United States Department of Agriculture,
Forest Service and Soil Conservation Service

In cooperation with the
Colorado Agricultural Experiment Station

Soil Survey of Pike National Forest, Eastern Part, Colorado,

Parts of Douglas, El Paso, Jefferson, and Teller Counties

How To Use This Soil Survey

General Soil Map

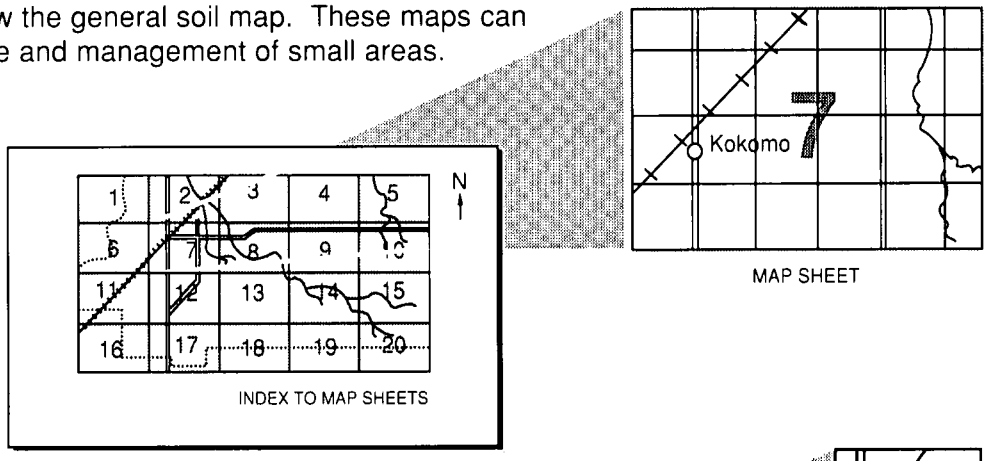
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

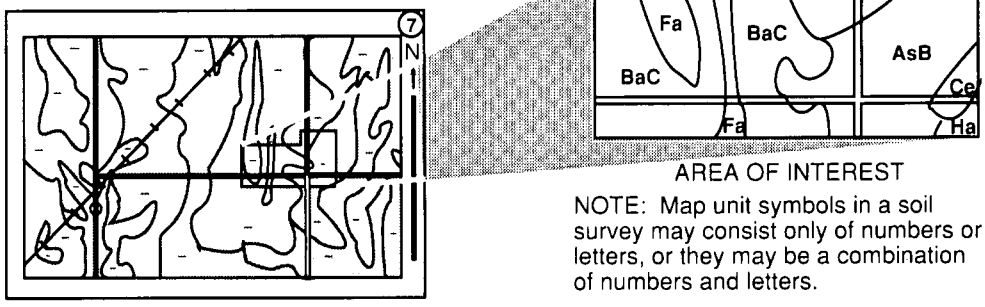
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

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



MAP SHEET

AREA OF INTEREST

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

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Forest Service, the Soil Conservation Service, and the Colorado Agricultural Experiment Station. It is part of the technical assistance furnished to the National Forest System Administration.

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

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Pikes Peak is a major landmark in the Pike National Forest in Colorado.

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Issued October 1992

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in the Pike National Forest. It contains predictions of soil behavior and highlights the limitations and hazards inherent in the soils.

This soil survey has been prepared primarily for land managers of the Pike National Forest and for planners, engineers, foresters, range conservationists, and other natural resource specialists. Teachers, students, and others can also use this survey to help them understand the soils and the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information about specific uses is given for each soil. Help in using this publication and additional information are available from soil scientists in the Forest Service.

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Soil Survey of Pike National Forest, Eastern Part, Colorado

Parts of Douglas, El Paso, Jefferson, and Teller Counties

By Randy Moore, Forest Service

Fieldwork by Randy Moore and David L. Smith, Forest Service, and Woodrow Nielson, George Borst, Terry Snider, Lou Olson, and Robert Pearson, Esca-Tech Corporation

United States Department of Agriculture, Forest Service and Soil Conservation Service, in cooperation with the Colorado Agricultural Experiment Station

This survey area is in the east-central part of Colorado (fig. 1). It has a total area of 468,318 acres, or about 732 square miles. It includes parts of Douglas, El Paso, Jefferson, and Teller Counties. About 95 percent of the acreage is National Forest System land in the Pike National Forest. This land is used for recreation, timber production, watershed, and wildlife habitat. Federal law permits mining and mineral exploration.

The map unit descriptions, names, and delineations in this soil survey do not fully agree with those in the soil surveys of adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, and variations in the intensity in mapping or in the extent of the soils in the survey areas.

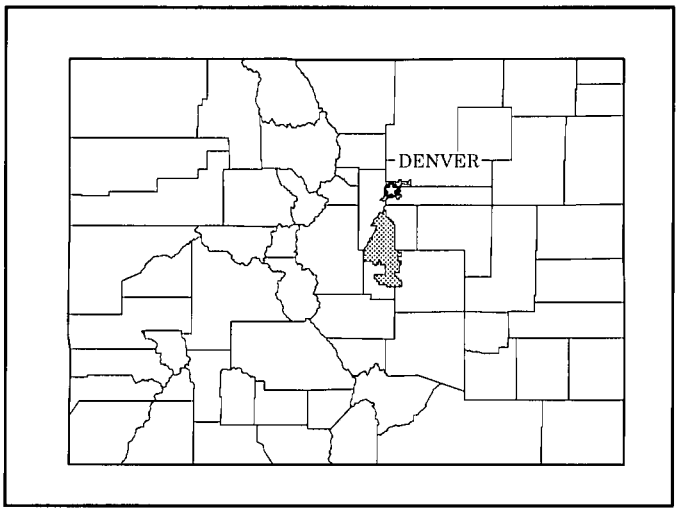

Figure 1.—Location of Pike National Forest, eastern part, in Colorado.

General Nature of the Survey Area

This section provides general information about the survey area. It describes natural resources, geomorphology, geology, drainage, climate, and vegetation.

Natural Resources

Except for the higher elevations, this survey area does not have an abundance of water resources. The area is partially drained by Fountain, Trout, and West Creeks and the South Platte River. Water for livestock and domestic use is available throughout most of the survey area. Sources of water include seasonal runoff, underground aquifers, ground streams, and manmade reservoirs. Numerous wells in valley floors yield water for agricultural and domestic uses.

Gravel and limestone are mined in the western part of the survey area and along the eastern flank of the Front Range. They are used for road construction and concrete aggregate.

The area has a variety of vegetation, including bristlecone pine, lodgepole pine, ponderosa pine, Douglas-fir, Engelmann spruce, and alpine and

subalpine wildflowers, which add special vitality to the mountain environment. Other types of ground cover at the lower elevations include shrubs, grasses, and forbs.

The area has a variety of wildlife species, including rabbits, marmots, squirrels, skunks, coyotes, beavers, badgers, ducks, grouse, ptarmigans, eagles, songbirds, jays, ravens, and hawks. The peregrine falcon, an endangered species, also inhabits this area.

Geomorphology

This survey area is in the Southern Rocky Mountains Physiographic province. It is part of the Colorado Front Range, which extends south to the Arkansas River and north to near the Wyoming border.

The dominant physiographic feature is Pikes Peak, in the southern part of the survey area. The Rampart Range, which is part of the Colorado Front Range, is an uplift that trends north and south, extending from Pikes Peak on the south to the Platte Canyon on the north. The east face of the range is steeply sloping. It forms the boundary with the Great Plains province to the east.

Elevations range from 5,420 feet where the South Platte River leaves the area to 14,110 feet at the summit of Pikes Peak. Much of the area is at an elevation of 7,400 to 9,000 feet.

The Rampart Range is part of the greater Front Range uplift. It is essentially a block bounded by a fault on the east and the South Platte River on the west. It is an exogenic, moderately dissected, sloping and rolling landform. The area has several faults, most of which are north-south trending. The Rampart Range fault and the Perrypark-Jarre Canyon fault form the front along the east side of the area. The Ute Pass fault zone extends through the central part of the area. Part of it is the west side of the Manitou Park Half Graben. The Oil Creek fault trends south through the central part of the area and to the west of Pikes Peak. The Emerald Valley fault is south of Pikes Peak, near the southern boundary of the area. The Ute Pass, Oil Creek, and Emerald Valley faults intersect or are in contact with each other, forming a loop around the east, south, and west sides of Pikes Peak.

The Manitou Park Half Graben is approximately 12 miles long by 3 miles wide. Relief is slight, ranging from approximately 325 to 500 feet. Trout Creek traverses the park south to north.

Geology

M. Martinez, forester, Forest Service, helped to prepare this section.

Granite and associated igneous rocks of the Pikes Peak batholith are dominant in the survey area. The main rock type is Pikes Peak granite. It is pink to reddish, medium grained to coarse grained biotite or hornblende-biotite granite. This unit includes most of the survey area. It extends from south of Pikes Peak to approximately the line between T. 7 S. and T. 8 S. North of this are Precambrian metamorphic rocks, which occur as hornblende gneiss and amphibolite and as quartz monzonite and granodiorite.

The hornblende gneiss and amphibolite are dominantly unlayered amphibolite, but they have a minor amount of layered hornblende gneiss, felsic gneiss, and calc-silicate gneiss. The quartz monzonite and granodiorite are pink to gray, massive to strongly foliated, and fine grained to coarse grained.

Outcrops and exposures of Paleozoic rocks are on the east flank and around the Manitou Park area. The Fountain Formation (Permian and Pennsylvanian) is grayish red, reddish brown, moderate red, and gray, coarse grained arkosic sandstone that has lenses of siltstone and fine grained sandstone, locally conglomeratic and crossbedded. The unit forms prominent hogbacks along the east edge of the Front Range and underlies Manitou Park. Leadville limestone (Mississippian), Williams Canyon limestone (Devonian), and Manitou limestone (Lower Ordovician) are in the Manitou Park area. Various other sedimentary rocks crop out in the valley of Fountain Creek.

Holocene and Pleistocene deposits are in the valleys throughout the survey area. The most extensive deposits are in Manitou Park. Fan alluvium, valley alluvium, and colluvium are throughout the area.

Drainage

This survey area lies within two major hydrologic regions. The northern part is in the Missouri Hydrologic Region, and the southern part is in the Arkansas-Red-White Hydrologic Region.

The divide between the two regions is on the ridges between Ice Cave Creek on the south and Plain Creek on the north. Ice Cave Creek is a tributary to Monument Creek. The hydrologic divide extends west from the ridges to the Rampart Range divide, from which it runs generally southwest.

Three major watersheds originate in the southern part of the survey area. They are the watersheds of Monument, Fountain, and Beaver Creeks. All of these watersheds eventually drain into the Arkansas River.

Several watersheds originate in the northern part of the survey area. The watershed of Plum Creek drains most of the northeastern side of Rampart Range. This creek eventually joins with the South Platte River, directly south of Denver.

The northwestern side of Rampart Range includes the watershed of West and Trout Creeks and of smaller

streams that flow into the South Platte River. The watershed of Buffalo Creek lies on the northwest boundary of the survey area. It flows into the north fork of the South Platte River, as do some smaller streams in this area. The South Platte River and the north fork of the South Platte River join near the town of South Platte, Colorado.

The survey area has a well defined drainage pattern. Waters flowing off this area are used for many purposes, the most important of which are domestic and agricultural uses.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Cheesman, Kassler, and Victor, Colorado. The period of record is 1951-81 at Cheesman and Kassler and 1966-73 at Victor. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperatures at Cheesman, Kassler, and Victor are 29, 34, and 24 degrees F, respectively. The average daily minimum temperature is 11 degrees at Cheesman, 19 degrees at Kassler, and 13 degrees at Victor. The lowest temperature, -41 degrees, occurred at Cheesman on January 10, 1962. In summer the average temperature is 64 degrees at Cheesman, 71 degrees at Kassler, and 57 degrees at Victor.

The average daily maximum temperature is 82 degrees at Cheesman, 85 degrees at Kassler, and 68 degrees at Victor. The highest recorded temperature, which occurred at Kassler on June 28, 1958, is 102 degrees.

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

The total annual precipitation is nearly 18 inches at Victor, 16 inches at Cheesman, and about 17 inches at Kassler. Of these totals 80 percent at Victor and 65 percent at Cheesman and Kassler usually fall in April through September. The growing season for most crops is included in this period. The heaviest 1-day rainfall during the period of record was 3.32 inches at Kassler on May 6, 1973. Thunderstorms occur on about 41 days of each year.

Average seasonal snowfall is about 66 inches at Cheesman, 81 inches at Kassler, and 72 inches at Victor. The greatest snow depth on any day during the time period of record was 20 inches at Kassler and 24 inches at Cheesman and Victor. On the average, 25 days at Kassler and 29 or 30 days at Cheesman and Victor had at least 1 inch of snow on the ground, but the number of such days varied greatly from year to year. Snow falls from late September through May, but it commonly melts from the southern exposures within days. The shallow snowpacks at the higher elevations and on the protected northern exposures generally disappear by the middle of May.

The average relative humidity in midafternoon is about 40 percent. Humidity is higher at night, and the average at dawn is about 65 percent. The percentage of possible sunshine is 70 percent in summer and 65 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

Vegetation

The vegetation in the survey area is in the Foothills, Montane, Subalpine, and Alpine plant zones. These zones have a total of 24 plant series. Most of the survey area is within the Montane zone. This zone consists of the Rampart Range and the area west of the range. The Foothills zone is mainly on the east-facing front and along the Platte Canyon and in other valleys. The Alpine and Subalpine zones are in the Pikes Peak area. Aspen groves are in the Montane and Subalpine zones, and grassland and parks are in all of the zones.

The vegetation in the Foothills zone is classified as Shrubland. The plant species within this zone include mountainmahogany, Gambel oak, and juniper. The vegetation in the Montane and Subalpine zones is classified as Forest and Woodland. Tree species include ponderosa pine, Douglas-fir, limber pine, bristlecone pine, subalpine fir, and Engelmann spruce. The Alpine zone is above the timberline.

The Alpine zone includes Dwarf-Shrubland, which supports shrubs that are less than 1.5 feet tall, and Short Grassland, which supports grasses and forbs that are less than 1.5 feet tall. Shrubs include willows, birch, and dryad. Forbs include alpine clover, primrose, sedan, cinquefoil, and paintbrush. Other plants include alpine poa, alpine timothy, alpine fescue, and alpine sedges.

Vegetation in the forested areas is grazed by domestic livestock and used for timber production and as wildlife habitat. Table 4 shows the major plant associations on the soils in the survey area. The plants likely to grow on the forested sites are in the Foothills,

Montane, and Subalpine zones, which are described in the following paragraphs.

Foothills.—Elevations in this zone generally are 6,000 to 7,500 feet, depending on slope exposure. The zone has Gambel oak, mountainmahogany, or pinyon/juniper woodlands at low elevations; forests of ponderosa pine at moderate or high elevations; forests of Douglas-fir on steep, cool, shaded slopes; and riparian, broad-leaved forests of cottonwood and boxelder along large streams and rivers.

Montane.—Elevations in this zone generally are 7,500 to 9,000 feet, depending on slope exposure. The zone dominantly has forests of ponderosa pine, commonly intermingled with meadows of Arizona fescue and other bunchgrasses, at the lower elevations; forests of Douglas-fir at the higher elevations and on north aspects; and some lodgepole pine, aspen, or spruce/fir forests at the upper edge of the higher elevations. Groves of narrowleaf cottonwood are along low-elevation waterways. As the altitude increases, the groves are gradually replaced by forests of blue spruce.

Subalpine.—Elevations in this zone generally are 9,000 to 11,500 feet, depending on slope exposure. The zone dominantly has forests of Douglas-fir, lodgepole pine, or aspen in the lower areas and spruce/fir stands at high altitudes and on cool, shaded exposures. It has some of the most productive forest sites.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data was assembled from other sources, such as research information, production records, and field experience of specialists.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soil of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

The words "limit of detailed soil survey" on the soil maps indicate areas where soil boundaries were interpreted, rather than mapped, because of owner preference. In these areas the soil boundaries were extended by a qualified soil scientist through the use of a stereoscope. This mapping is suitable for broad land use planning but is not to be substituted for a detailed soil survey.

General Soil Map Units

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

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

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

Soil Descriptions

1. Sphinx-Legault-Rock Outcrop

Rock outcrop and shallow, somewhat excessively drained soils that formed in material weathered from granite

This map unit is on mountainsides in the central and northern parts of the survey area. Slopes are 15 to 80 percent. The Sphinx soils support ponderosa pine, and the Legault soils support Douglas-fir. Elevations are 6,000 to 9,800 feet, and the mean annual precipitation is about 15 to 23 inches.

This map unit makes up about 57 percent of the survey area. It is about 50 percent Sphinx and similar soils, 20 percent Legault and similar soils, 15 percent areas of Rock outcrop, and 15 percent soils of minor extent.

The Sphinx soils are shallow and somewhat excessively drained. They formed in material weathered from Pikes Peak granite on mountainsides. Typically, the surface layer is gravelly coarse sandy loam. Below this is very gravelly loamy coarse sand.

The Legault soils are shallow and somewhat excessively drained. They formed in material weathered from Pikes Peak granite on the higher mountainsides, generally on north-facing slopes. Typically, the surface layer is very gravelly coarse sandy loam. The subsurface layer also is very gravelly coarse sandy loam. The underlying material is very gravelly loamy coarse sand.

The Rock outcrop is Pikes Peak granite.

The soils of minor extent are deep Aquolls at the base of the slopes and the moderately deep Guffey soils.

This unit is used for recreation, wildlife habitat, watershed, or limited timber production. The main limitations are the slope, a large number of coarse fragments in the soils, and the Rock outcrop.

2. Catamount-Ivywild-Legault-Rock Outcrop

Rock outcrop and shallow and moderately deep, somewhat excessively drained and excessively drained soils that formed in material weathered from granite

This map unit is on mountainsides in the southern part of the survey area. Slopes are 5 to 80 percent. The dominant vegetation is limber pine, lodgepole pine, and Douglas-fir in the lower areas and Englemann spruce and bristlecone pine in the higher areas. Elevations are 9,000 to 11,500 feet, and the mean annual precipitation ranges from 18 to 24 inches.

This map unit makes up about 24 percent of the survey area. It is about 35 percent Catamount and similar soils, 25 percent Ivywild and similar soils, 20 percent Legault and similar soils, 15 percent areas of Rock outcrop, and 5 percent soils of minor extent.

The Catamount soils are shallow and somewhat excessively drained. They formed in material weathered from granite on the mountainsides. Typically, the surface layer is gravelly coarse sandy loam.

The Ivywild soils are moderately deep and somewhat excessively drained. They formed in colluvium or glacial till derived from granite, generally on the higher mountainsides. Typically, the surface layer is gravelly sandy loam. The subsurface layer is very gravelly sandy

Figure 2.—An area of the Sphinx-Tecolote-Condie general soil map unit in the gently rolling uplands north of Woodland Park.

loam. The subsoil is very gravelly sandy loam and extremely gravelly sandy loam.

The Legault soils are shallow and somewhat excessively drained. They formed in material weathered from Pikes Peak granite on mountainsides. Typically, the surface layer is very gravelly coarse sandy loam. The subsurface layer also is very gravelly coarse sandy loam. The underlying material is very gravelly loamy coarse sand.

The Rock outcrop is Pikes Peak granite.

The soils of minor extent are Aquolls in wet areas and Herbman soils on the mountainsides.

This map unit is used for timber production, wildlife habitat, watershed, or recreation. The main limitations are the slope, the Rock outcrop, and a large number of coarse fragments in the soils.

3. Sphinx-Tecolote-Condie

Shallow and deep, somewhat excessively drained and well drained soils that formed in material weathered from granite or in colluvium over weathered granite

This map unit is on mountainsides and gently rolling uplands in the central and eastern parts of the survey area (fig. 2). Slopes are 2 to 70 percent. The dominant vegetation is ponderosa pine, Douglas-fir, and aspen. Elevations are 7,000 to 9,500 feet, and the mean annual precipitation ranges from 15 to 23 inches.

This map unit makes up about 2 percent of the survey area. It is about 40 percent Sphinx and similar soils, 25 percent Tecolote and similar soils, 25 percent Condie and similar soils, and 10 percent soils of minor extent.

The Sphinx soils are shallow and somewhat excessively drained. They formed in material weathered from Pikes Peak granite on mountainsides. Typically, the surface layer is gravelly coarse sandy loam. Below this is very gravelly loamy coarse sand.

The Tecolote soils are deep and well drained. They formed in cobbly or stony colluvium over weathered granitic rock on mountainsides. Typically, the surface layer is very stony sandy loam. The subsurface layer is very cobbly sandy loam. The subsoil is very cobbly sandy clay loam.

The Condie soils are deep and well drained. They formed in material weathered from granite on rolling uplands. Typically, the surface layer is coarse sandy loam. The subsurface layer is very gravelly coarse sandy loam. The subsoil is gravelly coarse sandy loam

and extremely gravelly sandy clay loam.

This map unit is used for grazing, wildlife habitat, recreation, watershed, or limited timber production. The Condie soils have good potential for timber production. The main limitation is a large number of coarse fragments in the soils.

4. Boyett-Frenchcreek-Pendant

Deep and shallow, well drained and somewhat excessively drained soils that formed in material weathered from limestone and granite and in alluvium derived from mixed red arkosic sandstone and granite

This map unit is in the central part of the survey area (fig. 3). Slopes are 2 to 70 percent. The dominant vegetation is ponderosa pine and fescue grasses. Elevations are 6,500 to 9,200 feet, and the mean annual precipitation ranges from 14 to 20 inches.

This map unit makes up about 6 percent of the survey area. It is about 30 percent Boyett and similar soils, 30 percent Frenchcreek and similar soils, 25 percent Pendant and similar soils, and 15 percent soils of minor extent.

The Boyett soils are deep and well drained. They formed in material weathered from mixed arkosic sandstone and granite on ridges. Typically, the surface layer is sandy loam. The subsurface layer is gravelly coarse sandy loam. The subsoil is gravelly sandy loam. The substratum is sandy loam.

The Frenchcreek soils are deep and well drained.

Figure 3.—An area of the Boyett-Frenchcreek-Pendant general soil map unit.

They formed in alluvium derived from arkosic sandstone and granite in swales. Typically, the surface layer is gravelly sandy loam. The subsoil is very gravelly sandy loam. The substratum is very gravelly coarse sandy loam and very gravelly loamy sand.

The Pendant soils are shallow and somewhat excessively drained. They formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations on mountainsides. Typically, the surface layer is cobbly loam over hard limestone.

The soils of minor extent are the Perrypark soils on outwash plains and the Sphinx and Kassler soils on mountainsides.

This map unit is used for livestock grazing, watershed, recreation, mining, wildlife habitat, or limited timber production. The main limitations are the slope, the depth to bedrock, and a large number of coarse fragments in the soils.

5. Security-Cathedral-Rock Outcrop

Rock outcrop and moderately deep and shallow, well drained soils that formed in material weathered from mixed schist, gneiss, and granite

This map unit is on mountainsides and ridges in the northernmost part of the survey area. Slopes are 5 to 80 percent. The dominant vegetation is Gambel oak. The soils also support a limited amount of ponderosa pine, Douglas-fir, and mountainmahogany. Elevations are 6,000 to 8,500 feet, and the mean annual precipitation ranges from 15 to 20 inches.

This map unit makes up about 4 percent of the survey area. It is about 40 percent Security and similar soils, 30 percent Cathedral and similar soils, 20 percent areas of Rock outcrop, and 10 percent soils of minor extent.

The Security soils are moderately deep and well drained. They formed in material weathered from mixed schist, gneiss, and granite on the mountainsides. Typically, the surface layer is very gravelly coarse sandy loam. The subsurface layer is very gravelly sandy loam. The subsoil is very gravelly sandy clay loam. The substratum is very gravelly sandy loam over soft bedrock.

The Cathedral soils are shallow and well drained. They formed in material weathered from mixed schist, gneiss, and granite on mountainsides. Typically, the surface layer is extremely stony sandy loam. The subsoil is extremely stony sandy loam over hard bedrock.

The Rock outcrop is schist, gneiss, and granite.

The soils of minor extent are Aquolls in wet areas and Palboone soils on north-facing slopes that support Douglas-fir.

This map unit is used for timber production, wildlife habitat, recreation, or watershed. The main limitations are the slope, the Rock outcrop, and a large number of coarse fragments in the soils.

6. Sachett-Cirque Land

Cirque land and shallow, excessively drained soils that formed in material weathered from granite

All of this map unit is on Pikes Peak Mountain. Slopes are 5 to 75 percent. The Sachett soils support alpine vegetation. Elevations are 11,500 to 14,000 feet, and the mean annual precipitation ranges from 20 to 26 inches.

This map unit makes up about 2 percent of the survey area. It is about 50 percent Sachett and similar soils, 45 percent areas of Cirque land, and 5 percent moderately deep soils that are similar to the Sachett soils.

The Sachett soils are shallow and excessively drained. They formed in material weathered from granite on mountainsides. Typically, the surface layer is cobbly sandy loam. The subsoil is very cobbly sandy loam over soft bedrock.

The Cirque land consists of glacial cirque headwalls carved from granite. Areas of this land have a talus and a cirque basin, which commonly contains a small, round lake or tarn. Little or no vegetation is in these areas.

This map unit is used for recreation, wildlife habitat, or watershed. It is a collection and storage area for accumulated snow. Valleys and cirque basins provide summer habitat for wildlife. The slope and the rockiness are the main management concerns.

7. Tecolote-Pendant

Deep and shallow, well drained and somewhat excessively drained soils that formed in material weathered from limestone and in cobbly or stony colluvium over weathered granite

This map unit is in the easternmost part of the survey area. Slopes are 15 to 70 percent. The Tecolote and Pendant soils support Douglas-fir, ponderosa pine, kinnikinnick, Gambel oak, and mountainmahogany. Elevations are 6,500 to 9,200 feet, and the mean annual precipitation ranges from 15 to 25 inches.

This map unit makes up about 5 percent of the survey area. It is about 40 percent Tecolote and similar soils, 40 percent Pendant and similar soils, and 20 percent soils of minor extent.

The Tecolote soils are deep and well drained. They formed in cobbly or stony colluvium over weathered granitic rock on mountainsides. Typically, the surface layer is very stony sandy loam. The subsurface layer is

very cobbly sandy loam. The subsoil is cobbly and very cobbly sandy clay loam.

The Pendant soils are shallow and somewhat excessively drained. They formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations on mountainsides. Typically, the surface layer is cobbly loam over hard sandstone.

The soils of minor extent are Aquolls in wet areas, Sphinx soils on mountainsides, and Kutch and Fortwingate soils in swales and grassed areas.

This map unit is used for grazing, wildlife habitat, recreation, mining, or limited timber production. The main limitations are the slope on both soils and a large number of coarse fragments in the Tecolote soils.

Detailed Soil Map Units

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions, together with the soil maps, can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. Preceding the name of each map unit is a symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. The principal hazards and limitations and the management practices needed are indicated.

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

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

Soils of one series can differ in texture of the surface layer or in the substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a soil phase commonly indicates a feature that affects use of management. For example, Catamount gravelly sandy loam, 5 to 40 percent slopes, is a phase of the Catamount series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes. A soil complex consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Boyett-Frenchcreek complex, 2 to 15 percent slopes, is an example.

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

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

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

Soil Descriptions

1—Alamosa loam, 0 to 6 percent slopes. This unit is on flood plains and fans. Elevations are 7,200 to 7,700 feet. The mean annual precipitation is 16 to 20 inches. The average annual air temperature is about 42 degrees F.

This somewhat poorly drained, deep soil formed in alluvium derived from granite and arkosic sandstone. Permeability is moderately slow, and the available water capacity is moderate. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the surface layer is dark grayish brown loam about 6 inches thick. The next layer is gray loam about 4 inches thick. The subsoil is gray clay loam about 14 inches thick. The next 8 inches is grayish brown loam. The substratum to a depth of 60 inches or more is brown loam.

About 10 percent of this unit is included areas of Aquolls and other soils that are similar to the Alamosa soil.

The potential plant community on the Alamosa soil is mainly slender wheatgrass, Baltic rush, Nebraska sedge, timothy, and reedgrass. Willows are part of the plant community. The average annual production of air-dry vegetation ranges from about 2,500 to 3,700 pounds per acre.

This soil is used mainly for rangeland, wildlife habitat, watershed, and recreation. Wet areas are well suited to shallow water developments, which improve the habitat for wetland wildlife. Because of the availability of moisture, the soil provides excellent waterfowl-nesting cover. Rangeland wildlife, such as deer and cottontail, inhabit the areas where excellent cover is provided by willows, rushes, and other wetland vegetation. The wildlife habitat can be improved or maintained by applying a proper system of livestock grazing and by allowing natural vegetation, such as willows and cattails, to grow.

2—Aquolls, 1 to 10 percent slopes. This unit is in drainageways and on valley bottoms. Elevations are 6,000 to 14,000 feet. The mean annual precipitation ranges from 15 to 25 inches. The average annual air temperature ranges from 28 to 46 degrees F.

These poorly drained, deep soils formed in material weathered from granite, schist, gneiss, or sandstone. Permeability is moderately rapid, and the available water capacity is moderate. Runoff is slow or medium, and the hazard of water erosion is slight.

The profile characteristics of these soils vary from area to area. In a commonly observed profile, the upper part of the surface layer is brown and dark brown fine sandy loam about 12 inches thick. The next part is brown and dark brown, stratified loamy fine sand about 13 inches thick. The lower part is dark grayish brown very fine sandy loam about 25 inches thick. The underlying material to a depth of 60 inches or more is reddish yellow coarse sand.

About 10 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides.

Aquolls provide habitat for many wildlife species because they support lush and abundant vegetation. The average annual production of air-dry vegetation ranges from about 2,000 to 3,500 pounds per acre. These soils have a shallow water table.

3—Boyett-Frenchcreek complex, 2 to 15 percent slopes. This unit is on alluvial terraces. The Boyett soil is on ridges, and the Frenchcreek soil is in swales. Elevations are 6,800 to 8,000 feet. The mean annual precipitation is 14 to 18 inches. The average annual air temperature is 46 degrees F. The unit is 50 percent Boyett sandy loam and 35 percent Frenchcreek gravelly sandy loam.

The well drained, deep Boyett soil formed in material weathered from arkosic sandstone and granite and in old alluvium. Permeability is moderately rapid, and the available water capacity is low. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the surface layer of the Boyett soil is brown sandy loam about 5 inches thick. The subsurface layer is pink gravelly coarse sandy loam about 4 inches thick. The upper part of the subsoil is reddish brown gravelly sandy loam about 7 inches thick. The next part is reddish brown gravelly sandy loam about 18 inches thick. The lower part is reddish brown gravelly sandy loam about 8 inches thick. The substratum is light reddish brown sandy loam about 11 inches thick. Arkosic sandstone is below a depth of about 53 inches.

