OREGON STATE UNIVERSITY, CORVALLIS

SOIL RESOURCE INVENTORY

Cottage Grove, Steamboat, Diamond Lake,
Glide and Tiller Ranger Districts

Umpqua National Forest

Pacific Northwest Region

1976

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Preface

This Soil Resource Inventory of the Umpqua National Forest was made to provide basic soil, bedrock, and landform information for land management planning, as a base for extensive project planning and preliminary design, and land management decision making. The inventory is part of the Regional soils program developed by the Soil Management Branch of the Division of Watershed Management. It also is part of the overall "Soil Resource Data Bank" on the Forest.

The objective of this Soil Resource Inventory is to provide soils information in a form useful to the land manager as an aid to multiple use management as directed by Public Law 86-517. This law states that the National Forests are to be administered to achieve and maintain in perpetuity a high level of annual or regular periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land.

All renewable surface resources of the National Forest are dependent upon soil, which is a nonrenewable resource. Soil develops at a very slow rate. This fact, plus the fact that most forest soils are thin to begin with, necessitates conservation, wise use, and preservation of this basic resource in order to produce sustained yields of water, timber, recreation, wildlife, and forage. To accomplish sustained yield of renewable resources, to conserve or preserve the soil resource while making wise use of this resource, it is necessary to have basic soils information and to make sound management interpretations.

This report contains a collection of information on definitions of mapping units, soil maps, landtype descriptions, climate, geology, laboratory data and management interpretations. The report is written in nontechnical terms, so that it can be easily understood by all users.

Field mapping was conducted from 1973 through July 1975, principally by Soil Scientist Sherman Radtke. Supervision was provided by Loren Herman. This report was written by Soil Scientist Rudolph V. Edwards, Jr. During the course of the survey, valuable assistance, advice and cooperation received from Dallas Hughes and other Forest personnel were sincerely appreciated.

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USE

Land management activities generally relate to the soil resource. Timber harvest, road construction, recreation development, and many other activities have an effect on the soil resource to some degree. It is extremely important for the land manager to thoroughly understand the effect of the various activities on the soil. It is equally important for the land manager to fully understand the capabilities of the soil resource. Basic soils information contained in this report will help the land managers and planners to (1) determine the effects of management on the soil and water resource and (2) evaluate the capabilities of the soil for various uses.

Information presented in this report is based on the Mapping Unit and is basic to soil identification and management interpretation. The mapping unit is derived and defined on the basis of its soil, landform, geology, and vegetation characteristics.

Management problems related to the landform and soil are easily defined and interpretations have been made. This information has been tabulated and can be found within this report.

The Soil Resource Inventory (SRI) has its primary use at the planning level. Soils, landforms, and bedrock characteristics are defined at an intensity sufficient to help develop resource management policies and basic plans. Due to the reconnaissance nature of this survey, it lacks detail for use in high-intensity, small-area projects. These projects require additional on-site study by various technical specialists, including soil scientists.

There are many uses for the information in this report. Some are quite simple and apparent, while others have not yet been conceived. The real work lies ahead in effectively and fully using this information. The use of this information is best achieved by those with full understanding of the interrelationships of the basic earth features.

Examples of how SRI information can be used are listed below:

1. Transportation Planning - This is an area where the soils information has key application. Conditions and problems can be met or avoided based on information such as landscape stability, soil depth, soil drainage and/or bedrock type and competency. Roads may be selected that avoid unstable areas, and construction and maintenance costs may be more accurately estimated.

2. Recreation Planning - The SRI information indicates the various soil suitabilities and limitations that may apply to ski areas, camping areas, trails, roads, and other aspects of recreation development. By knowing the soil suitabilities and limitations, the planner is better able to make plans that are consistent with the capabilities of the land.

3. LUP - This report provides information that will be incorporated into the land use plans. The report will define critical and sensitive soils. It will also help define constraints upon management activities to avoid excessive damage to critical and sensitive soils. The report will determine the effect of implementing the R-6 Fish Habitat Management Policy upon the commodity and amenity outputs of the Forest. It will also determine the activities impacted by the policy and what direction will be necessary to meet the policy standards. Finally, it will define those drainages where activities probably cannot be undertaken if the policy is to be met.

4. Five-Year Action Plan - This report provides information on the relative susceptibility of soil and other resource damage from timber harvest, road construction, and other timber-related activities. Provided also, is information on regeneration problems and erosion control requirements.

5. Timber Management Plan - The soils information can suggest direction and support policy for allowable cut determinations, logging systems, slash disposal methods, operating season, and deferred cutting areas. With a better understanding of problems and their location, the cut can be planned so that at a given time the majority of cutting is not taking place in critical soil areas. By spreading out and deferring the more critical areas, more time is available for proper road location and design on these areas. Also, within a few years, logging technology may have developed so that harvest methods are compatible with critical soil areas without causing excessive soil and resource damage.

6. EAR's - Any report involving the impact of a management activity requires soils input. Whether it is a ski area, recreation, or damsite proposal, there are soil factors that must be considered to make the report complete.

7. Land Appraisal and Exchange - Soils information should be used for land appraisal and exchange activities. The value of the land is related to such soil factors as texture, depth, drainage, productivity, and stability. Without knowledge of these and other soil factors, how can land value be appraised?

8. The following is a list of more specific uses of the report. These uses are adaptable and compatible with the survey data and are well within the scope and intensity of the survey.

   a. Engineering Testing - By using the soil maps, more efficient testing can be done. The soil maps can be used to determine which soils are most susceptible to certain engineering problems. These problem soils may need more closely spaced testing than soils in which few problems are anticipated.

   b. Reservoir Sites - This report gives information that can be used to determine problems that may be encountered for a reservoir

site. The soil interpretations will enable the planner to better determine the general suitability of a particular site and the soil stability as they affect reservoir uses.

   c. Hydrologic Analysis - The information in the SRI is sufficient to determine a broad hydrologic analysis and water balance on the Forest, and as a basis for comparisons between larger watersheds.

   d. Timber Harvest Methods - Additional facts known about the potential for erosion and landscape stability will encourage selection of timber harvest methods that cause minimum damage to soil and other resources.

   e. Timber Harvest and Road Construction Operating Season - These activities should be scheduled at times when they will cause minimum soil damage. Many soils are subject to damage (compaction, erosion, site deterioration) by timber harvest activities when overly wet or excessively dry.

   f. Erosion Control - Since there is wide variability in soil texture, depth, structure, permeability, drainage, and topography, wide differences also occur in the ability of the soil to resist erosion. Forest soils are rated as to their potential erosion class. The land manager can use this information to determine which areas will need special erosion protective measures. These will need to be developed on a site-by-site basis.

   h. Recreational Developments - Several kinds of information are available in this report to assist in selecting favorable sites for campground development. Among these are soil and landform properties and characteristics, specific ratings of filter drainage field suitability, the relative resistance of soil and vegetation to site deterioration, and indications of special problems which may be encountered.

DEFINITIONS OF MAPPING UNITS

This section defines the numbers and symbols found on the soil maps. The numbers identify mapping units. The symbols represent land features important to land management that are too small to delineate at the scale used for this survey. An exception is the dashed line used to delineate recently active or active slumps and unstable areas. The symbols used in this survey are listed below:



Rock Outcrop

Unstable Area

Wet Spot and Small Marshes

Slump or Slide Scarp

Avalanche or Debris Slide Track

Mapping Units[1/] are shown on the landtype maps as numbers. Mapping units contain a dominant landtype which accounts for at least 70% of the landtype delineation.

The dominant landtype of the mapping unit is described in the mapping unit description and identified by the same number as used for the mapping unit. Within the mapping unit other landtypes occur. Those most commonly associated with the dominant landtype of the mapping unit are included in the descriptions as inclusions. These inclusions of other landtypes account for no more than 30 percent of the mapping unit.

The management interpretations presented in the report apply only to the dominant landtype in each mapping unit and associated inclusions. The interpretations for most inclusions within any mapping unit are listed on the interpretative tables according to the appropriate landtype number.

Mapping Unit Complexes

Many symbols shown on the maps have three digits and are called "Mapping Unit Complexes." These are mapping units used in areas where two or more defined mapping units are present in an arrangement too complex to separate at the one-inch per mile scale. The Legend of Complexes indicates the mapping unit components of the complex and the approximate percentage of each component.

1/ Mapping units contain a dominant taxonomic unit.

Mapping Unit Descriptions

Most of the mapping units are described in detail. These landtypes have a definable range of characteristics that can be represented by a soil profile description. Mapping Units 0 through 9 are miscellaneous landtypes, quite variable, and not described in detail. They are described in a short narrative.

Information in Mapping Unit Descriptions

The first paragraph states the primary soil and the most common inclusions found within the mapping unit. The second paragraph gives a brief generalized description of the primary soil. The third paragraph briefly describes the bedrock occurring in the mapping unit. The fourth paragraph describes the landform and slope. The fifth paragraph describes the elevation and timber type. The sixth paragraph describes the drainage class and permeability rates. References should be made to Appendix VI for definitions of terms used in these descriptions.

Range of Profile Characteristics

This describes the range of soil profile characteristics that have been established for the dominant landtype within the mapping unit.

MAPPING UNIT DESCRIPTIONS[2/]

MAPPING UNIT 1

Rock Outcrop, Andesites and Basalts

This landtype comprises predominately hard, competent andesite and basalt rock outcrops commonly forming cliffs, rocklands, and "rock knobs." This mapping unit is usually associated with volcanic dikes, vents, and plugs. Minor amounts of various volcanic materials or sediments may be present.

At least 70 percent of the total area covered by this landtype is either exposed rock or contains less than 3 inches of soil or organic materials.

Included within this landtype are shallow, rocky soils (less than 3 feet) which occupy areas too small to map out separately.

Typically, this unit supports either no timber or very low quality timber. Consequently, this landtype is designated as noncommercial forest land.

MAPPING UNIT 2

Rock Outcrop, Volcanic Breccias and Tuffs

Volcanic breccias, tuffs, agglomerates, conglomerates; clastic and pyroclastic sediments generally more easily weathered than Mapping Unit 1. Typically, outcrops are massive with few fractures. Bedding planes are often present with minor dikes and flows of andesite or basalt. Locally, these materials have been altered by hydrothermal and volcanic activity to extremely hard and resistant materials. This mapping unit often supports grasses and forbs locally.

At least 70 percent of the total area covered by this landtype is either exposed rock or contains less than 3 inches of soil or organic materials.

Included in this landtype are shallow, rocky soils (less than 3 feet) which occupy areas too small to be mapped out separately.

Typically, this unit supports either no timber or very low quality timber. Consequently, this landtype is designated as noncommercial forest land.

2/ Mapping Units 0 through 9 are miscellaneous landtypes and are not described in detail.

MAPPING UNIT 3

Miscellaneous Forest-Nonforest Land

This mapping unit is a complex of soils highly variable in depth, rock content and moisture status; and interspersed with wet spots, stone fields, rock outcrops, talus-scree slopes, and avalanche tracks or chutes. Typically, up to 70 percent of this landtype comprises moderately deep (3 to 6 feet) soils. The inclusions of nonforest land are generally not large enough to be mapped out separately.

This mapping unit is normally found along upper sideslopes, in glacial basins, and in areas expressing crique topography. Elevation typically ranges from 3,500 to 6,000 feet.

Bedrock is predominately andesite or basalt. However, up to 30 percent of the area may be underlain by hard breccias and tuffs. Depth to bedrock ranges from 0 to 8 feet.

Commercial timber is prevalent on this landtype where areas of soil are present. Tree measurements have shown this landtype to support Site Class III Douglas-fir. True firs dominate in areas above 5,500 (estimated) feet elevation.

MAPPING UNIT 4

Rocky, Talus-Scree Slopes

This is a miscellaneous landtype comprising talus and scree slopes. The unit is associated primarily with the crest of the Cascade Range, principally the barren rocky and stony slopes leading from Mt. Thielsen, Mt. Bailey, and other prominent Cascade peaks. It is identified primarily by its geographic location. It is also typified by a general absence of significant vegetation. It is noncommercial forest land. Rock content within this landtype generally exceeds 70 percent (by volume). The unit is not extensive. However, it is quite prominent on the landscape. Slopes typically range from 50 to 80 percent but may locally exceed 100 percent.

MAPPING UNIT 5

Cinder Cones

This is a miscellaneous landtype comprising the cone-shaped landscape features common to the areas south and west of Diamond Lake. The unit is typified by an accumulation of cinder materials which may be exposed near the top of the cone. The cinders are often found together with an exposure of hard, very porous basalt materials. The cinders are characterized by a deep brownish red color. The base of the cone-shaped landform is characterized by an accumulation of coarse popcorn size pumice particles. Depth to bedrock near the base of the cone is generally quite deep and may exceed 8 to 10 feet. This landtypes does support timber. However, the merchantable value is questionable. Vegetative types generally consist of lodgepole pine mixed with true firs, western hemlock, and occasionally mountain hemlock. The lodgepole pine typically occurs in very dense dog hair type stands. Slopes around the cone typically range from 40 to 80 percent. Rock outcrops are common only at the top of the cone.

MAPPING UNIT 6

Wet Non-Forest Land

Miscellaneous landtype encompassing wet forest lands and meadows that have high water tables or become seasonally ponded. This mapping unit is highly variable in topographic position and is found in depressions, along streamside areas, and on sideslopes. Boulder fields are often found within this unit on steeper slopes. Dominant vegetation consists of sedges, rushes, grasses, tag alder, devil's club, and willow.

This landtype is most often found in the high elevations (above 4,000 feet) but is not limited to those areas. It is typically associated with glaciated areas.

Commercial stands of timber may be present but occur either as very small inclusions or as encroaching species around the wetland perimeter.

MAPPING UNIT 7

Dry Non-Forest Land

Dry non-forested areas supporting various grasses, forbs, sedges, and shrubs. These areas are usually found in the higher elevation areas, along ridge lines and areas of cirque topography. Soils are shallow to moderately deep and contain less than 30 percent rock outcrop visible on the mapping photos. Small patches of low quality timber may be included in this mapping unit.

MAPPING UNIT 8

Steep, Dissected Landforms, from Volcanic Breccias and Tuffs

Steep, dissected landforms developing primarily on green and red breccias and tuffs. Four to six major side drainages per mile parallel to slope are typical for this unit. Soil materials consist of residuum and colluvium and may range from less than one foot deep along ridge tops to more than 20 feet deep along drainages. Soil drainage, texture, coarse fragment content, and depth are highly variable. Occasional dikes and sills of andesite and basalt may occur. Douglas-fir site class may range from V along ridge lines to III along steep drainages. Due to the small scale used for this mapping, separation of the variabilities within this miscellaneous landtype is impractical.

Occasional water seep zones occur within the confines of this landtype. These conditions exist primarily because of the variable soil profile conditions.

MAPPING UNIT 9

Steep, Dissected Landforms, from Andesites, Basalts and Breccias

This unit is a miscellaneous landtype consisting of steep, dissected lands, formed primarily over andesitic and basaltic materials. Up to 30 percent of the unit may be underlain by volcanic breccias. The soil materials are comprised of colluvium and residuum materials. Soil depths range from less than 1 foot to greater than 20 feet. The shallow soils typically occur along the upper slopes and ridge tops of this landtype. Deeper soils are most common along the lower slopes in the bottom of this landtype. The deep soils may also occupy the lower end of the numerous dissected ravines which occur within this unit. Soil drainage, texture, coarse fragment content, and depth are highly variable. Up to 10 percent of this landtype may be occupied by rock outcrops or other noncommercial forest land. Conversely, there are areas within this landtype which have excellent timber-producing potential. Typically, Douglas-fir site classes range from V along the ridge lines and upper sideslopes to III along the steep drainages and bottom slopes. Due to the small scale used for this mapping, separation of the variabilities within this miscellaneous landtype is impractical.

MAPPING UNIT 13

Mapping Unit 13 consists predominately of Landtype 13 and lesser amounts of Units 15 and 16. It is closely associated with Units 41, 31, and 15.

Landtype 13 is comprised of deep and very deep soils derived principally from colluvial materials. The surface horizons are typically thin, gravelly loams. Subsoils are thick and range in texture from gravelly and/or cobbly loams to cobbly clay loam. Cobbles are usually angular. Locally, heavy concentrations of rounded glacial till may be present.

Bedrock is variable but consists primarily of competent, hard and moderately hard volcanic breccia, with minor amounts of andesites and basalts. Depth to bedrock is greater than six feet.

Typically, Landtype 13 occurs on uneven to hummocky benches, terraces and valley bottoms with slopes ranging to 45 percent. Small, local, steeper pitches may be present. Small local landflows may be present.

This landtype ranges in elevation from 1,500 to 3,500 feet and typically supports Site Class IV Douglas-fir.

The landtype is generally well drained but has temporary local small ponds due to deep seated failures. Permeability is moderately rapid in the surface soils and moderate to locally slow in the subsoils.