The well drained, deep Frenchcreek soil formed in alluvium derived from mixed red arkosic sandstone and Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is low. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the surface layer of the Frenchcreek soil is brown and dark brown gravelly sandy loam about 4 inches thick. The subsoil is reddish brown gravelly sandy loam about 10 inches thick. The upper part of the substratum is reddish brown very gravelly coarse sandy loam about 16 inches thick. The lower part to a depth of 60 inches or more is reddish brown very gravelly loamy sand.

About 15 percent of this unit is included areas of Perrypark coarse sandy loam on alluvial fans.

The dominant vegetation on the Boyett and Frenchcreek soils is ponderosa pine and mountainmahogany. The soils also support needleandthread, western wheatgrass, and other perennial grasses and forbs and shrubs. The average annual production of wood fiber is about 42 cubic feet per acre for ponderosa pine on the Boyett soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from about 400 to 700 on the Boyett soil and from about 500 to 900 on the Frenchcreek soil.

This unit is best suited to wildlife habitat, watershed, recreation, and grazing. The soils are susceptible to gully erosion in areas where runoff is concentrated or where the natural plant cover is disturbed. The major limitation affecting the production of forage or timber is droughtiness.

4—Boyett-Frenchcreek complex, 15 to 40 percent slopes. This unit is on alluvial terraces. The Boyett soil is on ridges, and the Frenchcreek soil is in swales.

Elevations are 6,800 to 8,000 feet. The mean annual precipitation is 14 to 18 inches. The average annual air temperature is about 46 degrees F. The unit is about 50 percent Boyett sandy loam and 30 percent Frenchcreek gravelly sandy loam.

The well drained, deep Boyett soil formed in material weathered from arkosic sandstone and granite and in old alluvium. Permeability is moderately rapid, and the available water capacity is low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer of the Boyett soil is brown sandy loam about 5 inches thick. The content of coarse fragments in this layer is about 10 percent. The subsurface layer is pink gravelly coarse sandy loam about 4 inches thick. The upper part of the subsoil is reddish brown gravelly sandy loam about 7 inches thick. The next part is reddish brown gravelly sandy loam about 18 inches thick. The lower part is reddish brown gravelly sandy loam about 8 inches thick. The substratum is light reddish brown sandy loam about 11 inches thick. Arkosic sandstone is below a depth of about 53 inches.

The well drained, deep Frenchcreek soil formed in alluvium derived from mixed red arkosic sandstone and Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is low. Runoff is medium, and the hazard of water erosion is moderate.

Typically, the surface layer of the Frenchcreek soil is brown and dark brown gravelly sandy loam about 4 inches thick. The subsoil is reddish brown gravelly sandy loam about 10 inches thick. The upper part of the substratum is reddish brown very gravelly coarse sandy loam about 16 inches thick. The lower part to a depth of 60 inches or more is reddish brown very gravelly loamy sand.

About 20 percent of this unit is included areas of Perrypark coarse sandy loam on alluvial fans.

The dominant vegetation on the Boyett and Frenchcreek soils is ponderosa pine, mountainmahogany, needleandthread, and western wheatgrass. The soils also support other perennial grasses and forbs and shrubs. The average annual production of wood fiber is about 42 cubic feet per acre for ponderosa pine on the Boyett soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from about 400 to 700 on the Boyett soil and from about 500 to 900 on the Frenchcreek soil.

This unit is best suited to wildlife habitat, watershed, recreation, and grazing. The soils are susceptible to sheet erosion and gullying in areas where runoff is concentrated or where the natural plant cover is disturbed. The major limitation affecting the production of forage or timber is droughtiness.

5—Catamount gravelly sandy loam, 5 to 40 percent slopes. This unit is on upland ridges. Elevations are about 9,000 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F.

This excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, about 80 percent of the surface is covered with vegetation and forest litter. The surface layer is grayish brown gravelly sandy loam about 2 inches thick. The next layer is brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is strong brown extremely gravelly loamy sand about 4 inches thick. Weathered, coarse grained granite is at a depth of about 12 inches. In some areas the surface layer is coarse sandy loam or very gravelly sandy loam.

About 5 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 5 percent is Legault very gravelly coarse sandy loam on north-facing mountainsides.

The dominant vegetation in the lower areas of the Catamount soil is limber pine, Douglas-fir, and quaking aspen. Engelmann spruce and bristlecone pine are at the higher elevations. The soil also supports some common juniper, kinnikinnick, annual forbs, and grasses. The average annual production of wood fiber, in cubic feet per acre, is about 26 for Englemann spruce and 20 for Douglas-fir. The average annual production of air-dry vegetation ranges from 50 to 100 pounds per acre.

This soil is best suited to recreation, wildlife habitat, and watershed. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or where the native plant cover is disturbed. The major limitations affecting the production and harvest of timber are the depth to bedrock, low natural fertility, and droughtiness.

6—Catamount gravelly sandy loam, 40 to 70 percent slopes. This unit is on upland ridges and mountainsides. Elevations are about 9,000 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F.

This excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 80 percent of the surface is covered with vegetation and forest litter. The surface layer is

grayish brown gravelly sandy loam about 2 inches thick. The next layer is brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is strong brown extremely gravelly loamy sand about 4 inches thick. Weathered, coarse grained granite is at a depth of about 12 inches. In some areas the surface layer is coarse sandy loam or very gravelly sandy loam.

About 5 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 5 percent is Legault very gravelly coarse sandy loam on north-facing mountainsides.

The dominant vegetation in the lower areas of the Catamount soil is limber pine, Douglas-fir, and quaking aspen. Engelmann spruce and bristlecone pine are at the higher elevations. The soil also supports some common juniper, kinnikinnick, annual forbs, and grasses. The average annual production of wood fiber, in cubic feet per acre, is about 20 for Douglas-fir and 26 for Engelmann spruce. The average annual production of air-dry vegetation ranges from 50 to 100 pounds per acre.

This soil is best suited to recreation, wildlife habitat, and watershed. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or the native plant cover is disturbed. The major limitations affecting the production and harvest of timber are the depth to bedrock, the slope, low natural fertility, and droughtiness.

7—Catamount-Rock outcrop complex, 15 to 70 percent slopes. This unit is on upland ridges and mountainsides. Elevations are about 9,000 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F. The unit is about 60 percent Catamount gravelly sandy loam and 30 percent outcrop of Pikes Peak granite.

The excessively drained, shallow Catamount soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Catamount soil is grayish brown gravelly sandy loam about 2 inches thick. The next layer is brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is strong brown extremely gravelly loamy sand about 4 inches thick. Highly weathered, coarse grained granite is at a depth of about 12 inches. In some areas the surface layer is coarse sandy loam or very gravelly sandy loam.

The Rock outcrop consists of large, rounded boulders and exposures of granitic rock, which are the product of spheroidal weathering and which exhibit in many places the parallel jointing characteristic of Pikes Peak granite. In some areas a considerable amount of granitic talus is at the base of these outcrops. These areas are actively eroding and tend to assume an angle of repose of about 50 percent.

About 5 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 5 percent is Legault very gravelly coarse sandy loam on north-facing mountainsides.

The Rock outcrop supports no vegetation. The dominant vegetation in the lower areas of the Catamount soil is limber pine, Douglas-fir, and quaking aspen. Engelmann spruce and bristlecone pine are at the higher elevations. Other plants include common juniper, kinnikinnick, annual forbs, and grasses. The average annual production of wood fiber, in cubic feet per acre, is about 20 for Douglas-fir and 26 for Engelmann spruce. The average annual production of air-dry vegetation ranges from 50 to 100 pounds per acre.

This unit is best suited to recreation, wildlife habitat, and watershed. Areas where runoff is concentrated or where the native plant cover is disturbed are susceptible to sheet erosion and gullying. The major limitations affecting the production and harvest of timber are the Rock outcrop, the slope, and droughtiness.

8—Cathedral gravelly sandy loam, 40 to 65 percent slopes, extremely stony. This unit is on mountainsides. Elevations are 6,000 to 7,400 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 45 degrees F.

This well drained, shallow soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 35 percent of the surface is covered with vegetation and forest litter. The surface layer is brown and dark brown gravelly sandy loam about 3 inches thick. The subsoil is brown and dark brown extremely gravelly sandy loam about 9 inches thick. Below this is hard, fractured schist, gneiss, and granite.

About 15 percent of this unit is included areas of Security very gravelly coarse sandy loam on mountainsides, and 5 percent is areas of rock outcrop on ridges.

The dominant vegetation on the Cathedral soil is Gambel oak. The soil also supports ponderosa pine, mountainmahogany, yucca, bluegrass, Oregongrape, and other grasses and forbs. The potential natural vegetation is ponderosa pine, Gambel oak, and mountainmahogany throughout the unit and Douglas-fir on north-facing side slopes. Gambel oak and

mountainmahogany appear to revegetate naturally. The average annual production of wood fiber, in cubic feet per acre, is 30 for ponderosa pine and 20 for Douglas-fir. The average annual production for air-dry vegetation ranges from 100 to 175 pounds per acre.

This soil is best suited to wildlife habitat, recreation, and watershed. On north-facing slopes it has limited potential for timber harvesting. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or where the plant cover is disturbed. The major management concerns are the slope, the depth to bedrock, and droughtiness.

9—Cirque land, 15 to 75 percent slopes. This unit consists of glacial cirque headwalls carved from granite. Areas of the unit have a talus and a cirque basin, which commonly contains a small, round lake or tarn. Little or no vegetation is in these areas, except for small amounts of alpine vegetation on the included soils.

This unit is above the timberline. Elevations are 11,500 to 14,110 feet. The mean annual precipitation is about 30 to 40 inches.

About 10 percent of this unit is included areas of soils that are similar to Sachett soils and wet soils that have a surface layer of peat.

This unit is best suited to watershed and recreation. The slope, rock outcrop, and the harsh alpine environment limit most uses of this unit.

10—Condie coarse sandy loam, 2 to 15 percent slopes. This unit is on rolling uplands. Elevations are about 8,500 to 9,500 feet. The mean annual precipitation is 20 to 23 inches. The average annual air temperature is 46 degrees F.

This well drained, deep soil formed in material weathered from Pikes Peak granite. Permeability is moderate, and the available water capacity is low. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the upper part of the surface layer is very dark grayish brown coarse sandy loam about 4 inches thick. The lower part is brown coarse sandy loam about 4 inches thick. The subsurface layer is pinkish gray very gravelly coarse sandy loam about 22 inches thick. The upper part of the subsoil is light reddish brown extremely gravelly sandy clay loam about 10 inches thick. The lower part to a depth of about 60 inches or more is light reddish brown extremely gravelly coarse sandy loam.

About 10 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 10 percent is Sphinx gravelly coarse sandy loam on mountainsides.

The dominant vegetation on the Condie soil is quaking aspen and Douglas-fir. The soil also supports ponderosa pine, kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber, in cubic feet per acre, is 19 for quaking aspen and 30 for Douglas-fir. The average annual production of air-dry vegetation ranges from 400 to 800 pounds per acre.

This soil is best suited to wildlife habitat, watershed, recreation, and grazing. The cleared areas provide forage. The soil has potential for timber production. The major limitation affecting the production of timber and forage is droughtiness.

11—Condie coarse sandy loam, 15 to 40 percent slopes. This unit is on rolling uplands. Elevations are about 8,500 to 9,500 feet. The mean annual precipitation is 20 to 23 inches. The average annual air temperature is 46 degrees F.

This well drained, deep soil formed in material weathered from Pikes Peak granite. Permeability is moderate, and the available water capacity is low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the upper part of the surface layer is dark grayish brown coarse sandy loam about 4 inches thick. The lower part is brown coarse sandy loam about 4 inches thick. The subsurface layer is pinkish gray very gravelly coarse sandy loam about 22 inches thick. The upper part of the subsoil is light reddish brown extremely gravelly sandy clay loam about 10 inches thick. The lower part to a depth of 60 inches or more is light reddish brown extremely gravelly coarse sandy loam.

About 10 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 10 percent is Sphinx gravelly coarse sandy loam on mountainsides.

The dominant vegetation on the Condie soil is quaking aspen and Douglas-fir. The soil also supports ponderosa pine, kinnikinnick, common juniper, grasses, and forbs. In the areas near Rampart Range Road south of Springdale Campground, forbs and grasses are the dominant plants, possibly as a result of land clearing. The average annual production of wood fiber, in cubic feet per acre, is 19 for quaking aspen and 30 for Douglas-fir. The average annual production of air-dry vegetation ranges from 400 to 800 pounds per acre.

This soil is best suited to wildlife habitat, watershed, recreation, and grazing. The cleared areas provide forage. The soil has potential for timber production. The major limitation affecting the production of timber and forage is droughtiness.

12—Fortwingate-Rock outcrop complex, 15 to 60 percent slopes. This unit is on mountainsides. Elevations are 6,600 to 8,000 feet. The mean annual precipitation is about 16 to 19 inches. The average annual air temperature is about 43 degrees F. The unit is about 40 percent Fortwingate soil and 30 percent Rock outcrop.

The well drained, moderately deep Fortwingate soil formed in material weathered from interbedded sandstone and shale. Permeability is slow, and the available water capacity is low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Fortwingate soil is reddish brown loam about 5 inches thick. The subsoil is reddish brown clay about 16 inches thick. The next layer is red, partially weathered soft sandstone and shale about 14 inches thick. Interbedded, hard sandstone and shale are at a depth of about 35 inches.

The Rock outcrop is in the steeper areas throughout the unit. It is mainly sandstone.

About 30 percent of this unit is included areas of Pendant cobbly loam on mountainsides and some areas of soils that are 10 to 20 inches deep over bedrock or more than 40 inches deep over bedrock.

The Rock outcrop supports no vegetation. The dominant vegetation on the Fortwingate soil is blue grama, sideoats grama, western wheatgrass, and needleandthread. The dominant shrubs and trees are Gambel oak, mountainmahogany, skunkbush sumac, oneseed juniper, and ponderosa pine. The average annual production of wood fiber is 32 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 325 to 575 pounds per acre.

This unit is best suited to wildlife habitat, watershed, recreation, and some livestock grazing. The major limitations affecting the production of timber and forage are the slope and droughtiness.

13—Garber very gravelly coarse sandy loam, 2 to 15 percent slopes. This unit is on mountainsides and is commonly adjacent to drainageways. Elevations are about 7,600 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F.

This well drained, deep soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the upper part of the surface layer is dark grayish brown very gravelly coarse sandy loam about 6 inches thick. The lower part is grayish brown very gravelly coarse sandy loam about 12 inches thick. The underlying material is brown extremely gravelly coarse sandy loam about 24 inches thick. Weathered granite bedrock is below a depth of about 42 inches.

About 5 percent of this unit is included areas of Sphinx gravelly coarse sandy loam on west- or south-facing mountainsides, and 10 percent is Sphinx gravelly coarse sandy loam on the steeper mountainsides.

The dominant vegetation on the Garber soil is quaking aspen. The soil also supports Douglas-fir, Gambel oak, strawberry, grasses, and forbs. The average annual production of wood fiber is 36 cubic feet per acre for quaking aspen. The average annual production of air-dry vegetation ranges from 1,000 to 2,500 pounds per acre.

This soil is best suited to wildlife habitat and watershed. It has limited potential for the commercial production of quaking aspen. The major limitation affecting grazing and timber harvesting is the proximity of the soil to streams and thus the risk of stream degradation. Because of this limitation, livestock grazing should be limited.

14—Garber very gravelly coarse sandy loam, 15 to 40 percent slopes. This unit is on mountainsides and is commonly adjacent to drainageways. Elevations are about 7,600 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F.

This well drained, deep soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the upper part of the surface layer is dark grayish brown very gravelly coarse sandy loam about 6 inches thick. The lower part is grayish brown very gravelly coarse sandy loam about 12 inches thick. The underlying material is brown extremely gravelly coarse sandy loam about 24 inches thick. Weathered granite bedrock is below a depth of about 42 inches.

About 5 percent of this unit is included areas of Sphinx gravelly coarse sandy loam on west- or south-facing mountainsides, and 10 percent is Sphinx gravelly coarse sandy loam on the steeper mountainsides and ridges.

The dominant vegetation on the Garber soil is quaking aspen. The soil also supports Douglas-fir, Gambel oak, strawberry, grasses, and forbs. The average annual production of wood fiber is 36 cubic feet per acre for quaking aspen. The average annual production of air-dry vegetation ranges from 1,000 to 2,500 pounds per acre.

This soil is best suited to wildlife habitat and watershed. It has limited potential for the commercial

production of quaking aspen. The major limitation affecting grazing and timber harvesting is the proximity of the soil to streams and thus the risk of stream degradation. Because of this limitation, livestock grazing should be limited.

15—Guffey very gravelly sandy loam, 5 to 40 percent slopes. This unit is on mountainsides. Elevations are about 8,500 to 9,800 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 44 degrees F.

This well drained, moderately deep soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer is grayish brown very gravelly sandy loam about 3 inches thick. The subsurface layer is very pale brown very gravelly sandy loam about 9 inches thick. The upper part of the subsoil is strong brown very gravelly sandy clay loam about 6 inches thick. The lower part is strong brown very gravelly sandy clay loam about 8 inches thick. Weathered granite bedrock is below a depth of about 26 inches.

About 5 percent of this unit is included areas of Sphinx gravelly coarse sandy loam, and 10 percent is Herbman very gravelly sandy loam. Included areas are on mountainsides and ridges.

The dominant vegetation on the Guffey soil is Douglas-fir. The soil also supports quaking aspen, ponderosa pine, kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 200 to 350 pounds per acre.

This soil is best suited to wildlife habitat and watershed. The major limitations affecting grazing and timber harvesting are the slope, low natural fertility, and droughtiness.

16—Guffey very gravelly sandy loam, 40 to 60 percent slopes. This unit is on mountainsides. Elevations are 8,500 to 9,800 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 44 degrees F.

This well drained, moderately deep soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer is grayish brown very gravelly sandy loam about 3 inches thick. The subsurface layer is very pale brown very gravelly sandy loam about 9 inches thick. The upper part of the subsoil is strong brown very gravelly sandy clay loam about 6 inches thick. The lower part is strong brown very gravelly sandy clay loam about 8 inches thick. Weathered granite bedrock is below a depth of about 26 inches.

About 5 percent of this unit is included areas of Sphinx gravelly coarse sandy loam, and 10 percent is Herbman very gravelly sandy loam. Included areas are on mountainsides and ridges.

The dominant vegetation on the Guffey soil is Douglas-fir. The soil also supports quaking aspen, ponderosa pine, kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 200 to 350 pounds per acre.

This soil is best suited to wildlife habitat, watershed, timber, and the development of extensive recreational areas. It has a limited potential for timber production and has little potential for other uses. It is very susceptible to water erosion if the cover of plants and forest litter is removed. The major limitations affecting grazing and timber harvesting are the slope, droughtiness, and low natural fertility.

17—Herbman very gravelly sandy loam, 15 to 40 percent slopes. This unit is on mountainsides and upland ridges. Elevations are about 9,000 to 12,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 43 degrees F.

This well drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, the upper part of the surface layer is brown very gravelly sandy loam about 3 inches thick. The lower part is dark grayish brown very gravelly sandy loam about 6 inches thick. The next layer is strong brown extremely gravelly sandy loam about 6 inches thick. Highly weathered, coarse grained granite is at a depth of about 15 inches.

About 10 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and about 10 percent is Legault very gravelly coarse sandy loam on the steeper, north-facing mountainsides.

The dominant vegetation on the Herbman soil is grasses and forbs and scattered stands of aspen. Some areas have completely reverted to quaking aspen. The average annual production of wood fiber is 23 cubic feet

per acre for quaking aspen. The average annual production of air-dry vegetation ranges from 200 to 450 pounds per acre.

This soil is best suited to grazing, wildlife habitat, watershed, and limited timber production. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or the native plant cover is disturbed. No major limitations affect the production of forage.

18—Herbman-Rock outcrop complex, 15 to 40 percent slopes. This unit is on mountainsides and upland ridges. Elevations are about 9,000 to 12,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 43 degrees F. The unit is about 60 percent Herbman gravelly loam and 20 percent Rock outcrop.

The well drained, shallow Herbman soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, the upper part of the surface layer of the Herbman soil is brown very gravelly sandy loam about 3 inches thick. The lower part is dark grayish brown very gravelly sandy loam about 6 inches thick. The next layer is strong brown extremely gravelly sandy loam about 6 inches thick. Highly weathered, coarse grained granite is at a depth of about 15 inches.

The Rock outcrop consists of large, rounded boulders and exposures of granitic rock, which are the product of spheroidal weathering and which in many places exhibit the parallel jointing characteristic of Pikes Peak granite. In some areas a considerable amount of granitic talus is at the base of these outcrops. These areas are actively eroding.

About 10 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and about 10 percent is Legault very gravelly coarse sandy loam on the steeper, north-facing mountainsides.

The Rock outcrop supports no vegetation. The dominant vegetation on the Herbman soil is mixed quaking aspen and minor amounts of limber pine, subalpine fir, and Engelmann spruce. This soil also supports an understory of common juniper, kinnikinnick, annual forbs, and grasses. The average annual production of wood fiber is 23 cubic feet per acre for quaking aspen. The average annual production of air-dry vegetation ranges from 200 to 450 pounds per acre.

This unit is best suited to recreation, wildlife habitat, watershed, grazing, and limited timber production. Areas where runoff is concentrated or the native plant cover is disturbed are susceptible to sheet erosion and gullying. The major limitation affecting the production of forage and timber is the Rock outcrop.

19—Ivywild gravelly sandy loam, 5 to 40 percent slopes. This unit is on mountainsides and ridges. Elevations are 9,500 to 11,500 feet. The mean annual precipitation is about 23 inches. The average annual air temperature is about 42 degrees F.

This somewhat excessively drained, moderately deep soil formed in colluvium or glacial till derived from granite. Permeability is rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer is very dark grayish brown gravelly sandy loam about 1 inch thick. The subsurface layer is light yellowish brown very gravelly sandy loam about 4 inches thick. The upper part of the subsoil is yellowish brown very gravelly sandy loam about 10 inches thick. The lower part is yellowish brown extremely gravelly sandy loam about 22 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 37 inches.

About 15 percent of this unit is included areas of Catamount gravelly sandy loam, and about 5 percent is Legault very gravelly coarse sandy loam on mountainsides.

The dominant vegetation on the Ivywild soil is Englemann spruce, quaking aspen, and limber pine. The soil also supports an understory of common juniper, kinnikinnick, wheatgrass, and Oregongrape. The average annual production of wood fiber, in cubic feet per acre, is 60 for Engelmann spruce and 41 for limber pine. The average annual production of air-dry vegetation ranges from 150 to 325 pounds per acre.

This soil is best suited to timber production, recreation, wildlife habitat, and watershed. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or the native plant cover is disturbed. No major limitations affect the production or harvest of timber.

20—Ivywild gravelly sandy loam, 40 to 70 percent slopes. This unit is on mountainsides and ridges. Elevations are 9,500 to 11,500 feet. The mean annual precipitation is about 23 inches. The average annual air temperature is about 42 degrees F.

This somewhat excessively drained, moderately deep soil formed in colluvium or glacial till derived from granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer is very dark grayish brown gravelly sandy loam about 1 inch thick. The

subsurface layer is light yellowish brown very gravelly sandy loam about 4 inches thick. The upper part of the subsoil is yellowish brown very gravelly sandy loam about 10 inches thick. The lower part is yellowish brown extremely gravelly sandy loam about 22 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 37 inches.

About 15 percent of this unit is included areas of Catamount gravelly sandy loam, and about 5 percent is Legault very gravelly coarse sandy loam on mountainsides.

The dominant vegetation on the Ivywild soil is Engelmann spruce, quaking aspen, and limber pine. The soil also supports an understory of common juniper, kinnikinnick, wheatgrass, and Oregongrape. The average annual production of wood fiber, in cubic feet per acre, is 60 for Engelmann spruce and 41 for limber pine. The average annual production of air-dry vegetation ranges from 150 to 325 pounds per acre.

This soil is best suited to timber production, recreation, wildlife habitat, and watershed. It is susceptible to sheet erosion and gullying in areas where runoff is concentrated or the native plant cover is disturbed. The major limitations affecting timber harvesting are the slope and, in some areas, large boulders.

21—Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery. This unit is on mountainsides and upland ridges. Elevations are 9,500 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F. The unit is about 50 percent Ivywild gravelly sandy loam and 35 percent Catamount gravelly sandy loam.

The somewhat excessively drained, moderately deep Ivywild soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, about 2 percent of the surface of the Ivywild soil is covered with coarse boulders and 50 percent with vegetation and forest litter. A few stones also are on the surface. The surface layer is very dark grayish brown gravelly sandy loam about 1 inch thick. The subsurface layer is light yellowish brown very gravelly sandy loam about 4 inches thick. The upper part of the subsoil is yellowish brown very gravelly sandy loam about 10 inches thick. The lower part is yellowish brown extremely gravelly sandy loam about 22 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 37 inches.

The excessively drained, shallow Catamount soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, about 2 percent of the surface of the Catamount soil is covered with boulders and 50 percent with vegetation and forest litter. A few stones are also on the surface. The surface layer is grayish brown gravelly sandy loam about 2 inches thick. The next layer is brown very gravelly sandy loam about 10 inches thick. Below this is weathered, coarse grained granite. In some areas the surface layer is coarse sandy loam or very gravelly sandy loam.

About 5 percent of this unit is included areas of Aquolls in drainageways and on valley bottoms, and 10 percent is Legault very gravelly coarse sandy loam on the steeper, north-facing mountainsides.

The dominant vegetation on the Ivywild and Catamount soils is Engelmann spruce, quaking aspen, and limber pine. The soils also support an understory of common juniper, kinnikinnick, wheatgrass, and Oregongrape. The average annual production of wood fiber, in cubic feet per acre, is 26 for Engelmann spruce on the Catamount soil and 60 for Engelmann spruce on the Ivywild soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from 150 to 325 on the Ivywild soil and from 50 to 100 on the Catamount soil.

These soils are best suited to recreation, wildlife habitat, and watershed. They are susceptible to sheet erosion and gullying in areas where runoff is concentrated or the native plant cover is disturbed. The soils have limited potential for timber production and harvesting, mainly because of the boulders, stones, and slope.

22—Kassler very gravelly coarse sandy loam, 5 to 35 percent slopes. This unit is on dissected old outwash fans and terraces. Elevations are about 6,200 to 7,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F.

This excessively drained, deep soil formed in alluvium derived from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is low. Runoff is slow or medium, and the hazard of water erosion is moderate.

Typically, the upper part of the surface layer is dark grayish brown very gravelly coarse sandy loam about 6 inches thick. The lower part is brown very gravelly coarse sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is brown very gravelly loamy coarse sand.

About 20 percent of this unit is included areas of sandy, deep, dark soils in swales and on the lower toe

slopes. Also included are soils that are mainly coarse sandy loam over gravelly sandy loam. Included soils are in areas adjacent to Pring soils in El Paso County.

The dominant vegetation on the Kassler soil is ponderosa pine. The soil also supports an understory of common juniper, kinnikinnick, forbs, and grasses. The average annual production of wood fiber is 39 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 900 to 2,000 pounds per acre.

This soil is best suited to watershed, wildlife habitat, and recreation. It has a limited potential for timber production. It is susceptible to sheet and gully erosion in areas where water is concentrated or the native plant cover is disturbed. The major limitation affecting the production of timber is droughtiness.

23—Kutch clay loam, 10 to 40 percent slopes. This unit is on uplands. Elevations are 6,300 to 8,000 feet. The mean annual precipitation is about 16 inches. The average annual air temperature is 47 degrees F.

This well drained, moderately deep soil formed in calcareous, clayey material weathered from shale. Permeability is slow, and the available water capacity is low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, the surface layer is grayish brown clay loam about 4 inches thick. The upper part of the subsoil is grayish brown clay loam about 4 inches thick. The next part is brown clay loam about 9 inches thick. The next part is light olive brown clay about 6 inches thick. The lower part is grayish brown clay about 8 inches thick. Gray and olive shale is below a depth of about 31 inches.

About 10 percent of this unit is included areas of Pendant cobbly loam on mountainsides, and 5 percent is soils that are 10 to 20 inches deep over shale.

The dominant vegetation on the Kutch soil is western wheatgrass, blue grama, needleandthread, and sideoats grama. The average annual production of air-dry vegetation ranges from 900 to 1,600 pounds per acre.

This soil is best suited to rangeland, wildlife habitat, watershed, and recreation. Because of droughtiness, it provides better habitat for rangeland wildlife, such as mule deer, cottontail, and coyote, than for other kinds of wildlife. Forage production is typically low because of the droughtiness. Proper livestock grazing management is necessary if wildlife and livestock share the range.

24—Legault very gravelly coarse sandy loam, 5 to 40 percent slopes. This unit is on mountainsides. It is generally on north aspects. Elevations are about 8,000 to 9,800 feet. The mean annual precipitation is 18 to 23 inches. The average annual air temperature is 44 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer is dark grayish brown very gravelly coarse sandy loam about 2 inches thick. The subsurface layer is pale brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is pale brown very gravelly loamy coarse sand about 9 inches thick. Highly weathered Pikes Peak granite is below a depth of about 17 inches.

About 5 percent of this unit is included areas of Herbman very gravelly sandy loam, on ridges and mountainsides, which supports more understory grasses and shrubs than the Legault soil; 5 percent is Sphinx gravelly coarse sandy loam on mountainsides and ridges; and 10 percent is Tecolote very gravelly sandy loam on mountainsides.

The dominant vegetation on the Legault soil is lodgepole pine and Douglas-fir. In some areas it is almost exclusively lodgepole pine. Other plant species include limber pine, quaking aspen, kinnikinnick, grasses, and forbs. The average annual production of wood fiber, in cubic feet per acre, is 25 for lodgepole pine and 24 for Douglas-fir. The average annual production of air-dry vegetation ranges from 150 to 250 pounds per acre.

This soil is best suited to wildlife habitat, watershed, and recreation. It has limited potential for the production of timber used for poles and firewood. It is susceptible to erosion if the surface layer is disturbed. The major limitations affecting the production of forage or timber are droughtiness, low natural fertility, and the depth to bedrock.

25—Legault very gravelly coarse sandy loam, 40 to 65 percent slopes. This unit is on mountainsides. It is generally on north aspects. Elevations are about 8,000 to 9,800 feet. The mean annual precipitation is 18 to 23 inches. The average annual air temperature is 44 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer is dark grayish brown very gravelly coarse sandy loam about 2 inches thick. The subsurface layer is pale brown very gravelly coarse sandy loam about 6 inches thick. The underlying

material is pale brown very gravelly loamy coarse sand about 9 inches thick. Highly weathered Pikes Peak granite is below a depth of about 17 inches.

About 5 percent of this unit is included areas of Herbman very gravelly sandy loam, on ridges and mountainsides, which supports more understory grasses and shrubs than the Legault soil; 5 percent is Sphinx gravelly coarse sandy loam on mountainsides and ridges; and 10 percent is Tecolote very gravelly sandy loam on mountainsides.

The dominant vegetation on the Legault soil is Douglas-fir. The soil also supports an understory of quaking aspen, lodgepole pine, kinnikinnick, grasses, and forbs. The average annual production of wood fiber is 24 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 150 to 250 pounds per acre.