Range of Profile Characteristics of Landtype 13

Litter:	Needles, leaves, twigs and decomposing organic matter; ½ to 2 inches thick.
Surface Layers:	Dark brown to dark reddish brown gravelly loams; weak, fine granular structure; 10 to 20 percent small subangular gravel by volume; nonsticky to slightly sticky, nonplastic, pH ranges from 6.0 to 7.2; 6 to 15 inches thick.
Subsoil Layers:	Reddish brown to brown gravelly to cobbly loams, and light clay loams; weak to moderate, fine to medium subangular blocky structure becoming massive below 40 inches (estimated); 30 to 40 percent rounded to subangular, gravels and cobbles by volume; slightly sticky, slightly plastic to plastic; pH ranges from 5.5 to 7.0; 60 to 120 inches thick.

MAPPING UNIT 14

Mapping Unit 14 consists dominantly of Landtype 14 and minor amounts of Landtypes 23, 24 and 28. This unit is typically associated with Units 23 and 24.

Landtype 14 consists of deep to very deep, fine and very fine textured soils.

Surface soils are thin shotty silt loams and clay loams. Subsoils are thick, silty clay loams, and clays. The profiles are generally free of gravels or cobbles. Reddish colors typically designate the profile.

Bedrock materials are variable and consist of competent, partially weathered andesites, basalts, breccias and tuffs. Depth to bedrock is usually greater than 12 feet but locally may be near 6 feet.

Typically, Landtype 14 occurs on elevated flats, benches, and terraces that are smooth to somewhat uneven with slopes ranging from 5 to 30 percent.

This landtype ranges in elevation from 1,200 to 3,500 feet and typically supports Site Class IV Douglas-fir.

The landtype is moderately well to well drained. Permeability is moderate in the surface soils and slow in the subsoils.

Range of Profile Characteristics of Landtype 14

Litter:	Needles, leaves, twigs, and decomposing organic matter; 2 to 3 inches thick.
Surface Layers:	Reddish brown, shotty loams and light clay loams; weak to moderate, fine and medium granular and subangular structure; nonsticky to slightly sticky, slightly plastic; pH ranges from 6.0 to 7.0; 2 to 14 inches thick.
Subsoil Layers:	Reddish brown to red, silty clay loams and clays; moderate to strong, fine and medium, subangular blocky structure becoming massive near bedrock; trace of rounded to subangular gravels and cobbles; slightly sticky to sticky, slightly plastic; pH ranges from 5.5 to 6.5; 62 to 88+ inches thick.

MAPPING UNIT 15

Landtype 15 is comprised of shallow to very deep soils derived from alluvium, colluvium and occasionally glacial till. Surface horizons are generally thin and exhibit loams, sandy loam, and loamy sand mixtures. Subsoils are usually gravelly to very gravelly, cobbly sandy loams.

Bedrock materials consist of various kinds found in the survey area. Depth to bedrock is usually greater than 12 feet but locally may be as little as 3 feet. Occasionally, andesites and basalts may occur as outcrops in stream bottoms.

Typically, Landtype 15 occurs along streams in valley bottoms with slopes less than 20 percent. Locally, this landtype is subject to flooding.

This landtype ranges in elevation from approximately 900 to 4,000 feet and supports Site Class IV Douglas-fir.

Drainage varies from poor to excessive. Permeability is rapid to very rapid in the surface soils and moderate to very rapid in the subsoils.

This unit is considered as a miscellaneous landtype because of the wide range of soil properties and other physical characteristics. Therefore, no representative profile has been identified.

Range of Profile Characteristics of Landtype 15

Litter:	Needles, leaves, twigs and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Very dark grayish brown loams and gravelly sandy loams; single grain to weak, fine and very fine granular and subangular blocky structure; 15 to 40 percent rounded to subangular gravels and cobbles by volume; nonsticky, nonplastic; pH ranges from 5.7 to 6.3; 4 to 15 inches thick.
Subsoil Layers:	Dark brown to brown gravelly cobbly sandy loams; massive; weakly compacted; 30 to 65 percent rounded to subangular gravels and cobbles, trace to 10 percent stones by volume; nonsticky, nonplastic; pH 6.0 to 6.3; 100 to 120 inches plus in thickness.

MAPPING UNIT 16

Mapping Unit 16 consists dominantly of Landtype 16 and minor amounts of Landtypes 13 and 15.

Landtype 16 is comprised of deep soils derived from colluvium, glacial till, and alluvium. Surface soils are usually thin gravelly loams and sandy loams. Subsoils are usually thick gravelly cobbly loams that locally may range from sandy loams to clay loams.

Bedrock materials are variable and consist of competent to moderately competent andesites, basalts, and breccias. Depth to bedrock varies from 6 to 10 feet.

Typically, Landtype 16 occurs on moderate to steep, midslopes, toeslopes, and valley bottoms that are smooth to somewhat dissected. Slopes range from 20 to 70 percent.

This landtype ranges in elevation from 1,500 to 4,500 feet and supports Site Class IV Douglas-fir.

The landtype is well drained. Permeability is rapid in the surface soils and rapid in the subsoils.

Range of Profile Characteristics of Landtype 16

Litter:	Needles, leaves, twigs, and decomposing organic matter; 2 to 3 inches thick.
Surface Layers:	Very dark grayish brown to dark brown, shotty sandy loams and gravelly loams; weak, medium, granular structure; 30 to 60 percent, rounded and subangular gravels, cobbles, and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 6.0 to 7.0; 10 to 24 inches thick.
Subsoil Layers:	Brown to reddish brown, gravelly and cobbly sandy loams to clay loams; weak, fine subangular blocky grading to massive; 40 to 75 percent rounded to angular gravels, cobbles, and stones by volume; nonsticky to slightly sticky, slightly plastic; pH ranges from 6.0 to 7.5; 69 to 120 inches thick.

MAPPING UNIT 18

Mapping Unit 18 consists dominantly of Landtype 18 and lesser amounts of Landtypes 19 and 24. It is commonly associated with Landtypes 19, 24, 52 and 57.

Landtype 18 consists of deep cobbly loam, soils developed in colluvial and/or glacial materials. The glacial materials are generally confined to areas above 5,000 feet elevation. Surface soil materials are typically shotty, gravelly and cobbly loams. Thickness of the surface horizon ranges from 6 to 12 inches. Subsoil horizons are cobbly loams and clay loams. Cobbles are usually angular and subangular but may be rounded in higher elevation areas influenced by glacial action. Locally, a weakly cemented gravelly layer may be present in the profile.

The bedrock underlying this landtype is of mixed origin. Competent basalt and/or andesite is commonly associated with this landtype and often underlies it. Hard and moderately hard breccia and tuffaceous materials also underlie up to 40 percent of this landtype. Depth to the bedrock materials is usually greater than 8 feet but may range to within 6 feet. Outcrops of andesite and/or basalt occur sporadically throughout this landtype but occupy less than 1 percent of the total area of this unit.

Typically, Landtype 18 occurs on ridgetops and sideslopes as well as on colluvial and glacial benches. Slopes range from 25 to 55 percent.

The elevation range is 2,500 to 5,500 feet. The unit supports Site Class IV Douglas-fir at the lower end of the elevation range. At the higher elevation (above 4,000 feet), Site Class V Douglas-fir sites are common. Also occurrin above 4,000 feet are Site Class V true firs and white pine.

This landtype is predominately well drained, but up to 20 percent of the area may be moderately well drained. Locally, a compacted or cemented gravelly layer may present a horizon which is restrictive or impervious to natural drainage. Infiltration is rapid to moderate in the surface and moderate to slow in the subsoil. Locally, water may be ponded due to presence of a restrictive soil layer.

Range of Profile Characteristics of Landtype 18

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Dark brown to reddish brown shotty, gravelly, and cobbly loams; moderate, fine and medium granular structure; friable; 10 to 30 percent (by volume) gravels and cobbles; angular and subangular cobbles or rock fragments; slightly sticky, nonplastic; pH range of 6.0 to 7.0; 6 to 12 inches thick.
Subsoil Layers:	Reddish brown to yellowish brown, cobbly loams and clay loams; moderate, medium subangular blocky structure grading to massive at increasing depths (below 42 inches); friable; 20 to 50 percent angular, subangular, and rounded cobbles (by volume); slightly sticky, plastic; pH range of 5.5 to 7.0; 60 to greater than 84 inches thick.

MAPPING UNIT 19

Mapping Unit 19 consists dominantly of Landtype 19 and minor amounts of Landtypes 18 and 57.

Landtype 19 is a moderately deep, nonplastic landtype derived from glacial till and volcanic breccias. Surface soils are thin gravelly loams. Subsoils are thick gravelly cobbly loams. A very gravelly, cemented layer may be present in some profiles within this landtype.

Bedrock is composed of moderately competent volcanic breccias that may locally be highly weathered and soft. Depth to bedrock is usually greater than 6 feet. Competent andesite and/or basalt dikes and cores occasionally interrupt this landtype.

Typically, Landtype 19 occurs on uneven to hummocky glacial benches and basins with slopes ranging to 50 percent.

This landtype ranges in elevation from 4,000 to 6,000 feet and supports Site Class II Pacific silver fir, Site Class IV Douglas-fir and western hemlock.

The landtype is generally well drained, but may be locally poorly drained causing some ponding. Permeability is rapid in the surface soils and rapid to slow in the subsoils.

Range of Profile Characteristics of Landtype 19

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Dark brown to dark reddish brown, gravelly to cobbly loams; weak, fine and medium, granular structure; 20 to 40 percent subangular and rounded gravels, cobbles, and stones by volume; slightly sticky, nonplastic; pH 6.5; 5 to 15 inches thick.
Subsoil Layers:	Dark reddish brown gravelly cobbly loams and gravelly sandy loams; subangular blocky to massive; 40 to 70 percent rounded and subangular gravels, cobbles, stones (by volume); slightly sticky, nonplastic; pH range of 5.5 to 6.5; 33 to 60 inches thick. (A cemented gravelly layer may be intermittently present in the subsoil.)

MAPPING UNIT 20

Mapping Unit 20 contains predominately Landtype 20 with lesser amounts of Landtype 28. It is located primarily in the Pickett Butte area of the Tiller Ranger District.

Landtype 20 consists of deep to very deep residual soils developed over weathered volcanic tuffs and breccia materials. A typical soil profile shows a dark, clay loam surface horizon. The upper subsoil is characterized by a light colored, very heavy, sticky, clay material. Textures of the heavy material vary from silty clay to clay. As subsoil depths increase, the extreme stickiness may decrease and grade to a heavy clay loam residual material. Variegated colors (mottles) are common in the lower subsoil.

Bedrock is primarily highly weathered, reddish tuffs and breccia materials. Depth to the soft rock is usually greater than 6 feet and may be greater than 12 feet. Bedrock will likely become harder and more competent at depths below 12 feet.

Landtype 20 is associated with nearly level lower slopes and benches. It is also present in large depressional areas and associated landflow areas. Slopes range from 0 to 20 percent.

Elevation range is 1,000 to 3,000 feet. It supports Site Class IV and V Douglas-fir and Site Class III sugar pine. Grand fir, madrone, and chinquapin are also associated with this landtype. These lesser species tend to encroach and take over in areas of diseased or decadent Douglas-fir. Deep rooted, drought-resistant timber species are best suited to this landtype.

Soils in this landtype are predominately somewhat poor and poorly drained. Surface infiltration is moderate to slow and subsoil permeability is slow to very slow.

Range of Profile Characteristics for Landtype 20

Litter:	Needles, leaves, twigs and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark reddish brown silt loams to light clay loams; weak and moderate, medium granular breaking to moderate, fine, subangular blocky structure; friable consistence; slightly plastic; pH ranges from 6.0 to 7.5; 6 to 16 inches thick.
Subsoil Layers:	Reddish brown, pale brown, and grayish brown silty clay loam to silty clay (textures grade to clay loam with increasing depth); massive structure throughout; firm, sticky consistency in upper portion of subsoil grading to firm; very sticky and very plastic in lower subsoil (stickiness decreases with depth); pH range of 6.0 to 6.8; 60 to greater than 120 inches thick.

MAPPING UNIT 21

Mapping Unit 21 is comprised of predominately Landtype 21 with lesser amounts of Units 22, 41 and 42. It is closely associated with breccia materials.

Landtype 21 consists of shallow, residual soils developed over highly weathered volcanic breccia materials. The surface horizon is generally a thin, slightly shotty and gravelly fine sandy loam or loam. The subsoils range from thin to thick (6 to 30 inches) with predominately clay loam textures. Gravels and cobbles generally occupy less than 20 percent (volume) of the profile.

Bedrock materials consist primarily of soft, highly weathered breccias and tuffs. Color of the weathered rock is quite variable and variegated. Reds and yellows are most common. Bedding or stratification of the rock materials is typical. Occasionally, hard, competent breccia is separated by intermittent layers of soft, weathered "rock." These layers of soil often exist in the contact area between rock layers. Depth to harder, more competent rock is typically 4 to 8 feet but may range from 2 to 12 feet.

This landtype is primarily associated with moderately steep and steep topography. It occurs on dissected landforms. Slopes are complex with the majority showing a concave profile. Slopes are typically 50 to 65 percent but range from 40 to 80 percent.

Potential for mass movement is inherently high in this landtype. This is especially true in the headwall areas at the head of the incised drainages.

The elevation range for this landtype is 1,000 to 3,600 feet. It supports Site Class IV and V Douglas-fir.

Soils in this landtype are well drained. Permeability is rapid in the surface soil and rapid to moderate in the subsoil.

Range of Profile Characteristics of Landtype 21

Litter:	Needles, leaves, twigs, and decomposing organic matter; ½ to 2 inches thick.
Surface Layers:	Reddish brown fine sandy loam to loam; weak, fine granular structure with some shotty and subangular gravelly materials; friable; slightly sticky, nonplastic; pH range of 6.0 to 7.2; 3 to 6 inches thick.
Subsoil Layers:	Reddish brown and reddish yellow loams and clay loams; friable, weak to moderate subangular blocky structure grading to massive; less than 10 percent angular and subangular gravels and cobbles; slightly sticky and slightly plastic; pH range of 6.0 to 7.0; 20 to 36 inches thick.

The subsoil layers grade into the underlying weathered rock materials. This gradation may be abrupt, gradual, or intermittent.

MAPPING UNIT 22

Mapping Unit 22 consists dominantly of Landtype 22 with minor amounts of 21, 23, 24 and 42. This unit is associated with Units 25 and 33.

This landtype comprises shallow, residual soils developed over highly weathe volcanic breccia and tuff materials. The surface horizon is generally a thi slightly shotty loam. The subsoil horizons range from thin to thick (6 to 3 inches) with loam to clay loam textures. Gravels and cobbles typically occu less than 10 percent (by volume) of the profiles in this unit. On a local basis, profiles may be quite cobbly and textures may range from sandy loam to heavy clay loam.

Bedrock materials consist primarily of soft, highly weathered breccias and occasional tuffs. Color of the soft rock is quite variegated with reds and yellows most common. Evidence of significant bedding in the soft rock materials is frequent. Depth to harder, more competent rock is typically 6 to 10 feet but may range from 2 to 20 feet.

This landtype occurs on undulating to hilly topography. It is usually found on low ridgetops and/or gentle sideslopes. It is also found associated with old landflows that have stabilized. Slopes are typically 25 to 50 percent but range from 15 to 60 percent.

This landtype ranges in elevation from 1,000 to 3,600 feet and supports Site Class IV Douglas-fir.

The landtype is well to moderately well drained. Permeability is moderate rapid in the surface soils and moderate in the subsoils.

Range of Profile Characteristics of Landtype 22

Litter;	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Dark yellowish brown loam; weak, fine, granular to fine, subangular blocky structure; friable; 10 to 20 percent shot and traces subangular gravel; slightly sticky, non-plastic; pH ranges from 6.0 to 7.0; 6 to 8 inches thick.
Subsoil Layers:	Dark brown to pale brown loams and clay loams; moderate, fine and medium, subangular blocky structure becoming massive at depth; 0 to 15 percent subangular gravel and stones; sticky, plastic; pH ranges from 6.0 to 7.2; 30 to 64 inches thick.

MAPPING UNIT 23

Mapping Unit 23 consists dominantly of Landtype 23 and minor amounts of Landtypes 14, 22, 25 and 33.

Landtype 23 consists of moderately deep to deep soils derived from colluvium and residuum materials. Surface soils are generally thin, shotty, fine sandy loams and loams. Subsoil horizons range from thin to thick clay loams and clays. The upper portion of the subsoil is characterized by predominately red colors. Heavy clay loams and/or clay textures are associated with this reddish layer. Gravels and cobbles are not typical of the profiles in this landtype.