This soil is best suited to wildlife habitat, watershed, and recreation. It has limited potential for the production of timber used for poles and firewood. It is highly susceptible to erosion if the surface layer is disturbed. The major limitations affecting the production of forage or timber are droughtiness, low natural fertility, the depth to bedrock, and the slope.

26—Legault-Rock outcrop complex, 15 to 65 percent slopes. This unit is on mountainsides. It is generally on north aspects. Elevations are about 8,000 to 9,800 feet. The mean annual precipitation is 18 to 23 inches. The average annual air temperature is 44 degrees F. The unit is about 50 percent Legault very gravelly coarse sandy loam and 30 percent Rock outcrop. The Rock outcrop is Pikes Peak granite.

The somewhat excessively drained, shallow Legault soil formed in material weathered from Pikes Peak granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Legault soil is dark grayish brown very gravelly coarse sandy loam about 2 inches thick. The subsurface layer is pale brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is pale brown very gravelly loamy coarse sand about 9 inches thick. Highly weathered Pikes Peak granite is below a depth of about 17 inches.

About 10 percent of this unit is included areas of Tecolote very gravelly sandy loam on mountainsides; 5 percent is Herbman very gravelly sandy loam, on ridges and mountainsides, which supports more understory grasses and shrubs than the Legault soil; and 5 percent is Sphinx gravelly coarse sandy loam on mountainsides and ridges.

The Rock outcrop supports no vegetation. The dominant vegetation on the Legault soil is Douglas-fir. The soil also supports an understory of quaking aspen, lodgepole pine, ponderosa pine, kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 24 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 150 to 250 pounds per acre.

This unit is best suited to wildlife habitat, recreation, and watershed. Areas where the cover of plants and forest litter is disturbed are highly susceptible to erosion. The major limitations affecting the production of forage or timber are the Rock outcrop, the slope, and low natural fertility.

27—Palboone-Security complex, 15 to 40 percent slopes. This unit is on mountainsides. It is primarily on north-facing slopes that support dense stands of Douglas-fir. The Palboone soil is on foot slopes, and the Security soil is on the steeper mountainsides. Elevations are 7,500 to 8,500 feet. The mean annual precipitation is 18 to 25 inches. The average annual air temperature is about 45 degrees F. The unit is about 50 percent Palboone loam and 30 percent Security very gravelly coarse sandy loam.

The well drained, deep Palboone soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is moderate. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer of the Palboone soil is dark grayish brown loam about 3 inches thick. The subsurface layer is pale brown and light gray loam and sandy loam about 16 inches thick. The upper part of the subsoil is brown sandy loam about 16 inches thick. The next part is yellowish brown sandy loam about 15 inches thick. The lower part to a depth of 60 inches or more is brownish yellow sandy loam.

The well drained, moderately deep Security soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, the surface layer of the Security soil is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of about 26 inches.

About 20 percent of this unit is included areas of soils that have a subsoil of loam. Also included are some areas where the surface layer is very stony.

The dominant vegetation on the Palboone and Security soils is Douglas-fir. The soils also support an

understory of quaking aspen, grasses, Gambel oak, forbs, and shrubs. The average annual production of wood fiber is 32 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 350 to 650 pounds per acre on the Palboone soil.

Most areas are used as sites for wildlife habitat and timber production. These soils are best suited to watershed, recreation, and wildlife habitat. No major limitations affect timber production.

28—Palboone-Security complex, 40 to 70 percent slopes. This unit is on mountainsides. It is primarily on north-facing slopes that support dense stands of Douglas-fir. The Palboone soil is on foot slopes, and the Security soil is on the steeper mountainsides. Elevations are 7,500 to 8,500 feet. The mean annual precipitation is 18 to 25 inches. The average annual air temperature is about 45 degrees F. The unit is about 50 percent Palboone loam and 30 percent Security very gravelly coarse sandy loam.

The well drained, deep Palboone soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is moderate. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Palboone soil is dark grayish brown sandy loam about 3 inches thick. The subsurface layer is pale brown and light gray loam and sandy loam about 16 inches thick. The upper part of the subsoil is brown sandy loam about 16 inches thick. The next part is yellowish brown sandy loam about 15 inches thick. The lower part to a depth of 60 inches or more is brownish yellow sandy loam.

The well drained, moderately deep Security soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Security soil is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of 26 inches.

About 20 percent of this unit is included areas of soils that have a subsoil of loam. Also included are some areas where the surface layer is very stony.

The dominant vegetation on the Palboone and Security soils is Douglas-fir. The soils also support scattered stands of grasses and some dense stands of Gambel oak. The average annual production of wood fiber is 32 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 350 to 650 pounds per acre on the Palboone soil.

These soils are best suited to watershed, recreation, and wildlife habitat. They have limited potential for timber production and for recreational uses. The major limitation affecting timber production and harvesting is the slope.

29—Pendant cobbly loam, 15 to 40 percent slopes. This unit is on mountainsides. Elevations are 6,500 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 45 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations. Permeability is moderate, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, about 70 percent of the surface is covered with vegetation and forest litter. The upper part of the surface layer is very dark grayish brown cobbly loam about 6 inches thick. The lower part is grayish brown very cobbly loam about 4 inches thick. Below this is hard, fractured limestone.

About 5 percent of this unit is included areas of rock outcrop of the Fountain Formation on ridges, 5 percent is Fortwingate soils on mountainsides, and 10 percent is soils that are moderately deep or deep.

The dominant vegetation on the Pendant soil is ponderosa pine, Douglas-fir, and Gambel oak. The soil also supports an understory of mountainmahogany, yucca, grasses, and forbs. The potential natural vegetation is ponderosa pine. The average annual production of wood fiber is 30 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 250 to 450 pounds per acre.

This soil is best suited to wildlife habitat, recreation, and watershed. The abundance of understory shrubs and the depth to bedrock limit the potential for other uses. The limestone bedrock can be quarried in some areas.

30—Pendant cobbly loam, 40 to 70 percent slopes. This unit is on mountainsides. Elevations are 6,500 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 45 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations. Permeability is moderate, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 70 percent of the surface is covered with vegetation and forest litter. The upper part of the surface layer is very dark grayish brown cobbly loam about 6 inches thick. The lower part is grayish brown very cobbly loam about 4 inches thick. Below this is hard, fractured limestone.

About 5 percent of this unit is included areas of rock outcrop of the Fountain Formation on ridges, 5 percent is Fortwingate soils on mountainsides, and 10 percent is soils that are moderately deep or deep.

The dominant vegetation on the Pendant soil is ponderosa pine, Douglas-fir, and Gambel oak. The soil also supports an understory of mountainmahogany, yucca, grasses, and forbs. The potential natural vegetation is ponderosa pine. The average annual production of wood fiber is 30 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 250 to 450 pounds per acre.

This soil is best suited to wildlife habitat, recreation, and watershed. The abundance of understory shrubs, the slope, and the depth to bedrock limit the potential for other uses. The limestone bedrock can be quarried in some areas.

31—Pendant-Rock outcrop complex, 15 to 70 percent slopes. This unit is on mountainsides. Elevations are 6,500 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 45 degrees F. The unit is about 60 percent Pendant cobbly loam and 30 percent Rock outcrop. The Rock outcrop is limestone of the Madison, Williams Canyon, and Fountain Formations.

The somewhat excessively drained, shallow Pendant soil formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations. Permeability is moderate, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 60 percent of the surface of the Pendant soil is covered with vegetation and forest litter. The upper part of the surface layer is very dark grayish brown cobbly loam about 6 inches thick. The lower part is grayish brown very cobbly loam about 4 inches thick. Below this is hard, fractured limestone.

About 10 percent of this unit is included areas of soils that are moderately deep or deep.

The Rock outcrop supports no vegetation. The dominant vegetation on the Pendant soil is ponderosa pine and Gambel oak. The soil also supports an understory of mountainmahogany, yucca, grasses, and forbs. The potential natural vegetation is ponderosa pine. The average annual production of wood fiber is 30 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 250 to 450 pounds per acre.

This unit is best suited to wildlife habitat, recreation, and watershed. The abundance of understory shrubs, the Rock outcrop, the slope, and the depth to bedrock in the Pendant soil limit other uses. The limestone bedrock can be quarried in some areas.

32—Perrypark coarse sandy loam, 1 to 15 percent slopes. This unit is on alluvial fans and valley side slopes. Elevations are 7,200 to 7,800 feet. The mean annual precipitation is about 16 inches. The average annual air temperature is 45 degrees F.

This well drained, deep soil formed in arkosic alluvium derived from the Lyons and Fountain Formations. Permeability is moderate, and the available water capacity is moderate. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, about 70 percent of the surface is covered with vegetation and forest litter. The surface layer is dark grayish brown coarse sandy loam about 4 inches thick. The upper part of the subsoil is brown loam about 6 inches thick. The next part is reddish brown sandy clay loam about 13 inches thick. The lower part is reddish brown loam about 27 inches thick. The substratum to a depth of 60 inches or more is light reddish brown gravelly sandy loam.

About 20 percent of this unit is included areas of soils in which the content of gravel is 15 to 30 percent.

The dominant vegetation on the Perrypark soil is little bluestem, blue grama, mountain muhly, and needleandthread. The average annual production of air-dry vegetation ranges from 1,000 to 2,500 pounds per acre.

This soil is used for recreation, wildlife habitat, watershed, or native range. Soil blowing is a hazard if the surface layer is disturbed. The soil has potential for grazing, but compaction of the subsoil and droughtiness are limitations.

33—Rock outcrop-Catamount complex, 15 to 70 percent slopes. This unit is on ridges and mountainsides. Elevations are about 9,000 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F. The unit is about 45 percent Rock outcrop and 40 percent Catamount gravelly sandy loam. The Rock outcrop is Pikes Peak granite.

The Rock outcrop consists of large boulders and exposures of granitic rock, which are the product of spheroidal weathering and which exhibit in many places the parallel jointing characteristic of the Pikes Peak granite. In some areas a considerable amount of

granitic talus is at the base of the outcrops. These areas are actively eroding and tend to assume an angle of repose of about 50 percent.

The excessively drained, shallow Catamount soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Catamount soil is grayish brown gravelly sandy loam about 2 inches thick. The next layer is brown very gravelly coarse sandy loam about 6 inches thick. The underlying material is strong brown extremely gravelly loamy sand about 4 inches thick. Highly weathered, coarse grained granite is at a depth of about 12 inches. In some areas the surface layer is coarse sandy loam or very gravelly sandy loam.

About 5 percent of this unit is included areas of Herbman very gravelly sandy loam on mountainsides; 5 percent is Legault very gravelly coarse sandy loam on the steeper, north-facing mountainsides; and 5 percent is Aquolls in drainageways and on valley bottoms.

The Rock outcrop supports no vegetation. The dominant vegetation in the lower areas of the Catamount soil is limber pine, Douglas-fir, and quaking aspen. Engelmann spruce and bristlecone pine are at the higher elevations. The soil also supports an understory of some common juniper, kinnikinnick, annual forbs, and grasses. The average annual production of wood fiber, in cubic feet per acre, is about 20 for Douglas-fir and 26 for Engelmann spruce. The average annual production of air-dry vegetation ranges from 50 to 100 pounds per acre.

This unit is best suited to recreation, wildlife habitat, and watershed. Some areas also are suited to timber production. Areas where runoff is concentrated or the native plant cover is disturbed are susceptible to sheet erosion and gullying. The major limitations affecting the production and harvest of timber are the Rock outcrop, the slope, and droughtiness.

34—Rock outcrop-Security-Cathedral complex, 15 to 65 percent slopes. This unit is on mountainsides and ridges. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F. The unit is about 40 percent Rock outcrop, 30 percent Security very stony sandy loam, and 25 percent Cathedral very stony sandy loam. The Rock outcrop is mixed schist, gneiss, and granite.

The well drained, moderately deep Security soil formed in material weathered from schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, the surface layer of the Security soil is dark gray very stony sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of about 26 inches.

The well drained, shallow Cathedral soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

About 35 percent of the surface of the Cathedral soil is covered with coarse fragments and 35 percent with vegetation. Typically, the surface layer is brown and dark brown very stony sandy loam about 3 inches thick. The subsoil is brown and dark brown very gravelly sandy loam about 9 inches thick. Below this is hard schist, gneiss, and granite.

About 5 percent of this unit is included areas of Legault very gravelly coarse sandy loam on mountainsides.

The Rock outcrop supports no vegetation. The dominant vegetation on the Security and Cathedral soils is Gambel oak. The soils also support ponderosa pine and Douglas-fir and an understory of mountainmahogany, yucca, Oregongrape, grasses, and forbs. The average annual production of wood fiber, in cubic feet per acre, is about 45 for ponderosa pine on the Security soil and about 30 for ponderosa pine on the Cathedral soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from 200 to 550 on the Security soil and from 175 to 350 on the Cathedral soil.

This unit is best suited to wildlife habitat and watershed. The Security and Cathedral soils generally are too steep and too stony for most recreational uses.

35—Rock outcrop-Sphinx complex, 15 to 80 percent slopes. This unit is on mountainsides and ridges. It is on north and east aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 46 degrees F. The unit is about 45 percent Rock outcrop and 40 percent Sphinx gravelly coarse sandy loam, cool. The Rock outcrop is Pikes Peak granite.

The somewhat excessively drained, shallow Sphinx soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Sphinx soil is

brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, and 10 percent is soils that have a dark surface layer.

The Rock outcrop supports no vegetation. The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 150 to 300 pounds per acre.

This unit is best suited to wildlife habitat and watershed. Because of the aspect and climatic conditions, this Sphinx soil is more heavily vegetated than the warm phase of the Sphinx series. The major limitations affecting the production of timber or forage are the Rock outcrop, the slope, and low natural fertility.

36—Rock outcrop-Sphinx, warm, complex, 15 to 80 percent slopes. This unit is on mountainsides and ridges. It is on south and west aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 46 degrees F. The unit is about 45 percent Rock outcrop and 40 percent Sphinx gravelly coarse sandy loam, warm. The Rock outcrop is Pikes Peak granite.

The somewhat excessively drained, shallow Sphinx soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Sphinx soil is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, and 10 percent is soils that have a dark surface layer.

The Rock outcrop supports no vegetation. The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 100 to 200 pounds per acre.

This unit is best suited to wildlife habitat and watershed. Because of the aspect, the Sphinx soil is sparsely vegetated. The major limitations affecting the production of timber or forage are the Rock outcrop, the slope, and low natural fertility.

37—Sachett-Rock outcrop complex, 5 to 70 percent slopes. This unit is mountainsides and ridges. Elevations are 11,500 to 14,000 feet. The mean annual precipitation is 20 to 26 inches. The average annual air temperature is about 28 degrees F. The unit is about 70 percent Sachett cobbly sandy loam and 25 percent Rock outcrop. The Rock outcrop is Pikes Peak granite.

The excessively drained, shallow Sachett soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer of the Sachett soil is brown and dark brown cobbly sandy loam about 8 inches thick. The subsoil is yellowish brown very cobbly sandy loam about 5 inches thick. Below this is highly weathered, coarse grained granite.

The Rock outcrop consists of large boulders, stones, and exposures of granitic rock, which are the product of spheroidal weathering and which exhibit the parallel jointing characteristic of Pikes Peak granite. In some areas a considerable amount of granitic talus is at the base of the outcrops. These areas are actively eroding and tend to assume an angle of repose of about 50 percent.

About 5 percent of this unit is included areas of soils that do not have a dark surface layer and have layers of sand or loamy sand.

The Rock outcrop supports no vegetation. About 60 percent of the surface of the Sachett soil is covered with moss, forbs, and grasses. In some areas alpine willow covers about 20 percent of the surface. The potential natural vegetation is characteristic of a tundra. The average annual production of air-dry vegetation ranges from 500 to 900 pounds per acre.

This unit is best suited to recreation and watershed. It is not suitable for other uses because of the high altitude, the slope, and the Rock outcrop. Areas where runoff is concentrated or the native plant cover is disturbed are susceptible to sheet erosion and gullying.

38—Security very gravelly coarse sandy loam, 5 to 40 percent slopes. This unit is on mountainsides and ridges. Elevations are about 6,000 to 8,500 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F.

This well drained, moderately deep soil formed in

material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, the surface layer is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered granite is below a depth of about 26 inches.

About 15 percent of this unit is included areas of Cathedral very stony sandy loam on upland ridges and mountainsides.

The dominant vegetation on the Security soil is Gambel oak. The soil also supports ponderosa pine and Douglas-fir and an understory of mountainmahogany, Oregongrape, grasses, and forbs. The average annual production of wood fiber is 45 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 300 to 550 pounds per acre.

This soil is best suited to wildlife habitat and watershed. It has potential for grazing and timber production if it is properly managed. The major limitation affecting timber production is droughtiness.

39—Security very gravelly coarse sandy loam, 40 to 65 percent slopes. This unit is on mountainsides and ridges. Elevations are about 6,000 to 8,500 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F.

This well drained, moderately deep soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of about 26 inches.

About 10 percent of this unit is included areas of Palboone sandy loam on the north aspects of foot slopes, 5 percent is areas of rock outcrop on ridges, and 5 percent is Cathedral very stony sandy loam on mountainsides near the rock outcrop.

The dominant vegetation on the Security soil is Gambel oak. The soil also supports ponderosa pine and Douglas-fir and an understory of mountainmahogany, Oregongrape, grasses, and forbs. The average annual production of wood fiber is 45 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 300 to 550 pounds per acre.

This soil is best suited to wildlife habitat and watershed. Recreational uses are limited because of the slope and the abundance of brush. The major limitations affecting the production and harvest of timber are the slope and droughtiness.

40—Security-Cathedral complex, 40 to 65 percent slopes, very stony. This unit is on mountainsides. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F. The unit is about 55 percent Security very gravelly coarse sandy loam and 30 percent Cathedral very gravelly sandy loam.

The well drained, moderately deep Security soil formed in material weathered from schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Security soil is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of about 26 inches.

The well drained, shallow Cathedral soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Cathedral soil is brown and dark brown very gravelly sandy loam about 3 inches thick. The subsoil is brown and dark brown very gravelly sandy loam about 9 inches thick. Below this is hard schist, gneiss, and granite.

About 10 percent of this unit is included areas of rock outcrop of mixed schist, gneiss, and granite, and 5 percent is Palboone sandy loam on north-facing foot slopes that support dense stands of Douglas-fir.

The dominant vegetation on the Security and Cathedral soils is Gambel oak and scattered ponderosa pine. The soils also support Douglas-fir, mountainmahogany, Oregongrape, grasses, and forbs. Gambel oak seems to revegetate naturally. The average annual production of wood fiber, in cubic feet per acre, is 45 for ponderosa pine on the Security soil and 30 for ponderosa pine on the Cathedral soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from 300 to 550 on the Security soil and from 175 to 350 on the Cathedral soil.

These soils are best suited to wildlife habitat and watershed. They are generally too steep and too stony for most recreational uses. The major limitations affecting the production and harvest of timber are the slope, a high content of stones, and plant competition from Gambel oak and mountain mahogany.

41—Security-Cathedral-Rock outcrop complex, 15 to 65 percent slopes, very stony. This unit is on mountainsides. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F. The unit is about 40 percent Security very gravelly coarse sandy loam, 30 percent Cathedral very gravelly sandy loam, and 20 percent Rock outcrop. The Rock outcrop is mixed schist, gneiss, and granite.

The well drained, moderately deep Security soil formed in material weathered from mixed schist, gneiss, and granite. Permeability is moderately rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, the surface layer of the Security soil is dark gray very gravelly coarse sandy loam about 6 inches thick. The subsurface layer is light brown very gravelly sandy loam about 8 inches thick. The subsoil is light brown very gravelly sandy clay loam about 8 inches thick. The substratum is light brown very gravelly sandy loam about 4 inches thick. Weathered schist, gneiss, and granite are below a depth of about 26 inches.

The well drained, shallow Cathedral soil formed in material weathered from schist, gneiss, and granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 35 percent of the surface of the Cathedral soil is covered with coarse fragments and 35 percent with vegetation. The surface layer is brown and dark brown very gravelly sandy loam about 3 inches thick. The subsoil is brown and dark brown very gravelly sandy loam about 9 inches thick. Hard schist, gneiss, and granite are below a depth of about 12 inches.

About 10 percent of this unit is included areas of Palboone sandy loam on north-facing foot slopes that support dense stands of Douglas-fir.

The Rock outcrop supports no vegetation. The dominant vegetation on the Security and Cathedral soils is Gambel oak and scattered ponderosa pine. The soils also support Douglas-fir, mountainmahogany, Oregongrape, grasses, and forbs. The average annual production of wood fiber, in cubic feet per acre, is 45 for ponderosa pine on the Security soil and 30 for ponderosa pine on the Cathedral soil. The average annual production of air-dry vegetation, in pounds per acre, ranges from 300 to 550 on the Security soil and from 175 to 350 on the Cathedral soil.

This unit is best suited to wildlife habitat, hunting, and watershed. The major limitations affecting the production and harvest of timber are the slope and the Rock outcrop.

42—Sphinx gravelly coarse sandy loam, 15 to 40 percent slopes. This unit is on mountainsides and ridges. It is on north and east aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, 40 to 65 percent of the surface is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil; and 5 percent is areas of outcrop of Pikes Peak granite on mountainsides and ridges. About 5 percent of this unit north of Devil's Head Mountain is included areas of Tecolote very gravelly sandy loam on mountainsides. In the part of Teller County west of Highway 67, about 10 percent of this unit is included areas of Condie coarse sandy loam on foot slopes and rolling uplands where quaking aspen is the dominant vegetation.

The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 150 to 300 pounds per acre.

This soil is best suited to wildlife habitat, watershed, recreation, and limited timber production. Because of the aspect and climatic conditions, it is somewhat more heavily vegetated than the warm phase of the Sphinx series. It is very susceptible to erosion if the cover of plants and forest litter is disturbed. The major limitations affecting the production and harvest of timber are a high susceptibility to erosion, low natural fertility, and the depth to bedrock.

43—Sphinx gravelly coarse sandy loam, 40 to 70 percent slopes. This unit is on mountainsides and ridges. It is on north and east aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, 40 to 65 percent of the surface is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil; and 5 percent is outcrop of Pikes Peak granite on mountainsides and ridges. About 5 percent of this unit north of Devil's Head Mountain is included areas of Tecolote very gravelly sandy loam on mountainsides. In the part of Teller County west of Highway 67, about 10 percent of this unit is included areas of Condie coarse sandy loam on foot slopes and rolling uplands where quaking aspen is the dominant vegetation.

The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 29 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 150 to 300 pounds per acre.

This soil is best suited to wildlife habitat, watershed, recreation, and limited timber production. Because of the aspect and climatic conditions, it is somewhat more heavily vegetated than the warm phase of the Sphinx series. It is very susceptible to erosion if the cover of plants and forest litter is disturbed. The major limitations affecting the production and harvest of timber are the slope, a high susceptibility to erosion, low natural fertility, and the depth to bedrock.

44—Sphinx gravelly coarse sandy loam, warm, 15 to 40 percent slopes. This unit is on mountainsides and ridges. It is on south and west aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 46 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is moderate.

Typically, 40 to 65 percent of the surface is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil; and 5 percent is areas of outcrop of Pikes Peak granite on mountainsides and ridges. About 5 percent of this unit north of Devil's Head Mountain is included areas of Tecolote very gravelly sandy loam on mountainsides. In the part of Teller County west of Highway 67, 10 percent of this unit is included areas of Condie coarse sandy loam on foot slopes and rolling uplands where quaking aspen is the dominant vegetation.

The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 25 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 100 to 200 pounds per acre.

This soil is best suited to wildlife habitat, watershed, and recreation. It has very limited potential for timber production and has little potential for other uses. It is very susceptible to erosion if the cover of plants and forest litter is disturbed. The major limitations affecting the production and harvest of timber are a high susceptibility to erosion, low natural fertility, the depth to bedrock, and droughtiness.

45—Sphinx gravelly coarse sandy loam, warm, 40 to 70 percent slopes. This unit is on mountainsides and ridges. It is on south and west aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F.

This somewhat excessively drained, shallow soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is

very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, 40 to 65 percent of the surface is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil; and 5 percent is areas of outcrop of Pikes Peak granite on mountainsides and ridges. About 5 percent of this unit north of Devil's Head Mountain is included areas of Tecolote very gravelly sandy loam on mountainsides. In the part of Teller County west of Highway 67, 10 percent of this unit is included areas of Condie coarse sandy loam on foot slopes and rolling uplands where quaking aspen is the dominant vegetation.

The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The average annual production of wood fiber is 25 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 100 to 200 pounds per acre.

This soil is best suited to wildlife habitat, watershed, and recreation. It has very limited potential for timber production and has little potential for other uses. It is very susceptible to erosion if the cover of plants and forest litter is disturbed. The major limitations affecting the production and harvest of timber are a high susceptibility to erosion, low natural fertility, the depth to bedrock, the slope, and droughtiness.

46—Sphinx-Rock outcrop complex, 15 to 80 percent slopes. This unit is on mountainsides and ridges. It is on north and east aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F. The unit is about 60 percent Sphinx gravelly coarse sandy loam, cool, and 25 percent Rock outcrop. The Rock outcrop is Pikes Peak granite.

The somewhat excessively drained, shallow Sphinx soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 40 to 65 percent of the surface of the Sphinx soil is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; and 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil.

The Rock outcrop supports no vegetation. The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The potential natural vegetation is ponderosa pine. The average annual production of air-dry vegetation ranges from 150 to 300 pounds per acre.

This unit is best suited to wildlife habitat, watershed, and limited timber production. The major limitations affecting the production and harvest of timber are the slope, the Rock outcrop, and a susceptibility to erosion. Because of the aspect and climatic conditions, this Sphinx soil is more heavily vegetated than the warm phase of the Sphinx series.

47—Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes. This unit is on mountainsides and ridges. It is on south and west aspects. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F. The unit is about 60 percent Sphinx gravelly coarse sandy loam, warm, and 25 percent Rock outcrop. The Rock outcrop is Pikes Peak granite.

The somewhat excessively drained, shallow Sphinx soil formed in material weathered from Pikes Peak granite. Permeability is rapid, and the available water capacity is very low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 40 to 65 percent of the surface of the Sphinx soil is covered with vegetation and forest litter. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The next layer is yellowish brown very gravelly loamy coarse sand about 8 inches thick. Highly weathered, coarse grained granite, or grus, is below a depth of about 12 inches.

About 5 percent of this unit is included areas of Garber very gravelly coarse sandy loam on mountainsides, commonly adjacent to drainageways; and 10 percent is soils that have a surface layer that is darker than that of the Sphinx soil.

The Rock outcrop supports no vegetation. The dominant vegetation on the Sphinx soil is ponderosa pine. The soil also supports Douglas-fir and quaking

aspen and an understory of kinnikinnick, common juniper, grasses, and forbs. The potential natural vegetation is ponderosa pine. The average annual production of air-dry vegetation ranges from 100 to 200 pounds per acre.

This unit is best suited to wildlife habitat, watershed, and very limited timber production. The major limitations affecting the production and harvest of timber are the Rock outcrop, the slope, a susceptibility to erosion, and droughtiness.

48—Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony. This unit is on mountainsides. Elevations are 7,500 to 9,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 46 degrees F.

This well drained, deep soil formed in cobbly or stony colluvium over weathered granitic rock. Permeability is moderate, and the available water capacity is low. Runoff is medium or rapid, and the hazard of water erosion is moderate.

Typically, about 40 percent of the surface is covered with vegetation and forest litter and 3 percent with stones. The surface layer is grayish brown very gravelly sandy loam about 2 inches thick. The subsurface layer is very pale brown very cobbly sandy loam about 18 inches thick. The upper part of the subsoil is reddish brown and very pale brown very cobbly sandy clay loam about 10 inches thick. The lower part is reddish brown very cobbly sandy clay loam about 15 inches thick. Weathered granite is below a depth of about 45 inches.

About 5 percent of this unit is included areas of soils that have a dark surface layer, that do not have a fine textured subsoil, and that formed in recent stony alluvium along stream channels. About 5 percent is soils in which the content of coarse fragments is less than 35 percent in the subsoil, and 5 percent is soils that formed in a very thick layer of colluvium and have no weathered granitic rock within a depth of 5 feet.

The dominant vegetation on the Tecolote soil is Douglas-fir and lesser amounts of quaking aspen and ponderosa pine. The soil also supports kinnikinnick, Gambel oak, mountainmahogany, and annual grasses and forbs. The potential natural vegetation is Douglas-fir. The average annual production of wood fiber is 32 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 300 to 600 pounds per acre.

This soil is best suited to recreation, timber production, wildlife habitat, and watershed. Timber production probably could be improved by selective thinning and applications of fertilizer. The major limitations affecting the production and harvest of timber are a susceptibility to sheet erosion and gullying, low natural fertility, and the number of stones.

49—Tecolote very gravelly sandy loam, 40 to 70 percent slopes, very stony. This unit is on mountainsides. Elevations are 7,500 to 9,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 46 degrees F.

This well drained, deep soil formed in cobbly or stony colluvium over weathered granitic rock. Permeability is moderate, and the available water capacity is low. Runoff is rapid, and the hazard of water erosion is severe.

Typically, about 40 percent of the surface is covered with vegetation and forest litter and 3 percent with stones. The surface layer is grayish brown very gravelly sandy loam about 2 inches thick. The subsurface layer is very pale brown very cobbly sandy loam about 18 inches thick. The upper part of the subsoil is reddish brown and very pale brown very cobbly sandy clay loam about 10 inches thick. The lower part is reddish brown very cobbly sandy clay loam about 15 inches thick. Weathered granite is below a depth of about 45 inches.

About 5 percent of this unit is included areas of soils that have a dark surface layer, that do not have a fine textured subsoil, and that formed in recent stony alluvium along stream channels. About 5 percent is soils in which the content of coarse fragments is less than 35 percent in the subsoil, and 5 percent is soils that formed in a very thick layer of colluvium that has no weathered granitic rock within a depth of 5 feet.

The dominant vegetation on the Tecolote soil is Douglas-fir and lesser amounts of quaking aspen and ponderosa pine. The soil also supports kinnikinnick, Gambel oak, mountainmahogany, and annual grasses and forbs. The potential natural vegetation is Douglas-fir. The average annual production of wood fiber is 32 cubic feet per acre for Douglas-fir. The average annual production of air-dry vegetation ranges from 300 to 600 pounds per acre.

This soil is best suited to recreation, timber production, wildlife habitat, and watershed. Timber production probably could be improved by selective thinning and applications of fertilizer. The major limitations affecting the production and harvest of timber are a susceptibility to sheet erosion and gullying, low natural fertility, the number of stones, and the slope.

50—Tomah sandy loam, 2 to 15 percent slopes. This unit is on alluvial fans, hills, and ridges in the uplands. Elevations are about 7,300 to 7,800 feet. The mean annual precipitation is 17 to 22 inches. The average annual air temperature is 43 degrees F.

This well drained, deep soil formed in alluvium or in material weathered from arkose beds. Permeability is moderately rapid, and the available water capacity is moderate. Runoff is slow or medium, and the hazard of water erosion is slight.

Typically, the surface layer is dark grayish brown sandy loam about 10 inches thick. The subsurface layer is light gray coarse sand about 8 inches thick. The subsoil is brown loamy coarse sand that has many thin bands of sandy clay loam. It is about 17 inches thick. The substratum to a depth of 60 inches or more is pale brown loamy coarse sand.

About 20 percent of this unit is included areas of a soil that has a subsoil of loam or sandy clay loam.

The dominant vegetation on the Tomah soil is mountain muhly, mountain brome, blue grama, bluestem, and needleandthread. This soil is subject to invasion by Gambel oak. The most common forbs are fringed sagebrush, buckwheat, milkvetch, goldenrod, and geranium. The average annual production of air-dry vegetation ranges from 900 to 2,200 pounds per acre.

This soil is best suited to openland wildlife habitat, watershed, and recreation. Windblown sand and the moderate available water capacity are the major limitations affecting the establishment of trees and shrubs. In areas of rangeland, the wildlife population can be increased by a livestock grazing system that prevents overgrazing of the more desirable grass species and depletion of the various brush species.

51—Tripit loam, 5 to 15 percent slopes. This unit is on hills and ridges in the uplands. Elevations are about 7,800 to 8,400 feet. The mean annual precipitation is 18 to 22 inches. The average annual air temperature is 42 degrees F.

This well drained, moderately deep soil formed in calcareous sediments weathered from reddish sandstone, shale, and limestone. Permeability is moderate, and the available water capacity is low. Runoff is medium, and the hazard of water erosion is slight.

Typically, the surface layer is reddish gray loam about 6 inches thick. The upper part of the subsoil is reddish brown sandy clay loam about 13 inches thick. The lower part is reddish brown gravelly sandy clay loam about 13 inches thick. The substratum is reddish brown sandy clay loam about 6 inches thick. Soft, interbedded limestone and shale are at a depth of about 38 inches.

About 10 percent of this unit is included areas of Boyett sandy loam on ridges, 5 percent is Sphinx soils on mountainsides and ridges, and 5 percent is areas of rock outcrop on mountainsides and ridges.

The dominant vegetation on the Tripit soil is Arizona fescue, mountain muhly, junegrass, and ponderosa pine. The potential natural vegetation is ponderosa pine. The average annual production of wood fiber is 32 cubic feet per acre for ponderosa pine. The average annual production of air-dry vegetation ranges from 800 to 2,000 pounds per acre.

This soil is best suited to recreation, wildlife habitat, watershed, and urban development. The main limitations are the depth to bedrock and a moderate shrink-swell potential.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it helps avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to identify the potentials and limitations of each soil for specific land uses. It can be used to plan the management of soils for forestry, range, watershed, and transportation systems. Certain land uses, such as camp areas, picnic areas, and gravel pits, are site-specific and require detailed onsite investigation. Other land uses, such as timber production and roads, can be planned on the basis of information in this survey, but project investigations are needed. Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Range

A limited amount of grazing is permitted in the survey area. Many of the base ranches in the area have been sold for development purposes, and the demand for grazing on National Forest System lands is decreasing. The primary forage producing areas are meadows along streams; bunchgrass parks, generally along drainageways; open ponderosa pine stands that have an understory of bunchgrasses; and alpine grassland on Pikes Peak.

Forage production is declining in much of the survey area because of crown closure of the tree overstory. If there is a demand for forage production for domestic livestock or wildlife, the timber could be managed at a lower stocking level to provide for the growth of grasses, forbs, and shrubs in the understory.

The productivity of the soils in the survey area is generally low. Grazing management that prevents overgrazing and provides periodic rest periods is very important. Revegetation is difficult, and the hazard of water erosion is high.

Timber

D. Powell, forester, Forest Service, helped to prepare this section.

About 93 percent of this survey area is forested. The primary forest cover types are ponderosa pine, Douglas-fir/white fir, lodgepole pine, Engelmann spruce, subalpine fir, and quaking aspen. Limited areas support forests of mainly limber pine or bristlecone pine, primarily on the massif of Pikes Peak. A few low-elevation sites northwest of Manitou Springs support forests of pinyon and oneseed juniper. Because they make up most of the survey area, the most important of the upland forest types are ponderosa pine and Douglas-fir/white fir.

Some parts of the survey area have riparian forests of blue spruce, water birch, thinleaf alder, or narrowleaf cottonwood. Although these forests are much less extensive than upland types, they are extremely important because they are used for recreation, livestock and wildlife grazing, and watershed stabilization.

Scattered throughout the survey area are shrub communities, some of which are converting to ponderosa pine or Douglas-fir forests. Most of these communities are fire-maintained serial stages of Gambel oak or true mountainmahogany. On south-facing slopes and other dry, rocky sites, the Gambel oak and mountainmahogany are the potential natural community and will not be replaced by forests.

Nonforest riparian communities include sites dominated by shrubby cinquefoil, redosier dogwood, chokecherry, and Rocky Mountain maple. Bebb willow, planeleaf willow, and other willows also are very common in shrub-dominated riparian communities throughout the survey area. These communities are along streams or in moist, low-lying meadows.

The limitations affecting reforestation are given in the

map unit descriptions of those soils in the survey area that can support forest vegetation. For those soils having severe limitations, the most limiting factors are specified.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are the depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating

of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Vegetation and Wildlife Habitat

This survey area is primarily a mature coniferous forest dominated by Douglas-fir on northerly aspects and ponderosa pine on the drier, more southerly aspects. Scattered stands of aspen and Arizona fescue/mountain muhly grasslands are throughout this forest. Below the ponderosa pine/Douglas-fir zone, Gambel oak is the dominant species. Above the zone, aspen, limber pine, Englemann spruce, subalpine fir, and alpine tundra species dominate the vegetation. The vegetation along the numerous streams in the survey area is primarily willows, shrubby cinquefoil, and various sedges and grasses.

Because so much of the survey area is dominated by Douglas-fir and ponderosa pine, the most common wildlife species are those that inhabit these mature and pole-sized stands. Because of the numerous habitat types and the wide range in elevation, however, the survey area has about 35 species of wildlife and fish. The most common species are beaver, mule deer, Abert's squirrel, mountain bluebird, yellow-bellied sapsucker, green-tailed towhee, turkey, Virginia's warbler, and Wilson's warbler. The smaller streams provide habitat primarily for brook trout. Large streams, such as the South Platte River, provide habitat for brown and rainbow trout as well as brook trout.

The survey area is heavily used for the recreational activities associated with fish and wildlife resources. This heavy pattern of use results more from the proximity of the area to Denver and Colorado Springs than to the productivity of the habitat for fish and wildlife.

The general goals of habitat management in the survey area are to increase habitat diversity and maintain desirable habitat by cutting mature timber stands and regenerating new stands and to improve and maintain the habitat for high-priority indicator species.

Recreation

Recreational uses in the survey area are increasing in extent and are expected to increase in the future. Advance planning is necessary to accommodate the demand and, at the same time, preserve the basic soil and water resources. A prerequisite for advance recreational planning is information about soils that will help to determine their suitability for recreational uses. A determination of the esthetic quality of a given area also is important.

Two of the more significant factors affecting the soil profile are compaction of the surface layer and destruction of the vegetation, which reduce the rate of water infiltration and thus increase the hazard of erosion. In many recreational areas valuable surface soil has been lost through sheet erosion. As it runs off the surface, water removes the finer soil particles and exposes coarse fragments. Over a period of time, the accumulation of coarse fragments at the surface of the recreational areas creates an erosion pavement.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be

offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Water Management

Table 8 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and terraces and diversions.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, salts, or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for

drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 9 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer is given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A1 through A7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A7 are fine grained. Highly organic soils are classified in group A8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage

points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 10 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE)

to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 10, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 11 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high inflation rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced eletrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage loss, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(4)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 12 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Boralf (*Bor*, meaning cool plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Cryoboralfs (*Cryo*, meaning cold, plus *boralf*, the suborder of the Alfisols that has a cryic temperature regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typified the great group. An example is Typic Cryoboralfs.

FAMILY. Families are established with a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed Typic Cryoboralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(3)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(4)*. Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alamosa Series

The Alamosa series consists of deep, somewhat poorly drained soils that formed in alluvium derived from granite and arkosic sandstone. These soils are on flood plains and fans. Elevations are 7,200 to 7,700 feet.

Slopes are 0 to 6 percent. The mean annual precipitation is 16 to 20 inches. The average annual air temperature is 42 degrees F, and the frost-free season is less than 120 days.

Alamosa soils are classified as fine-loamy, mixed, frigid Typic Argiaquolls.

Typical pedon of Alamosa loam, 0 to 6 percent slopes; El Paso County, Colorado, the northeast corner of NE¼ sec. 21, T. 11 S., R. 67 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; neutral; clear smooth boundary.

BA—6 to 10 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common fine roots; neutral; clear smooth boundary.

Btg—10 to 24 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; few fine distinct mottles; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common moderately thick clay films on faces of peds; few fine roots; mildly alkaline; gradual wavy boundary.

BCkg—24 to 32 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; common fine distinct mottles; massive; hard, very friable, nonsticky and slightly plastic; few fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Cg—32 to 60 inches; brown (10YR 5/3) loam, brown and dark brown (10YR 4/3) moist; common fine distinct mottles; massive; hard, very friable, nonsticky and slightly plastic; few fine roots; strongly effervescent; moderately alkaline.

Aquolls

These deep, poorly drained soils formed in material weathered from granite or from schist, gneiss, sandstone, or granite. They are in drainageways and on valley bottoms. Elevations are 6,000 to 14,000 feet. Slopes are 1 to 10 percent. The mean annual precipitation ranges from 15 to 25 inches. The average annual air temperature ranges from 28 to 46 degrees F.

The profile characteristics of these soils vary from area to area. A commonly observed pedon, in Douglas County, Colorado, NE¼ sec. 27, T. 9 S., R. 70 W., is as follows:

A1—0 to 12 inches; brown and dark brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.

A2—12 to 25 inches; brown and dark brown (7.5YR 4/2), stratified loamy fine sand, dark brown (7.5YR 3/2) moist; few fine faint mottles in the lower part; weak fine granular structure; soft, very friable, nonsticky and nonplastic, many fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.

2Abg—25 to 50 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark brown (10YR 2/2) moist; common fine faint mottles; massive; slightly hard, friable, nonsticky and slightly plastic; few fine roots; few fine tubular pores; neutral; abrupt wavy boundary.

3C—50 to 60 inches; reddish yellow (5YR 6/6) coarse sand, yellowish red (5YR 4/6) moist; single grained; loose, nonsticky and nonplastic; many fine interstitial pores; neutral.

The depth to coarse sand ranges from 20 to more than 60 inches. The control section ranges from coarse sand to clay loam.

Boyett Series

The Boyett series consists of deep, well drained soils that formed in material weathered from arkosic sandstone and granite and in old alluvium. These soils are on ridges. Slopes are 2 to 40 percent. Elevations are 6,800 to 8,000 feet. The mean annual precipitation is 14 to 18 inches. The average annual air temperature is about 46 degrees F, and the frost-free season is less than 90 days.

Boyett soils are classified as coarse-loamy, mixed Mollic Eutroboralfs.

Typical pedon of Boyett sandy loam, in an area of Boyett-Frenchcreek complex, 2 to 15 percent slopes; in the center of W½ sec. 15, T. 11 S., R. 69 W.

Oi—1 inch to 0; needles, leaves, and twigs.

A—0 to 5 inches; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 5 percent pebbles; few fine and medium roots; few fine interstitial pores; slightly acid; clear smooth boundary.

E—5 to 9 inches; pink (7.5YR 7/4) gravelly coarse sandy loam, brown (7.5YR 4/4) moist; weak medium and fine granular structure; slightly hard, friable, nonsticky and nonplastic; about 15 percent pebbles; few fine and medium roots; common fine tubular pores; slightly acid; abrupt wavy boundary.

Bt1—9 to 16 inches; reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/4) moist; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; about 20 percent pebbles; few very fine roots; slightly acid; abrupt smooth boundary.

Bt2—16 to 34 inches; reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; very hard, very firm, slightly sticky and slightly plastic; about 30 percent pebbles; few very fine roots; slightly acid; abrupt smooth boundary.

Btk—34 to 42 inches; reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; about 15 percent lime-coated pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

Ck—42 to 53 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 4/4) moist; massive; hard, friable, sticky and plastic; about 5 percent lime-coated pebbles; strongly effervescent; moderately alkaline; abrupt smooth boundary.

R—53 inches; arkosic sandstone.

The C horizon has hue of 10YR to 2.5YR, value of 4 to 7 (3 to 6 moist), and chroma of 4 to 6. It is loam, sandy loam, or coarse sand. It is slightly acid to moderately alkaline.

Catamount Series

The Catamount series consists of shallow, excessively drained soils that formed in material weathered from granite. These soils are on upland ridges and mountainsides. Slopes are 5 to 70 percent. Elevations are 9,000 to 11,500 feet. The mean annual precipitation is 18 to 24 inches. The average annual air temperature is about 42 degrees F, and the frost-free season is less than 75 days.

Catamount soils are classified as loamy-skeletal, mixed, nonacid, shallow Typic Cryorthents.

Typical pedon of Catamount gravelly sandy loam, 5 to 40 percent slopes; Teller County, Colorado, along Pikes Peak Toll Road, 75 feet east of road by Crystal Creek Reservoir, sec. 17, T. 13 S., R. 68 W.

Oi—0.5 inch to 0; needles, leaves, and twigs.

A—0 to 2 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 15 percent pebbles; slightly acid; clear smooth boundary.

AC—2 to 8 inches; brown (10YR 5/3) very gravelly coarse sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 45 percent pebbles; common fine and medium roots; many fine interstitial pores; moderately acid; clear wavy boundary.

C—8 to 12 inches; strong brown (7.5YR 5/6) extremely gravelly loamy sand, strong brown (7.5YR 4/6) moist; single grained; soft, very friable, nonsticky and nonplastic; about 60 percent pebbles; strongly acid; clear wavy boundary.

Cr—12 to 28 inches; weathered, coarse grained granite.

Cathedral Series

The Cathedral series consists of shallow, well drained soils that formed in material weathered from mixed schist, gneiss, and granite. These soils are on upland ridges and mountainsides. Slopes are 40 to 65 percent. Elevations are 6,000 to 7,400 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is about 45 degrees F, and the frost-free season is less than 100 days.

Cathedral soils are classified as loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of Cathedral gravelly sandy loam, 40 to 65 percent slopes, extremely stony; Douglas County, Colorado, along South Platte River Canyon, SW¼ sec. 9, T. 7 S., R. 69 W.

A—0 to 3 inches; brown and dark brown (7.5YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; about 5 percent stones and 25 percent pebbles; common fine and medium roots; common fine interstitial pores; neutral; clear wavy boundary.

Bw—3 to 12 inches; brown and dark brown (7.5YR 4/4) extremely gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; about 5 percent stones and 55 percent pebbles; few fine roots; few fine interstitial pores; slightly acid; abrupt irregular boundary.

R—12 to 60 inches; hard, fractured schist, gneiss, and granite.

The depth to bedrock ranges from 10 to 20 inches.

Condie Series

The Condie series consists of deep, well drained soils that formed in material weathered from granite of the Pikes Peak Formation. These soils are on foot

slopes and rolling uplands. Slopes are 2 to 40 percent. Elevations are 8,500 to 9,500 feet. The mean annual precipitation is 20 to 23 inches. The average annual air temperature is 46 degrees F, and the frost-free season is less than 70 days.

Condie soils are classified as loamy-skeletal, mixed Mollic Cryoboralfs.

Typical pedon of Condie coarse sandy loam, 2 to 15 percent slopes; El Paso County, Colorado, Springdale Campground, sec. 22, T. 12 S., R. 68 W.

Oe—2 inches to 0; partially decomposed leaves.
A1—0 to 4 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 10 percent pebbles; common fine roots; many fine interstitial pores; slightly acid; clear smooth boundary.
A2—4 to 8 inches; brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 10 percent pebbles; few fine, medium, and coarse roots; many fine interstitial pores; slightly acid; gradual wavy boundary.
E—8 to 18 inches; pinkish gray (7.5YR 7/2) very gravelly coarse sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; about 40 percent pebbles; few fine, medium, and coarse roots; many fine interstitial pores; slightly acid; abrupt smooth boundary.
E/B—18 to 30 inches; very gravelly coarse sandy loam with colors that are 60 percent those of the E horizon and 40 percent those of the B horizon; moderate medium and coarse subangular blocky structure; very hard, friable, sticky and slightly plastic; about 45 percent pebbles; common moderately thick clay films on faces of peds; few fine roots; few fine tubular pores; moderately acid; clear smooth boundary.
Bt1—30 to 40 inches; light reddish brown (5YR 6/4) extremely gravelly sandy clay loam, reddish brown (5YR 4/4) moist; strong fine subangular blocky structure; extremely hard, firm, sticky and plastic; about 60 percent pebbles; many thick clay films on faces of peds; few fine roots; many fine tubular pores; moderately acid; gradual wavy boundary.
Bt2—40 to 60 inches; light reddish brown (5YR 6/4) extremely gravelly coarse sandy loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; about 65 percent pebbles; moderately acid; gradual wavy boundary.

The B horizon is very gravelly or extremely gravelly coarse sandy loam or very gravelly or extremely gravelly sandy clay loam. The content of gravel in this horizon is 45 to 65 percent.

Fortwingate Series

The Fortwingate series consists of moderately deep, well drained soils that formed in material weathered from interbedded sandstone and shale. These soils are on mountainsides. Elevations are 6,600 to 8,000 feet. Slopes are 15 to 40 percent. The mean annual precipitation is 16 to 19 inches. The average annual air temperature is about 43 degrees F.

Fortwingate soils are classified as fine, montmorillonitic Typic Eutroboralfs.

Typical pedon of Fortwingate loam, in an area of Fortwingate-Rock outcrop complex, 15 to 60 percent slopes; along Rampart Range Road, sec. 21, T. 13 S., R. 67 W.

A—0 to 5 inches; reddish brown (5YR 5/3) loam, dark reddish brown (5YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.
Bt—5 to 21 inches; reddish brown (2.5YR 5/4) clay, reddish brown (2.5YR 4/4) moist; strong medium and coarse prismatic structure parting to strong fine and medium subangular blocky; extremely hard, very firm, sticky and plastic; neutral; clear smooth boundary.
Cr—21 to 35 inches; red (10R 4/6), partially weathered sandstone and shale, dark red (10R 3/6) moist; massive; extremely hard, very firm; mildly alkaline; gradual smooth boundary.
R—35 inches; hard, interbedded sandstone and shale.

The solum ranges from 20 to 35 inches in thickness.

Frenchcreek Series

The Frenchcreek series consists of deep, well drained soils that formed in alluvium derived from mixed red arkosic sandstone and Pikes Peak granite. These soils are in swales. Slopes are 2 to 20 percent. Elevations are 6,800 to 8,000 feet. The mean annual precipitation is 14 to 18 inches. The average annual air temperature is 46 degrees F, and the frost-free season is less than 90 days.

Frenchcreek soils are classified as loamy-skeletal, mixed Aridic Haploborolls.

Typical pedon of Frenchcreek gravelly sandy loam, in an area of Boyett-Frenchcreek complex, 2 to 15 percent slopes; directly south of South Meadows Campground, off Highway 67, sec. 27, T. 11 S., R. 69 W.

A—0 to 4 inches; brown and dark brown (7.5YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; about 15 percent pebbles; common fine roots; neutral; clear smooth boundary.

Bw—4 to 14 inches; reddish brown (5YR 4/3) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; about 30 percent pebbles; common fine roots; slightly acid; clear smooth boundary.

C1—14 to 30 inches; reddish brown (5YR 5/4) very gravelly coarse sandy loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; about 35 percent pebbles; slightly acid; gradual smooth boundary.

C2—30 to 60 inches; reddish brown (5YR 5/4) very gravelly loamy sand, reddish brown (5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; about 50 percent pebbles; neutral.

The A horizon is gravelly sandy loam or sandy loam. The B horizon is gravelly or very gravelly sandy loam or gravelly or very gravelly loam. The pebbles in these soils are less than 1 inch in diameter. The rooting depth is 40 inches or more.

Garber Series

The Garber series consists of deep, well drained soils that formed in material weathered from Pikes Peak granite. These soils are on mountainsides and are commonly adjacent to drainageways. Slopes are 2 to 40 percent. Elevations are 7,600 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F, and the frost-free season is less than 75 days.

Garber soils are classified as loamy-skeletal, mixed Pachic Haploborolls.

Typical pedon of Garber very gravelly coarse sandy loam, 2 to 15 percent slopes; about 1 mile south of Devil's Head Campground and 120 feet east of Rampart Range Road, sec. 16, T. 9 S., R. 69 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) very gravelly coarse sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 45 percent pebbles; common medium and coarse roots; many fine interstitial pores; slightly acid; gradual smooth boundary.

A2—6 to 18 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and slightly plastic; about 55 percent pebbles; few medium and coarse roots; many fine interstitial pores; slightly acid; clear smooth boundary.

C—18 to 42 inches; brown (7.5YR 5/4) extremely gravelly coarse sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and slightly plastic; about 70 percent pebbles; few fine roots; few fine interstitial pores; moderately acid; clear smooth boundary.

Cr—42 to 60 inches; highly weathered, coarse grained granite (grus).

The mollic epipedon ranges from 16 to 36 inches in thickness. The rooting depth ranges from 40 to 60 inches. The C horizon is very gravelly or extremely gravelly coarse sandy loam or very gravelly or extremely gravelly sandy loam. The pebbles in these soils are mainly ⅛ inch to 1½ inches in diameter.

Guffey Series

The Guffey series consists of moderately deep, well drained soils that formed in material weathered from Pikes Peak granite. These soils are on mountainsides. Slopes are 5 to 60 percent. Elevations are 8,500 to 9,800 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 44 degrees F, and the frost-free season is less than 75 days.

Guffey soils are classified as loamy-skeletal, mixed Typic Cryoboralfs.

Typical pedon of Guffey very gravelly sandy loam, 5 to 40 percent slopes; Douglas County, Colorado, about 1.9 miles north of Cabin Ridge picnic ground and 20 feet west off Rampart Range Road, sec. 3, T. 9 S., R. 69 W.

Oi—1 inch to 0; slightly decomposed leaves and needles.

A—0 to 3 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; about 40 percent pebbles; many fine and medium roots; many fine interstitial pores; slightly acid; abrupt smooth boundary.

E—3 to 12 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; about 40 percent pebbles; many fine and medium roots; many fine

interstitial pores; strongly acid; clear wavy boundary.
B/E—12 to 18 inches; very gravelly sandy clay loam that has colors that are mainly those of the Bt horizon but also has streaks and spots that are the color of the E horizon; moderate fine subangular blocky structure; very hard, friable, sticky and plastic; about 45 percent pebbles; few fine and medium roots; strongly acid; gradual irregular boundary.
Bt—18 to 26 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; about 45 percent pebbles; few fine roots; strongly acid; abrupt wavy boundary.
Cr—26 to 60 inches; weathered granite (grus).

The effective rooting depth is 20 to 40 inches. The Bt horizon is very gravelly or extremely gravelly sandy clay loam. The pebbles in these soils are ⅛ inch to 1½ inches in diameter.

Herbman Series

The Herbman series consists of shallow, well drained soils that formed in material weathered from Pikes Peak granite. These soils are on upland ridges and mountainsides. Slopes are 15 to 40 percent. Elevations are 9,000 to 12,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 43 degrees F, and the frost-free season is less than 75 days.

Herbman soils are classified as loamy-skeletal, mixed, shallow Typic Cryoborolls.

Typical pedon of Herbman very gravelly sandy loam, 15 to 40 percent slopes; Teller County, Colorado, about 1 mile west and 30 feet north of Penrose Reservoir, on Gold Camp Road, sec. 22, T. 15 S., R. 68 W.

A1—0 to 3 inches; brown (7.5YR 5/2) very gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 5 percent cobbles and 30 percent pebbles; common fine roots; many fine interstitial pores; neutral; clear smooth boundary.
A2—3 to 9 inches; dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 45 percent pebbles; common medium and few fine roots; few fine tubular pores; moderately acid; clear smooth boundary.
AC—9 to 15 inches; strong brown (7.5YR 4/6) extremely gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; about 80 percent pebbles; common medium roots; few fine tubular pores; moderately acid; clear wavy boundary.
Cr—15 to 60 inches; highly weathered, coarse grained granite (grus).

The depth to weathered granite is 7 to 20 inches. The AC horizon is very gravelly or extremely gravelly sandy loam, very gravelly loam, or very gravelly sandy clay loam. The pebbles in these soils are mainly ⅛ inch to 1½ inches in diameter.

Ivywild Series

The Ivywild series consists of moderately deep, somewhat excessively drained soils that formed in colluvium or glacial till derived from granite. These soils are on mountainsides and ridges. Slopes are 5 to 70 percent. Elevations are 9,500 to 11,500 feet. The mean annual precipitation is about 23 inches. The average annual air temperature is about 42 degrees F, and the frost-free season is less than 75 days.

Ivywild soils are classified as loamy-skeletal, mixed Dystric Cryochrepts.

Typical pedon of Ivywild gravelly sandy loam, in an area of Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery; El Paso County, Colorado, about 1.2 miles north and 200 feet west of Reservoir No. 4, SE¼SW¼ sec. 28, T. 14 S., R. 68 W.

Oi—1 inch to 0; slightly decomposed needles, leaves, and twigs.
A—0 to 1 inch; very dark grayish brown (10YR 3/2) gravelly sandy loam, black (10YR 2/1) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; about 2 percent boulders, a few stones, about 25 percent pebbles; many fine and medium roots; many fine interstitial pores; very strongly acid; clear smooth boundary.
E—1 to 5 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; loose, very friable, nonsticky and nonplastic; about 55 percent fine pebbles; many fine and very fine roots; many fine interstitial pores; extremely acid; clear wavy boundary.
Bw1—5 to 15 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; about 55 percent fine pebbles; few fine and very fine roots;

many fine interstitial pores; extremely acid; gradual wavy boundary.

Bw2—15 to 37 inches; yellowish brown (10YR 5/6) extremely gravelly sandy loam, reddish brown (5YR 4/4) moist; single grained; loose, nonsticky and nonplastic; about 70 percent fine and medium pebbles; few fine roots; very strongly acid; gradual wavy boundary.

Cr—37 to 42 inches; highly weathered, coarse grained granite (grus).

The depth to weathered granite is 20 to 40 inches. The depth to hard granite is 40 to more than 60 inches. The E horizon is gravelly or very gravelly sandy loam. The B horizon is very gravelly or extremely gravelly sandy loam or very gravelly or extremely gravelly coarse sandy loam. The pebbles in these soils are mainly ⅛ inch to 1½ inches in diameter.

Kassler Series

The Kassler series consists of deep, excessively drained soils that formed in alluvium derived from Pikes Peak granite. These soils are on dissected old outwash fans and terraces. Slopes are 5 to 35 percent. Elevations are 6,200 to 7,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F, and the frost-free season is less than 100 days.

Kassler soils are classified as sandy-skeletal, mixed Torriorthentic Haploborolls.

Typical pedon of Kassler very gravelly coarse sandy loam, 5 to 35 percent slopes; Douglas County, Colorado, SW¼ sec. 15, T. 9 S., R. 70 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) very gravelly coarse sandy loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 40 percent pebbles; common fine and few medium roots; common fine interstitial pores; slightly acid; gradual wavy boundary.

A2—6 to 13 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; about 50 percent pebbles; few fine and medium roots; slightly acid; clear wavy boundary.

C—13 to 60 inches; brown (10YR 5/3) very gravelly loamy coarse sand, dark yellowish brown (10YR 3/4) moist; single grained; loose, nonsticky and nonplastic; about 50 percent pebbles; few fine, medium, and coarse roots; neutral.

The C horizon is very gravelly or extremely gravelly loamy coarse sand. The pebbles in these soils are mainly ½ inch in diameter.

The Kassler soils in this survey area are taxadjuncts to the official series because they have yellower hue in the C horizon.

Kutch Series

The Kutch series consists of moderately deep, well drained soils that formed in calcareous material weathered from shale. These soils are on uplands. Elevations are 6,300 to 8,000 feet. Slopes are 10 to 40 percent. The mean annual precipitation is about 16 inches. The average annual air temperature is about 47 degrees F, and the frost-free season is less than 130 days.

Kutch soils are classified as fine, montmorillonitic, mesic Torrertic Argiustolls.

Typical pedon of Kutch clay loam, 10 to 40 percent slopes; SE¼ sec. 28, T. 12 S., R. 67 W.

A—0 to 4 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong fine and medium granular structure; soft, very friable, sticky and plastic; common medium roots; neutral; clear smooth boundary.

BA—4 to 8 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic structure; extremely hard, firm, sticky and plastic; few thin clay films on faces of peds; common medium roots; neutral; clear smooth boundary.

Bt—8 to 17 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to strong medium angular blocky; extremely hard, firm, very sticky and very plastic; many moderately thick clay films on faces of peds; few fine roots; mildly alkaline; gradual smooth boundary.

Btk—17 to 23 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; moderate coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few thin clay films on faces of peds; few fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk—23 to 31 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; few thin clay films on faces of peds; few fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—31 to 60 inches; gray and olive, calcareous shale that has few crystals of gypsum.

Legault Series

The Legault series consists of shallow, somewhat excessively drained soils that formed in material weathered from Pikes Peak granite. These soils are on mountainsides. Slopes are 5 to 65 percent. Elevations are 8,000 to 9,800 feet. The mean annual precipitation is 18 to 23 inches. The average annual air temperature is 44 degrees F, and the frost-free season is less than 75 days.

Legault soils are classified as sandy-skeletal, mixed, shallow Typic Cryorthents.

Typical pedon of Legault very gravelly coarse sandy loam, 5 to 40 percent slopes; Douglas County, Colorado, 345 feet north and 60 feet east of Forest Service Trail 563 off Rampart Range Road, sec. 36, T. 9 S., R. 69 W.

Oi—1 inch to 0; slightly decomposed twigs, needles, and other forest litter.
A—0 to 2 inches; dark grayish brown (10YR 4/2) very gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 35 percent pebbles; many fine and medium roots; many fine interstitial pores; strongly acid; abrupt wavy boundary.
E—2 to 8 inches; pale brown (10YR 6/3) very gravelly coarse sandy loam, brown and dark brown (10YR 4/3) moist; single grained; loose, nonsticky and nonplastic; about 45 percent pebbles; many fine and medium roots; many fine interstitial pores; strongly acid; clear smooth boundary.
C—8 to 17 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 4/3) moist; single grained; loose, nonsticky and nonplastic; about 45 percent pebbles; few fine and medium roots; many fine interstitial pores; strongly acid; clear wavy boundary.
Cr—17 to 60 inches; highly weathered granite (grus).

The A horizon is gravelly or very gravelly coarse sandy loam or gravelly or very gravelly sandy loam. The pebbles in these soils are ⅛ inch to 1½ inches in diameter. Some clay coatings are on the grus.