Bedrock is composed of soft to moderately hard, reddish breccias and tuffs. Colors of the weathered rock are variable and variegated with reds and yellows being most prominant. Greens occur to a lesser extent. Evidence of bedding or stratification in the underlying rock material is common. These layers of soil material often exist between the layers of rock. Depth to hard, competent rock is typically 4 to 8 feet but may range from 3 to 10 feet.

Typically, Landtype 23 occurs on moderate, smooth to somewhat hummocky, undulating to rolling lower sideslopes and benches with slopes ranging from 10 to 50 percent. It is often associated with old landflows, occupying the "bench" portion of the old flow.

This landtype ranges in elevation from 1,000 to 3,600 feet and supports Site Class IV Douglas-fir.

The landtype is well to moderately well drained. Permeability is moderately rapid in the surface soils and moderate to slow in the subsoils.

Range of Profile Characteristics of Landtype 23

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Dark gray shotty loam; moderate fine and medium, granular structure; 5 to 20 percent shot and gravel (by volume); slightly sticky, plastic; pH ranges from 6.0 to 7.0; 2 to 12 inches thick.
Subsoil Layers:	Dark reddish brown to dark red silty clay loams, clay loams and clays; moderate to strong, medium, subangular blocky structure becoming massive at depth (below 30 inches); very sticky, very plastic; pH ranges from 5.0 to 6.5; 48 to 100 inches thick.

MAPPING UNIT 24

Mapping Unit 24 consists predominately of Landtype 24 and lesser amounts of Landtypes 14, 18, 22, 23 and 25. It is also often found in association with Unit 18.

Landtype 24 comprises deep to very deep, medium textured soils. They are derived primarily from residuum materials; but in some areas, they have also developed in colluvium debris. Typically, surface soil materials are moderately thick (4 to 14 inches), shotty, loams and light clay loams. Subsoils are typically thick loams and clay loams. The profiles within this unit usually contain less than 10 percent (by volume) gravels, cobbles, or stones. Locally, subsoil textures may range to clay and volume of cobble may approach 20 percent. However, these range extremes are not extensive.

Bedrock materials are variable. Moderately competent, partially weathered red breccia is most common. However, the range may include soft, highly weathered breccias and tuffs as well as hard andesites, basalts, and tuffs (welded). Depth to bedrock material is usually between 6 to 8 feet but may range from 6 to greater than 12 feet.

Landtype 24 occurs on gently sloping sideslopes, low ridges, benches, and terraces. Topography is undulating to sloping with a slope range of 15 to 45 percent.

This landtype ranges in elevation from 1,500 to 4,500 feet. Below 3,500 feet it has the potential to support Site Class III Douglas-fir. Elsewhere it supports Site Class IV Douglas-fir.

Drainage in this landtype is both well and moderately well. Infiltration is moderate and permeability in the subsoil is moderate to slow.

Range of Profile Characteristics of Landtype 24

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark brown to very dark grayish brown shotty loams; moderate, fine and medium granular structures; 5 to 20 percent shot (by volume); slightly sticky, non-plastic; pH ranges from 6.0 to 7.5; 4 to 14 inches thick.
Subsoil Layers:	Strong brown clay loams and silty clay loams; moderate, fine and medium subangular blocky structure grading to massive at depths below 48 inches; 5 to 10 percent angular and rounded cobbles; pH ranges from 5.0 to 6.5; 36 to 120 inches thick.

MAPPING UNIT 25

Mapping Unit 25 covers land areas which exhibit characteristics for old landtypes. The unit encompasses the entire landflow and consists of several soil conditions. Therefore, it is considered as a miscellaneous landtype.

Landtype 25 comprises deep and very deep soils associated with inactive landflows. Included are land areas which have moved in the past but have stabilized. Soil profiles are quite mixed because of their history of past movement. A representative profile shows a thin (less than 12 inches), gravelly and/or cobbly loam surface. This is underlain by a gravelly clay loam to clay subsoil. The boundary between the surface and subsoil horizon is often quite diffuse. Gravel and cobble content in the profile may range from less than 10 to 40 percent by volume.

Bedrock is most typically saprolytic, reddish breccias and tuffs. These materials have weathered to clayey materials and have become plastic. Depth to hard bedrock varies from 6 to greater than 12 feet.

Typically, Landtype 25 occurs on hummocky, uneven landforms associated with old landflows and unstable areas. Slopes range from 15 to 40 percent. Actively moving areas are indicated by a dashed line around the perimeter of the unit (Example: Idiot Slide).

This landtype ranges in elevation from 1,000 to 4,000 feet and supports Site Class IV Douglas-fir.

This landtype ranges from well to poorly drained. Permeability is rapid to moderate in the surface soils and moderate to slow in the subsoil.

Physical features such as pressure ridges, leaning trees, and sag ponds are indicators of this landtype. In general, this landtype encompasses old landflows or other past movements which have stabilized. Current or continuing mass movement is indicated by a dashed landtype boundary.

This unit is considered as a miscellaneous landtype because of the wide variety of soil conditions existing within the unit.

As previously indicated, landflows which show active movement are designated with a dashed unit boundary line.

No representative profile has been established for this landtype.

MAPPING UNIT 27

Mapping Unit 27 consists dominantly of Landtype 27 and lesser amounts of Landtypes 22, 23, 24 and 47.

Landtype 27 comprises shallow to moderately deep, residual soils developed over weathered residuum. Surface horizons typically range from silt loams to light clay loams. Subsoils consist of clay loams and clays. Gravels and cobbles normally occupy less than 10 percent of the profile volume. Locally, the soils may be quite shotty in the surface horizons.

Bedrock is composed primarily of moderately soft to moderately hard, volcan tuffs and occasionally breccias. Depth to bedrock ranges from less than 3 feet to greater than 8 feet.

Typically, Landtype 27 occurs on broad uneven low ridgetops and gentle side slopes. It is also found on hummocky benches associated with old landflows. Slopes range from 10 to 50 percent.

This landtype ranges in elevation from 2,500 to 4,500 feet and supports Sit Class IV Douglas-fir and Site Class III Noble fir in areas above 4,000 feet. Western hemlock, Pacific silver fir, and incense cedar are also associated with typical stands.

The landtype is moderately well drained but may be locally poorly drained causing ponding. Permeability is moderate in the surface soils and moderat to slow in the subsoils.

Range of Profile Characteristics of Landtype 27

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Reddish brown gravelly silt loams; weak to moderate, fine and medium, granular structure; friable; 10 to 40 percent shot and/or gravels and cobbles by volume; sticky, plastic; pH ranges from 6.0 to 7.2; 3 to 12 inches thick.
Subsoil Layers:	Yellowish red clay loam and clay; moderate to strong, angular to subangular structure grading to massive; sticky, very plastic; pH ranges from 5.5 to 6.2; 32 to 84 inches thick.

MAPPING UNIT 28

Mapping Unit 28 is dominated by Landtype 28 with minor amounts of Landtypes 20, 27 and 24. It is most common on the Tiller District.

Landtype 28 includes deep to very deep developed soils formed over weathered volcanic tuffs and breccia materials. A typical soil profile shows a developed B horizon separating the surface horizon from the underlying subsoil layers. The surface horizon generally exhibits loam and fine sandy loam textures. Locally, the surface may be quite shotty and/or gravelly. The upper portion of the subsoil is the developed B horizon of clay loam to clay textures. Thickness of a B horizon ranges from 10 to 20 inches. Below the B horizon, a clay layer may be present. If present, the clay layer has characteristics similar to those found in the subsoil of Landtype 20. The lower portion of the subsoil is clay loam and is a transition to the weathered "rock" below. Variegated colors are common in the lower subsoil.

Bedrock is primarily highly weathered, reddish tuffs and breccia materials. Depth to hard rock is usually greater than 6 feet and may be greater than 12 feet.

Typically, Landtype 28 occurs on very broad, low ridgetops and gently sloping to nearly level sideslopes. It is also found on nearly level benches or swales associated with old landflows. Slopes range from 5 to 45 percent.

This landtype ranges in elevation from 1,200 to 4,000 feet. It supports Site Class IV Douglas-fir and Site Class II and III sugar pine. Deep rooted, drought tolerant species are preferred because of the clay and silty clay texture.

Soil drainage varies from well to moderately well. Locally, drainage may be impeded with some surface ponding. Surface infiltration is moderate and internal permeability is slow in the subsoil. Locally, permeability may be very slow.

Range of Profile Characteristics for Landtype 28

Litter:	Needles, leaves, twigs, and decomposing organic matter; 2 to 4 inches thick.
Surface Layers:	Reddish brown, shotty, fine sandy loam to light clay loam; weak, fine and medium granular structure; friable consistency; slightly sticky, slightly plastic; pH range of 6.2 to 8.0; 6 to 20 inches thick.
Subsoil Layers:	Upper subsoil (B horizon): Reddish brown and dark reddish brown clay loam to clay; moderate, fine and medium subangular blocky structure; firm; sticky, very plastic; pH range of 5.5 to 6.2; 8 to 12 inches thick. Clay layer (present intermittently): Pale brown and reddish yellow; massive structure; very sticky and very plastic; pH range of 6.0 to 7.0; 8 to 20 inches thick. Lower subsoil layers: Brown, clay and clay loam; massive; friable to firm; nonplastic to slightly plastic; pH range of 5.5 to 6.0; 40 to greater than 60 inches thick.

MAPPING UNIT 30

Mapping Unit 30 consists predominately of Landtype 30 with lesser amounts of Landtypes 33 and 35.

Landtype 30 consists of deep to very deep soils derived from colluvial and residual materials. A typical soil profile shows a dark shotty, heavy loam or clay loam surface horizon. Subsoils are characteristically light gray-green colored and possess clay and silty clay textures. These subsoil materials are commonly referred to as clay layer. As subsoil depths increase, the extreme stickiness may decrease and approach a consistency similar to that found in Unit 33.

Bedrock is predominately moderately hard to soft green and greenish tinted tuffs and breccias. Depth to the bedrock is typically greater than 6 feet and may be greater than 12 feet.

Landtype 32 occurs predominately on nearly level lower sideslopes and benches as well as in large depressional areas. Slopes range from 0 to 20 percent.

The elevation range is 1,000 to 4,000 feet. This landtype supports low Site Class IV Douglas-fir. In general, deep rooted, drought tolerant species are better suited to this landtype.

Soil drainage is predominately somewhat poor but ranges from moderately well to poor. Surface infiltration is moderate and internal permeability is slow to very slow.

Range of Profile Characteristics of Landtype 30

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark brown and very dark brown gravelly loam; moderate, fine and medium granular and subangular blocky structure; friable to slightly firm; sticky, slightly plastic; pH ranges from 5.5 to 6.5; 4 to 20 inches thick.
Subsoil Layers:	Light brownish gray, weak red, and olive brown; silty clay loam to silty clay; massive structure with upper portion resembling clay layer materials; very sticky and slightly plastic; pH range of 5.2 to 6.2; 60 to greater than 120 inches thick. Many mantles in subsoil.

MAPPING UNIT 31

Mapping Unit 31 consists dominantly of Landtype 31 and minor amounts of Landtypes 32, 33, 41 and 51.

Landtype 31 consists of shallow soils derived from residuum and colluvium materials. Surface soils are typically gravelly to very gravelly loams. Subsoils are thin gravelly and cobbly loams and clay loams. Gravels, cobbles and rock fragments may occupy up to 50 percent of the soil profiles.

Bedrock is composed of competent to moderately competent, hard to moderately hard, green and greenish tinted breccias and occasional tuffs. Depth to bedrock is usually less than 3 feet.

Typically, Landtype 31 occurs on steep, smooth to moderately dissected sideslopes and ridges with slopes ranging from 40 to greater than 90 percent. The most common slope range is 55 to 70 percent.

This landtype ranges in elevation from 1,000 to 4,500 feet and supports Site Class IV Douglas-fir. Pacific silver fir and white pine are commonly present at higher elevations (above 4,000 feet).

The landtype is well to excessively drained. Infiltration of the surface soil is moderately rapid. Permeability in the subsoils is moderate.

Range of Profile Characteristics of Landtype 31

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 inch thick.
Surface Layers:	Very dark gray to dark grayish brown gravelly loams that may range from sandy loams to silt loams; weak, fine and medium, granular structure; 10 to 40 percent angular and subangular gravels and cobbles by volume; nonsticky, nonplastic; pH ranges from 5.5 to 6.5; 3 to 12 inches thick.
Subsoil Layers:	Reddish gray, gravelly and cobbly loams and clay loams; moderate, fine to medium, subangular blocky structure; 20 to 70 percent angular and subangular gravel and cobbles by volume; nonsticky, nonplastic; pH ranges from 4.5 to 6.5; 17 to 33 inches thick.

MAPPING UNIT 32

Mapping Unit 32 consists dominantly of Landtype 32 and minor amounts of Landtypes 31 and 33.

Landtype 32 consists of moderately deep soils derived from residuum and colluvium materials. Surface soils are typically gravelly loams. Subsoils are gravelly to gravelly and cobbly loams and clay loams. Gravels, cobbles and rock fragments may occupy up to 30 percent of the soil profile.

Bedrock is composed of competent to moderately competent, hard to moderately hard, green and greenish tinted breccias and occasionally tuffs. Depth to bedrock is typically 4 to 5 feet but may range from 2 to 8 feet.

Landtype 32 occurs on smooth to moderately dissected sideslopes and ridges with slopes ranging from 20 to 60 percent. The most common slope range is 25 to 45 percent.

This landtype ranges in elevation from 1,500 to 3,500 feet and supports Site Class IV Douglas-fir.

The landtype is well to excessively drained. Infiltration of the surface soil is moderate to rapid. Permeability in the subsoils is moderate.

Range of Profile Characteristics of Landtype 32

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 inch thick.
Surface Layers:	Dark reddish brown to dark grayish brown gravelly loams; weak, fine and medium, granular structure; trace to 30 percent angular and subangular gravels and cobbles by volume; slightly sticky, slightly plastic; pH ranges from 6.0 to 7.2; 6 to 18 inches thick.
Subsoil Layers:	Strong brown to light olive brown gravelly and cobbly loams and clay loams; moderate, fine to medium, subangular blocky structure; 5 to 40 percent angular and subangular gravel and cobbles by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 6.5; 42 to 72 inches thick.

MAPPING UNIT 33

Mapping Unit 33 consists dominantly of Landtype 33 and minor amounts of Landtypes 22, 31, 32 and 35.

Landtype 33 consists of moderately deep to locally deep soils derived from colluvium and residuum materials. Surface soils are typically thin loams and fine sandy loams. Subsoils are moderately thick to thick (30 to 60 inches) loams and clay loams. Gravels and cobbles occur locally and may occupy up to 30 percent (by volume) of the soil profile. The contact between the soil material and the underlying weathered "breccia" is often diffuse.

Bedrock is composed primarily of soft to moderately hard, green and greenish tinted breccias and tuffs. Depth to bedrock ranges from 3 to 8 feet. Typically, the weathered rock appears quite laminated. These layers of soils often separate the layers of "rock." Colors in the bedded rock are predominately green but may be a mixture of grays, yellows, reds and greens.

Typically, Landtype 33 occurs on moderate, uneven to hummocky lower sideslopes, and benches with slopes ranging from 15 to 50 percent. It is occasionally found on flat ridgetops.

This landtype ranges in elevation from 1,000 to 4,500 feet and supports Site Class IV Douglas-fir.

The landtype is moderately well drained. Permeability is rapid to moderate in the surface soils and moderate to slow in the subsoils.

Range of Profile Characteristics of Landtype 33

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Very dark grayish brown to dark brown loams and fine sandy loams; weak to moderate, fine, granular structure; 5 to 20 percent angular and subangular gravel by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 6.5; 4 to 15 inches thick.
Subsoil Layers:	Olive to pale olive, gravelly loams and clay loams; moderate to strong, fine and medium, subangular blocky structure becoming massive below 40 inches; 10 to 50 percent soft to hard, angular and subangular gravels and cobbles by volume; slightly sticky to sticky, slightly plastic; clay films; pH ranges from 4.5 to 6.0; 35 to 55 inches thick.
	The underlying bedrock may be layered with soil material bedded between the layers.

MAPPING UNIT 34

Mapping Unit 34 consists predominately of Landtype 34 and lesser amounts of Landtypes 24, 30, 32, 33 and 35.

Landtype 34 is comprised of deep soils derived from colluvium and residuum materials. The soils have developed over green breccia and tuffaceous volcanic materials. The soils are characterized by the presence of a fine textured developed subsoil. A typical profile shows a gravelly, fine sandy loam to loam surface soil. The subsoil is divided into upper and lower portions. The upper subsoil comprises gravelly and cobbly loams. The color is principally dark brown. The lower portion of the subsoil is comprised of reddish brown to brownish red clay loams and clays with less than 5 percent coarse fragment content. This finer textured lower subsoil is considered as a developed "B" horizon.

Bedrock in this landtype is composed of moderately competent to competent, moderately hard and hard green and greenish tinted breccias and tuffs. Depth to bedrock ranges from 6 to 10 feet.