Palboone Series

The Palboone series consists of deep, well drained soils that formed in material weathered from mixed schist, gneiss, and granite. These soils are on foot slopes. Slopes are 15 to 50 percent. Elevations are 7,500 to 8,500 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is about 45 degrees F, and the frost-free season is less than 70 days.

Palboone soils are classified as coarse-loamy, mixed Typic Cryoboralfs.

Typical pedon of Palboone loam, in an area of Palboone-Security complex, 15 to 40 percent slopes; Douglas County, Colorado, about 1.2 miles northwest along Roxbourgh Park Road, directly south of Indian Creek Work Center, sec. 3, T. 8 S., R. 69 W.

Oi—2 inches to 0; slightly decomposed organic material.
A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; few fine and medium roots; many fine interstitial pores; slightly acid; clear smooth boundary.
E1—3 to 8 inches; pale brown (10YR 6/3) loam, brown and dark brown (10YR 4/3) moist; weak medium and fine subangular blocky and weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular pores; slightly acid; gradual smooth boundary.
E2—8 to 19 inches; light gray (10YR 7/2) sandy loam, brown and dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; slightly acid; clear wavy boundary.
B/E—19 to 26 inches; about 60 percent brown (7.5YR 5/4) and 40 percent light gray (10YR 7/2) sandy loam, brown and dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; slightly acid; clear wavy boundary.
Bt1—26 to 35 inches; brown (7.5YR 5/4) sandy loam, brown and dark brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; hard, firm, sticky and plastic; many thick clay films on faces of peds; few medium roots; slightly acid; abrupt smooth boundary.
2Bt2—35 to 50 inches; yellowish brown (10YR 5/6) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common thick clay films on faces of peds; neutral; clear smooth boundary.

2Bt3—50 to 60 inches; brownish yellow (10YR 6/6) sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and plastic; neutral.

Pendant Series

The Pendant series consists of shallow, somewhat excessively drained soils that formed in material weathered from limestone of the Madison, Williams Canyon, and Fountain Formations. These soils are on mountainsides. Slopes are 15 to 70 percent. Elevations are 6,500 to 9,200 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F, and the frost-free season is less than 90 days.

Pendant soils are classified as loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of Pendant cobbly loam, 15 to 40 percent slopes; Douglas County, Colorado, along Rainbow Falls Park Road, NE¼ sec. 28, T. 10 S., R. 69 W.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; about 15 percent cobbles and 15 percent pebbles; many fine and common medium roots; many fine interstitial pores; mildly alkaline; clear smooth boundary.

A2—6 to 10 inches; grayish brown (10YR 5/2) very cobbly loam, brown and dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; about 25 percent cobbles and 20 percent pebbles; common fine and many medium roots; many fine interstitial pores; mildly alkaline; abrupt wavy boundary.

R—10 inches; hard, fractured limestone.

The depth to hard, fractured limestone ranges from 10 to 20 inches. The content of coarse fragments ranges from 35 to 50 percent in the control section.

Perrypark Series

The Perrypark series consists of deep, well drained soils that formed in arkosic alluvium derived from the Lyons and Fountain Formations. These soils are on alluvial fans and valley side slopes. Slopes are 1 to 15 percent. Elevations are 7,200 to 7,800 feet. The mean annual precipitation is about 16 inches. The average annual air temperature is 45 degrees F, and the frost-free season is less than 90 days.

Perrypark soils are classified as fine-loamy, mixed Aridic Argiborolls.

Typical pedon of Perrypark coarse sandy loam, 1 to 15 percent slopes; El Paso County, Colorado, 800 feet northwest of Highway 25, along Lucky 4 Ranch Road, sec. 9, T. 13 S., R. 68 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; about 5 percent pebbles; neutral; clear smooth boundary.

BA—4 to 10 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very friable, slightly sticky and slightly plastic; about 5 percent pebbles; neutral; gradual smooth boundary.

Bt—10 to 23 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very friable, slightly sticky and plastic; many thin clay films on faces of peds; about 10 percent pebbles; neutral; gradual smooth boundary.

BC—23 to 50 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; common thin clay films on faces of peds; about 5 percent pebbles; mildly alkaline; gradual smooth boundary.

C—50 to 60 inches; light reddish brown (5YR 6/4) gravelly sandy loam, reddish brown (5YR 4/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; about 20 percent pebbles; mildly alkaline.

Coarse fragments make up about 5 to 20 percent of the solum. They are mainly less than 3 inches in diameter but range from about ⅛ inch to 10 inches. The A horizon is sandy loam or coarse sandy loam. The Bt horizon is sandy clay loam or gravelly sandy clay loam. It may have few carbonates in the lower part.

Sachett Series

The Sachett series consists of shallow, excessively drained soils that formed in material weathered from Pikes Peak granite. These soils are on ridges and mountainsides. Slopes are 5 to 50 percent. Elevations are 11,500 to 14,000 feet. The mean annual precipitation is 20 to 26 inches. The average annual air temperature is about 28 degrees F, and the frost-free season is less than 50 days.

Sachett soils are classified as sandy-skeletal, mixed, shallow Pergelic Cryumbrepts.

Typical pedon of Sachett cobbly sandy loam, in an area of Sachett-Rock outcrop complex, 5 to 70 percent slopes, El Paso County, Colorado, along Cog Railway on Pikes Peak, 0.9 mile north of reservoir and 400 feet west of Sachett Mountain, sec. 19, T. 14 S., R. 68 W.

A—0 to 8 inches; brown and dark brown (10YR 4/3) cobbly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; about 15 percent pebbles and 15 percent cobbles; many fine and common medium roots; many fine interstitial pores; strongly acid; clear smooth boundary.

Bw—8 to 13 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 25 percent pebbles and 25 percent cobbles; many fine and common medium roots; many fine interstitial pores; strongly acid; clear smooth boundary.

Cr—13 inches; highly weathered, coarse grained granite (grus).

The depth to weathered granite is 10 to 20 inches. The depth to hard granite is 20 to more than 60 inches. The Bw horizon is very gravelly or very cobbly sandy loam or very gravelly or very cobbly loam. The pebbles in these soils are mainly ⅛ inch to 1½ inches in diameter.

Security Series

The Security series consists of moderately deep, well drained soils that formed in material weathered from mixed schist, gneiss, and granite. These soils are on mountainsides and ridges. Slopes are 5 to 65 percent. Elevations are 6,000 to 8,500 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 45 degrees F, and the frost-free season is less than 90 days.

Security soils are classified as loamy-skeletal, mixed Mollic Eutroboralfs.

Typical pedon of Security very gravelly coarse sandy loam, 5 to 40 percent slopes; Douglas County, Colorado, 0.2 mile northwest of Highway 67 at Moonridge, NE¼ sec. 5, T. 8 S., R. 69 W.

Oi—1 inch to 0; slightly decomposed needles, leaves, and twigs.

A—0 to 6 inches; dark gray (10YR 4/1) very gravelly coarse sandy loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; about 40 percent pebbles; many fine and medium roots; many fine interstitial pores; slightly acid; clear wavy boundary.

E—6 to 14 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown and dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; about 40 percent pebbles; many fine and medium roots; many fine interstitial pores; slightly acid; clear wavy boundary.

Bt—14 to 22 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and slightly plastic; about 45 percent pebbles; few fine roots; slightly acid; clear wavy boundary.

C—22 to 26 inches; light brown (7.5YR 6/4) very gravelly sandy loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; about 45 percent pebbles; few fine roots; slightly acid; abrupt wavy boundary.

Cr—26 inches; weathered granite (grus).

The Bt horizon is very gravelly sandy clay loam or very gravelly clay loam. The C horizon is very gravelly or extremely gravelly sandy loam. The pebbles in these soils are ⅛ inch to 1½ inches in diameter.

Sphinx Series

The Sphinx series consists of shallow, somewhat excessively drained soils that formed in material weathered from granite of the Pikes Peak Formation. These soils are on mountainsides and ridges. Slopes are 15 to 70 percent. Elevations are 6,000 to 8,000 feet. The mean annual precipitation is 15 to 20 inches. The average annual air temperature is 46 degrees F, and the frost-free season is less than 90 days.

Sphinx soils are classified as sandy-skeletal, mixed, frigid, shallow Typic Ustorthents.

Typical pedon of Sphinx gravelly coarse sandy loam, 15 to 40 percent slopes; Douglas County, Colorado, approximately 2 miles south of Indian Creek Campground, along Highway 67, and 20 feet west of Sunset Point, sec. 23, T. 8 S., R. 69 W.

Oi—1 inch to 0; slightly decomposed needles, twigs, and other forest litter.

A—0 to 4 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common medium and fine roots; many fine interstitial pores; about 25 percent pebbles; slightly acid; clear smooth boundary.

AC—4 to 12 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand, brown and dark brown (10YR 4/3) moist; massive; slightly hard, friable,

nonsticky and nonplastic; few medium and fine roots; few fine interstitial pores; about 50 percent pebbles; strongly acid; abrupt wavy boundary.
Cr—12 to 60 inches; weathered granite (grus).

The depth to soft bedrock is 10 to 20 inches. The AC horizon is very gravelly or extremely gravelly loamy coarse sand or very gravelly or extremely gravelly coarse sand. The pebbles in these soils are ⅛ inch to 1½ inches in diameter.

Tecolote Series

The Tecolote series consists of deep, well drained soils that formed in cobbly or stony colluvium over weathered granitic rock. These soils are on mountainsides. Slopes are 15 to 70 percent. Elevations are 7,500 to 9,000 feet. The mean annual precipitation is 20 to 25 inches. The average annual air temperature is 46 degrees F, and the frost-free season is less than 75 days.

Tecolote soils are classified as loamy-skeletal, mixed Typic Eutroboralfs.

Typical pedon of Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony; El Paso County, Colorado, the northwest corner of sec. 29, T. 11 S., R. 67 W.

Oi—1 inch to 0; slightly decomposed needles and duff.
A—0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; about 30 percent pebbles, 15 percent cobbles, and 5 percent stones; common fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.
E—2 to 20 inches; very pale brown (10YR 7/3) very cobbly sandy loam, brown (10YR 5/3) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; about 30 percent pebbles and 20 percent cobbles; common fine roots; many fine interstitial pores; neutral; gradual wavy boundary.
B/E—20 to 30 inches; very cobbly sandy clay loam that has the colors characteristic of the E and B horizons; slightly hard, firm, sticky and plastic; about 35 percent pebbles and 20 percent cobbles; few fine roots; slightly acid; gradual wavy boundary.
Bt—30 to 45 inches; reddish brown (5YR 5/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; about 35 percent pebbles and 20 percent cobbles; few fine roots; moderately acid; abrupt wavy boundary.
Cr—45 to 60 inches; weathered granite (grus).

The solum ranges from 40 to 60 inches in thickness. It is moderately acid to neutral. The content of coarse fragments is 35 to 60 percent in the solum. The B horizon is very gravelly sandy clay loam or very cobbly sandy clay loam.

Tomah Series

The Tomah series consists of deep, well drained soils that formed in alluvium or in material weathered from arkose beds. These soils are on alluvial fans, hills, and ridges in the uplands. Slopes are 2 to 15 percent. Elevations are 7,300 to 7,800 feet. The mean annual precipitation is 17 to 22 inches. The average annual air temperature is 43 degrees F.

Tomah soils are classified as coarse-loamy, mixed Boralfic Argiborolls.

Typical pedon of Tomah sandy loam, 2 to 15 percent slopes; El Paso County, Colorado, about 1.5 miles west and 200 feet north of monument on Mt. Herman Road, sec. 17, T. 11 S., R. 67 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium granular structure; soft, loose, nonsticky and nonplastic; slightly acid; gradual smooth boundary.
E—10 to 18 inches; light gray (10YR 7/1) coarse sand, brown (10YR 5/3) moist; weak fine granular structure; soft, loose, nonsticky and nonplastic; slightly acid; clear wavy boundary.
Bt—18 to 35 inches; brown (10YR 5/3) loamy coarse sand, brown and dark brown (10YR 4/3) moist; weak fine subangular blocky structure; thin lamellae of sandy clay loam that has weak fine subangular blocky structure; loose (matrix) and hard (lamellae), loose (matrix) and friable (lamellae), nonsticky (matrix) and slightly sticky (lamellae), nonplastic (matrix) and slightly plastic (lamellae); few thin clay films on faces of peds; about 5 percent pebbles; slightly acid; gradual smooth boundary.
C—35 to 60 inches; pale brown (10YR 6/3) loamy coarse sand, grayish brown (10YR 5/2) moist; massive; hard, very friable, nonsticky and nonplastic; about 10 percent pebbles; neutral.

The solum ranges from 40 to 60 inches in thickness. It is slightly acid or neutral.

Tripit Series

The Tripit series consists of moderately deep, well drained soils that formed in calcareous sediments weathered from reddish sandstone, shale, and

limestone. These soils are on hills and ridges in the uplands. Slopes are 5 to 15 percent. Elevations are 7,800 to 8,400 feet. The mean annual precipitation is 18 to 22 inches. The average annual air temperature is 42 degrees F, and the frost-free season is less than 80 days.

Tripit soils are classified as fine-loamy, mixed Argic Cryoborolls.

Typical pedon of Tripit loam, 5 to 15 percent slopes; El Paso County, Colorado, about 1,300 feet east and 1,100 feet north of the southwest corner of sec. 32, T. 12 S., R. 68 W.

A—0 to 6 inches; reddish gray (5YR 5/2) loam, dark reddish brown (5YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Bt1—6 to 11 inches; reddish brown (5YR 5/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and plastic; few thin clay films on faces of peds; strongly effervescent; mildly alkaline; gradual smooth boundary.

Bt2—11 to 19 inches; reddish brown (2.5YR 5/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common thin clay films on faces of peds; about 10 percent limestone pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bt3—19 to 32 inches; reddish brown (2.5YR 5/4) gravelly sandy clay loam, dark reddish brown (2.5YR 3/4) moist, red (2.5YR 4/6) rubbed; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, friable, sticky and plastic; few thin clay films on faces of peds; about 15 percent limestone pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

C—32 to 38 inches; reddish brown (2.5YR 5/4) sandy clay loam, reddish brown (2.5YR 4/4) moist; massive; hard, friable, sticky and plastic; about 5 percent limestone pebbles; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—38 inches; weathered, reddish limestone interbedded with some shale.

The Bt horizon is sandy clay loam or gravelly sandy clay loam. The C horizon, if it occurs, is gravelly sandy loam, sandy clay loam, or gravelly loam.

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(3) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A fanlike area where a stream issues from a gorge onto a plain or where a tributary stream is near or at its junction with the main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. In profile back slopes are commonly steep, are linear, and may or may not include segments of cliffs.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Cirque. A semicircular, concave, bowllike area that has a steep face. It formed primarily as a result of glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Depth, soil. The depth of a soil to bedrock. The depth classes in this survey area are:

Shallow	less than 20 inches
Moderately deep	20 to 40 inches
Deep	more than 40 inches

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—These soils have very high and high hydraulic conductivity and low water-holding capacity. They are not suited to crop production unless irrigated.
Somewhat excessively drained.—These soils have high hydraulic conductivity and low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.
Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season for yields to be adversely affected.
Moderately well drained.—These soils are wet close enough to the surface or long enough for planting or harvesting operations or the yields of some field crops to be adversely affected unless artificial drainage is provided. Moderately well drained soils commonly are characterized by a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.
Somewhat poorly drained.—These soils are wet close enough to the surface or long enough for planting or harvesting operations or crop growth to be markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly are characterized by a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.
Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. The poor drainage is caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.
Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except for rice) unless the soil is artificially drained.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Felsenmeer. An assemblage of rock pieces above timberline.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. All browse and nonwoody plants available to livestock or game animals and used for grazing.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action. Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:
O horizon.—An organic layer of fresh and decaying plant residue.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon.—The mineral horizon in which the main

feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The rock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2 to 6 inches
Rapid	6 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plant association. The climax plant community type.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water. The following criteria were used to determine the runoff classes in this survey:

Slow.—The hydrologic group is A and the slope is 0 to 15 percent, the hydrologic group is B and the slope is 0 to 10 percent, the hydrologic group is C and the slope is 0 to 5 percent, or the hydrologic group is D and the slope is 0 to 3 percent.

Medium.—The hydrologic group is A and the slope is 15 to 40 percent, the hydrologic group is B and the slope is 10 to 30 percent, the hydrologic group is C and the slope is 5 to 15 percent, or the hydrologic group is D and the slope is 3 to 9 percent.

Rapid.—The hydrologic group is A and the slope is greater than 40 percent, the hydrologic group is B and the slope is greater than 30 percent, the hydrologic group is C and the slope is greater than 15 percent, or the hydrologic group is D and the slope is greater than 9 percent.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular.* Structureless soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or a very steep rock slope. These loose, broken rocks moved to their present position chiefly by falling, rolling, or sliding.

Tarn. A small mountain lake or pool, especially one that occupies an ice-gouged basin on the floor of a cirque.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Water erosion hazard. The following criteria, with K representing the erodibility factor, were used to determine the water erosion hazard on soils in this survey:

Slight.—The average slope is 0 to 15 percent and K is less than 0.35, or the average slope is 0 to 10 percent and K is greater than 0.35.

Moderate.—The average slope is 15 to 40 percent and K is less than 0.35, or the average slope is 10 to 25 percent and K is greater than 0.35.

Severe.—The average slope is greater than 40 percent and K is less than 0.35, or the average slope is greater than 25 percent and K is greater than 0.35.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Cheesman and Kassler, Colorado, and 1966-73 at Victor, Colorado)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
CHEESMAN:											
January----	45.8	9.3	27.6	66	-24	26	0.43	0.14	0.66	2	5.4
February---	48.2	11.1	29.7	67	-22	24	.61	.27	.89	2	8.0
March------	51.1	16.9	34.0	71	-12	51	1.22	.70	1.66	4	14.1
April------	59.0	25.9	42.5	76	3	143	1.64	.84	2.36	4	12.0
May--------	68.2	34.1	51.2	84	19	347	2.05	.77	3.12	5	1.4
June-------	79.4	42.3	60.9	93	29	627	1.36	.56	2.05	4	.1
July-------	84.4	47.6	66.0	95	39	806	2.70	1.80	3.52	8	.0
August-----	82.0	46.0	64.0	92	36	744	2.38	1.05	3.50	7	.0
September--	76.5	38.4	57.5	90	23	525	1.15	.36	1.80	3	1.9
October----	67.0	28.5	47.8	83	10	256	1.07	.25	1.72	3	4.1
November---	53.5	18.8	36.2	73	-7	62	.80	.35	1.18	2	10.3
December---	47.4	13.1	30.3	67	-15	26	.59	.18	.92	2	8.9
Yearly:											
Average---	63.5	27.7	45.6	---	---	---	---	---	---	---	---
Extreme---	---	---	---	95	-29	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,637	16.00	13.27	18.61	46	66.2
KASSLER:											
January----	46.6	16.5	31.6	69	-16	62	.57	.22	.86	2	9.9
February---	50.0	20.2	35.1	72	-10	74	.82	.35	1.21	3	13.2
March------	53.4	24.5	39.0	77	-7	120	1.50	.87	2.05	5	18.3
April------	62.9	33.9	48.4	82	9	269	2.04	.91	3.00	5	12.0
May--------	71.6	43.6	57.6	88	26	546	3.01	1.16	4.55	6	.3
June-------	82.5	52.7	67.6	98	36	828	1.59	.52	2.48	4	.0
July-------	87.6	59.1	73.4	98	47	1,035	1.78	.80	2.61	5	.0
August-----	85.4	57.6	71.5	97	44	977	1.37	.59	2.02	4	.0
September--	78.5	48.9	63.7	93	31	711	1.39	.34	2.21	3	1.2
October----	68.3	38.3	53.3	86	16	422	1.29	.30	2.06	3	4.3
November---	55.0	26.2	40.6	77	-3	119	1.02	.49	1.47	3	11.3
December---	48.7	19.8	34.3	70	-10	57	.70	.21	1.09	2	10.3
Yearly:											
Average---	65.9	36.8	51.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	-19	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,220	17.08	13.39	20.53	45	80.8

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
VICTOR:											
January----	34.5	13.9	24.2	53	-18	0	0.35	0.08	0.55	1	7.2
February---	35.5	13.6	24.6	49	-11	0	.33	.14	.47	2	7.7
March------	39.1	17.5	28.3	57	-9	28	.60	.13	.98	2	7.3
April------	45.8	22.4	34.1	65	-2	36	1.37	.40	2.15	4	16.9
May--------	55.9	32.7	44.3	71	11	170	1.67	1.01	2.25	5	3.3
June-------	65.9	41.3	53.6	79	25	408	1.59	.53	2.46	5	.1
July-------	71.4	47.4	59.4	81	35	601	4.84	2.20	7.09	11	.0
August-----	69.1	45.6	57.4	77	33	539	3.66	2.64	4.60	10	.0
September--	62.4	38.1	50.3	73	17	315	1.55	1.04	2.01	5	.4
October----	52.5	29.0	40.8	67	5	143	1.08	.27	1.72	3	11.9
November---	41.6	21.2	31.4	58	0	9	.36	.21	.49	2	8.0
December---	33.7	12.7	23.2	50	-10	0	.47	.04	.77	2	8.7
Yearly:											
Average---	50.6	28.0	39.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	82	-18	---	---	---	---	---	---
Total-----	---	---	---	---	---	2,249	17.87	13.78	23.82	52	71.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
CHEESMAN:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 26	June 5	June 18
2 years in 10 later than--	May 19	May 31	June 12
5 years in 10 later than--	May 6	May 19	June 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 22	Sept. 13	Sept. 2
2 years in 10 earlier than--	Sept. 28	Sept. 18	Sept. 8
5 years in 10 earlier than--	Oct. 9	Sept. 28	Sept. 18
KASSLER:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 1	May 11	May 27
2 years in 10 later than--	Apr. 26	May 6	May 21
5 years in 10 later than--	Apr. 16	Apr. 27	May 11
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 11	Oct. 1	Sept. 20
2 years in 10 earlier than--	Oct. 16	Oct. 6	Sept. 25
5 years in 10 earlier than--	Oct. 25	Oct. 16	Oct. 6

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
VICTOR:			
Last freezing temperature in spring:			
1 year in 10 later than--	June 13	June 21	June 21
2 years in 10 later than--	June 6	June 14	June 16
5 years in 10 later than--	May 24	May 30	June 5
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 15	Sept. 7	Aug. 9
2 years in 10 earlier than--	Sept. 20	Sept. 12	Aug. 18
5 years in 10 earlier than--	Oct. 1	Sept. 20	Sept. 3

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
CHEESMAN:			
9 years in 10	124	103	80
8 years in 10	135	112	89
5 years in 10	156	131	106
2 years in 10	176	149	124
1 year in 10	187	158	133
KASSLER:			
9 years in 10	173	151	126
8 years in 10	179	158	133
5 years in 10	191	172	146
2 years in 10	203	186	160
1 year in 10	209	193	167
VICTOR:			
9 years in 10	106	83	64
8 years in 10	114	93	73
5 years in 10	129	112	89
2 years in 10	145	132	105
1 year in 10	153	142	114

TABLE 4.--PLANT ASSOCIATIONS AND POTENTIAL PRODUCTION

(Absence of an entry indicates that the soil does not support significant amounts of the stated vegetation)

Soil name and map symbol	Plant associations	Potential annual timber production	Potential annual forage production
		Cu ft/ac/yr	Lbs/ac/yr
1---------- Alamosa	---	---	2,500-3,700
2---------- Aquolls	---	---	2,000-3,500
3, 4:			
Boyett--------	Ponderosa pine/mountainmahogany----------	42	400-700
Frenchcreek---	Ponderosa pine/mountainmahogany----------	---	500-900
5, 6---------- Catamount	Engelmann spruce/moss----------	26	50-100
7:			
Catamount-----	Engelmann spruce/moss----------	26	50-100
Rock outcrop.*			
8---------- Cathedral	Ponderosa pine/Gambel oak----------	30	100-175
	Douglas-fir/Gambel oak on north aspects--------	20	---
9.* Cirque land			
10, 11--------- Condie	Douglas-fir/Arizona fescue----------	30	400-800
12:			
Fortwingate---	Ponderosa pine/Gambel oak----------	32	325-575
Rock outcrop.*			
13, 14--------- Garber	Quaking aspen/common juniper----------	36	1,000-2,500
	Douglas-fir/Gambel oak on the drier sites------	---	---
15, 16--------- Guffey	Douglas-fir/kinnikinnick----------	29	200-350
17---------- Herbman	Engelmann spruce/moss----------	23	200-450
18:			
Herbman-------	Engelmann spruce/moss----------	23	200-450
Rock outcrop.*			
19, 20--------- Ivywild	Engelmann spruce/moss----------	60	150-325
21:			
Ivywild-------	Engelmann spruce/moss----------	60	150-325
Catamount-----	Engelmann spruce/moss----------	26	50-100

See footnote at end of table.

TABLE 4.--PLANT ASSOCIATIONS AND POTENTIAL PRODUCTION--Continued

Soil name and map symbol	Plant associations	Potential annual timber production	Potential annual forage production
		Cu ft/ac/yr	Lbs/ac/yr
22---------- Kassler	Ponderosa pine/common juniper/kinnikinnick-----	39	900-2,000
23---------- Kutch	Western wheatgrass/blue grama----------	---	900-1,600
24, 25--------- Legault	Douglas-fir/kinnikinnick----------	24	150-250
26: Legault-------	Douglas-fir/kinnikinnick----------	24	150-250
Rock outcrop.*			
27: Palboone------	Douglas-fir/mountain ninebark----------	32	350-650
Security------	Douglas-fir/mountain ninebark----------	**	**
28: Palboone------	Douglas-fir/mountain ninebark----------	32	350-650
Security------	Douglas-fir/mountain ninebark----------	**	**
29, 30--------- Pendant	Ponderosa pine/mountainmahogany----------	30	250-450
31: Pendant-------	Ponderosa pine/mountainmahogany----------	30	250-450
Rock outcrop.*			
32---------- Perrypark	Bluestem/blue grama----------	---	1,000-2,500
33: Rock outcrop.*			
Catamount-----	Engelmann spruce/moss----------	26	50-100
34: Rock outcrop.*			
Security------	Ponderosa pine/Gambel oak----------	45	200-550
Cathedral-----	Ponderosa pine/Gambel oak----------	30	175-350
35: Rock outcrop.*			
Sphinx--------	Ponderosa pine/common juniper----------	29	150-300
36: Rock outcrop.*			
Sphinx--------	Ponderosa pine/common juniper----------	29	100-200
37: Sachett-------	Kobresia/dwarf clover----------	---	500-900
Rock outcrop.*			

See footnote at end of table.