Landtype 34 typically is found on lower sideslopes, benches, and in areas of generally hummocky topography. It is typically associated with the upper portions of large, basin-type areas. The slopes within this landtype range from 10 to 35 percent. The most common slope range is 20 to 25 percent.

This landtype ranges in elevation from 1,500 to 3,500 feet and supports Site Class IV Douglas-fir.

This landtype is well and moderately well drained. Infiltration of the surface soil is moderate. Internal permeability is moderate to slow. Permeability in the lower subsoil is slow to very slow.

Range of Profile Characteristics of Landtype 34

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 4 inches thick.
Surface Layers:	Dark reddish brown, fine sandy loams and loams; weak, fine and medium granular and subangular blocky structure; slightly sticky, slightly plastic; pH ranges from 6.0 to 7.0; 4 to 16 inches thick.
Subsoil Layers:	Upper Subsoil - Reddish brown clay loams; moderate, fine and medium, subangular blocky structure; sticky, very plastic; pH range of 5.5 to 6.5; 10 to 30 inches thick.
	Lower Subsoil - Brown clay loam to clay; strong, medium subangular blocky structure grading to massive below 48 inches; sticky, very plastic; 12 to 30 inches thick; pH ranges from 5.8 to 6.8.
	Locally, a layer of weathered green breccia rock material may be present below the subsoil. This layer is typified by a greenish gray color with gravels and cobbles exceeding 30 percent (by volume).

MAPPING UNIT 35

Mapping Unit 35 comprises land areas which exhibit characteristics of old landflows which exhibit varying soil profile characteristics. This unit is, therefore, considered as a miscellaneous landtype.

Landtype 35 consists of deep to very deep soils associated with old inactive landflows. Soil profiles typically show a gravelly and shotty loam or clay loam surface horizon. Subsoils are gravelly and cobbly clay loams. Locally, subsoils may exhibit clay horizons. Subsoils are often stratified and variegated in color. Cobbles and rock fragments are commonly soft and easily broken by hand.

Bedrock is composed of incompetent, saprolytic, green and greenish tinted breccias and tuffs. Depth to bedrock is greater than 6 feet and commonly is not observed in road cutbanks.

Typically, Landtype 35 occurs on gentle to moderate, hummocky, unstable areas such as slump basins and landflows with slopes ranging from 15 to 40 percent.

This landtype ranges in elevation from 1,000 to 4,000 feet and has the potential to support Site Class IV Douglas-fir.

This landtype has drainage conditions ranging from well to poorly drained, depending on position on old landflows. Permeability is moderate to slow in the surface soils and slow to very slow in the subsoils. Some pending ponding in old slump basins is typical.

Physical features such as pressure ridges, leaning trees, and perched ponds are indicators of this landtype. In general, this landtype represents past land movement which has stabilized. Current or continuing movement is indicated by a dashed landtype boundary.

This unit is considered as a miscellaneous landtype because of the wide variety of soil conditions existing within the unit.

As previously indicated, landflows which show active movement are designated with a dashed unit boundary line.

No representative profile has been established for this landtype.

MAPPING UNIT 41

Mapping Unit 41 consists predominately of Landtype 41 and minor amounts of Landtypes 31, 42 and 51.

Landtype 41 consists of shallow soils derived from colluvial and residual materials. Surface soils are thin gravelly loams and clay loams. Subsoils are thin gravelly and cobbly loams and clay loams. Cobbles may occupy up to 40 percent (by volume) of the profile.

Bedrock is generally hard and moderately hard, competent to moderately competent, reddish volcanic breccias and tuffs. Colors of the bedrock materials may be quite variable locally. Colors may range from deep purple to lighter, yellowish grays. Depth to the bedrock is usually less than 3 feet.

Typically, Landtype 41 occurs on steep, smooth to moderately dissected upper sideslopes and ridges with slopes ranging from 40 to 90 percent. A typical slope is between 60 and 65 percent.

This landtype ranges in elevation from near 1,000 to 4,500 feet and supports Site Class IV Douglas-fir. True firs and western white pine occur sporadically at higher elevations (above 4,000 feet).

The soil is well to excessively drained. Permeability is rapid to moderate in the surface soils and moderate in the subsoils.

Range of Profile Characteristics of Landtype 41

Litter:	Needles, leaves, twigs, and decomposing organic matter; ½ to 1 inch thick.
Surface Layers:	Reddish brown gravelly and shotty loams and clay loams; weak fine granular structure; 10 to 40 percent subangular gravel and cobbles by volume; slightly sticky, slightly plastic; pH ranges from 6.0 to 7.0; 4 to 14 inches thick.
Subsoil Layers:	Brown to reddish brown loams to clay loams; moderate fine and medium subangular blocky structure grading to massive below 24 inches; 10 to 40 percent subangular gravels and cobbles by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 7.0; 22 to 32 inches thick.

MAPPING UNIT 42

Mapping Unit 42 consists of predominately Landtype 42 and lesser amounts of Landtypes 22 and 41.

This landtype includes moderately deep soils derived from residual and colluvial materials. Typically, the soils within this unit exhibit a thin surface horizon of gravelly loam textures. Locally, the textures may be quite shotty (small, rounded, hard concretions). Subsoils vary in texture from loams to clay loams. Cobbles may occupy up to 40 percent (by volume) of the profile.

Bedrock materials are variable and consist primarily of competent, hard and moderately hard volcanic breccia materials. Colors of the breccia are primarily red but may range from purples to yellows. Depth to the bedrock is typically 4 to 6 feet but may range from 3 to 8 feet. Rock outcrops may occur in this unit but make up less than 5 percent of the total area.

This landtype is commonly found on moderately steep, dissected sideslopes; near the bottom of large ravines; and occasionally on uneven benches. Slopes range from 25 to 60 percent.

This landtype ranges in elevation from 1,500 to 3,500 feet and supports Site Class IV Douglas-fir.

The landtype is well drained. Permeability is rapid in the surface soil and rapid to moderate in the subsoil.

Range of Profile Characteristics of Landtype 42

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Dark reddish brown gravelly loams and fine, sandy loams; weak, medium and coarse, granular structure; 10 to 25 percent gravel by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 7.0; 3 to 8 inches thick.
Subsoil Layers:	Reddish brown, gravelly loams ranging to clay loams; moderate to strong, medium and fine, subangular blocky structure becoming massive below 42 inches; 15 to 40 percent subangular gravels and cobbles by volume; slightly sticky to sticky, slightly plastic; pH ranges from 5.0 to 6.5; 32 to 72 inches thick.

MAPPING UNIT 46

Mapping Unit 46 is dominated by Landtype 46 but also contains minor amounts of Landtypes 31, 41, 47 and 51.

Landtype 46 contains shallow soils derived from predominately residuum (tuffaceous) materials. A typical soil profile shows a thin, gravelly and/or shotty loam surface horizon. The subsoils are thin to moderately thick, cobbly loams and clay loams. Colors in the subsoil horizon(s) are characteristically light colored and variegated. Gravel and cobble content usually range from 30 to 80 percent.

Bedrock is predominately of tuffaceous origin. Hardness and competence is variable, ranging from hard, competent (welded tuff) to moderately hard, non competent. An estimated 60 percent of this unit is underlain by the hard, competent tuff. Colors are characteristically variegated with yellow, gray, and orange being most common. This landtype includes the material commonly referred to as rhyolitic tuff. A rusty surface color is common for this material. Depth to bedrock is typically less than 3 feet but may range to 5 or 6 feet.

This landtype is characterized by steep to very steep topography with deeply incised drainages. The ridges are typically elongated with narrow ridgetops and steep sideslopes. The sideslopes show numerous, deeply incised drainage ways. The larger, side drainages often show additional smaller drainages. The major side drainages typically occur at an estimated rate of 4 to 6 per mile. Slopes within these side drainages often exceed 60 percent. Rock outcrops cover up to 10 percent (estimated) of the total area of this landtype. Slopes are variable throughout this landtype with position on the landscape as the important variable. Major sideslopes range from 40 to 60 percent with the slopes in the deep incised drainages ranging from 50 percent to greater than 80 percent. Slopes on the ridgetops range from 40 to 70 percent. The more gentle sloping areas are generally not extensive.

Landtype 46 ranges in elevation from 2,000 to 6,000 feet. It supports Site Class IV Douglas-fir. Western white pine and true firs are common above 5,000 feet.

This landtype is well to excessively well drained. Permeability is rapid in the surface soils and moderately rapid to moderate in the subsoils.

Range of Profile Characteristics of Landtype 46

Litter: Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.

Surface Layers: Dark brown to gravelly and/or shotty loams; weak to moderate, fine and medium, granular structure; 25 to 60 percent angular and subangular shot, gravels and cobbles (by volume); slightly sticky, slightly plastic; pH ranges from 5.8 to 7.2; 3 to 10 inches thick.

Subsoil Layers: Reddish yellow, gravelly clay loams, cobbly loams and loams; weak to moderate, fine and medium subangular blocky structure becoming massive below 30 inches; 30 to 80 percent subangular and angular gravels, cobbles, and stone by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 7.0; 15 to 30 inches thick.

In areas where the rock is soft and noncompetent, the colors become variegated with reds and yellows predominating. Harder rock may be interspersed among the softer materials.

MAPPING UNIT 47

Mapping Unit 47 is dominated by Landtype 47 with lesser amounts of Landtype 27, 46 and 52.

Landtype 47 comprises moderately deep soils of colluvium and residuum origi and underlain by tuffs and rhyolitic tuff materials. A typical soil profil shows a gravelly and/or shotty loam surface horizon. Subsoils are generall cobbly loams and clay loams. Colors in the subsoil (below 36 inches) are characteristically light colored and variegated. Gravel, cobble and stone content usually ranges from 10 to 40 percent, but may exceed 50 percent on a local basis.

Bedrock is predominately of tuffaceous origin. Hardness and competence is variable, ranging from hard competent (welded) tuff to moderately hard non-competent. An estimated 60 percent of this landtype is underlain by compet tuff materials. Colors in the bedrock are characteristically variegated wi yellow, gray and orange being most common. This landtype includes a materi commonly referred to as rhyolitic tuff. A rusty surface color (from weathe is common for this material. Depth to the more competent bedrock is typica five to six feet but may range from three to eight feet.

This landtype occupies ridgetops and upper sideslopes in landscapes dominat by Landtype 46. It also occupies entire sideslopes where slopes are less t 50 percent. The major slope shape of this landtype is straight to slightly convex. However, numerous side drainages which are concave present a gener concave appearance to the entire slope. Slopes within the side drainages often exceed 50 percent.

Landtype 47 ranges in elevation from 2,000 to 5,800 feet. It supports Site Class IV Douglas-fir. True firs encroach and may dominate areas above 4,50 feet.

This landtype is well drained. Permeability is rapid in the surface soil a rapid to moderate in the subsoil. Permeability is impeded in the zone wher the bedrock is highly weathered and quite soft.

Range of Profile Characteristics of Landtype 47

Litter: Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.

Surface Layers: Dark reddish brown, gravelly and shotty loams; weak, fine and medium granular structure; friable; slightly sticky, plastic; 5 to 25 percent subangular gravels and cobbles (by volume); pH range of 5.8 to 6.8; 6 to 16 inches thick.

Subsoil Layers: Reddish yellow, gravelly and cobbly loam; weak to moderate, fine and medium subangular blocky structure becoming massive at depths below 30 inches; friable;

slightly sticky, nonplastic; 20 to 40 percent (by volume); subangular and angular cobbles and stones; pH range of 4.5 to 6.5; 30 to 60+ inches thick.

In areas where the rock is soft and noncompetent, the color has become variegated with reds and yellows predominating. Harder rock may be interspersed among the softer materials.

MAPPING UNIT 51

Mapping Unit 51 consists predominantly of Landtype 51 and minor amounts of Landtypes 1, 31, 41 and 52.

Landtype 51 is a shallow landtype derived from residuum and colluvium materials. Surface soils are thin gravelly to very gravelly loams. Subsoils are thin gravelly or cobbly loams and clay loams.

Bedrock is composed primarily of competent, hard, highly to moderately fractured andesites and basalts. Up to 30 percent of this landtype is underlain by hard, competent breccias and tuffaceous materials. Depth to bedrock is usually less than 3 feet. Rock outcrops.

Typically, Landtype 51 occurs on steep, smooth to moderately dissected side slopes and ridges with slopes ranging from 45 to greater than 90 percent. Most common slopes are in the 60 to 75 percent range.

This landtype ranges in elevation from 1,000 to 5,000 feet and supports Site Class IV and V Douglas-fir.

The landtype is well to excessively drained. Permeability is rapid to moderate in the surface soils and rapid to moderate in the subsoils.

Range of Profile Characteristics of Landtype 51

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 inch thick.
Surface Layers:	Red and yellowish red, gravelly to very gravelly loams; weak, fine, granular structure; 10 to 40 percent angular and subangular gravels by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 6.0 to 7.0; 4 to 12 inches thick.
Subsoil Layers:	Reddish brown, gravelly or cobbly loams ranging to clay loams; moderate, medium, subangular blocky structure; 50 to 75 percent angular to subangular gravels, cobbles and stones by volume; nonsticky to slightly sticky, nonplastic; pH ranges from 5.5 to 7.0; 11 to 32 inches thick.

MAPPING UNIT 52

Mapping Unit 52 consists predominantly of Landtype 52 and minor amounts of Landtypes 18, 42 and 51.

Landtype 52 comprises moderately deep soils derived from residuum and colluvium materials. Typically, surface soils are thin, gravelly loams. Subsoils are thin to moderately thick and range in texture from loams to clay loams. Cobbles may occupy up to 30 percent (by volume) of the soil profile.

Bedrock is composed of competent, hard, highly fractured andesites and basalts. Up to 30 percent of this landtype is underlain by hard, competent breccias and tuffaceous materials. Depth to bedrock ranges from 3 to 8 feet.

Typically, Landtype 52 occurs on moderately sloping, smooth sideslopes and benches. Slopes are typically between 40 and 50 percent, but may range from 20 to 60 percent.

This landtype ranges in elevation from 1,000 to 5,000 feet and supports Site Class IV Douglas-fir. Locally, this landtype may support Site Class III Douglas-fir.

The landtype is well drained. Permeability is rapid to moderate in the surface soils and moderate in the subsoil layers.

Range of Profile Characteristics of Landtype 52

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark yellowish brown, gravelly and shotty loams and fine sandy loams; weak, fine and medium granular structure; 10 to 30 percent subangular and angular gravels and cobbles (by volume); slightly sticky, slightly plastic; pH ranges from 6.0 to 7.5; 8 to 16 inches thick.
Subsoil Layers:	Dark brown to dark reddish brown, gravelly or cobbly loams and clay loams; massive to weak, fine and medium subangular blocky structure; 30 to 80 percent angular, platy or subangular gravels and cobbles by volume; slightly sticky, slightly plastic; pH ranges from 5.5 to 7.0; 20 to 72 inches thick.

MAPPING UNIT 56

Mapping Unit 56 consists predominantly of Landtype 56 and minor amounts of Landtypes 1 and 57.

Landtype 56 comprises shallow soils derived from residual and colluvial materials. Surface soils are typically thin gravelly and cobbly loams. Subsoils are thin gravelly and cobbly loams and clay loams. Gravels and cobbles may occupy up to 80 percent of the soil profiles. However, 40 to 60 percent occupancy (by volume) is considered normal.

Bedrock is composed of competent, hard, fractured andesites and basalts. Depth to bedrock is usually less than 3 feet.

Typically, Landtype 56 occurs on steep, smooth to uneven upper sideslopes and ridges with slopes ranging from 45 to 90 percent.

This landtype ranges in elevation from 4,000 to 7,500 feet and supports true fir-mountain hemlock type vegetation. Occasional stands of Douglas-fir occur at the lower end of the elevation range (below 5,000 feet).

The landtype is well drained. Permeability is moderate in the surface soils and rapid to moderate in the subsoils.

Range of Profile Characteristics of Landtype 56

Litter:	Needles, leaves, twigs, and decomposing organic matter; ½ to 1 inch thick.
Surface Layers:	Very dark gray, gravelly and cobbly loam; moderate, fine, granular structure; 10 to 45 percent angular gravels and cobbles by volume; nonsticky, nonplastic; pH ranges from 5.5 to 7.0; 6 to 12 inches thick.
Subsoil Layers:	Dark reddish gray, gravelly and cobbly loams and clay loams; weak, fine and medium, subangular blocky structure, grading to massive; 45 to 70 percent angular gravels, cobbles and stones by volume; nonsticky, nonplastic; pH ranges from 5.5 to 7.0; 24 to 30 inches thick.

Note: This landtype differs from Landtype 51 by consisting of slightly 1[illegible] textured soils and by occurring at elevations above 5,000 feet.