TABLE 4.--PLANT ASSOCIATIONS AND POTENTIAL PRODUCTION--Continued

Soil name and map symbol	Plant associations	Potential annual timber production	Potential annual forage production
		Cu ft/ac/yr	Lbs/ac/yr
38, 39--------- Security	Ponderosa pine/Gambel oak----------	45	300-550
40: Security------	Ponderosa pine/Gambel oak----------	45	300-550
Cathedral-----	Ponderosa pine/Gambel oak----------	30	175-350
41: Security------	Ponderosa pine/Gambel oak----------	45	300-550
Cathedral-----	Ponderosa pine/Gambel oak----------	30	175-350
Rock outcrop.*			
42, 43--------- Sphinx	Ponderosa pine/kinnikinnick/common juniper-----	29	150-300
44, 45--------- Sphinx	Ponderosa pine/common juniper----------	25	100-200
46: Sphinx--------	Ponderosa pine/kinnikinnick/common juniper-----	29	150-300
Rock outcrop.*			
47: Sphinx--------	Ponderosa pine/common juniper----------	25	100-200
Rock outcrop.*			
48, 49--------- Tecolote	Douglas-fir/Gambel oak----------	32	300-600
50---------- Tomah	---	---	900-2,200
51---------- Tripit	---	32	800-2,000

* Supports little, if any, vegetation.
** Data unknown.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Douglas County	El Paso County	Jefferson County	Teller County	Total	
						Area	Extent
		Acres	Acres	Acres	Acres	Acres	Pct
1	Alamosa loam, 0 to 6 percent slopes	440	0	0	0	440	0.1
2	Aquolls, 1 to 10 percent slopes	3,000	3,187	1,262	3,500	10,949	2.3
3	Boyett-Frenchcreek complex, 2 to 15 percent slopes	0	1,104	0	5,090	6,194	1.3
4	Boyett-Frenchcreek complex, 15 to 40 percent slopes	0	510	0	1,010	1,520	0.3
5	Catamount gravelly sandy loam, 5 to 40 percent slopes	0	1,400	0	2,184	3,584	0.8
6	Catamount gravelly sandy loam, 40 to 70 percent slopes	0	1,089	0	2,800	3,889	0.8
7	Catamount-Rock outcrop complex, 15 to 70 percent slopes	0	4,100	0	10,777	14,877	3.2
8	Cathedral gravelly sandy loam, 40 to 65 percent slopes, extremely stony	502	0	0	0	502	0.1
9	Cirque land, 15 to 75 percent slopes	0	6,166	0	9,039	15,205	3.3
10	Condie coarse sandy loam, 2 to 15 percent slopes	0	2,000	0	566	2,566	0.6
11	Condie coarse sandy loam, 15 to 40 percent slopes	0	1,150	0	436	1,586	0.3
12	Fortwingate-Rock outcrop complex, 15 to 60 percent slopes	0	1,607	0	0	1,607	0.3
13	Garber very gravelly coarse sandy loam, 2 to 15 percent slopes	859	714	0	341	1,914	0.4
14	Garber very gravelly coarse sandy loam, 15 to 40 percent slopes	1,800	523	0	835	3,158	0.7
15	Guffey very gravelly sandy loam, 5 to 40 percent slopes	2,932	0	0	0	2,932	0.6
16	Guffey very gravelly sandy loam, 40 to 60 percent slopes	3,107	0	0	0	3,107	0.7
17	Herbman very gravelly sandy loam, 15 to 40 percent slopes	128	950	0	450	1,528	0.3
18	Herbman-Rock outcrop complex, 15 to 40 percent slopes	0	936	0	586	1,522	0.3
19	Ivywild gravelly sandy loam, 5 to 40 percent slopes	0	0	0	387	387	0.1
20	Ivywild gravelly sandy loam, 40 to 70 percent slopes	0	0	0	613	613	0.1
21	Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery	0	6,055	0	12,102	18,157	3.9
22	Kassler very gravelly coarse sandy loam, 5 to 35 percent slopes	600	53	0	0	653	0.1
23	Kutch clay loam, 10 to 40 percent slopes	60	152	0	0	212	*
24	Legault very gravelly coarse sandy loam, 5 to 40 percent slopes	5,139	780	0	2,500	8,419	1.8
25	Legault very gravelly coarse sandy loam, 40 to 65 percent slopes	4,000	700	0	2,815	7,515	1.6
26	Legault-Rock outcrop complex, 15 to 65 percent slopes	6,950	450	0	4,800	12,200	2.6
27	Palboone-Security complex, 15 to 40 percent slopes	217	0	0	0	217	0.1
28	Palboone-Security complex, 40 to 70 percent slopes	1,945	0	0	0	1,945	0.4
29	Pendant cobbly loam, 15 to 40 percent slopes	895	1,915	0	0	2,810	0.6
30	Pendant cobbly loam, 40 to 70 percent slopes	498	1,010	0	0	1,508	0.3
31	Pendant-Rock outcrop complex, 15 to 70 percent slopes	2,950	982	0	0	3,932	0.8
32	Perrypark coarse sandy loam, 1 to 15 percent slopes	0	363	0	0	363	0.1
33	Rock outcrop-Catamount complex, 15 to 70 percent slopes	0	1,980	0	2,507	4,487	1.0

See footnote at end of table.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Douglas County	El Paso County	Jefferson County	Teller County	Total	
						Area	Extent
		Acres	Acres	Acres	Acres	Acres	Pct
34	Rock outcrop-Security-Cathedral complex, 15 to 65 percent slopes	887	0	0	0	887	0.2
35	Rock outcrop-Sphinx complex, 15 to 80 percent slopes	6,671	6,990	1,880	9,987	25,528	5.5
36	Rock outcrop-Sphinx, warm, complex, 15 to 80 percent slopes	3,375	5,108	1,156	4,095	13,734	2.9
37	Sachett-Rock outcrop complex, 5 to 70 percent slopes	0	3,709	0	0	3,709	0.8
38	Security very gravelly coarse sandy loam, 5 to 40 percent slopes	1,609	0	0	0	1,609	0.3
39	Security very gravelly coarse sandy loam, 40 to 65 percent slopes	2,407	0	0	0	2,407	0.5
40	Security-Cathedral complex, 40 to 65 percent slopes, very stony	2,581	0	0	0	2,581	0.6
41	Security-Cathedral-Rock outcrop complex, 15 to 65 percent slopes, very stony	1,830	0	0	0	1,830	0.4
42	Sphinx gravelly coarse sandy loam, 15 to 40 percent slopes	28,382	9,900	5,940	10,800	55,022	11.8
43	Sphinx gravelly coarse sandy loam, 40 to 70 percent slopes	19,209	12,100	4,440	10,110	45,859	9.8
44	Sphinx gravelly coarse sandy loam, warm, 15 to 40 percent slopes	4,612	12,006	2,187	7,570	26,375	5.6
45	Sphinx gravelly coarse sandy loam, warm, 40 to 70 percent slopes	3,848	9,830	2,287	6,430	22,395	4.8
46	Sphinx-Rock outcrop complex, 15 to 80 percent slopes	40,472	12,180	10,000	25,260	87,912	18.8
47	Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes	5,086	11,860	3,093	12,380	32,419	6.9
48	Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony	0	4,446	0	0	4,446	1.0
49	Tecolote very gravelly sandy loam, 40 to 70 percent slopes, very stony	0	772	0	0	772	0.2
50	Tomah sandy loam, 2 to 15 percent slopes	0	190	0	0	190	*
51	Tripit loam, 5 to 15 percent slopes	0	145	0	0	145	*
	Total	156,991	129,112	32,245	149,970	468,318	100.0

* Less than 0.1 percent.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for the production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
3:									
Boyett	3S	Slight	Moderate	Slight	Slight	Slight	Ponderosa pine	55	Ponderosa pine.
Frenchcreek	---	Slight	Slight	Moderate	Slight	Moderate	Ponderosa pine	---	
4:									
Boyett	3S	Moderate	Moderate	Slight	Slight	Slight	Ponderosa pine	55	Ponderosa pine.
Frenchcreek	---	Moderate	Moderate	Moderate	Slight	Moderate	Ponderosa pine	---	
5--- Catamount	2D	Moderate	Moderate	Moderate	Moderate	Slight	Douglas-fir Limber pine Englemann spruce	45 --- 40	Douglas-fir, Engelmann spruce, limber pine.
6--- Catamount	2R	Severe	Severe	Severe	Moderate	Slight	Douglas-fir Limber pine Englemann spruce	45 --- 40	Douglas-fir, Engelmann spruce, limber pine.
7:									
Catamount	2R	Severe	Severe	Severe	Moderate	Slight	Douglas-fir Limber pine Engleman spruce	45 --- 40	Douglas-fir, Engelmann spruce, limber pine.
Rock outcrop.									
8--- Cathedral	2R	Severe	Severe	Severe	Severe	Severe	Ponderosa pine Douglas-fir	40 ---	---
10--- Condie	2S	Slight	Slight	Slight	Slight	Moderate	Quaking aspen Douglas-fir Ponderosa pine	55 45 ---	Douglas-fir.
11--- Condie	2S	Moderate	Moderate	Slight	Slight	Moderate	Quaking aspen Douglas-fir Ponderosa pine	55 45 ---	Douglas-fir.
12:									
Fortwingate	2R	Severe	Moderate	Slight	Moderate	Moderate	Ponderosa pine	45	---
Rock outcrop.									
13--- Garber	2S	Slight	Slight	Moderate	Slight	Moderate	Quaking aspen Douglas-fir Ponderosa pine	65 65 65	Douglas-fir, ponderosa pine.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
14---------- Garber	2S	Moderate	Moderate	Moderate	Slight	Moderate	Quaking aspen------- Douglas-fir--------- Ponderosa pine------	65 65 65	Douglas-fir, ponderosa pine.
15---------- Guffey	2S	Moderate	Slight	Moderate	Slight	Slight	Douglas-fir---------	40	Douglas-fir.
16---------- Guffey	2R	Severe	Moderate	Slight	Moderate	Slight	Douglas-fir---------	40	Douglas-fir.
17---------- Herbman	2D	Moderate	Slight	Severe	Moderate	Slight	Quaking aspen------- Limber pine---------	50 ---	Engelmann spruce.
18: Herbman---------- Rock outcrop.	2D	Moderate	Slight	Severe	Moderate	Slight	Quaking aspen------- Limber pine---------	50 ---	Engelmann spruce.
19---------- Ivywild	4S	Moderate	Moderate	Moderate	Moderate	Slight	Engelmann spruce---- Douglas-fir--------- Quaking aspen------- Lodgepole pine------	70 50 --- ---	Douglas-fir.
20---------- Ivywild	4R	Severe	Severe	Moderate	Moderate	Slight	Engelmann spruce---- Douglas-fir--------- Quaking aspen------- Lodgepole pine------	70 50 --- ---	Douglas-fir.
21: Ivywild----------	4R	Moderate	Moderate	Moderate	Moderate	Slight	Engelmann spruce---- Douglas-fir--------- Quaking aspen------- Lodgepole pine------	70 50 --- ---	Douglas-fir.
Catamount---------	2R	Moderate	Moderate	Moderate	Moderate	Slight	Douglas-fir--------- Limber pine--------- Engelmann spruce----	40 --- 40	Douglas-fir, Engelmann spruce, limber pine.
22---------- Kassler	3S	Moderate	Moderate	Moderate	Slight	Slight	Ponderosa pine------	50	Ponderosa pine.
24---------- Legault	2D	Moderate	Moderate	Moderate	Severe	Slight	Douglas-fir--------- Engelmann spruce---- Lodgepole pine------	40 45 ---	Douglas-fir, Engelmann spruce.
25---------- Legault	2R	Severe	Severe	Moderate	Severe	Slight	Douglas-fir--------- Engelmann spruce---- Lodgepole pine------	40 45 ---	Douglas-fir, Engelmann spruce.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
26:									
Legault	2R	Severe	Severe	Moderate	Severe	Slight	Douglas-fir Engelmann spruce Lodgepole pine	40 45 ---	Douglas-fir, Engelmann spruce.
Rock outcrop.									
27:									
Palboone	2S	Moderate	Moderate	Slight	Slight	Moderate	Douglas-fir Ponderosa pine	45 ---	Douglas-fir.
Security	2F	Moderate	Moderate	Moderate	Moderate	Moderate	Douglas-fir	40	---
28:									
Palboone	2R	Severe	Severe	Slight	Slight	Moderate	Douglas-fir Ponderosa pine	45 ---	Douglas-fir.
Security	2R	Severe	Severe	Moderate	Moderate	Moderate	Douglas fir	40	---
29--Pendant	2D	Moderate	Moderate	Severe	Severe	Moderate	Ponderosa pine	40	Ponderosa pine.
30--Pendant	2R	Severe	Severe	Severe	Severe	Moderate	Ponderosa pine	40	Ponderosa pine.
31:									
Pendant	2R	Severe	Severe	Severe	Severe	Moderate	Ponderosa pine	40	Ponderosa pine.
Rock outcrop.									
33:									
Rock outcrop.									
Catamount	2R	Severe	Severe	Severe	Moderate	Slight	Douglas-fir Limber pine Engelmann spruce	40 --- 40	Douglas-fir, Engelmann spruce, limber pine.
34:									
Rock outcrop.									
Security	3R	Moderate	Moderate	Moderate	Moderate	Moderate	Ponderosa pine Douglas-fir	60 40	---
Cathedral	2R	Severe	Severe	Moderate	Severe	Moderate	Ponderosa pine Douglas-fir	40 ---	---
35, 36:									
Rock outcrop.									

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
35, 36: Sphinx	2R	Severe	Moderate	Severe	Moderate	Slight	Ponderosa pine	40	Ponderosa pine, Douglas-fir.
38---------- Security	3F	Moderate	Moderate	Moderate	Moderate	Moderate	Ponderosa pine Douglas-fir	60 50	---
39---------- Security	3R	Severe	Severe	Moderate	Moderate	Moderate	Ponderosa pine	60	---
40: Security----------	3R	Severe	Severe	Moderate	Moderate	Moderate	Ponderosa pine	60	---
Cathedral---------	2R	Severe	Severe	Severe	Severe	Severe	Ponderosa pine	40	---
41: Security----------	3R	Severe	Severe	Moderate	Moderate	Moderate	Ponderosa pine	60	---
Cathedral--------- Rock outcrop.	2R	Severe	Severe	Severe	Severe	Severe	Ponderosa pine	40	---
42---------- Sphinx	2D	Moderate	Slight	Severe	Moderate	Slight	Ponderosa pine	40	Douglas-fir.
43---------- Sphinx	2R	Severe	Moderate	Severe	Moderate	Slight	Ponderosa pine	40	Ponderosa pine, Douglas-fir.
44---------- Sphinx	2D	Moderate	Slight	Severe	Moderate	Slight	Ponderosa pine	40	Ponderosa pine, Douglas-fir.
45---------- Sphinx	2R	Severe	Moderate	Severe	Moderate	Slight	Ponderosa pine	40	Ponderosa pine, Douglas-fir.
46, 47: Sphinx---------- Rock outcrop.	2R	Severe	Moderate	Severe	Moderate	Slight	Ponderosa pine	40	Ponderosa pine, Douglas-fir.
48---------- Tecolote	2F	Moderate	Moderate	Moderate	Slight	Moderate	Douglas-fir	45	Douglas-fir, ponderosa pine.
49---------- Tecolote	2R	Severe	Severe	Moderate	Slight	Moderate	Douglas fir	45	Ponderosa pine, Douglas-fir.
51---------- Tripit	2S	Slight	Slight	Moderate	Slight	Severe	Ponderosa pine	45	Ponderosa pine.

TABLE 7.--RECREATIONAL DEVELOPMENT

Soil name and map symbol	Camp areas	Picnic areas	Paths and trails
1---------- Alamosa	Severe: flooding, wetness, excess salt.	Severe: excess salt.	Moderate: wetness, flooding.
2---------- Aquolls	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
3:			
Boyett----------	Moderate: slope.	Moderate: slope.	Slight.
Frenchcreek----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Slight.
4:			
Boyett----------	Severe: slope.	Severe: slope.	Severe: slope.
Frenchcreek----------	Severe: slope.	Severe: slope.	Moderate: slope.
5---------- Catamount	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
6---------- Catamount	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
7:			
Catamount----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.			
8---------- Cathedral	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
9. Cirque land			
10---------- Condie	Moderate: slope.	Moderate: slope.	Slight.
11---------- Condie	Severe: slope.	Severe: slope.	Severe: slope.
12:			
Fortwingate----------	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Rock outcrop.			
13---------- Garber	Severe: small stones.	Severe: small stones.	Severe: small stones.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Paths and trails
14--- Garber	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
15--- Guffey	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
16--- Guffey	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
17--- Herbman	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
18: Herbman---	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
Rock outcrop.			
19--- Ivywild	Severe: slope, too acid.	Severe: slope, too acid.	Moderate: slope.
20--- Ivywild	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope.
21: Ivywild---	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope.
Catamount---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
22--- Kassler	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
23--- Kutch	Severe: slope.	Severe: slope.	Moderate: slope.
24--- Legault	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
25--- Legault	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Paths and trails
26:			
Legault	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, droughty.
Rock outcrop.			
27, 28:			
Palboone	Severe: slope.	Severe: slope.	Severe: slope.
Security	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
29, 30	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Pendant			
31:			
Pendant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.			
32	Moderate: slope.	Moderate: slope.	Slight.
Perrypark			
33:			
Rock outcrop.			
Catamount	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
34:			
Rock outcrop.			
Security	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.
Cathedral	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones
35, 36:			
Rock outcrop.			
Sphinx	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
37:			
Sachett	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.			

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Paths and trails
38--- Security	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
39--- Security	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
40: Security---	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Cathedral---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
41: Security---	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Cathedral---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
Rock outcrop.			
42, 43, 44, 45--- Sphinx	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
46: Sphinx---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
Rock outcrop.			
47: Sphinx---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.
Rock outcrop.			
48, 49--- Tecolote	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.
50--- Tomah	Moderate: slope.	Moderate: slope.	Severe: slope.
51--- Tripit	Moderate: slope.	Moderate: slope.	Severe: slope.

TABLE 8.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
1---------- Alamosa	Moderate: seepage, slope.	Severe: thin layer, wetness.	Severe: slow refill, cutbanks cave.	Flooding, frost action, slope.	Wetness, slope, flooding.	Wetness.
2---------- Aquolls	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Flooding, frost action, slope.	Slope, wetness, soil blowing.	Wetness, soil blowing.
3, 4:						
Boyett----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing, rooting depth.	Slope, soil blowing.
Frenchcreek------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, too sandy.
5, 6---------- Catamount	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, rooting depth.	Slope, depth to rock, too sandy.
7:						
Catamount--------	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, rooting depth.	Slope, depth to rock, too sandy.
Rock outcrop.						
8---------- Cathedral	Severe: depth to rock, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
9. Cirque land						
10, 11---------- Condie	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, soil blowing, slope.	Slope, soil blowing.
12:						
Fortwingate------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.
Rock outcrop.						
13, 14---------- Garber	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, slope.	Slope.
15, 16---------- Guffey	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.
17---------- Herbman	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock.	Slope, large stones, depth to rock.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
18: Herbman	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock.	Slope, large stones, depth to rock.
Rock outcrop.						
19, 20 Ivywild	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.
21: Ivywild	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.
Catamount	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, too sandy.
22 Kassler	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, slope.	Slope, too sandy.
23 Kutch	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock.
24, 25 Legault	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock, too sandy.
26: Legault	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock, too sandy.
Rock outcrop.						
27, 28: Palboone	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope	Slope.
Security	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.
29, 30 Pendant	Severe: depth to rock, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.
31: Pendant	Severe: depth to rock, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.
Rock outcrop.						
32 Perrypark	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing, slope.	Slope, soil blowing.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
33: Rock outcrop.						
Catamount	Severe: depth to rock, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, depth to rock, rooting depth.	Slope, depth to rock, too sandy.
34: Rock outcrop.						
Security	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.
Cathedral	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.
35, 36: Rock outcrop.						
Sphinx	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.
37: Sachett	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.
Rock outcrop.						
38, 39 Security	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Slope, depth to rock.
40: Security	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.
Cathedral	Severe: depth to rock, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty, depth to rock.	Slope, large stones, depth to rock.
41: Security	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.
Cathedral	Severe: depth to rock, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Rock outcrop.						
42, 43, 44, 45 Sphinx	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.

TABLE 8.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
46: Sphinx	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.
Rock outcrop.						
47: Sphinx	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.
Rock outcrop.						
48, 49 Tecolote	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Slope, large stones, droughty.	Slope, large stones.
50: Tomah	Severe: slope.	Slight	Severe: no water.	Deep to water	Soil blowing	Slope, too sandy, soil blowing.
51: Tripit	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.

TABLE 9.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1----------	0-6	Loam----------	CL-ML	A-4	0	90-100	80-100	80-95	55-75	25-30	5-10
Alamosa	6-24	Clay loam, loam, sandy clay loam.	CL	A-6	0	90-100	80-100	80-100	65-80	30-40	15-25
	24-60	Loam, sandy loam, loamy sand.	ML, SM, CL-ML, SM-SC	A-4, A-2	0	85-100	75-100	50-90	15-70	15-30	NP-10
2----------	0-12	Fine sandy loam	SM	A-2, A-4	0-10	90-100	80-100	45-85	25-45	20-30	NP-5
Aquolls	12-50	Loamy fine sand, very fine sandy loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0-10	70-100	60-100	40-85	20-45	20-30	NP-5
	50-60	Very gravelly loamy coarse sand, coarse sand.	SP, GP, SP-SM, GP-GM	A-1	5-20	35-65	30-55	0-30	0-10	---	NP
3:											
Boyett----------	0-5	Sandy loam-------	SM	A-2, A-4	0-5	80-100	75-90	50-70	25-50	---	NP
	5-9	Coarse sandy loam, gravelly coarse sandy loam.	SM	A-2, A-4	0-5	65-90	60-85	45-65	25-50	---	NP
	9-34	Gravelly sandy loam, gravelly loam.	SM, GM	A-2, A-4, A-1	0-5	60-75	55-70	40-60	15-40	20-25	NP-5
	34-53	Gravelly sandy loam, gravelly coarse sand, sandy loam.	SM, SP-SM	A-2, A-1	0-5	55-95	50-90	20-50	5-35	20-25	NP-5
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Frenchcreek-----	0-4	Gravelly sandy loam.	SM, GM	A-2, A-4	0-5	60-85	50-75	40-60	20-40	20-25	NP-5
	4-14	Gravelly sandy loam, very gravelly sandy loam.	SM, GM	A-1, A-2	0-5	50-70	40-60	35-50	20-35	20-25	NP-5
	14-30	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM, SM	A-1	0-5	40-60	25-50	20-35	10-20	20-25	NP-5
	30-60	Very gravelly loamy sand.	GP-GM, SP-SM	A-1	0-5	35-60	25-50	10-40	5-15	---	NP

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
4:											
Boyett----------	0-5	Sandy loam-------	SM	A-2, A-4	0-5	80-100	75-90	50-70	25-50	---	NP
	5-9	Coarse sandy loam, gravelly coarse sandy loam.	SM	A-2, A-4	0-5	65-90	60-85	45-65	25-50	---	NP
	9-34	Gravelly sandy loam, gravelly loam.	SM, GM	A-2, A-4, A-1	0-5	60-75	55-70	40-60	15-40	20-25	NP-5
	34-53	Gravelly sandy loam, gravelly coarse sand, sandy loam.	SM, SP-SM	A-2, A-1	0-5	55-95	50-90	20-50	5-35	20-25	NP-5
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Frenchcreek-----	0-4	Gravelly sandy loam.	SM, GM	A-2, A-4	0-5	60-85	50-75	40-60	20-40	20-25	NP-5
	4-14	Gravelly sandy loam, very gravelly sandy loam.	SM, GM	A-1, A-2	0-5	50-70	40-60	35-50	20-35	20-25	NP-5
	14-30	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM, SM	A-1	0-5	40-60	25-50	20-35	10-20	20-25	NP-5
	30-60	Very gravelly loamy sand.	GP-GM, SP-SM	A-1	0-5	35-60	25-50	10-40	5-15	---	NP
5, 6---------- Catamount	0-2	Gravelly sandy loam.	SM	A-1, A-2	0-5	60-70	50-60	30-45	15-35	20-30	NP-5
	2-8	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM	A-1	0-5	30-50	25-40	20-30	10-25	20-25	NP-5
	8-12	Extremely gravelly loamy sand, very gravelly coarse sandy loam.	GP-GM, GM	A-1	0-5	30-50	20-40	15-30	5-20	20-25	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
7:											
Catamount-------	0-2	Gravelly sandy loam.	SM	A-1, A-2	0-5	60-70	50-60	30-45	15-35	20-30	NP-5
	2-8	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM	A-1	0-5	30-50	25-40	20-30	10-25	20-25	NP-5
	8-12	Extremely gravelly loamy sand, very gravelly coarse sandy loam.	GP-GM, GM	A-1	0-5	30-50	20-40	15-30	5-20	20-25	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8---------- Cathedral	0-3	Gravelly sandy loam.	SM	A-1	0-15	80-95	60-65	25-35	15-25	15-20	NP-5
	3-12	Very gravelly sandy loam, extremely gravelly sandy loam.	GP-GM, SP-SM, SM, GM	A-1	0-30	20-75	15-50	15-35	5-20	15-20	NP-5
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9. Cirque land											
10, 11---------- Condie	0-8	Coarse sandy loam	SM	A-1, A-2	0-5	90-100	75-90	20-50	10-35	15-20	NP-5
	8-30	Very gravelly coarse sandy loam.	SM, GM, SM-SC, GM-GC	A-1, A-2	0-5	40-60	30-50	15-30	5-25	15-25	NP-10
	30-40	Extremely gravelly sandy clay loam, very gravelly coarse sandy loam.	SC, GC, SM-SC, GM-GC	A-2	0-5	30-60	20-50	15-30	5-15	20-30	5-15
	40-60	Extremely gravelly coarse sandy loam, very gravelly sandy clay loam.	SM-SC, GM-GC	A-2	0-5	30-60	20-50	15-30	5-15	20-25	5-10
12: Fortwingate-----	0-5	Loam----------	CL	A-6	0-5	90-100	85-100	80-95	60-75	30-35	10-15
	5-21	Clay, clay loam	CL	A-7	5-10	90-100	85-95	80-90	70-80	40-50	20-25
	21-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13, 14---------- Garber	0-6	Very gravelly coarse sandy loam.	SM, GM, SP-SM, GP-GM	A-1	0-5	40-70	30-50	20-40	10-20	20-25	NP-5
	6-18	Very gravelly coarse sandy loam, very gravelly sandy loam.	SM, GM, GP-GM, SP-SM	A-1	0-5	40-70	25-50	15-35	5-20	20-25	NP-5
	18-42	Extremely gravelly coarse sandy loam, very gravelly sandy loam.	SM, GM, GP-GM, SP-SM	A-1	0-5	30-70	20-50	10-30	5-15	20-25	NP-5
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
15, 16---------- Guffey	0-12	Very gravelly sandy loam.	SM, SP-SM, GM, GP-GM	A-1	0-30	40-70	30-55	20-35	10-20	20-25	NP-5
	12-26	Extremely gravelly sandy clay loam, very gravelly sandy clay loam.	GC, GP-GC, SC, SP-SC	A-1, A-2	0-5	50-80	15-30	5-25	5-15	25-35	5-15
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
17---------- Herbman	0-9	Very gravelly sandy loam.	GM	A-1	5-10	30-50	30-50	20-50	10-25	15-20	NP-5
	9-15	Very gravelly sandy loam, very gravelly loam, extremely gravelly sandy loam.	GM	A-1, A-2	5-25	35-50	30-50	20-40	10-30	15-20	NP-5
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
18: Herbman---------	0-9	Very gravelly sandy loam.	GM	A-1	5-10	30-50	30-50	20-50	10-25	15-20	NP-5
	9-15	Very gravelly sandy loam, very gravelly loam, extremely gravelly sandy loam.	GM	A-1, A-2	5-25	35-50	30-50	20-40	10-30	15-20	NP-5
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
19, 20---------- Ivywild	0-1	Gravelly sandy loam.	SM	A-2, A-4, A-1	0-5	70-80	60-70	30-60	20-40	20-30	NP-5
	1-5	Very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	0-5	30-65	25-60	15-50	10-30	---	NP
	5-37	Very gravelly sandy loam, extremely gravelly sandy loam.	GP-GM, GM	A-1	0-5	30-50	20-45	10-30	5-20	---	NP
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
21: Ivywild---------	0-1	Gravelly sandy loam.	SM	A-2, A-4, A-1	0-15	70-80	60-70	30-60	20-40	20-30	NP-5
	1-5	Very gravelly sandy loam, gravelly sandy loam.	GM, SM	A-1, A-2	0-5	30-65	25-60	15-50	10-30	---	NP
	5-37	Very gravelly sandy loam, extremely gravelly sandy loam.	GP-GM, GM	A-1	0-5	30-50	20-45	10-30	5-20	---	NP
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
Catamount-------	0-2	Gravelly sandy loam.	SM	A-1, A-2	0-15	60-70	50-60	30-45	15-35	20-30	NP-5
	2-12	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM	A-1	0-5	30-50	25-40	20-30	10-25	20-25	NP-5
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22---------- Kassler	0-6	Very gravelly coarse sandy loam.	SM, GM, SP-SM, GP-GM	A-1	0-5	40-70	30-55	20-40	10-20	---	NP
	6-13	Very gravelly coarse sandy loam.	SM, GM	A-1	0-5	45-75	25-50	20-35	10-20	---	NP
	13-60	Very gravelly loamy coarse sand, extremely gravelly loamy coarse sand.	SP-SM, SM, GM, GP-GM	A-1	0-5	50-80	20-50	10-25	5-15	---	NP
23---------- Kutch	0-4	Clay loam--------	CL	A-6, A-7	0-10	95-100	90-100	90-100	70-80	30-50	15-30
	4-31	Clay, clay loam	CH, CL	A-7	0-5	95-100	90-100	90-100	75-95	45-60	20-35
	31	Weathered bedrock	---	---	---	---	---	---	---	---	---
24, 25---------- Legault	0-8	Very gravelly coarse sandy loam.	SM	A-1	0-5	60-80	40-50	15-35	10-25	---	NP
	8-17	Very gravelly loamy coarse sand.	GP, GP-GM, GM	A-1	0-5	35-50	20-40	10-35	0-15	---	NP
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
26: Legault---------	0-8	Very gravelly coarse sandy loam.	SM	A-1	0-5	60-80	40-50	15-35	10-25	---	NP
	8-17	Very gravelly loamy coarse sand.	GP, GP-GM, GM	A-1	0-5	35-50	20-40	10-35	0-15	---	NP
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
27: Palboone--------	0-3	Loam----------	SM, ML	A-4	0-5	80-100	75-90	45-75	40-70	20-25	NP-5
	3-19	Loam, sandy loam	SM, ML	A-2, A-4	0-5	75-100	70-90	45-75	25-70	20-25	NP-5
	19-60	Sandy loam-------	SM, ML	A-2, A-4	0-5	75-100	70-90	50-80	15-65	25-30	NP-5
Security--------	0-6	Very gravelly coarse sandy loam.	SM	A-1	0-5	60-80	40-50	15-35	10-25	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
28:											
Palboone--------	0-3	Sandy loam-------	SM, ML	A-4	0-5	80-100	75-90	45-75	40-70	20-25	NP-5
	3-19	Loam, sandy loam	SM, ML	A-2, A-4	0-5	75-100	70-90	45-75	25-70	20-25	NP-5
	19-60	Sandy loam-------	SM, ML	A-2, A-4	0-5	75-100	70-90	50-80	15-65	25-30	NP-5
Security--------	0-6	Very gravelly coarse sandy loam.	SM	A-1	0-5	60-80	40-50	15-35	10-25	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
29, 30----------	0-6	Cobbly loam------	SM, SM-SC	A-4	20-30	75-90	70-80	55-75	40-50	20-30	NP-10
Pendant	6-10	Very gravelly loam, extremely gravelly loam, very cobbly loam.	GM, GM-GC	A-1, A-2	5-40	35-60	30-50	20-45	15-35	20-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
31:											
Pendant---------	0-6	Cobbly loam------	SM, SM-SC	A-4	20-30	75-90	70-80	55-75	40-50	20-30	NP-10
	6-10	Very gravelly loam, extremely gravelly loam, very cobbly loam.	GM, GM-GC	A-1, A-2	5-40	35-60	30-50	20-45	15-35	20-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
32----------	0-4	Coarse sandy loam	SM	A-2, A-1	0-5	80-100	75-100	45-70	15-35	10-20	NP-5
Perrypark	4-50	Sandy clay loam, loam, gravelly sandy clay loam.	SC, CL	A-6, A-2	0-5	70-100	60-100	50-90	25-65	20-35	10-20
	50-60	Sandy loam, coarse sandy loam, gravelly sandy loam.	SM	A-2	0-5	70-100	60-100	50-75	15-35	10-20	NP-5