Locally, pumice fragments may be evident throughout the soil profiles. [illegible] pumice particles occupy less than 2 percent (by volume) of the profile. [illegible] condition is not evident for all Landtype 56 units.

MAPPING UNIT 57

Mapping Unit 57 consists predominantly of Landtype 57 and minor amounts of Landtypes 7, 18 and 56.

Landtype 57 is a moderately deep landtype derived from residuum and colluvium materials. Typically, surface soils are thin, gravelly and cobbly loams. Subsoils are thin to moderately thick, cobbly, and range in texture from sandy loams to light clay loams. Cobbles may occupy up to 70 percent (by volume) of the soil profile although 20 to 40 percent occupancy is considered normal.

Bedrock is composed of competent, hard, highly fractured andesites and basalts. Depth to bedrock is typically 3 to 6 feet, but may range to 8 feet.

Landtype 57 occurs on broad ridgetops as well as on moderately sloping, smooth sideslopes and benches. Slopes are typically between 40 and 60 percent, but may range from 30 to 65 percent.

This landtype ranges in elevation from 4,500 to 6,000 feet and supports Site Class IV Douglas-fir. Pacific silver fir, western white pine, and mountain hemlock occur at the higher elevations (above 5,000 feet). High elevation meadows are commonly associated with this unit.

The landtype is well drained. Permeability is rapid in the surface soils and rapid to moderate in the subsoil layers.

Range of Profile Characteristics of Landtype 57

Litter:	Needles, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark reddish brown, gravelly and cobbly loams; weak, fine and medium granular structure; 10 to 25 percent subangular and angular gravels and cobbles (by volume); slightly sticky, slightly plastic; pH ranges from 5.5 to 7.0; 6 to 14 inches thick.
Subsoil Layers:	Dark brown to reddish brown, cobbly and stony sandy loams to light clay loams; weak, fine and medium subangular blocky structure, grading to massive below 48 inches; 45 to 70 percent angular, platy or subangular cobbles and stones (by volume); slightly sticky, slightly plastic; pH ranges from 5.8 to 7.0; 26 to 60+ inches thick.

Note: This landtype differs from Landtype 52 by occurring at elevations above 4,500 feet and supporting principally true fir and mountain hemlock vegetation. It is commonly associated with higher elevation meadows.

Small pumice particles may be noted in these soils. Here, this condition is not considered typical for this unit.

MAPPING UNIT 61

Mapping Unit 61 consists dominantly of Landtype 61 with lesser amounts of Landtypes 60, 62 and 71.

Landtype 61 is comprised of shallow residual soils derived from granitic materials. Typically, the surface soil is gravelly loam. Gravels and cobbles may occupy up to 20 percent (by volume) of this horizon. Granite stones and rock sporadically appear on the surface but do not cover more than 20 percent of the unit's surface area. The subsoil consists of gravelly cobbly and stony loamy sands and sandy loams. Subsoil materials are non-plastic and contain up to 40 percent (by volume) gravels, cobbles and stones. A layer of highly weathered, gravel size granite particles may separate the subsoil from the underlying hard granite bedrock.

Bedrock is composed of hard, moderately competent granites and, to a lesser extent, diorites. Depth to the bedrock is typically less than three feet. Depth to the hard rock may be slightly deeper if a layer of weathered, decomposed granite is present. Granite outcrops may occupy up to 5 percent of this landtype.

This landtype is confined exclusively to the Tiller District and is found south and west of an imaginary line connecting Tiller and Railroad Gap. Typically, it occurs on steep, dissected landscapes. The landscape is typified by deeply incised drainages with well defined, oversteepened sidewalls and headwalls. Slopes range from 50 to 110 percent with steepest part located in headwall areas.

The elevation range of this landtype is from 1,200 to 4,400 feet. It supports Site Class IV Douglas-fir.

This landtype is well to excessively drained. Infiltration is moderate to rapid and internal permeability is rapid.

Range of Profile Characteristics of Landtype 61

Litter:	Needles, leaves, twigs, and decomposing organic matter; ¼ to 1 inch thick.
Surface Layer:	Reddish brown, gravelly loam; weak, fine and medium granular structure; nonsticky and nonplastic; 5 to 20 percent (by volume) subangular gravels and cobbles; pH ranges from 6.0 to 7.5; 4 to 10 inches thick.
Subsoil Layers:	Light brown and light red grading to brownish yellow, gravelly and cobbly sandy loams and loamy sands; weak, medium subangular blocky structure grading to massive below 30 inches; 10 to 40 percent (by volume) weathered, subangular gravels, cobbles, and stones; nonsticky and very slightly plastic; pH range of 5.5 to 7.0; 10 to 30 inches thick.

Intermittently, a layer of highly weathered and well decomposed granitic materials separate the subsoil from the underlying rock. This layer is of fine gravel texture, single grained structure, and loose consistence. This condition exists in up to 40 percent of this landtype. When present, it is subject to serious raveling if exposed.

MAPPING UNIT 62

Mapping Unit 62 consists predominantly of Landtype 62 with up to 20 percent inclusions of Landtypes 61 and 63. The unit also includes minor amounts of Landtypes 72 and 73.

Landtype 62 is comprised predominantly of moderately deep residual soils derived from granitic materials. A typical soil profile shows a gravelly, sandy loam to loam, surface horizon with gravels occupying up to 15 percent (by volume) of this horizon. Thickness, depth and textures of the subsoil are quite variable, depending upon the amount of decomposition that has taken place on the underlying granitic rock. Normally, the upper portion of the subsoil (20 to 40 inches) consists of gravelly, sandy loams and loams. Below this upper subsoil layer the materials grade to a loose, noncoherent coarse sand or fine gravel just above the more coherent, granitic bedrock. This lower subsoil may range in thickness from 20 to greater than 120 inches. The entire subsoil is characterized by linear striations which appear to run perpendicular to each other. These striations are typically 6 to 24 inches apart. These striations are not continuous over the entire landtype and apparently have little significance for management. Another variation in this landtype shows a distinct salt and pepper type pattern in the subsoil materials. This condition, again, is not continuous over the entire landtype and of little apparent significance for management purposes.

Bedrock consists of moderately hard to hard, moderately competent granites and diorites. Depth to the hard bedrock is quite variable, depending on the amount of decomposed rock contained in the subsoil. Typically, depth to the harder granite rock ranges from three to six feet but variances extend the range from four to nearly eight feet.

Because of the variableness in terms of competency and depth to competent rock, this landtype possess many and sometimes serious limitations to management activities. The degree of these limitations is amplified by the presence of loose, noncompetent, decomposed granitic materials.

This landtype is confined exclusively to the Tiller District and is found south and west of an imaginary line connecting Tiller and Railroad Gap. Typically, it occurs on moderately steep (35 to 60 percent) dissected landscapes. Slopes are normally quite smooth and convex. However, well defined incised drainages interrupt these slopes to the extent that up to 30 percent of the area possesses slopes steeper than normal. The steeper slopes occur on the sidewalls and headwalls of the drainages. Where these side drainages occur to an extent greater than 30 percent, the landtype is combined with Landtype 61 to form the complex 621.

The elevation range of this landtype is from 1,200 to 4,400 feet. It supports primarily Site Class IV Douglas-fir.

Landtype 62 is well to excessively drained. Infiltration is rapid to very rapid and internal permeability is rapid to moderate, depending upon the degree of consistency of the decomposed rock underlying the subsoil.

Range and Profile Characteristics of Landtype 62

Litter:	Needles, twigs, and decomposing organic matter; ½ to 3 inches thick.
Surface Layers:	Reddish gray, gravelly, sandy loam to loam; weak, fine and medium granular structure; friable, nonsticky and nonplastic; up to 15 percent (by volume) subangular gravels and cobbles; pH ranges from 6.0 to 7.2; 6 to 18 inches thick.
Subsoil Layers:	Yellowish brown grading to brownish yellow, gravelly and cobbly, sandy loams, grading to loamy sand and sands with increased depth (below 40 inches); weak, medium, subangular blocky structure grading to massive; friable in the upper subsoil to loose in the lower subsoil; nonsticky and nonplastic; 10 to 25 percent (by volume) weathered subangular gravels, cobbles and stones; pH range of 5.5 to 6.5; 30 to 72 inches thick.
	In the lower portion of the subsoil, a layer of highly weathered to well decomposed granitic rock is present. It has the appearance of loose, noncohesive fine gravel. The depth and thickness of this layer is quite variable but typically ranges from 20 to 40 inches thick. If exposed, this layer is subject to serious raveling. This, in turn, creates an unstable situation for the soil material above.

MAPPING UNIT 63

Mapping Unit 63 consists predominately of Landtype 63 with up to 30 percent inclusions of Landtypes 61 and 62. Minor amounts of Landtypes 72 and 73 may also occur.

Landtype 63 is comprised of moderately deep, residual and colluvial soils derived from granitic materials. This profile is characterized by the presence of mica fragments. The mica fragments are apparent from visual observation as well as hand texturing. Typically, the surface soil consists of gravelly sandy loam and fine sandy loam materials. The subsoil consists of materials ranging in texture from sandy loams to light clay loams. A layer of highly weathered granite may separate the subsoil from the underlying hard granitic bedrock. Depth to the weathered rock material may range from 40 to 72 inches.

Bedrock is composed of hard, moderately hard, moderately competent granites to a lesser extent diorites. Depth to the bedrock is quite variable, depend upon the amount of decomposed rock contained in the subsoil. Typically, de to the harder granite rock ranges from 4 to 8 feet, but variances extend th range from 3 to nearly 10 feet.

Because of the variableness in terms of rock material and depth to rock, th landtype possesses numerous and serious limitations to management activitie The degree of these limitations is amplified by the presence of loose weath and decomposed granitic materials.

This landtype is confined exclusively to the Tiller District and is found s and west of an imaginary line connecting Tiller and Railroad Gap. Typicall it occurs on moderately steep (35 to 55 percent) dissected landscapes. Slo are smooth and convex. However, drainages interrupt these slopes to the ex that up to 30 percent of the area possesses steeper than normal slopes. Th steeper slopes occur on sidewalls and headwalls of the drainages as well as along the lower portion of the major sideslopes. If the steeper slopes occ more than 30 percent of the landtype, this unit is combined with Landtype 6 to form the complex 631.

The elevation range of this landtype is from 1,200 to 4,000 feet. It suppo Site Class IV Douglas-fir.

This landtype is well drained. Infiltration is rapid and internal permeabi is rapid to moderate, depending upon the degree of consistency of the deco rock underlying the subsoil. Depth to any restricted soil layer is greater 3 feet.

Range and Profile Characteristics of Landtype 63

Litter:	Needles, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark brown to dark grayish brown, gravelly, sandy loam to fine sandy loam; weak, medium granular structure; friable; nonsticky and nonplastic; up to 15 percent (by volume) subangular gravels and cobbles; pH ranges from 6.0 to 7.5; 4 to 14 inches thick.
Subsoil Layers:	Reddish yellow, light clay loams grading to loamy sands with increased depth (typically below 42 inches); weak, medium, subangular blocky structure grading to massive; friable consistence; nonsticky and nonplastic; up to 15 percent (by volume) weathered subangular gravels, cobbles and stones; pH range of 5.5 to 6.5; 30 to 72 inches thick.

In the lower portion of the subsoil, a layer of highly weathered to well decomposed granitic rock is present. The depth and thickness of this layer is quite variable. It typically ranges from 20 to 40 inches thick. If exposed, this layer is subject to serious raveling which, in turn, creates an unstable situation for the soil material above.

MAPPING UNIT 64

Mapping Unit 64 consists principally of Landtype 64 with the inclusions of Landtypes 62 and 63 and lesser amounts of Landtypes 73 and 74.

Landtype 64 is comprised of moderately deep to deep residual and colluvial soils derived from granitic materials. It is characterized by possessing a developed soil profile. A typical soil profile shows a gravelly, sandy loa surface horizon. The subsoil is divided into two portions; namely, the upp and lower subsoil. Typically, the upper portion of the subsoil (16 to 36 inches thick) consists of gravelly, sandy loams and loams. These materials are nonplastic and may contain up to 25 percent fine gravels. The lower su soil is comprised of heavy loams to clay loam textures. The color is characteristically dark reddish brown. Thickness of this finer textured layer ranges from 10 to 24 inches. A layer of weathered granitic material may separate the subsoil from the more coherent granitic bedrock.

Bedrock consists of moderately hard to hard, moderately competent granites. Depth to the hard bedrock is variable, depending upon the amount of decompo rock underlying the subsoil. Typically, depth to the harder granitic rock ranges from 6 to 10 feet.

This landtype is found exclusive in the southwest end of the Tiller Distric It is found south and west of an imaginary line connecting Tiller and Railr Gap. Typically, this landtype is associated with gentle to nearly level lo slopes and benches. It is often located at the point where the sideslopes meet with old river bottoms. Slopes are typically 20 to 25 percent but ra from 5 to 35 percent.

The elevation range of this landtype is from 1,000 to 3,000 feet. It supp Site Class IV Douglas-fir.

This landtype is moderately well to well drained. Infiltration is rapid. Internal permeability is rapid to moderate in the upper subsoil and slow i the lower subsoil. Internal permeability is further influenced by the deg of consistency of the decomposed rock underlying the subsoil.

Range and Profile Characteristics of Landtype 64

Litter: Needles, twigs, and decomposing organic matter; 1 to 3 inches thick.

Surface Layers: Very dark grayish brown, fine sandy loam to loam; weak, medium granular structure; friable; nonsticky and non-plastic; up to 15 percent gravels (by volume); pH ranges from 6.2 to 6.8; 3 to 10 inches thick.

Subsoil Layers: Upper Subsoil - Reddish yellow grading to brownish yellow sandy loams and loams; weak, medium subangular blocky structure; friable; nonsticky and nonplastic; up to 10 percent gravels (by volume); pH range of 5.6 to 6.5; 18 to 30 inches thick.

Lower Subsoil - Dark reddish brown clay loam; massive; slightly firm consistence; sticky and slightly plastic; pH range of 5.5 to 6.5; 10 to 20 inches thick.

Below the developed subsoil, a layer of highly weathered, well decomposed granitic rock material may be present. The depth and thickness of this layer is quite variable, but typically ranges from 20 to 40 inches thick. If exposed, this layer is subject to raveling.

MAPPING UNIT 71

Mapping Unit 71 consists primarily of Landtype 71 with lesser amounts of Landtypes 61, 72 and 81.

Landtype 71 is a shallow landtype derived from residual and colluvial materi and underlain by schist bedrock. The surface soil is typically gravelly, sa loam and fine sandy loam to loam. The subsoil is comprised of gravelly and cobbly sandy loams and loams. Gravels and cobbles occupy from 15 to 40 perc (by volume) of the entire soil profile.

Bedrock is composed of moderately competent, hard and moderately hard schist Depth to the bedrock is typically less than three feet. In up to 20 percent this landtype, the upper portion of the schist may be weathered and partiall decomposed. Where this situation occurs, depth to the hard schist may range to four or five feet. Schist outcrops may occur but make up less than 10 pe cent of this landtype.

Landtype 71 occurs on steep landscapes with well defined, incised drainages. Sidewalls and headwalls of the drainages are generally oversteepened (greate than 75 percent). Slopes typically range from 45 to 70 percent with the ra extending to 100 percent in the incised side drainages.

This landtype occurs only on the Tiller District. It is further confined t an area south and west of a line between Tiller and Peavine Camp. The elev range is from 1,000 to 4,000 feet. The landtype supports primarily Site Class IV Douglas-fir.

The landtype is well drained. Infiltration is rapid and internal permeabil is rapid to moderate above the bedrock. Because of the platy nature of the schist, lateral water movement is common above the rock. This is especiall true if a layer of weathered, decomposed schist is present.

Range of Profile Characteristics of Landtype 71

Litter:	Needles, leaves, twigs, and decomposing organic matter; ¼ to 1 inch thick.
Surface Layer:	Dark yellowish brown, gravelly, sandy loam and fine sandy loam; weak, fine to coarse granular structure; friable; nonsticky, nonplastic; up to 30 percent (by volume) angular and subangular gravels and cobbles; pH range of 5.8 to 7.0; 4 to 12 inches thick.
Subsoil Layers:	Dark reddish gray to olive brown, gravelly and cobbly loam; weak, medium platy and subangular blocky structure grading to massive with increased profile depths (below 24 inches); friable; nonsticky and nonplastic; 15 to 40 percent (by volume) angular and subangular gravels, cobbles and stones; pH ranges from 5.0 to 6.2; 10 to 32 inches thick. A layer of weathered, partially decomposed schist rock may separate the subsoil from the hard underlying rock. This decomposed material is green in color and has a pronounced platy structure. When a profile is exposed, water seeps are common in this layer. This condition exists over an estimated 25 percent of this landtype. Thickness of the "softer" rock ranges from 2 to 20 inches.

MAPPING UNIT 72

Mapping Unit 72 consists primarily of Landtype 72 with lesser amounts of Landtype 62, 63, 71 and 73.