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
33:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Catamount-------	0-2	Gravelly sandy loam.	SM	A-1, A-2	0-5	60-70	50-60	30-45	15-35	20-30	NP-5
	2-12	Very gravelly coarse sandy loam, very gravelly sandy loam.	GM	A-1	0-5	30-50	25-40	20-30	10-25	20-25	NP-5
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
34:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Security--------	0-6	Very stony sandy loam.	SM	A-1, A-2	10-20	60-85	40-60	25-45	10-30	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cathedral-------	0-3	Very stony sandy loam.	SM	A-1, A-2	20-50	70-90	60-85	20-50	10-30	20-25	NP-5
	3-12	Very gravelly sandy loam, extremely gravelly coarse sandy loam.	GM, GP-GM, SM, SP-SM	A-1	5-10	40-60	20-55	10-30	5-15	20-25	NP-5
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
35, 36:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sphinx----------	0-4	Gravelly coarse sandy loam.	GM, SM	A-1, A-2	0-5	60-85	50-75	30-55	15-35	---	NP
	4-12	Very gravelly loamy coarse sand, very gravelly loamy sand.	GP-GM, GM	A-1	0-10	25-50	25-50	15-30	10-15	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
37:											
Sachett	0-8	Cobbly sandy loam	SM, ML	A-2, A-4	20-40	80-90	75-85	50-75	25-60	20-30	NP-5
	8-13	Very cobbly sandy loam, very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	15-40	30-55	30-50	20-30	10-30	20-30	NP-5
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
38, 39 Security	0-6	Very gravelly coarse sandy loam.	SM	A-1	0-5	60-80	40-50	15-35	10-25	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
40:											
Security	0-6	Very gravelly coarse sandy loam.	SM	A-1, A-2	10-20	60-85	40-60	25-45	10-30	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy bedrock.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cathedral	0-3	Very gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-1, A-2	0-30	40-60	35-55	20-35	5-20	15-20	NP-5
	3-12	Very gravelly sandy loam, extremely gravelly sandy loam.	GP-GM, SP-SM, SM, GM	A-1	0-30	20-75	15-50	15-35	5-20	15-20	NP-5
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
41:											
Security--------	0-6	Very gravelly coarse sandy loam.	SM	A-1, A-2	10-20	60-85	40-60	25-45	10-30	---	NP
	6-14	Very gravelly sandy loam, gravelly sandy loam, gravelly loam.	SM	A-1, A-2	0-5	65-80	40-60	25-45	10-35	---	NP
	14-22	Very gravelly sandy clay loam, very gravelly clay loam.	SM, SC, GM, GC	A-2, A-1	0-5	50-75	35-45	25-40	15-35	30-40	5-15
	22-26	Very gravelly sandy loam, extremely gravelly sandy loam.	GM, SM	A-1	0-5	50-75	25-40	15-30	10-20	---	NP
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cathedral-------	0-3	Very gravelly sandy loam.	SM, GM, GP-GM, SP-SM	A-1, A-2	0-30	40-60	35-55	20-35	5-20	15-20	NP-5
	3-12	Very gravelly sandy loam, extremely gravelly sandy loam.	GP-GM, SP-SM, SM, GM	A-1	0-30	20-75	15-50	15-35	5-20	15-20	NP-5
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
42, 43, 44, 45--- Sphinx	0-4	Gravelly coarse sandy loam.	GM, SM	A-1, A-2	0-5	60-85	50-75	30-55	15-35	---	NP
	4-12	Very gravelly loamy coarse sand, very gravelly loamy sand.	GP-GM, GM	A-1	0-10	25-50	25-50	15-30	10-15	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
46:											
Sphinx----------	0-4	Gravelly coarse sandy loam.	GM, SM	A-1, A-2	0-5	60-85	50-75	30-55	15-35	---	NP
	4-12	Very gravelly loamy coarse sand, very gravelly loamy sand.	GP-GM, GM	A-1	0-10	25-50	25-50	15-30	10-15	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 9.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
47:											
Sphinx----------	0-4	Gravelly coarse sandy loam.	GM, SM	A-1, A-2	0-5	60-85	50-75	30-55	15-35	---	NP
	4-12	Very gravelly loamy coarse sand, very gravelly loamy sand.	GP-GM, GM	A-1	0-10	25-50	25-50	15-30	10-15	---	NP
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
48, 49---------- Tecolote	0-2	Very gravelly sandy loam.	GM-GC	A-2	5-45	45-65	40-60	25-50	15-35	20-30	5-10
	2-20	Very cobbly sandy loam, very stony sandy loam.	GM-GC	A-2	25-45	45-65	40-60	25-50	15-35	20-30	5-10
	20-45	Very cobbly sandy clay loam.	GC	A-2	25-45	45-55	45-50	20-40	15-25	30-40	10-20
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---
50---------- Tomah	0-10	Sandy loam-------	SM	A-2, A-4	0	95-100	90-100	60-80	30-50	20-25	NP-5
	10-18	Loamy sand, coarse sand.	SM	A-2	0	95-100	80-100	50-75	15-30	---	NP
	18-35	Stratified sandy clay loam to loamy coarse sand.	SC	A-2, A-6	0	95-100	75-100	40-65	25-45	20-30	10-20
	35-60	Loamy sand, loamy coarse sand.	SM-SC, SP-SC	A-2, A-1	0	90-100	75-90	30-45	10-25	15-25	5-10
51---------- Tripit	0-6	Loam----------	CL-ML, SM-SC	A-4	0	75-90	75-90	65-85	45-70	20-30	5-10
	6-38	Gravelly sandy clay loam, clay loam, sandy clay loam.	GC, CL	A-2, A-6	0-5	55-85	50-85	35-70	30-60	30-40	15-20
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
1----------	0-6	15-22	1.25-1.30	0.6-2.0	0.16-0.20	6.6-8.4	2-16	Low-------	0.24	5	6	2-5
Alamosa	6-24	25-35	1.30-1.40	0.2-0.6	0.18-0.20	6.6-8.4	2-16	Moderate	0.28			
	24-60	5-20	1.40-1.50	0.6-2.0	0.08-0.16	7.4-8.4	<16	Low-------	0.28			
2----------	0-12	10-19	1.35-1.45	2.0-6.0	0.11-0.15	6.6-8.4	<4	Low-------	0.10	5	3	3-6
Aquolls	12-50	5-19	1.40-1.50	2.0-6.0	0.10-0.15	6.6-8.4	<4	Low-------	0.15			
	50-60	2-10	1.45-1.55	<20	0.01-0.04	6.6-8.4	<2	Low-------	0.02			
3:												
Boyett----------	0-5	5-10	1.30-1.35	2.0-6.0	0.12-0.15	6.1-7.3	<2	Low-------	0.20	4	3	1-2
	5-9	5-10	1.55-1.60	2.0-6.0	0.08-0.11	6.1-7.3	<2	Low-------	0.15			
	9-34	12-18	1.65-1.70	2.0-6.0	0.10-0.13	6.1-7.3	<2	Low-------	0.15			
	34-53	12-18	1.55-1.75	2.0-6.0	0.05-0.10	6.1-8.4	<2	Low-------	0.15			
	53	---	---	---	---	---	---	----------	----			
Frenchcreek-----	0-4	15-20	1.40-1.50	2.0-6.0	0.09-0.11	6.1-7.8	<2	Low-------	0.15	5	6	2-4
	4-14	15-20	1.45-1.60	2.0-6.0	0.07-0.10	6.1-7.8	<2	Low-------	0.10			
	14-30	10-20	1.50-1.60	2.0-6.0	0.06-0.09	6.1-7.8	<2	Low-------	0.05			
	30-60	5-15	1.60-1.70	6.0-20	0.04-0.07	6.1-7.8	<2	Low-------	0.05			
4:												
Boyett----------	0-5	5-10	1.30-1.35	2.0-6.0	0.12-0.15	6.1-7.3	<2	Low-------	0.20	4	3	1-2
	5-9	5-10	1.55-1.60	2.0-6.0	0.08-0.11	6.1-7.3	<2	Low-------	0.15			
	9-34	12-18	1.65-1.70	2.0-6.0	0.10-0.13	6.1-7.3	<2	Low-------	0.15			
	34-53	12-18	1.55-1.75	2.0-6.0	0.05-0.10	6.1-8.4	<2	Low-------	0.15			
	53	---	---	---	---	---	---	----------	----			
Frenchcreek-----	0-4	15-20	1.40-1.50	2.0-6.0	0.09-0.11	6.1-7.8	<2	Low-------	0.15	5	6	2-4
	4-14	15-20	1.45-1.60	2.0-6.0	0.07-0.10	6.1-7.8	<2	Low-------	0.10			
	14-30	10-20	1.50-1.60	2.0-6.0	0.06-0.09	6.1-7.8	<2	Low-------	0.05			
	30-60	5-15	1.60-1.70	6.0-20	0.04-0.07	6.1-7.8	<2	Low-------	0.05			
5, 6----------	0-2	7-15	1.45-1.50	6.0-20	0.07-0.09	5.6-7.3	<2	Low-------	0.10	1	7	1-2
Catamount	2-8	7-13	1.45-1.50	6.0-20	0.06-0.08	5.1-7.3	<2	Low-------	0.05			
	8-12	5-10	1.50-1.80	6.0-20	0.05-0.07	5.1-7.3	<2	Low-------	0.05			
	12	---	---	---	---	---	---	----------	----			
7:												
Catamount-------	0-2	7-15	1.45-1.50	6.0-20	0.07-0.09	5.6-7.3	<2	Low-------	0.10	1	7	1-2
	2-8	7-13	1.45-1.50	6.0-20	0.06-0.08	5.1-7.3	<2	Low-------	0.05			
	8-12	5-10	1.50-1.80	6.0-20	0.05-0.07	5.1-7.3	<2	Low-------	0.05			
	12	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	---	---	---	---	---	<2	----------	----	---	---	---
8----------	0-3	5-18	1.20-1.25	6.0-20	0.08-0.09	5.6-7.8	<2	Low-------	0.20	1	6	2-4
Cathedral	3-12	5-18	1.40-1.50	6.0-20	0.05-0.07	5.6-7.8	<2	Low-------	0.10			
	12	---	---	---	---	---	---	----------	----			
9.												
Cirque land.												
10, 11----------	0-8	10-15	1.40-1.50	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low-------	0.10	5	3	1-3
Condie	8-30	10-20	1.50-1.60	2.0-6.0	0.04-0.07	5.6-6.5	<2	Low-------	0.05			
	30-40	18-35	1.50-1.60	0.6-2.0	0.06-0.09	5.6-6.0	<2	Low-------	0.05			
	40-60	15-25	1.50-1.60	0.6-2.0	0.05-0.08	5.6-6.0	<2	Low-------	0.05			

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
12:												
Fortwingate-----	0-5	20-27	1.35-1.45	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low-------	0.37	2	6	<1
	5-21	35-45	1.25-1.35	0.06-0.2	0.15-0.18	6.1-7.3	<2	High------	0.20			
	21-35	---	---	---	---	---	---	----------	----			
	35	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	---	---	---	---	---	<2	----------	----	---	---	---
13, 14----------	0-6	5-15	1.45-1.55	2.0-6.0	0.05-0.08	6.1-7.8	<2	Low-------	0.05	4	7	1-3
Garber	6-18	5-15	1.50-1.60	2.0-6.0	0.05-0.08	5.6-7.8	<2	Low-------	0.05			
	18-42	5-15	1.55-1.65	2.0-6.0	0.04-0.07	5.6-7.8	<2	Low-------	0.05			
	42	---	---	---	---	---	---	----------	----			
15, 16----------	0-12	10-18	1.25-1.35	6.0-20	0.05-0.07	5.1-6.5	<2	Low-------	0.05	2	8	<.5
Guffey	12-26	18-35	1.40-1.50	2.0-6.0	0.04-0.07	4.5-6.5	<2	Low-------	0.02			
	26	---	---	---	---	---	---	----------	----			
17--------------	0-9	5-18	1.30-1.40	2.0-6.0	0.05-0.08	5.6-7.3	<2	Low-------	0.10	1	8	2-4
Herbman	9-15	5-18	1.50-1.60	2.0-6.0	0.05-0.10	5.6-7.3	<2	Low-------	0.10			
	15	---	---	---	---	---	---	----------	----			
18:												
Herbman---------	0-9	5-18	1.30-1.40	2.0-6.0	0.05-0.08	5.6-7.3	<2	Low-------	0.10	1	8	2-4
	9-15	5-18	1.50-1.60	2.0-6.0	0.05-0.10	5.6-7.3	<2	Low-------	0.10			
	15	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	---	---	---	---	---	<2	----------	----	---	---	---
19, 20----------	0-1	10-20	1.35-1.50	6.0-20	0.07-0.10	<5.6	<2	Low-------	0.15	2	7	2-5
Ivywild	1-5	8-13	1.35-1.50	6.0-20	0.06-0.07	<5.6	<2	Low-------	0.10			
	5-37	5-10	1.40-1.50	6.0-20	0.04-0.06	<5.6	<2	Low-------	0.05			
	37	---	---	---	---	---	---	----------	----			
21:												
Ivywild---------	0-1	10-20	1.35-1.50	6.0-20	0.07-0.10	<5.6	<2	Low-------	0.15	2	7	2-5
	1-5	8-13	1.35-1.50	6.0-20	0.06-0.07	<5.6	<2	Low-------	0.10			
	5-37	5-10	1.40-1.50	6.0-20	0.04-0.06	<5.6	<2	Low-------	0.05			
	37	---	---	---	---	---	---	----------	----			
Catamount-------	0-2	7-15	1.45-1.50	6.0-20	0.07-0.09	5.6-7.3	<2	Low-------	0.10	1	7	1-2
	2-12	7-13	1.45-1.50	6.0-20	0.06-0.08	5.1-7.3	<2	Low-------	0.05			
	12	---	---	---	---	---	---	----------	----			
22--------------	0-6	5-10	1.40-1.50	2.0-6.0	0.07-0.09	6.1-7.3	<2	Low-------	0.05	5	7	2-4
Kassler	6-13	5-10	1.40-1.50	6.0-20	0.07-0.09	6.1-7.3	<2	Low-------	0.05			
	13-60	0-10	1.60-1.70	6.0-20	0.04-0.07	6.1-7.8	<2	Low-------	0.05			
23--------------	0-4	27-35	---	0.2-0.6	0.15-0.20	6.1-7.8	<2	High------	0.32	2	6	2-4
Kutch	4-31	35-45	---	0.06-0.2	0.18-0.20	6.1-9.0	<4	High------	0.24			
	31	---	---	---	---	---	---	----------	----			
24, 25----------	0-8	5-10	1.50-1.60	2.0-6.0	0.05-0.08	5.1-6.5	<2	Low-------	0.05	1	7	.5-1
Legault	8-17	0-10	1.60-1.70	6.0-20	0.03-0.06	5.1-6.5	<2	Low-------	0.05			
	17	---	---	---	---	---	---	----------	----			
26:												
Legault---------	0-8	5-10	1.50-1.60	2.0-6.0	0.05-0.08	5.1-6.5	<2	Low-------	0.05	1	7	.5-1
	8-17	0-10	1.60-1.70	6.0-20	0.03-0.06	5.1-6.5	<2	Low-------	0.05			
	17	---	---	---	---	---	---	----------	----			
Rock outcrop----	0-60	---	---	---	---	---	---	----------	----	---	---	---

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
27:												
Palboone	0-3	8-15	1.25-1.35	2.0-6.0	0.14-0.17	6.1-7.3	<2	Low	0.28	5	5	.5-1
	3-19	7-12	1.45-1.55	2.0-6.0	0.13-0.16	5.6-7.3	<2	Low	0.15			
	19-60	11-16	1.50-1.60	2.0-6.0	0.10-0.13	5.6-7.3	<2	Low	0.15			
Security	0-6	5-10	1.40-1.50	6.0-20	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
28:												
Palboone	0-3	8-15	1.25-1.35	2.0-6.0	0.14-0.17	6.1-7.3	<2	Low	0.28	5	5	.5-1
	3-19	7-12	1.45-1.55	2.0-6.0	0.13-0.16	5.6-7.3	<2	Low	0.15			
	19-60	11-16	1.50-1.60	2.0-6.0	0.10-0.13	5.6-7.3	<2	Low	0.15			
Security	0-6	5-10	1.40-1.50	6.0-20	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
29, 30	0-6	10-25	1.20-1.30	0.6-2.0	0.09-0.12	7.4-8.4	<2	Low	0.15	1	5	1-3
Pendant	6-10	10-25	1.25-1.35	0.6-2.0	0.06-0.08	7.4-8.4	<2	Low	0.05			
	10	---	---	---	---	---	---	---	---			
31:												
Pendant	0-6	10-25	1.20-1.30	0.6-2.0	0.09-0.12	7.4-8.4	<2	Low	0.15	1	5	1-3
	6-10	10-25	1.25-1.35	0.6-2.0	0.06-0.08	7.4-8.4	<2	Low	0.05			
	10	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	---	---
32	0-4	10-20	1.40-1.50	2.0-6.0	0.12-0.15	6.1-7.8	<2	Low	0.15	5	3	2-4
Perrypark	4-50	20-35	1.40-1.50	0.6-2.0	0.14-0.16	6.1-7.8	<2	Moderate	0.17			
	50-60	10-20	1.50-1.60	2.0-6.0	0.09-0.13	6.1-7.8	<2	Low	0.10			
33:												
Rock outcrop	0-60	---	---	---	---	---	<2	---	---	---	---	---
Catamount	0-2	7-15	1.45-1.50	6.0-20	0.07-0.09	5.6-7.3	<2	Low	0.10	1	7	1-2
	2-12	7-13	1.45-1.50	6.0-20	0.06-0.08	5.1-7.3	<2	Low	0.05			
	12	---	---	---	---	---	---	---	---			
34:												
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	---	---
Security	0-6	5-10	1.40-1.50	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
Cathedral	0-3	5-18	1.50-1.60	2.0-6.0	0.05-0.08	6.1-7.8	<2	Low	0.10	1	8	1-2
	3-12	5-18	1.55-1.65	2.0-6.0	0.04-0.07	5.6-7.3	<2	Low	0.05			
	12	---	---	---	---	---	---	---	---			
35, 36:												
Rock outcrop	0-60	---	---	---	---	---	<2	---	---	---	---	---

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
35, 36:												
Sphinx	0-4	5-15	1.45-1.55	6.0-20	0.06-0.09	6.1-7.3	<2	Low	0.15	1	7	1-2
	4-12	5-10	1.10-1.70	6.0-20	0.03-0.05	5.1-6.5	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
37:												
Sachett	0-8	7-15	1.45-1.50	6.0-20	0.08-0.09	4.5-5.5	<2	Low	0.10	1	7	3-5
	8-13	5-13	1.50-1.55	6.0-20	0.03-0.07	4.5-5.5	<2	Low	0.05			
	13	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	<2	---	---	---	---	---
38, 39	0-6	5-10	1.40-1.50	6.0-20	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
Security	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
40:												
Security	0-6	5-10	1.40-1.50	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
Cathedral	0-3	5-18	1.35-1.45	6.0-20	0.05-0.07	5.6-7.8	<2	Low	0.10	1	8	2-4
	3-12	5-18	1.40-1.50	6.0-20	0.05-0.07	5.6-7.8	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
41:												
Security	0-6	5-10	1.40-1.50	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low	0.10	2	7	1-4
	6-14	5-15	1.35-1.45	6.0-20	0.07-0.10	5.6-7.3	<2	Low	0.10			
	14-22	20-30	1.30-1.40	2.0-6.0	0.08-0.10	5.6-7.3	<2	Moderate	0.17			
	22-26	5-10	1.40-1.50	6.0-20	0.04-0.06	5.6-7.3	<2	Low	0.15			
	26	---	---	---	---	---	---	---	---			
Cathedral	0-3	5-18	1.35-1.45	6.0-20	0.05-0.07	5.6-7.8	<2	Low	0.10	1	8	2-4
	3-12	5-18	1.40-1.50	6.0-20	0.05-0.07	5.6-7.8	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	<2	---	---	---	---	---
42, 43, 44, 45	0-4	5-15	1.45-1.55	6.0-20	0.06-0.09	6.1-7.3	<2	Low	0.15	1	7	1-2
Sphinx	4-12	5-10	1.10-1.70	6.0-20	0.03-0.05	5.1-6.5	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
46:												
Sphinx	0-4	5-15	1.45-1.55	6.0-20	0.06-0.09	6.1-7.3	<2	Low	0.15	1	7	1-2
	4-12	5-10	1.10-1.70	6.0-20	0.03-0.05	5.1-6.5	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	<2	---	---	---	---	---
47:												
Sphinx	0-4	5-15	1.45-1.55	6.0-20	0.06-0.09	6.1-7.3	<2	Low	0.15	1	7	1-2
	4-12	5-10	1.10-1.70	6.0-20	0.03-0.05	5.1-6.5	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	---	---

TABLE 10.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
48, 49----------	0-2	10-20	1.35-1.45	2.0-6.0	0.05-0.08	6.6-7.8	<2	Low-------	0.10	3	6	1-2
Tecolote	2-20	10-20	1.45-1.55	2.0-6.0	0.05-0.08	6.1-7.8	<2	Low-------	0.10			
	20-45	20-35	1.40-1.50	0.6-2.0	0.07-0.10	5.6-7.3	<2	Low-------	0.10			
	45	---	---	---	---	---	---	----------	----			
50----------	0-10	12-17	1.30-1.40	2.0-6.0	0.13-0.15	6.1-7.3	<2	Low-------	0.17	5	3	2-4
Tomah	10-18	2-6	1.55-1.65	6.0-20	0.06-0.08	6.1-7.3	<2	Low-------	0.15			
	18-35	12-18	1.50-1.65	0.6-2.0	0.11-0.16	6.1-7.3	<2	Low-------	0.17			
	35-60	8-13	1.60-1.70	6.0-20	0.06-0.08	6.1-7.3	<2	Low-------	0.10			
51----------	0-6	10-25	1.30-1.40	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low-------	0.37	3	6	2-4
Tripit	6-38	28-35	1.25-1.35	0.6-2.0	0.10-0.16	6.6-8.4	<2	Moderate	0.17			
	38	---	---	---	---	---	---	----------	----			

TABLE 11.--SOIL AND WATER FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Bedrock		Risk of corrosion	
		Depth	Hardness	Uncoated steel	Concrete
		In			
1---------- Alamosa	D	>60	---	High-----	Moderate.
2---------- Aquolls	D	>60	---	High-----	Low.
3, 4: Boyett----------	B	40-60	Hard	High-----	Low.
Frenchcreek------	B	>60	---	Moderate	Low.
5, 6---------- Catamount	D	10-20	Soft	Moderate	Moderate.
7: Catamount--------	D	10-20	Soft	Moderate	Moderate.
Rock outcrop-----	D	0	Hard	---	---
8---------- Cathedral	D	10-20	Hard	Moderate	Moderate.
9. Cirque land					
10, 11---------- Condie	B	>60	---	Moderate	Moderate.
12: Fortwingate------	C	20-40	Hard	---	---
Rock outcrop-----	D	0	Hard	---	---
13, 14---------- Garber	B	40-60	Soft	Moderate	Moderate.
15, 16---------- Guffey	C	20-40	Soft	High-----	High.
17---------- Herbman	D	7-20	Soft	Moderate	Moderate.
18: Herbman----------	D	7-20	Soft	Moderate	Moderate.
Rock outcrop-----	D	0	Hard	---	---
19, 20---------- Ivywild	C	20-40	Soft	High-----	High.
21: Ivywild----------	C	20-40	Hard	High-----	High.
Catamount--------	D	10-20	Soft	Moderate	Moderate.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Risk of corrosion	
		Depth	Hardness	Uncoated steel	Concrete
		In			
22---------- Kassler	A	>60	---	Moderate	Low.
23---------- Kutch	C	20-40	Soft	High-----	Moderate.
24, 25---------- Legault	D	5-20	Soft	Moderate	Moderate.
26:					
Legault----------	D	5-20	Soft	Moderate	Moderate.
Rock outcrop-----	D	0	Hard	---	---
27, 28:					
Palboone---------	B	>60	---	Moderate	Moderate.
Security---------	C	20-40	Soft	Moderate	Moderate.
29, 30---------- Pendant	D	7-20	Hard	Moderate	Low.
31:					
Pendant----------	D	7-20	Hard	Moderate	Low.
Rock outcrop-----	D	0	Hard	---	---
32---------- Perrypark	B	>60	---	Moderate	Low.
33:					
Rock outcrop-----	D	0	Hard	---	---
Catamount--------	D	10-20	Soft	Moderate	Moderate.
34:					
Rock outcrop-----	D	0	Hard	---	---
Security---------	C	20-40	Soft	Moderate	Moderate.
Cathedral--------	D	10-20	Hard	Moderate	Moderate.
35, 36:					
Rock outcrop-----	D	0	Hard	---	---
Sphinx-----------	D	8-20	Soft	Moderate	Low.
37:					
Sachett----------	C	10-20	Soft	High-----	High.
Rock outcrop-----	D	0	Hard	---	---
38, 39---------- Security	C	20-40	Soft	Moderate	Moderate.
40:					
Security---------	C	20-40	Soft	Moderate	Moderate.
Cathedral--------	D	10-20	Hard	Moderate	Moderate.

TABLE 11.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Risk of corrosion	
		Depth	Hardness	Uncoated steel	Concrete
		In			
41: Security	C	20-40	Soft	Moderate	Moderate.
Cathedral	D	10-20	Hard	Moderate	Moderate.
Rock outcrop	D	0	Hard	---	---
42, 43, 44, 45--- Sphinx	D	8-20	Soft	Moderate	Low.
46: Sphinx	D	8-20	Soft	Moderate	Low.
Rock outcrop	D	0	Hard	---	---
47: Sphinx	D	8-20	Soft	Moderate	Low.
Rock outcrop	D	0	Hard	---	---
48, 49--- Tecolote	B	40-60	Soft	Moderate	Moderate.
50--- Tomah	B	>60	---	Moderate	Low.
51--- Tripit	C	20-40	Soft	Moderate	Low.

TABLE 12.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alamosa	Fine-loamy, mixed, frigid Typic Argiaquolls
Aquolls	Aquolls
Boyett	Coarse-loamy, mixed Mollic Eutroboralfs
Catamount	Loamy-skeletal, mixed, nonacid, shallow Typic Cryorthents
Cathedral	Loamy-skeletal, mixed Lithic Haploborolls
Condie	Loamy-skeletal, mixed Mollic Cryoboralfs
Fortwingate	Fine, montmorillonitic Typic Eutroboralfs
Frenchcreek	Loamy-skeletal, mixed Aridic Haploborolls
Garber	Loamy-skeletal, mixed Pachic Haploborolls
Guffey	Loamy-skeletal, mixed Typic Cryoboralfs
Herbman	Loamy-skeletal, mixed, shallow Typic Cryoborolls
Ivywild	Loamy-skeletal, mixed Dystric Cryochrepts
*Kassler	Sandy-skeletal, mixed Torriorthentic Haploborolls
Kutch	Fine, montmorillonitic, mesic Torrertic Argiustolls
Legault	Sandy-skeletal, mixed, shallow Typic Cryorthents
Palboone	Coarse-loamy, mixed Typic Cryoboralfs
Pendant	Loamy-skeletal, mixed Lithic Haploborolls
Perrypark	Fine-loamy, mixed Aridic Argiborolls
Sachett	Sandy-skeletal, mixed, shallow Pergelic Cryumbrepts
Security	Loamy-skeletal, mixed Mollic Eutroboralfs
Sphinx	Sandy-skeletal, mixed, frigid, shallow Typic Ustorthents
Tecolote	Loamy-skeletal, mixed Typic Eutroboralfs
Tomah	Coarse-loamy, mixed Boralfic Argiborolls
Tripit	Fine-loamy, mixed Argic Cryoborolls

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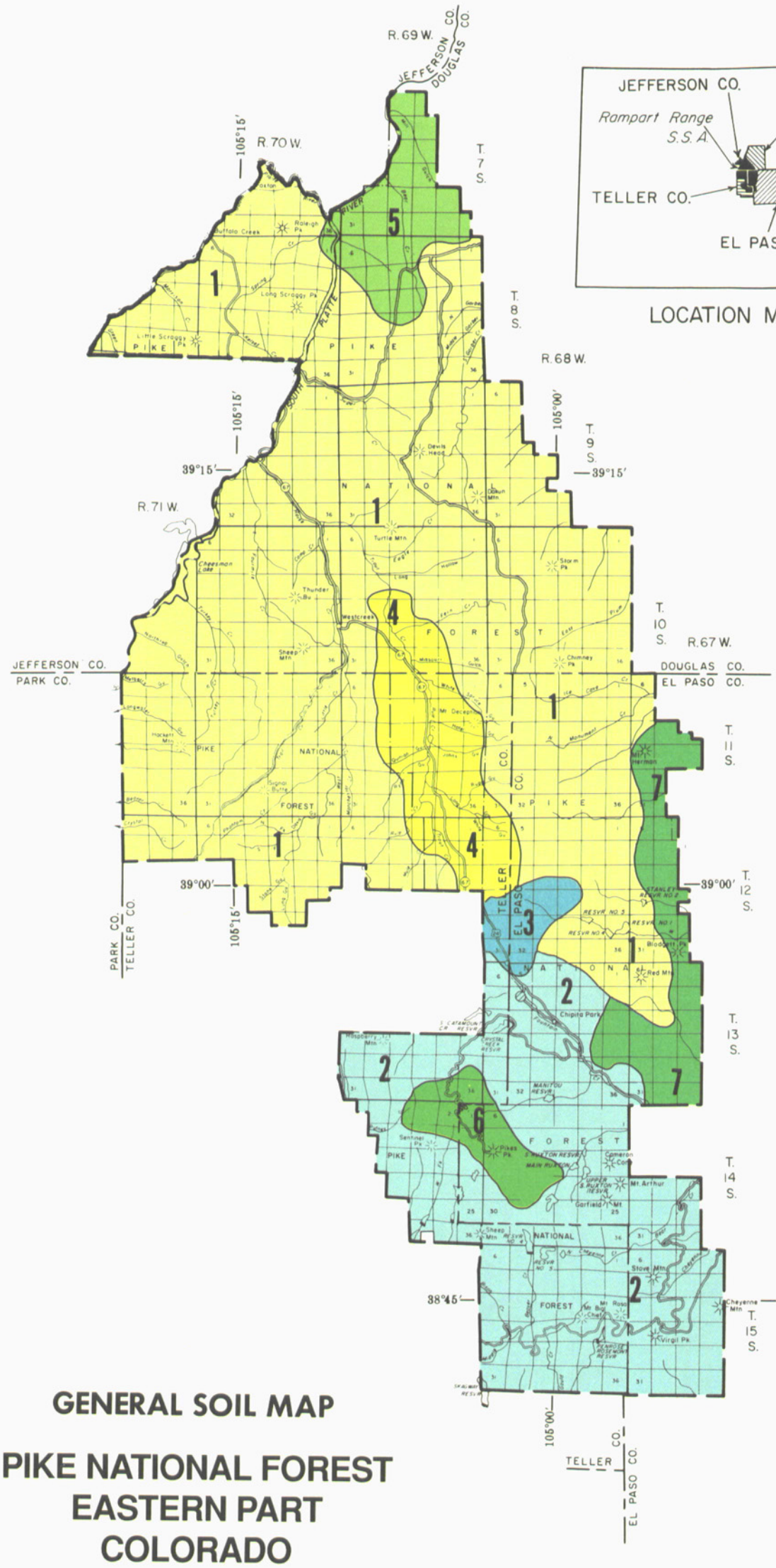


LOCATION MAP

SOIL LEGEND

1 — Sphinx-Legault-Rock outcrop: Rock outcrop and shallow, somewhat excessively drained soils that formed in material weathered from granite

2 — Catamount-Ivywild-Legault-Rock outcrop: Rock outcrop and shallow and moderately deep, somewhat excessively drained, and excessively drained soils that formed in material weathered from granite

3 — Sphinx-Tecolote-Condie: Shallow and deep, somewhat excessively drained and well drained soils that formed in material weathered from granite or in colluvium over weathered granite

4 — Boyett-Frenchcreek-Pendant: Deep and shallow, well drained and somewhat excessively drained soils that formed in material weathered from limestone and granite, and in alluvium derived from mixed red arkosic sandstone

5 — Security-Cathedral-Rock outcrop: Rock outcrop and moderately deep and shallow, well drained soils that formed in material weathered from mixed schist, gneiss, and granite

6 — Sachett-Cirque land: Cirque land and shallow, excessively drained soils that formed in material weathered from granite

7 — Tecolote-Pendant: Deep and shallow, well drained and somewhat excessively drained soils that formed in material weathered from limestone and in cobbly or stony colluvium over weathered granite

Compiled 1986

GENERAL SOIL MAP

PIKE NATIONAL FOREST EASTERN PART COLORADO

JULY 1992

5 0 5 10 MILES

Scale 1:362,057

1 inch equals approximately 5.7 miles

PARTS OF DOUGLAS, EL PASO, JEFFERSON, AND TELLER COUNTIES, COLORADO

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SOIL CONSERVATION SERVICE
COLORADO AGRICULTURAL EXPERIMENT STATION

INDEX TO MAP SHEETS

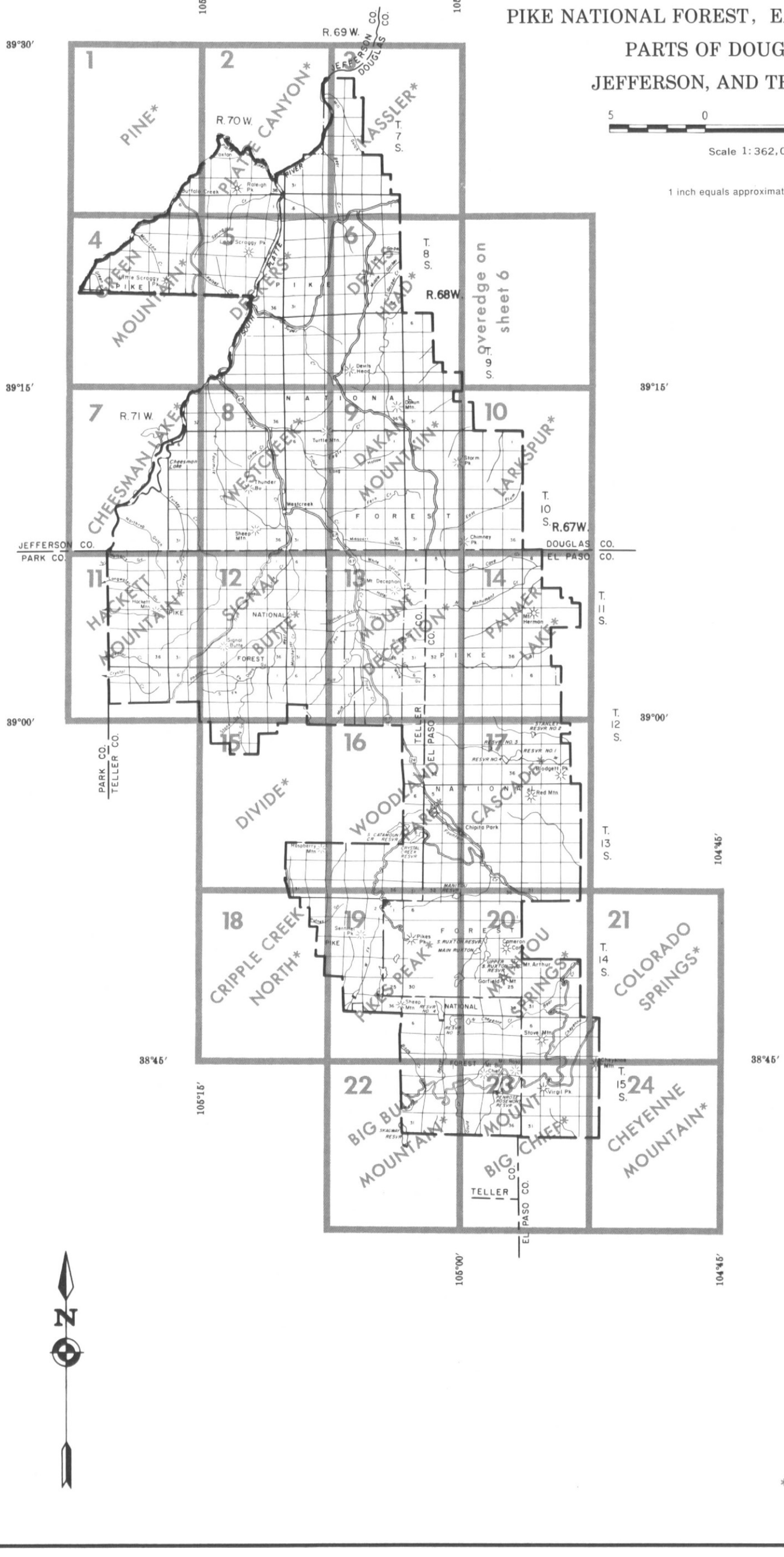
PIKE NATIONAL FOREST, EASTERN PART, COLORADO

PARTS OF DOUGLAS, EL PASO, JEFFERSON, AND TELLER COUNTIES

5 0 5 10 MILES

Scale 1:362,057

1 inch equals approximately 5.7 miles



*QUADRANGLE NAME

SOIL LEGEND

SYMBOL	NAME
1	Alamosa loam, 0 to 6 percent slopes
2	Aquolls, 1 to 10 percent slopes
3	Boyett-Frenchcreek complex, 2 to 15 percent slopes
4	Boyett-Frenchcreek complex, 15 to 40 percent slopes
5	Catamount gravelly sandy loam, 5 to 40 percent slopes
6	Catamount gravelly sandy loam, 40 to 70 percent slopes
7	Catamount-Rock outcrop complex, 15 to 70 percent slopes
8	Cathedral gravelly sandy loam, 40 to 65 percent slopes, extremely stony
9	Cirque land, 15 to 75 percent slopes
10	Condie coarse sandy loam, 2 to 15 percent slopes
11	Condie coarse sandy loam, 15 to 40 percent slopes
12	Fortwingate-Rock outcrop complex, 15 to 60 percent slopes
13	Garber very gravelly coarse sandy loam, 2 to 15 percent slopes
14	Garber very gravelly coarse sandy loam, 15 to 40 percent slopes
15	Guffey very gravelly sandy loam, 5 to 40 percent slopes
16	Guffey very gravelly sandy loam, 40 to 60 percent slopes
17	Herbman very gravelly sandy loam, 15 to 40 percent slopes
18	Herbman-Rock outcrop complex, 15 to 40 percent slopes
19	Ivywild gravelly sandy loam, 5 to 40 percent slopes
20	Ivywild gravelly sandy loam, 40 to 70 percent slopes
21	Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery
22	Kassler very gravelly coarse sandy loam, 5 to 35 percent slopes
23	Kutch clay loam, 10 to 40 percent slopes
24	Legault very gravelly coarse sandy loam, 5 to 40 percent slopes
25	Legault very gravelly coarse sandy loam, 40 to 65 percent slopes
26	Legault-Rock outcrop complex, 15 to 65 percent slopes
27	Palboone-Security complex, 15 to 40 percent slopes
28	Palboone-Security complex, 40 to 70 percent slopes
29	Pendant cobbly loam, 15 to 40 percent slopes
30	Pendant cobbly loam, 40 to 70 percent slopes
31	Pendant-Rock outcrop complex, 15 to 70 percent slopes
32	Perrypark coarse sandy loam, 1 to 15 percent slopes
33	Rock outcrop-Catamount complex, 15 to 70 percent slopes
34	Rock outcrop-Security-Cathedral complex, 15 to 65 percent slopes
35	Rock outcrop-Sphinx complex, 15 to 80 percent slopes
36	Rock outcrop-Sphinx, warm complex, 15 to 80 percent slopes
37	Sachett-Rock outcrop complex, 5 to 70 percent slopes
38	Security very gravelly coarse sandy loam, 5 to 40 percent slopes
39	Security very gravelly coarse sandy loam, 40 to 65 percent slopes
40	Security-Cathedral complex, 40 to 65 percent slopes, very stony
41	Security-Cathedral-Rock outcrop complex, 15 to 65 percent slopes, very stony
42	Sphinx gravelly coarse sandy loam, 15 to 40 percent slopes
43	Sphinx gravelly coarse sandy loam, 40 to 70 percent slopes
44	Sphinx gravelly coarse sandy loam, warm, 15 to 40 percent slopes
45	Sphinx gravelly coarse sandy loam, warm, 40 to 70 percent slopes
46	Sphinx-Rock outcrop complex, 15 to 80 percent slopes
47	Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes
48	Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony
49	Tecolote very gravelly sandy loam, 40 to 70 percent slopes, very stony
50	Tomah sandy loam, 2 to 15 percent slopes
51	Tripit loam, 5 to 15 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate (173)
- Federal (173)
- State (28)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or Small (water)

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (Gas)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial (water, w)
- Intermittent (int, i)

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (3, 6)

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Camp Ground

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 1

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

QUADRANGLE LOCATION

PINE, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 2

105°15' 39°30' 479000m E 480 481 12'30" 485 R. 70 W. 10' 486 R. 69 W. 487 2 100 000 FEET 488 489 105°07'30" 39°30'
4372000m N 4372
4371 4371
4370 4370
600 000 FEET
T. 6 S. T. 7 S.
JEFFERSON CO
DOUGLAS CO
SOUTH PLATTE RIVER
LIMIT OF SURVEY
4369
4368 4368
27'30" 27'30"
4367 4367
4366 4366
(Joins sheet 1)
(Joins sheet 3)
NATIONAL FOREST BOUNDARY
NORTH FORK SOUTH PLATTE RIVER
SEE SOIL SURVEY OF GOLDEN AREA, COLORADO
STRONTIA SPRINGS RESERVOIR
LIMIT OF SURVEY
4364 4364
4363 4363
25' 25'
PLATTE RIVER
JEFFERSON CO
DOUGLAS CO
4362
4361 4361
570 000 FEET
T. 7 S.
T. 8 S.
4360 4360
4359 4359000m N.
39°22'30" 105°15' 479 481 2 080 000 FEET 12'30" 483 (Joins sheet 5) R. 70 W. 10' 486 R. 69 W. 487000m E. 39°22'30" 105°07'30"

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

COLORADO
QUADRANGLE LOCATION

PLATTE CANYON, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 3

105°07'30" 490000m E. 91 5' 93 94 95 R. 69 W. R. 68 W. 96 2'30" 97 98 105°00'
39°30' 4372000m N. 4371 4370 T. 6 S. T. 7 S. 4369 4368 27'30" 4367 4366 4364 4363 25' 4362 570 000 FEET 4361 T. 7 S. T. 8 S. 4360 4359 39°22'30"

NATIONAL FOREST BOUNDARY

JEFFERSON CO
DOUGLAS CO
PLATTE RIVER
SOUTH

(Joins sheet 2)

NATIONAL FOREST BOUNDARY

NATIONAL FOREST BOUNDARY

(Joins sheet 6)

600 000 FEET

2 110 000 FEET

105°07'30" 490 92 5' 93 94 95 R. 69 W. R. 68 W. 96 2'30" 97 4980000m E. 105°00'

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

COLORADO
QUADRANGLE LOCATION

KASSLER, COLO.

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and cooperating agencies on orthophotography.

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FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 4

105°22'30" 468000mE 469 470 471 20' 472 (Joins sheet 1) 474 17'30" R. 71 W. R. 70 W. 477 2 070 000 FEET 105°15'
39°22'30" 4358000mN 4357 4356 4355 4354 20' 4353 4352 4351 T. 8 S. T. 9 S. 17'30" 4348 4347 4346 520 000 FEET 4345 39°15'

560 000 FEET

Buffalo Creek

Limit of Soil Survey

Buffalo Creek

LIMIT OF SOIL SURVEY

LIMIT OF SOIL SURVEY

(Joins sheet 5)

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

COLORADO

QUADRANGLE LOCATION

GREEN MOUNTAIN, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST—EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 5

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

COLORADO
QUADRANGLE LOCATION

DECKERS, COLO.

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UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 6

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

COLORADO

QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

DEVILS HEAD, COLO.

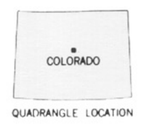
Sheet No. 6 of 24

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 7

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER



QUADRANGLE LOCATION

CHEESMAN LAKE, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 8

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

WESTCREEK, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
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UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 9

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

DAKAN MOUNTAIN, COLO.

This map was compiled by U. S. Department of Agriculture—Forest Service
and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 10

Orthophotograph prepared from 1:80,000-scale aerial photograph taken June 26, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

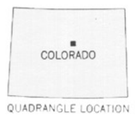
NORTH

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER



QUADRANGLE LOCATION

LARKSPUR, COLO.
N3907.5—W10452.5/7.5

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

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FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 11

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

NORTH

COLORADO
QUADRANGLE LOCATION

Orthophotograph prepared from 1:80,000-scale aerial photograph taken August 29, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

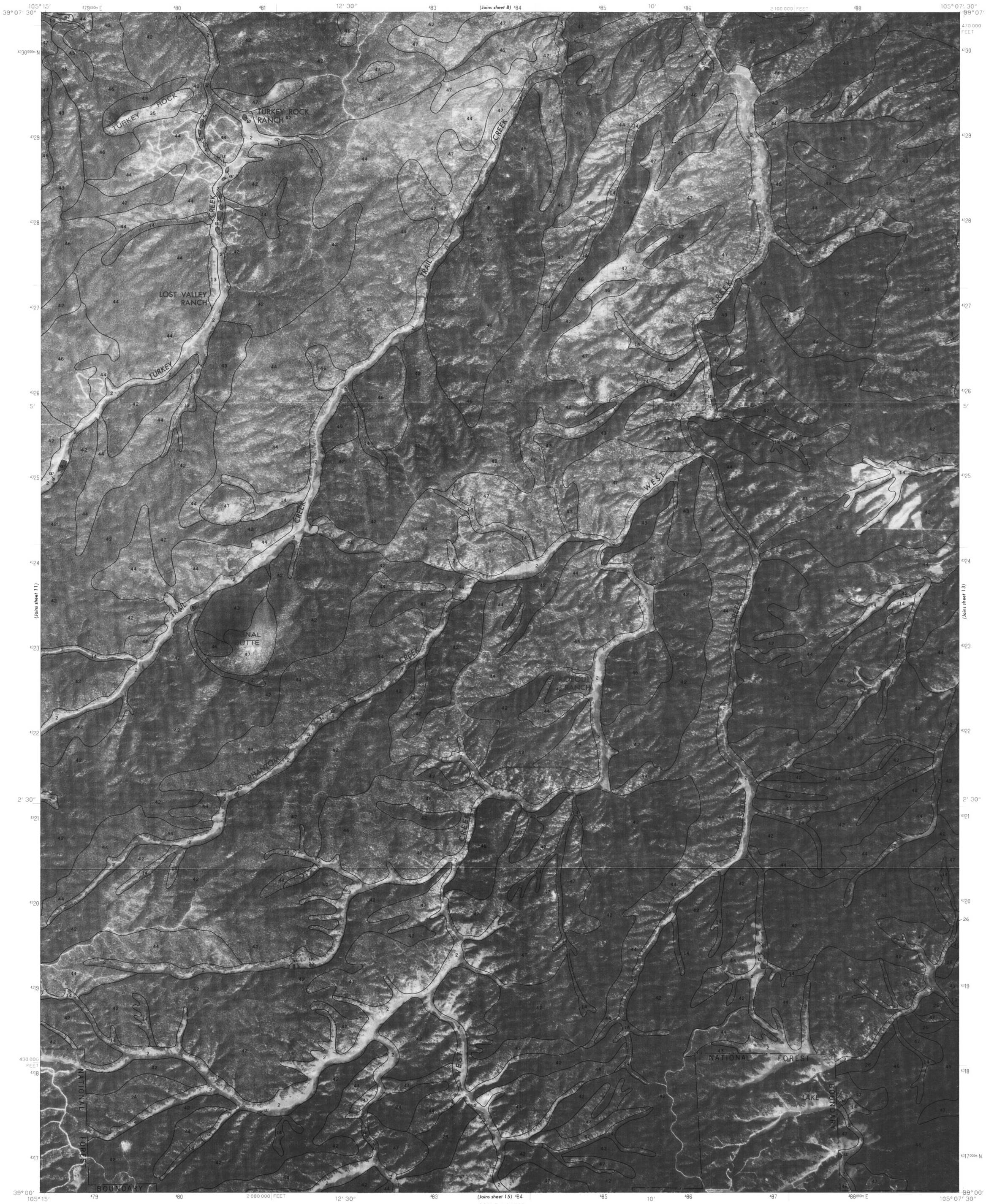
Photoimagery rectified by automatic correlation

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

HACKETT MOUNTAIN, COLO.
N3900–W10515/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 12



SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

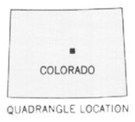
NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken August 29, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation



QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

SIGNAL BUTTE, COLO.
N3900–W10507.5/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 13

105° 07′ 30″ — 5′ — 2′ 30″ — 105° 00′

39° 07′ 30″ — 39° 00′

4330 000m N — 4329 — 4328 — 4327 — 4326 — 5′ — 4325 — 4324 — 4323 — 4322 — 2′ 30″ — 4321 — 4320 — 4319 — 4318 — 4317 000m N

2 140 000 FEET — 470 000 FEET — 2 110 000 FEET — 430 000 FEET

490 000m E — 491 — 492 — 493 — 494 — 495 — 496 — 497 — 498 — 499 000m E

(Joins sheet 9) — (Joins sheet 12) — (Joins sheet 14) — (Joins sheet 16)

WORDEN RANCH

TROUT CREEK

MANITOU PARK LAKE
water

MOUNT DECEPTION

EL PASO CO
TELLER CO

NORTH ELKHORN CREEK

SOLDIER MOUNTAIN

WHITE CREEK

SAGE CREEK

SAGE CREEK

NATIONAL FOREST BOUNDARY

NATIONAL FOREST BOUNDARY

NATIONAL FOREST BOUNDARY

LOY

TELLER CO
EL PASO CO

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken August 29, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

COLORADO
QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

MOUNT DECEPTION, COLO.
N3900–W10500/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 14

SCALE 1:24 000

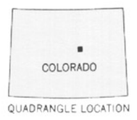
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken June 26, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation



QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

PALMER LAKE, COLO.
N3900—W10452.5/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 15

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 15, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

COLORADO

QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

DIVIDE, COLO.
N3852.5–W10507.5/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 16

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 15, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

WOODLAND PARK, COLO.
N3852.5–W10500/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST—EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 17

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 23, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

COLORADO

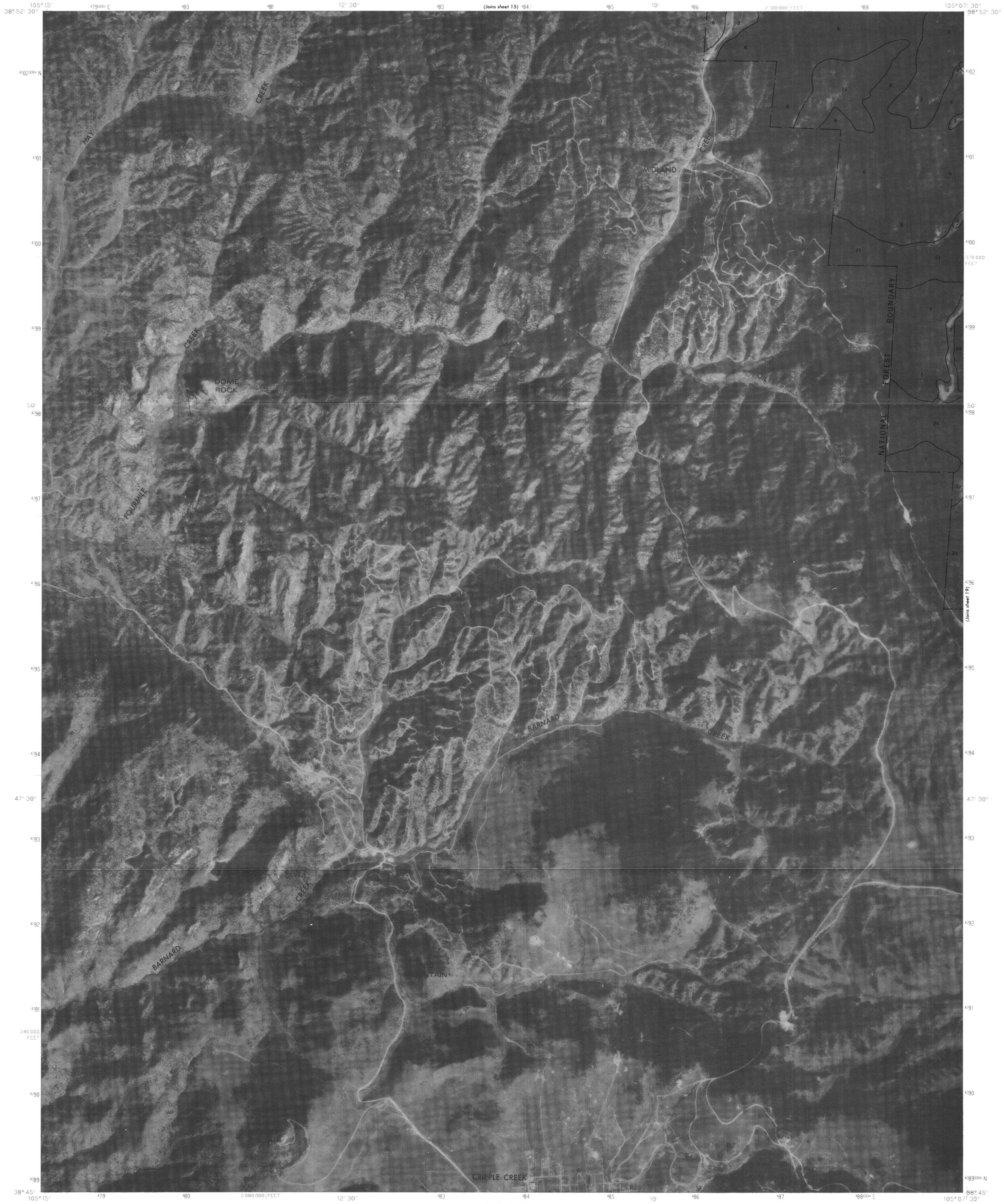
QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

CASCADE, COLO.
N3852.5—W10452.5/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 18



Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 15, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

NORTH

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

COLORADO

QUADRANGLE LOCATION

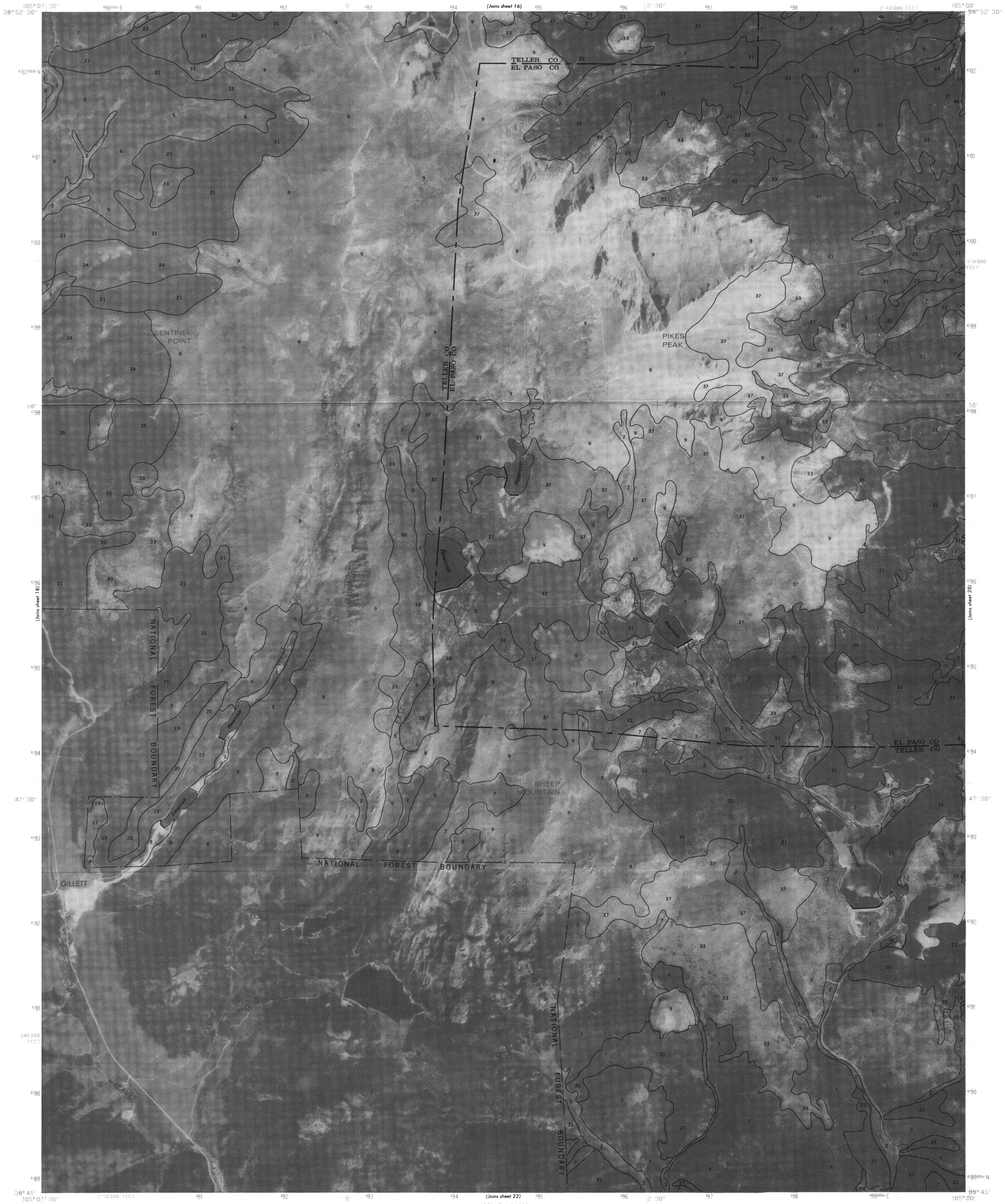
This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

CRIPPLE CREEK NORTH, COLO.

Sheet No. 18 of 24

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST—EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 19



Orthophotograph prepared from 1:80,000-scale aerial photograph taken August 29, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

COLORADO

QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

PIKES PEAK, COLO.
N3845—W10500/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 20

HURRICANE CANYON NATURAL AREA BOUNDARY

NATURAL AREA

GARDEN OF THE GODS PARK BOUNDARY

NATIONAL FOREST BOUNDARY

MANITOU SPRINGS

Reservoir

EL PASO CO
TELLER CO

CHEYENNE CREEK

NORTH CHEYENNE CANYON PARK BOUNDARY

TELLER CO
EL PASO CO

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 23)

105° 00′ 57′ 30″ 55′ 104° 52′ 30″

38° 52′ 30″ 38° 45′

2 170 000 FEET 2 150 000 FEET 370 000 FEET 340 000 FEET

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken June 26, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

COLORADO

QUADRANGLE LOCATION

MANITOU SPRINGS, COLO.
N3845—W10452.5/7.5

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DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 21

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 23, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

COLORADO

QUADRANGLE LOCATION

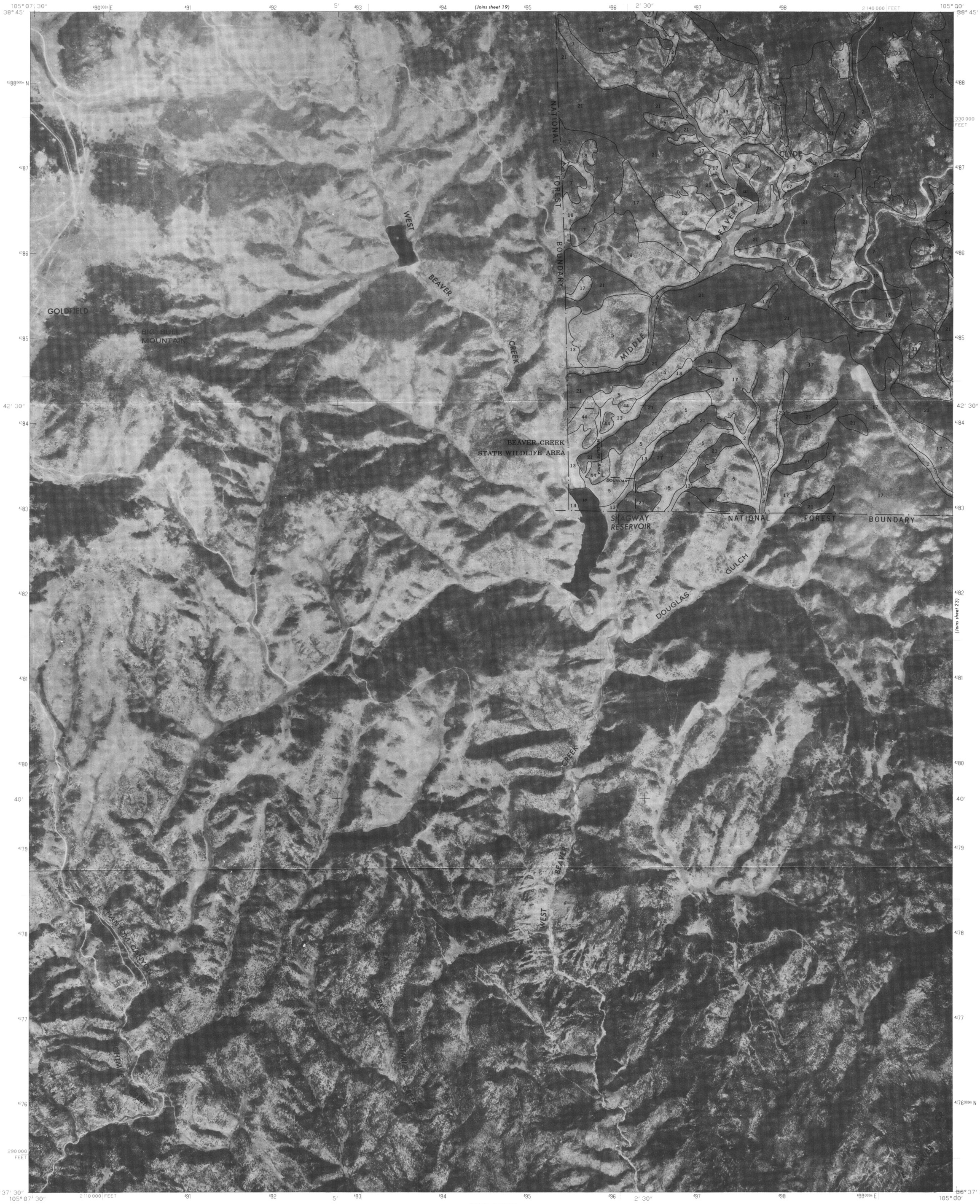
This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

COLORADO SPRINGS, COLO.
N3845—W10445/7.5

Sheet No. 21 of 24

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 22



SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 1, 1979

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 13. 1927 North American Datum

To place on the predicted North American Datum 1983 move the projection lines to position shown by dashed corner ticks

Photoimagery rectified by automatic correlation

QUADRANGLE LOCATION

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

BIG BULL MOUNTAIN, COLO.
N3837.5–W10500/7.5

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST—EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 23

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken June 26, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

QUADRANGLE LOCATION

MOUNT BIG CHIEF, COLO.
N3837.5—W10452.5/7.5

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE R–2

PIKE NATIONAL FOREST–EASTERN PART, COLORADO
SOIL SURVEY AREA
SHEET NO. 24

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

NORTH

Orthophotograph prepared from 1:80,000-scale aerial photograph taken September 23, 1975

Projection and 10,000-foot grid ticks: Colorado coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid, zone 13. 1927 North American datum

Photoimagery rectified by automatic correlation

QUADRANGLE LOCATION

CHEYENNE MOUNTAIN, COLO.
N3837.5—10445/7.5

This map was compiled by U. S. Department of Agriculture—Forest Service and cooperating agencies on orthophotography.