Landtype 72 is a moderately deep landtype derived from colluvial and residual materials and underlain by schist bedrock. A typical soil profile shows a surface soil of gravelly, fine sandy loam to loam texture. The subsoil is a gravelly, cobbly or stony loam to clay loam. Gravels, cobbles and stones may occupy 5 to 40 percent (by volume) of the entire soil profile.

Bedrock consists primarily of moderately competent, hard and moderately hard schist materials. Depth to the bedrock is typically 3 to 6 feet but may range to 8 feet. In up to 30 percent of this landtype the upper portion of the schist may be well weathered and partially decomposed. If this condition exists, greater depths to hard, competent rock are common.

This landtype normally occurs on moderately steep landscapes with well defined drainage patterns. The sidewalls and headwalls of the drainages are generally quite pronounced. Dominant slopes in this landtype range from 30 to 60 percent. Slopes within the incised side drainages generally range from 45 to 90 percent, with the steepest portion being at the headwall end of the drainage. These incised drainages are subject to serious scouring as a result of management activities.

This landtype occurs only on the Tiller Ranger District. It is further confined to an area south and west of a line between Tiller and Peavine Camp. The elevation range is from 1,000 to 4,000 feet. The landtype supports Site Class III Douglas-fir.

Landtype 72 is well drained. Surface infiltration is rapid and internal. Permeability is rapid to moderate. Because of the platy nature of the schist, lateral water movement is quite common. This is especially true when the layer of weathered, decomposed schist is present.

Range of Profile Characteristics of Landtype 72

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark grayish brown to very dark brown, gravelly, fine sandy loam and loam; weak, fine and medium granular structure; friable; nonsticky, nonplastic; 5 to 15 percent (by volume) angular and subangular and platy gravels and cobbles; pH range of 6.0 to 7.5; 6 to 12 inches thick.
Subsoil Layers:	Olive to olive brown, gravelly and cobbly loams and clay loams; weak, medium, platy and subangular blocky structure grading to massive with increased depth (below 42 inches); friable; slightly sticky and plastic; 15 to 40 percent (by volume) angular, subangular and platy cobbles and stones; pH range of 5.5 to 6.5; 30 to 72 inches thick.

A layer of weathered, partially decomposed schist rock typically separates the subsoil from the harder underlying rock. This decomposed rock material is characteristically green in color and has a pronounced platy structure. When a profile is exposed, water commonly seeps within this layer. Thickness of the "softer" rock ranges from 6 to 30 inches.

MAPPING UNIT 73

Mapping Unit 73 consists primarily of Landtype 73 with lesser amounts of Landtypes 72, 62 and 63.

Landtype 73 is a shallow to moderately deep landtype derived from residual and colluvial materials and underlain by schist bedrock. A typical soil profile shows a surface soil of gravelly, fine sandy loam to loam texture. The subsoil is a gravelly, cobbly or stony clay loam and is characterized by stratification of materials. The lower portion of the subsoil may comprise alternate layers of soil and weathered schist materials. Gravels, cobbles, and stones may occupy 10 to 40 percent (by volume) of the entire soil profile.

Bedrock consists primarily of soft to moderately hard, incompetent to moderately competent schist materials. Depth to the bedrock material is typically 2 to 6 feet, but may range to 8 feet. Typically, in this landtype, the upper portion of the schist bedrock is well weathered and partially decomposed. Also characteristic is the horizontal weathering pattern of the schist material. If this condition exists, greater depths to hard, competent rock are common.

Landtype 73 normally occurs on gentle to moderately steep landscapes with well defined drainage patterns. The sidewalls and headwalls of drainages are generally quite pronounced. Dominant slopes on this landtype range from 35 to 55 percent. In areas where incised drainages are prominant, the land is subject to serious scouring as a result of management activities.

This landtype occurs only on the Tiller Ranger District. It is further confined to an area south and west of a line between Tiller and Peavine Camp. The elevation range is from 1,200 to 4,000 feet. The landtype supports primarily Site Class IV Douglas-fir.

Landtype 73 is moderately well to well drained. Surface infiltration is rapid and internal permeability is moderate. Because of the weathering pattern and platy nature of the schist, lateral water movement is quite common. This is especially true in this landtype where the layer of weathered, decomposed schist is typically present.

Range of Profile Characteristic of Landtype 73

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark brown, gravelly, fine sandy loam and loam; weak, fine granular structure; friable; nonsticky, nonplastic; 10 to 20 percent (by volume) angular, subangular and platy gravels and cobbles; pH range of 6.0 to 7.5; 4 to 12 inches thick.
Subsoil Layers:	Dark brown to olive brown, gravelly and cobbly loams and clay loams; weak, medium platy to subangular blocky structure grading to massive below 30 inches; friable;

slightly sticky and nonplastic; 15 to 40 percent (by volume) angular, subangular and platy cobbles and stones; pH range of 5.5 to 7.0; 20 to 36+ inches thick.

The subsoil within this landtype is characterized by a stratification or layering of weathered, partially decomposed schist rock. These layers are typically separated by thin layers of soil. The decomposed rock material is characteristically green in color and has a pronounced platy structure. When the profile is exposed, water commonly seeps within these soil layers. Thickness of the "soft" rock ranges from 20 to 60 inches.

MAPPING UNIT 74

Mapping Unit 74 is comprised of predominately Landtype 74 with lesser amounts of Landtypes 72 and 73.

Landtype 74 consists of moderately deep to deep soils derived from residual and colluvial materials and underlain by schist bedrock. This landtype is characterized by soils which possess a developed subsoil. The typical soil profile exhibits a surface soil of gravelly, silt loam to loam textures. The upper portion of the subsoil exhibits heavy loam to clay loam textures. This is immediately underlain by the developed "B" horizon consisting of silty clay loam and clay textures. The lower subsoil is characterized by a light clay loam textured soil. Gravels, cobbles and stones may occupy 5 to 30 percent (by volume) of the entire soil profile.

Bedrock consists primarily of competent to moderately competent, hard and moderately hard schist materials. Depth to the bedrock is typically 4 to 8 feet but may range to 10 feet. In up to 30 percent of this landtype, the upper portion of the schist may be well weathered and partially decomposed.

Landtype 74 normally occupies gently sloping lower sideslopes and broad ridge tops or benches. Dominant slopes range from 15 to 35 percent.

This landtype occurs only on the Tiller Ranger District and is further confined to an area south and west of a line between Tiller and Peavine Camp. The elevation range is from 1,000 to 3,500 feet. The landtype supports Site Class III and IV Douglas-fir stands.

Landtype 74 is moderately well to well drained. Surface infiltration is moderate to rapid and internal permeability is moderate in the upper portion of the subsoil and slow in the lower portion. Because of the platy nature of the schist, lateral water movement is common. This is especially true if the upper portion of the underlying rock is layered, well weathered and decomposed.

Range of Profile Characteristics of Landtype 74

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 4 inches thick.
Surface Layers:	Dark gray to very dark brown, gravelly loam; weak, fine and medium granular structure; friable; slightly sticky, nonplastic; 5 to 10 percent (by volume) angular and subangular and platy gravels and cobbles; pH range of 6.0 to 7.2; 5 to 10 inches thick.
Subsoil Layers:	Upper Subsoil - Dark grayish brown, gravelly and cobbly loams and light clay loams; weak, medium to coarse platy and subangular blocky structure; friable; slightly sticky and nonplastic; 15 to 30 percent (by volume) angular, subangular, and platy cobbles and stones.

Lower Subsoil - Dark reddish brown clay loam; massive; firm; pH of entire subsoil ranges from 6.0 to 7.2; upper subsoil 10 to 24 inches thick; lower subsoil 16 to 30 inches thick.

A layer of weathered, partially decomposed schist rock typically separates the subsoil from the harder underlying rock. This decomposed rock material is characteristically green in color and has pronounced platy structure. When a profile is exposed, water commonly seeps within the stratified layers. Thickness of the "softer" rock ranges from 6 to 30 inches.

MAPPING UNIT 80

Serpentine Rockland - Scabland

This is a miscellaneous landtype consisting of serpentine outcrops, boulder fields, grassy scablands, and very low quality timber. Greater than 70 percent of this landtype occurs as rock outcrops or areas possessing less than 3 inches of soil. A variety of shallow rooted grasses dominate this landtype.

This mapping unit is found predominately in the vicinity of the Tiller Ranger Station. It is not extensive--outside an area five miles southeast of the station.

Typically, this unit supports either no timber or very low quality timber.

MAPPING UNIT 81

Mapping Unit 81 is comprised of predominately Landtype 81 with up to 10 percent of Landtype 80 and lesser amounts of Landtype 82.

Landtype 81 comprises shallow, colluvial and residual soils developed over serpentine bedrock. A typical soil profile shows a surface horizon of gravelly and cobbly fine sandy loam textures. This horizon may contain up to 25 percent gravels and cobbles. The subsoil is a cobbly to very cobbly or stony loam to clay loam. In the subsoil, cobbles and stones occupy up to 70 percent (by volume) of the profile. Red colors are predominant in this landtype.

Bedrock consists entirely of hard, moderately competent serpentine. Color of the rock is typically quite green. Shiny, glassy-like rock faces are a typifying characteristic of the serpentine rock. Depth to the underlying bedrock is generally less than three feet but may range to four or five feet.

This landtype is found exclusively on the Tiller Ranger District and is confined to an area south and west of a line extended from Tiller to Fawn Camp. It occurs quite sporadically throughout this area. It is most common in the immediate vicinity of the Tiller Ranger Station. This landtype typically occupies ridge tops and upper sideslopes. It is most often associated with landscapes dominated by granites and schists. Slopes are generally quite smooth but complex. Within this landtype, slopes range from 30 to 60 percent.

The elevation range for this landtype is 1,500 to 4,500 feet. It supports Site Class V Douglas-fir. Much of this landtype occurs as barren "scab" land.

The soils in this landtype are well drained. Infiltration in the surface soil is moderate and internal permeability is moderate to slow.

Range of Profile Characteristics of Landtype 81

Litter:	Needles, leaves, twigs, and decomposing organic matter; ¼ to 1 inch thick.
Surface Layers:	Dark reddish brown to dark red gravelly and cobbly loam; moderate, medium granular structure; friable to slightly firm consistence; slightly sticky and nonplastic; up to 30 percent gravels and cobbles; pH range of 5.8 to 6.5; 4 to 12 inches thick.
Subsoil Layers:	Dark red to reddish brown and stony loams and clay loams; moderate subangular blocky structure, grading to massive below 30 inches; firm; sticky, slightly plastic; 30 to 70 percent (by volume) cobbles and stones; pH range of 6.2 to 7.5; 4 to 36 inches thick.

MAPPING UNIT 82

Mapping Unit 82 comprises predominately Landtype 82 with lesser amounts of Landtypes 81 and 83.

Landtype 82 consists of moderately deep, colluvial and residual soils developed over serpentine bedrock. A typical soil profile shows a surface horizon of gravelly and cobbly loam. This horizon may contain up to 20 percent gravels and cobbles by volume. The subsoil is a cobbly to very cobbly clay loam. In the subsoil, cobbles and stones occupy up to 50 percent by volume of the horizon. Red colors dominate this landtype.

Bedrock consists entirely of hard, moderately competent, serpentine rock. Color of the rock is typically greenish with light grayish colored streaking. Shiny, glassy-like rock faces are a typical characteristic of the serpentine rock. Depth to the underlying bedrock is generally three to six feet but may range from three to eight feet.

This landtype is found exclusively on the Tiller Ranger District and is confined to an area south and west of a line extended from Tiller to Fawn Camp. It occurs quite sporadically throughout this area and is most common in the immediate vicinity of the Tiller Ranger Station. This landtype typically occupies broad ridgetops and upper sideslopes in close association with Landtype 81. It most often occurs as ridgetop cappings of otherwise predominantly granitic and schist ridges. Slopes are generally quite smooth and predominantly convex. Within this landtype slopes range from 25 to 50 percent.

The elevation range for Landtype 82 is 1,500 to 4,500 feet. It supports Site Class V Douglas-fir. Timber stands exhibit very low density in this landtype.

This is a well drained landtype. Infiltration into the surface material is moderate and internal permeability is moderate to slow.

Range of Profile Characteristics of Landtype 82

Litter:	Needles, leaves, twigs, and decomposing organic matter; 1 to 2 inches thick.
Surface Layers:	Yellowish red, gravelly and cobbly sandy loam and loam; moderate, medium, granular structure; friable; slightly sticky when wet and slightly plastic; 10 to 30 percent (by volume) gravels and cobbles; pH range of 6.0 to 7.5; 4 to 12 inches thick.
Subsoil Layers:	Dark red to red, cobbly and stony clay loams and clays; moderate to strong subangular blocky structure, grading to massive below 36 inches; slightly firm; slightly sticky, plastic; 15 to 50 percent (by volume) cobbles and stones; pH range of 5.5 to 6.5; 30 to 72 inches thick.

MAPPING UNIT 90

Mapping Unit 90 consists dominately of Landtype 90 with minor amounts of Landtypes 92 and 99.

Landtype 90 is a deep to very deep unit derived from volcanic ejecta (pumice). Typically, the surface horizon consists of coarse textured, sandy pumice materials. Subsoils consist of coarse and very coarse, rounded, "popcorn" pumice fragments. This landtype is typically free of cobbles and stones in the upper six feet of pumice materials. However, pumice fragments up to 12 inches in diameter are common.

Bedrock is composed of hard, competent fractured andesites and/or basalts. The rock underlying this landtype is more porous than the typical andesite (basalt) found on the Forest. It often possesses a hard cinder-like appearance when associated with Landtype 5 (cinder cones). Depth to the underlying bedrock is normally greater than 12 feet but ranges to within 6 feet.

This landtype occurs on areas ranging from pumice "flats" to the "benchy" undulating slopes leading up to the Cascade crest and Mt. Bailey. It is associated primarily with the High Cascades and occurs only west of a line from Garwood Butte to Lemolo Lake to Birds Point.

Typical slopes range from 5 to 25 percent although extremes range from 2 to 45 percent. This landtype is associated with cobbly and stony ridges and isolated rock mounds. Large pumice fragments are commonly found on the surface of this landtype.

The elevation range is from 4,500 to 7,500 feet. Landtype 90 supports lodgepole pine and true fir - mountain hemlock vegetation. Estimated site class range from IV for lodgepole pine to low IV and V for true firs and mountain hemlock.

This landtype is excessively drained. Infiltration is rapid to very rapid and permeability is rapid to very rapid in the subsoil.

Range of Profile Characteristics of Landtype 90

Litter:	Needles, twigs, and decomposing organic matter; ¼ to 1 inch thick.
Surface Layers:	Grayish brown to yellowish brown, sandy pumice materials; single grained; nonsticky and nonplastic, pH ranges from 6.0 to 7.2; 8 to 24 inches thick.
Subsoil Layers:	Yellowish brown to brownish yellow, coarse and very coarse pumice material; single grained; rounded and subangular pumice fragments; up to 70 percent gravel size particles (2 to 3 inches), 25 percent cobble size (3 to 10 inches), 5 percent stone size (greater than 10 inches); nonsticky, nonplastic; pH ranges from 6.0 to 7.0; 60 to 136+ inches thick.

MAPPING UNIT 91

Mapping Unit 91 consists dominantly of Landtype 92 with lesser amounts of Landtypes 90 and 92. It is commonly associated with Landtypes 1 and 96 in the North Umpqua corridor.

Landtype 91 is a deep to very deep unit derived from volcanic ejecta (ash). Typically, the surface soil consists of loamy fine sand and loamy sand, pumice material. Subsoils are commonly stratified with the matrix being primarily fine sand and loamy sand textures. Sands and fine sands exist as stratified layers in the lower portion of the subsoil. Pieces of charred wood fragments are occasionally evident in the subsoil.

The bedrock underlying this landtype consists of hard competent andesites and/or basalts. Depth of this underlying bedrock is quite variable. Typically, depth to bedrock exceeds 12 feet and often exceeds 20 feet. However, along much of the North Umpqua corridor, soil depths may be shallower. This is especially true if the landtype is positioned along the canyon walls. This condition is especially true in the area between Dry Creek and the Toketee Ranger Station.

This landtype typically identified the ashy deposits occurring within the vicinity of the North Umpqua corridor. This landtype occupies steep dune-like ridges as well as the talus-type slopes associated with the canyon walls. This landtype is concentrated primarily in the corridor area between Dry Creek and Whitehorse Falls. Other locations have been noted but they are not extensive. Slopes typically range from 40 to 110 percent. The steepest slopes are associated with the dune-like deposits. This formation is very evident along the North Umpqua Highway in the vicinity described.

The elevation range of 2,500 to 5,500 feet is typical for this landtype. Locations along the North Umpqua corridor account for lower elevation occurrences. This landtype may also occur as inclusions in the higher elevations of the High Cascades area. Landtype 91 supports a mixture of Douglas-fir, true fir, lodgepole pine, and mountain hemlock. Site Class for Douglas-fir is V.

This landtype is excessively drained. Infiltration is rapid to very rapid and permeability is rapid to very rapid in the upper portion of the subsoil. Permeability may be reduced to moderate in the area of the stratified materials.

Range of Profile Characteristics of Landtype 91

Litter:	Needles, twigs, and decomposing organic matter; ½ to 2 inches thick.
Surface Layers:	Light reddish brown, loamy very fine sand to loamy fine sand, ash materials; weak, moderate, granular; friable to loose consistence; nonsticky and nonplastic; pH range of 6.0 to 7.5; 2 to 8 inches thick.

Subsoil Layers: Brown to pale brown, loamy fine sand to gravelly fine sand ash materials in the upper 36 inches of the profile; sands, fine sands, and fine ashy gravels may occur as stratified layers below 36 inches; single grained structure; loose; pieces of charcoal and ashy concretions may be scattered throughout the lower subsoil; nonsticky, nonplastic; pH range of 6.0 to 7.5; 60 to 120+ inches thick.

MAPPING UNIT 92

Mapping Unit 92 consists dominantly of Landtype 92 with lesser amounts of Landtypes 90, 93 and 94.

Landtype 92 is a deep to very deep unit derived from volcanic ejecta (pumice). Typically, the surface soil consists of loamy fine sand and loamy sand pumice material. Subsoils are commonly stratified with the matrix being primarily loamy sand textures. Sands and fine sands exist as stratified layers in the lower portion of the subsoil. Intermittently, a layer of coarse and very coarse rounded "popcorn" pumice may also occur. This stratification of materials generally does not occur in the upper 36 inches of the soil profile.

Bedrock consists of hard competent andesites and/or basalts. The rock underlying this landtype is more porous than the typical andesite found on the forest. It often possesses a hard cinder-like appearance. Depth of this underlying bedrock is normally greater than 12 feet but may range to within 8 feet in the vicinity of Lemolo Lake.

This landtype occupies nearly level to undulating slopes. It is most common in the triangular area bounded by Stump Lake, Lemolo Lake and Diamond Lake. However, it is also found along the North Umpqua Corridor as far east as Dry Creek. Also, locations have been noted along the Jackson Creek Corridor as far southeast as Tiller. Typical slopes range from 0 to 25 percent, although extremes alter the range. Sporadic locations of the "popcorn" size fragments are more common and are considered typical for this landtype unit.

The elevation range of 2,500 to 5,500 feet is typical for this landtype. Locations along the North Umpqua, South Umpqua and Jackson Creek Corridors account for lower elevation occurrences.

Landtype 92 supports predominantly Site Class V lodgepole pine. Douglas-fir may occur when the landtype is in association with Landtype 94.

This landtype is excessively drained. Infiltration is rapid to very rapid and permeability is rapid to very rapid in the upper portion of the subsoil. Permeability may be reduced to moderate in the area of the stratified materials.

Range of Profile Characteristics of Landtype 92

Littler: Needles, twigs, and decomposing organic matter; ½ to 2 inches thick.

Surface Layers: Grayish brown, loamy sand to loamy fine sand, pumice; weak, fine, granular; friable to loose; nonsticky and nonplastic; pH range of 5.5 to 7.0; 2 to 10 inches thick.

Subsoil Layers: Yellowish brown to brownish yellow, loamy sand to sand pumice in the upper 36 inches of the subsoil; sands, fine sands, and fine pumice gravels may occur as stratified layers below 36 inches; single grained structure; loose consistence; some rounded and some angular pumice fragment "popcorn" in this lower subsoil; nonsticky and nonplastic; pH range of 6.0 to 8.0; 60 to 120+ inches thick.

MAPPING UNIT 93

Mapping Unit 93 consists predominantly of Landtype 93 with inclusions of Landtypes 92, 94 and 98.

Landtype 93 consists of deep to very deep soils derived from predominantly volcanic ejecta materials (pumice). Typically, textures of the surface soil range from loamy sand to fine sandy loam. Textures in the subsoil range from loamy sand and loam. The matrix would be primarily light sandy loam. Coarse popcorn size pumice fragments are common throughout the profile. Gravels, cobbles, and stones of andesite and basalt composition may occupy up to 20 percent of the profile (by volume).

Bedrock is typically hard competent, porous andesites and/or basalts. The rock underlying this landtype is more porous that the typical andesite found on the Forest. It often possesses a hard, cinder-like appearance. Depth to the underlying bedrock is normally greater than 8 feet but may range to within 6 feet in the vicinity of Lemolo Lake.

This landtype occupies undulating to rolling slopes. Slopes are typically smooth and concave. Slopes range from 20 to 50 percent.

This landtype has a normal range in elevation from 4,500 to 6,000 feet. It supports Site Class V Douglas-fir at elevations below 5,500 feet. More typically it supports Site Class IV and V true firs and Site Class V lodgepole pine.

Landtype 93 is well drained. Infiltration is rapid in the surface. Permeabl in the subsoil is rapid to moderate.

Range of Profile Characteristics of Landtype 93

Litter:	Needles, twigs, and decomposing organic matter; ½ to 2 inches thick.
Surface Layers:	Brown, light sandy loam to loamy sand with yellowish brown pumice fragments; weak, medium, granular structure; very friable; up to 30 percent rounded and subangular gravels and cobbles (by volume); nonsticky and nonplastic; pH ranges from 6.0 to 7.5; 6 to 14 inches thick.
Subsoil Layers:	Yellowish brown to brownish yellow, gravelly and cobbly loamy sand to light loam with yellowish brown pumice fragments; 15 to 30 percent rounded to subangular gravels, cobbles, and stones; weak, subangular blocky structure grading to massive; very friable; nonsticky and nonplastic; pH ranges from 5.5 to 7.0; 60 to 120+ inches.

MAPPING UNIT 94

Mapping Unit 94 consists predominantly of Landtype 94 with lesser amounts of inclusions of Landtypes 92 and 93.

Landtype 94 consists of deep to very deep soils derived from volcanic ejecta (pumice) materials as well as colluvial and residual materials. Soils within this landtype are commonly referred to as "buried" soils. Typically, the surface horizon possesses loamy fine sand or light sandy loam pumice materials. The subsoils consist of colluvial materials with textures ranging from gravelly loam to clay. Depth to the contrasting soil material typically ranges from 20 to 48 inches but locally may be much shallower. A thin layer of coarse and very coarse rounded "popcorn" pumice fragments often separate the pumice surface soil from the underlying soil material. Thickness of this pumice layer may range from 3 to 8 inches.

Bedrock consists of hard competent andesites and/or basalts. Depth to the bedrock ranges from 6 to greater than 12 feet.

This landtype occupies the nearly level areas associated with the intercanyon basalt flows. It is most common in the areas around and above the Toketee Ranger Station. Since the areas are quite flat, depressional areas commonly hold water during the rainy season.

Slopes range from 2 to 40 percent. Elevation range is from 3,000 to 5,000 feet. This landtype supports primarily Site Class IV Douglas-fir. Lodgepole pine may occur as inclusions.

This landtype is normally moderately well to well drained with inclusions of somewhat poor to poorly drained areas. Infiltration is rapid in the surface materials. Permeability in the subsoil ranges from rapid in the upper subsoil to slow in the "buried" lower subsoil.

Range of Profile Characteristics of Landtype 94

Litter:	Needles, twigs, and decomposing organic matter; 1 to 3 inches thick.
Surface Layers:	Dark reddish brown to reddish gray, loamy sand to loamy fine sand pumice; weak, moderate, granular structure; very friable; nonsticky and nonplastic; pH range of 6.0 to 7.0; 2 to 8 inches thick.
Upper Subsoil Layers:	Dark brown to strong brown, fine sand and loamy fine sand; weak, fine and medium, subangular blocky structure grading to single grain; very friable to loose; nonsticky, nonplastic; pH ranges from 6.0 to 8.0; 12 to 44 inches thick. A layer of coarse and very coarse, gravel size (popcorn) pumice fragments typically separates the above material from the underlying "buried" soil material.
Lower Subsoil:	Dark red clay loam to clay, grading to loam with increased depth (below 60 inches); massive structure; friable to slightly firm consistence; sticky and very plastic; pH range of 6.0 to 7.0; 18 to 48+ inches thick.

MAPPING UNIT 95

Mapping Unit 95 consists dominately of Landtype 95 with very minor amounts of inclusions of Landtypes 90 and 92.

Landtype 95 is a somewhat poorly to poorly drained, deep to very deep unit derived from volcanic ejecta (pumice). Typically, the surface horizon consists of sandy pumice materials. Subsoils consist of loamy sands to sand pumice materials. A layer of coarse and very coarse rounded "popcorn" pumice fragments is common and occurs over an estimated 40 percent of this landtype. This landtype is typically free of cobbles and large stones in the upper six feet of pumice materials.

Bedrock consists of hard, competent andesites and/or basalts. A one- to three-foot thick layer of glacial till may overly the underlying bedrock. Depth to the bedrock is estimated to be 6 feet and may actually be greater than 12 feet.

This landtype is not extensive on the Forest. It occurs only in the vicinity of Diamond Lake, Lemolo Lake and in the Windigo Pass area. It is typified by being very flat. It is commonly associated with surface water, either in the form of a stream dissecting the unit or as a perched water table during certain periods of the year.

Slopes range from 0 to 5 percent, although 0 to 2 percent is most typical. The elevation range is from 4,500 to 6,000 feet. This landtype supports principally sedge grasses and other vegetation associated with wet meadows. Occasional true firs and mountain hemlocks may occur. However, the landtype is considered noncommercial forest land.

This landtype is somewhat poorly to poorly drained. Infiltration is rapid to moderate and internal permeability is moderate to slow. During dry summer periods, permeability may improve to rapid.

This unit is considered to be a miscellaneous landtype. A representative profile has not been identified.

MAPPING UNIT 96

Mapping Unit 96 consists dominantly of Landtype 96 and lesser amounts of Landtypes 94, 98 and 99.

Landtype 96 consists of shallow to moderately deep, nonplastic soils derived from volcanic ejecta (pumice) over hard competent andesite and basalts. Surface soil materials are predominately gravelly loamy sand to light sandy loam pumice. Subsoils are typically cobbly and stony loamy sand ranging to coarse rounded pumice fragments. Occasionally, a thin (less than 12 inches) layer of glacial (or colluvial) till may separate the pumice from the underlying bedrock. Texture of the till material is typically cobbly loam.

Bedrock is composed of competent, hard andesite and basalt. The rock underlying this landtype is more porous than the typical andesite (basalt) found on the Forest. It often possesses a hard cinder-like appearance when associated with Landtype 5 (cinder cones). Depth to bedrock ranges from less than 3 feet to 8 feet.

Typically, Landtype 96 occurs on high elevation ridgetops, upper sideslopes, and glacial terraces. It is also found on the large convex "benchy" slopes associated with past volcanic eruptions. This latter occurrence is most common in the immediate vicinities of Mt. Bailey and Mt. Thielsen. Up to 10 percent of the surface area of this unit may be rock outcrops. Slopes typically range from 45 to 70 percent although extremes extend the range from 20 to 90 percent.

This landtype has a typical elevation range of 3,500 to 8,000 feet. Higher extremes are found along the crest of the Cascades and near the summit of Mt. Bailey. The landtype supports predominately Douglas-fir (below 5,500 feet) and true fir - mountain hemlock with lodgepole pine (above 5,500 feet). Estimated site class for Douglas-fir is IV and V, and V for lodgepole pine.

Drainage in this landtype is well to excessive. Permeability is very rapid in the surface soils and rapid to moderate in the subsoils where glacial till is evident.

Range of Profile Characteristics of Landtype 96

Litter:	Needles, leaves, twigs, and decomposing organic matter; sparse to 1 inch thick.
Surface Layers:	Black to very dark gray, gravelly and cobbly loamy fine sand pumice; weak, fine, subangular blocky; friable; nonsticky, nonplastic; pH ranges from 6.0 to 7.0; 1 to 6 inches thick.
Subsoil Layers:	Dark reddish brown to dark brown, gravelly, cobbly and stony loamy sand and loamy fine sand pumice with sporadic coarse pumice fragments; weak, medium, granular single grained; loose; 40 to 60 percent rounded and subangular cobbles and stones by volume; nonsticky, nonplastic; pH ranges from 6.0 to 7.0; 20 to 72 inches thick.
	Intermittently, a dark reddish brown, cobbly and stony sandy loam or loam horizon may be present. This layer typically separates the pumice overburden from the underlying bedrock. Cobbles and stones may occupy up to 70 percent of this horizon.

MAPPING UNIT 97

Mapping Unit 97 consists predominantly of Landtype 97 with lesser amounts of Landtypes 94, 96 and 98.

Landtype 97 is comprised of deep, gravelly and cobbly soils derived from both volcanic ejecta materials (pumice) and colluvial and glacial materials. These soils are often referred to as buried soils. Soil depths range from deep to very deep. Textures in the surface horizons are typically gravelly loamy sand to light sandy loam of pumice origin. Textures in the subsoil vary from cobbly loam to cobbly clay loam materials. Cobbles and stones may occupy from 10 to 30 percent (by volume) of the subsoil. Material below the pumice mantle is commonly colluvial in nature. The boundary between the pumice and underlying colluvial soil is abrupt.

Bedrock is composed of hard fractured, competent andesites and/or basalts with up to 20 percent inclusions of breccia materials. The andesite/basalt is typically more porous than normal for the rest of the Forest. Depth to the underlying bedrock ranges from 6 to 12 feet.

Typically, Landtype 97 occurs on relatively smooth upper slopes and benches which are associated with areas of apparent past glacial activity. This landtype is typically associated with the contact zone between the Western Cascades and the High Cascades. Slopes range from 25 to 55 percent.

This landtype has a normal range in elevation from 4,000 to 6,500 feet. It typically supports Site Class IV Douglas-fir at elevations below 5,500 feet. Above this elevation, it supports Site Class IV and V (estimated) true firs, western hemlock and occasional mountain hemlock.

Landtype 97 is moderately well to well drained. Infiltration is rapid to very rapid in the surface. Permeability of the subsoil is moderate.

Range of Profile Characteristics of Landtype 97

Litter:	Needles, twigs, and decomposing organic matter; ¼ to 3 inches thick.
Surface Layers:	Reddish yellow, light sandy loam pumice; pumice cobbles and stones occupying up to 5 percent of the surface area; single grained to weak granular structure; friable to loose; nonsticky and nonplastic; pH ranges from 5.8 to 7.0; 10 to 30 inches thick.
Subsoil Layers:	Reddish brown to dark reddish brown, gravelly and cobbly clay loam; weak, medium, subangular blocky structure grading to massive below 36 inches; 5 to 20 percent (by volume) rounded to subangular gravels, cobbles and stones; sticky, slightly plastic; pH ranges from 6.0 to 7.0; 60 to 120+ inches thick.

MAPPING UNIT 98

Mapping Unit 98 consists predominantly of Landtype 98 with lesser amounts of Landtypes 93, 96, 97 and 99.

Landtype 98 is comprised of deep, gravelly and cobbly soils derived from both volcanic ejecta materials (pumice) and colluvial and glacial materials. Soil depths range from deep to very deep. Textures in the surface horizons are normally gravelly sandy loam or loam and of predominantly pumice origin. Stones (greater than 10 inches) may occupy up to 5 percent of the surface area of this landtype. Textures in the subsoil are typically cobbly loam and clay loam. Cobbles and stones may occupy from 10 to 30 percent (by volume) of the subsoil. A layer of partially cemented glacial material is typical in this soil. Depth to this cemented layer ranges from 36 to 48 inches and may be 12 to 20 inches thick. Material below the cemented layer is commonly colluvial in nature with textures being predominantly sandy loam to light loam. Although the cemented horizon is typical, it is intermittent over much of the area. The degree of cementation is also quite variable. Where this horizon is evident and dominant, zones of moisture or subsurface seeps can be noted in cutbanks.

Bedrock is composed primarily of hard, fractured, competent andesites and/or basalts. It is typically more porous than normal for the rest of the Forest. Up to 20 percent of the unit may be underlain by hard, reddish breccia materials. Depth to the underlying bedrock ranges from 6 to 12 feet.

Typically, Landtype 98 occurs on relatively smooth concave upper slopes which are part of an apparent glacial valley. This landtype is often associated with the contact zone between the Western Cascades and the High Cascades. Slopes range from 25 to 55 percent.

This landtype has a normal range in elevation from 4,000 to 6,000 feet. It typically supports Site Class IV Douglas-fir at elevations below 5,500 feet (estimated). Above this elevation, it supports Site Class IV and V true firs, western hemlock and occasional mountain hemlock.

Landtype 98 is moderately well to well drained. Infiltration is rapid to very rapid in the surface. Permeability of the subsoil varies from slow to moderate, depending upon the degree of cementation of the glacial layer.

Range of Profile Characteristics of Landtype 98

Litter:	Needles, twigs, and decomposing organic matter; ¼ to 3 inches thick.
Surface Layers:	Reddish yellow, loamy sand to sandy loam pumice; surface cobbles and stones occupying up to 5 percent of the surface area; weak, fine, granular structure; friable; 10 to 30 percent rounded and subangular gravels and cobbles (by volume); nonsticky and nonplastic; pH ranges from 5.8 to 7.0; 10 to 30 inches thick.

Subsoil Layers: Reddish brown, gravelly cobbly and stony sandy loam to loam; weak, subangular blocky structure grading to massive below 42 inches; 10 to 30 percent (by volume) rounded to subangular gravels, cobbles and stones; sticky and slightly plastic; pH ranges from 6.0 to 7.0; 60 to 120+ inches.

Within the subsoil a cemented or partially cemented layer is typical. This layer possesses reddish brown to dark reddish brown colors; cobbly and stony sandy loam and loam textures; structure is massive; thickness ranges from 6 to 36 inches. Gravels, cobbles and stones occupy up to 20 percent of this layer.

MAPPING UNIT 99

Mapping Unit 99 consists predominantly of Landtype 99 with lesser amounts of Landtypes 93, 96 and 98.

Landtype 99 is comprised of cobbly and stony soils derived from volcanic ejecta (pumice) and glacial debris. Soil depth ranges from deep to very deep. A typical profile shows a gravelly and cobbly pumice surface of fine sandy loam texture. Stones (greater than 10 inches) may occupy up to 10 percent of the surface area of this landtype. The subsoil shows very cobbly and stony mixture of pumice and glacial materials. Light sandy loam is the dominant texture in the upper part of the subsoil. Textures grade to sand and fine gravels below 36 inches. Gravels, cobbles and stones typically occupy an estimated 50 to 75 percent of the profile (by volume). The cobbles and stones are predominately rounded and subangular blocky andesite or basalt fragments. Occasional cobble-size pumice fragments may also occur sporadically throughout the profile. Intermittently, a cobbly and stony glacial till layer may occur at depths below 72 inches. This till layer, when present, is typically heavy sandy loam and loam textured and is a source of subsurface moisture (seeps).

Bedrock is composed of hard, fractured but competent andesites and/or basalts. It is often more porous than normal for this rock type. Depth to the underlying rock is normally 8 to 10 feet but may range from 4 to greater than 12 feet.

Typically, Landtype 99 occurs on smooth, concave slopes which are part of an apparent glacial valley. Slopes range from 25 to 55 percent. Landtype 99 is also found in association with Landtypes 90 and 96 on the large, smooth slopes extending outward and downward from Mt. Bailey and the Cascade crest. In these areas, Unit 99 occurs as raised mounds or benches along the entire length of the slope. In this situation, slopes range from 15 to 45 percent.

This landtype has a normal range in elevation from 4,500 to 7,000 feet. However, the extremes extend the range from 3,500 feet to greater than 8,000 feet near the top of Mt. Thielsen. It typically supports Site Class V lodgepole pine. It also supports Site Class IV and V true firs and mountain hemlock.

Landtype 99 is well to excessively drained. Infiltration is rapid to very rapid in the surface. Permeability in the subsoil is rapid to moderate. The moderate rating is indicative of the presence of a glacial till layer.

Range of Profile Characteristics of Landtype 99

Litter: Needles, twigs, and decomposing organic matter; ¼ to 1 inch thick.

Surface Layers: Dark reddish brown, predominately pumice, gravelly and cobbly fine sandy loam with stones on the surface (up to 10 percent of surface area); weak, medium, granular structure; friable to loose; 30 to 50 percent rounded and subangular gravels and cobbles (by volume); non-sticky and nonplastic; pH ranges from 6.0 to 7.2; 1 to 6 inches thick.

Subsoil Layers: Reddish brown to dark reddish brown, cobbly and stony fine sandy loam, predominately pumice, grading to coarse sand and fine gravels below 36 inches; weak subangular blocky structure grading to single grained; 50 to 80 percent (by volume) rounded to subangular gravels, cobbles, and stones; nonsticky and nonplastic; pH ranges from 6.0 to 7.5; 60 to 140+ inches thick.

A reddish brown to dark reddish brown, cobbly and stony sandy loam to loam horizon may be present in the subsoil. It is present in up to 20 percent of the areas covered by this landtype. The structure is typically massive. Evidence of cementation in this horizon is common. Thickness ranges from 6 to 36 inches.

LEGEND OF COMPLEXES

Symbol	Components and Approximate %		Typical Inclusions
131	13 - 60%	41, 51 - 40%	31, 52, 42
132	13 - 70%	42 - 30%	16, 22, 41
135	13 - 70%	25 - 30%	24
136	13 - 60%	52 - 40%	16, 24, 42
151	1 - 60%	51 - 40%	2, 31, 41
153	15 - 60%	13 - 40%	16
156	1 - 70%	56 - 30%	7, 57
161	16 - 60%	51 - 40%	13, 31, 41, 52
165	16 - 50%	25 - 50%	13
182	18 - 60%	52 - 40%	24, 51
183	18 - 60%	93 - 40%	24, 92, 94
184	18 - 60%	24 - 40%	22, 42
185	18 - 60%	25 - 40%	24
186	18 - 60%	46 - 40%	47, 51
187	18 - 60%	57 - 40%	19, 24, 56
188	18 - 60%	98 - 40%	3, 93
189	18 - 60%	94 - 40%	16, 92
193	19 - 70%	97 - 30%	18, 94
195	19 - 70%	6 - 30%	18, 93
196	1 - 50%	96 - 50%	91, 56
197	19 - 60%	57 - 40%	18, 56
198	19 - 50%	18 - 50%	57
205	20 - 70%	25 - 30%	28
206	20 - 70%	6 - 30%	25, 28

Symbol	Components and Approximate %			Typical Inclusions
208	20 - 60%	28 - 40%		25
211	21 - 60%	41 - 40%		22, 42
212	21 - 60%	42 - 40%		22, 41
213	21 - 60%	23 - 40%		22, 24
214	23 - 60%	14 - 40%		22, 24
215	21 - 50%	25 - 50%		22, 23
220	22 - 70%	20 - 30%		23, 25, 28
221	22 - 70%	21 - 30%		23, 42
222	22 - 60%	42 - 40%		23
223	22 - 60%	33 - 40%		23, 32, 42
224	22 - 70%	24 - 30%		23, 42
225	22 - 60%	25 - 40%		23, 24
227	22 - 70%	47 - 30%		18, 27
228	22 - 60%	18 - 40%		24, 42
230	23 - 70%	20 - 30%		14, 28
231	21 - 40%	31 - 30%	41 - 30%	2, 51
232	23 - 50%	22 - 50%		24, 42
233	23 - 60%	33 - 40%		22, 24
234	23 - 50%	24 - 50%		14
235	23 - 60%	25 - 40%		13, 22
242	24 - 70%	22 - 30%		23
243	24 - 50%	13 - 50%		16, 22, 23
244	24 - 70%	14 - 30%		23
245	24 - 70%	25 - 30%		13, 22, 23
248	24 - 60%	18 - 40%		42
252	24 - 60%	52 - 40%		18, 51

Symbol	Components and Approximate %			Typical Inclusions
255	24 - 70%	33, 35 - 30%		22, 34
273	27 - 60%	33 - 40%		22, 47
275	27 - 70%	25 - 30%		18, 22
276	27 - 70%	6 - 30%		22, 47
277	27 - 60%	47 - 40%		18, 22
278	27 - 60%	18 - 40%		47
280	28 - 60%	20 - 40%		23, 24, 25
282	28 - 70%	52 - 30%		24, 51
284	28 - 60%	24 - 40%		14, 18, 23
285	28 - 70%	25 - 30%		20, 23, 24
305	30 - 60%	35 - 40%		6, 33
311	31 - 50%	41 - 30%	51 - 20%	2
312	31 - 60%	32 - 40%		2, 33
313	31 - 60%	33 - 40%		2, 32
315	31 - 70%	35 - 30%		32, 33
321	32 - 70%	31 - 30%		18, 33
322	32 - 60%	42 - 40%		33, 31, 41
323	32 - 50%	33 - 50%		18, 31
330	33 - 60%	30 - 40%		6, 34
331	33 - 70%	31 - 30%		22, 32
332	33 - 60%	22 - 40%		32, 42
333	33 - 60%	23 - 40%		22
335	33 - 70%	35 - 30%		30
336	33 - 70%	16-30%		13, 18, 22
342	31 - 40%	41 - 40%	21 - 20%	2, 51
344	34 - 60%	24 - 40%		18, 33

Symbol	Components and Approximate %			Typical Inclusions
351	31 - 60%	51 - 40%		2, 51
352	32 - 60%	52 - 40%		31, 51
411	41 - 60%	31 - 40%		2, 51
412	41 - 60%	21 - 40%		2, 22, 42
413	41 - 40%	42 - 30%	18 - 30%	13
414	41 - 60%	42 - 40%		18, 22
415	41 - 50%	42 - 30%	25 - 20%	18, 31, 32
416	41 - 60%	51 - 25%	16 - 15%	18, 42, 58
418	41 - 50%	18, 42 - 50%		13
421	42 - 70%	41 - 30%		13, 47
422	42 - 60%	22 - 40%		21, 41
423	42 - 60%	23 - 40%		13, 22
424	42 - 60%	24 - 40%		22
427	42 - 60%	27 - 40%		41, 47
428	42 - 60%	18 - 40%		41, 47
432	41, 31 - 70%	2 - 30%		
433	41 - 50%	31 - 30%	13 - 20%	32, 42, 46
451	41 - 60%	51 - 40%		1, 31
453	31, 41, 51 - 70%	13 - 30%		1, 2
461	46 - 60%	51 - 40%		1, 47
462	46 - 70%	2 - 30%		41, 47
463	46 - 60%	31 - 40%		41
465	46 - 50%	51, 31, 21 - 50%		41, 47
466	46 - 70%	56 - 30%		47, 52
467	46 - 60%	47 - 40%		18, 41, 42

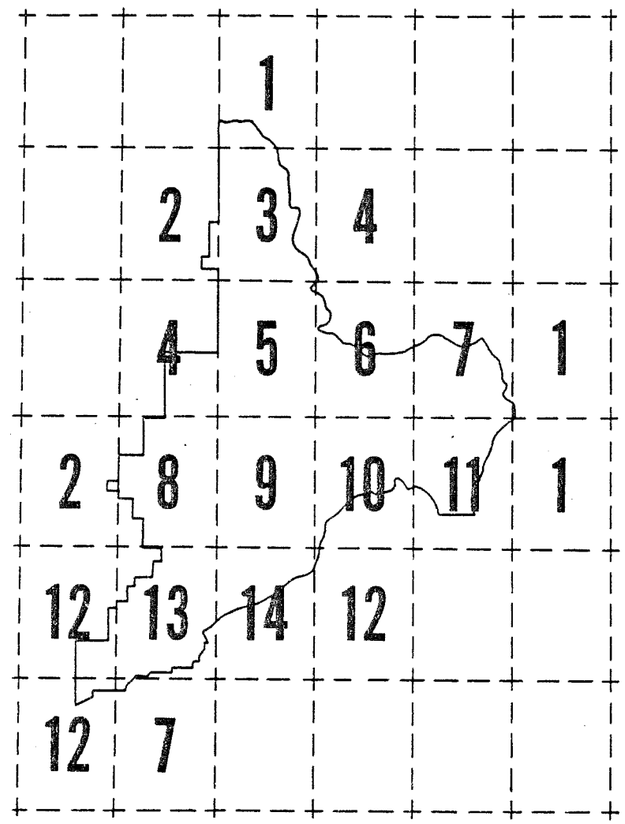
Symbol	Components and Approximate %			Typical Inclusions
468	46 - 70%	18 - 30%		47
472	47 - 60%	32 - 40%		31, 46
476	47 - 70%	46 - 30%		18, 27, 42
477	47 - 60%	27 - 40%		
478	47 - 60%	18 - 40%		24, 27
511	51 - 70%	1 - 30%		52
512	51 - 60%	52 - 40%		1, 18, 24
513	51, 52 - 70%	13 - 30%		25
516	51 - 70%	16 - 30%		41, 52
517	51 - 60%	7 - 40%		1, 52
518	51 - 70%	18 - 30%		52
521	52 - 70%	51 - 30%		18
522	52 - 60%	42 - 40%		22, 24, 41
523	52 - 50%	51 - 30%	13 - 20%	
524	52 - 60%	24 - 40%		18, 51
525	52, 42 - 70%	25 - 30%		41, 51
526	52 - 70%	16 - 30%		51
527	52 - 50%	47 - 50%		18, 27
531	51 - 50%	31, 41 - 50%		21, 46
532	52 - 50%	32 - 50%		18, 24
533	52 - 60%	33 - 40%		18, 32
541	51 - 40%	41 - 30%	1, 2 - 30%	31, 46
542	51 - 40%	46 - 40%	1, 2 - 20%	31, 41
543	41, 42 - 40%	51, 52 - 40%	13 - 20%	18
546	51 - 50%	46 - 50%		41, 47, 52

Symbol	Components and Approximate %		Typical Inclusions
561	56 - 70%	1 - 30%	57
563	56 - 60%	31 - 40%	32, 57
564	56 - 60%	41 - 40%	31
566	56 - 60%	47 - 40%	31, 47
567	56 - 60%	57 - 40%	18
568	56 - 60%	18 - 40%	57
569	56 - 60%	19 - 40%	18, 57
576	57 - 70%	6 - 30%	19, 56
577	57 - 60%	7 - 40%	1, 56
578	57 - 60%	18, 19 - 40%	6, 56
612	61 - 60%	62 - 40%	71, 72
617	61 - 60%	71 - 40%	62, 72
621	62 - 70%	61 - 30%	63
623	62 - 60%	63 - 40%	61, 64
624	62 - 70%	64 - 30%	61, 63
631	62, 63 - 70%	61 - 30%	72
634	63 - 60%	64 - 40%	62, 74
673	62 - 60%	73 - 40%	63, 72
712	71 - 60%	72 - 40%	61, 81
723	72 - 60%	73 - 40%	71, 62
733	73 - 70%	82 - 30%	72
801	80 - 60%	81 - 40%	82
810	81 - 70%	80 - 30%	80
812	81 - 60%	82 - 40%	
821	82 - 70%	81 - 30%	

Symbol	Components and Approximate %			Typical Inclusions
823	82 - 60%	34 - 40%		81
901	90 - 60%	91 - 40%		92
902	90 - 60%	92 - 40%		93, 96
904	90 - 40%	96 - 30%	4 - 30%	99
906	90 - 60%	96 - 20%	99 - 20%	98
911	91 - 70%	1 - 30%		96
916	91 - 60%	96 - 40%		1
921	92 - 60%	91 - 40%		90, 93
924	92 - 60%	94 - 40%		93
925	92 - 60%	95 - 40%		90
927	92 - 60%	7 - 40%		6, 97
932	93 - 60%	92 - 40%		90, 94
936	93 - 70%	96 - 30%		92, 98, 99
938	93 - 60%	98 - 40%		99
939	93 - 70%	99 - 30%		98
942	94 - 60%	92 - 40%		93
943	94 - 60%	93 - 40%		92
946	94 - 60%	96 - 40%		92, 93
960	96 - 60%	90 - 40%		92, 99
961	96 - 70%	1 - 30%		56
962	96 - 60%	92 - 40%		90, 99
964	96 - 70%	94 - 30%		93
966	96 - 50%	56 - 50%		1, 57
967	96 - 60%	7 - 40%		1, 97
968	96 - 60%	98 - 40%		97
969	96 - 70%	99 - 30%		1, 18, 98

Symbol	Components and Approximate %			Typical Inclusions
972	97 - 60%	92 - 40%		93
976	97 - 60%	96 - 40%		93, 98
980	98 - 70%	6, 7 - 30%		18, 19, 96
986	98 - 70%	96 - 30%		7
987	98 - 60%	97 - 40%		18, 93
988	98 - 70%	18 - 30%		93, 97
989	98 - 70%	99 - 30%		96
990	99 - 40%	96 - 30%	90 - 30%	98
991	96 - 60%	91 - 40%		90, 99
992	99 - 50%	92 - 50%		90, 91
996	99 - 60%	96 - 40%		1, 98
998	99 - 50%	98 - 50%		90, 93, 96

SOIL RESOURCE INVENTORY
UMPQUA NATIONAL FOREST
PACIFIC NORTHWEST REGION (R-6)
1975



Soil mapping by R-6 Soil Scientist Sherman A. Radtke (1973–1975)
Portion of South Umpqua area converted from South Umpqua Area
Soil Map. Land type unit description are described in the Soil

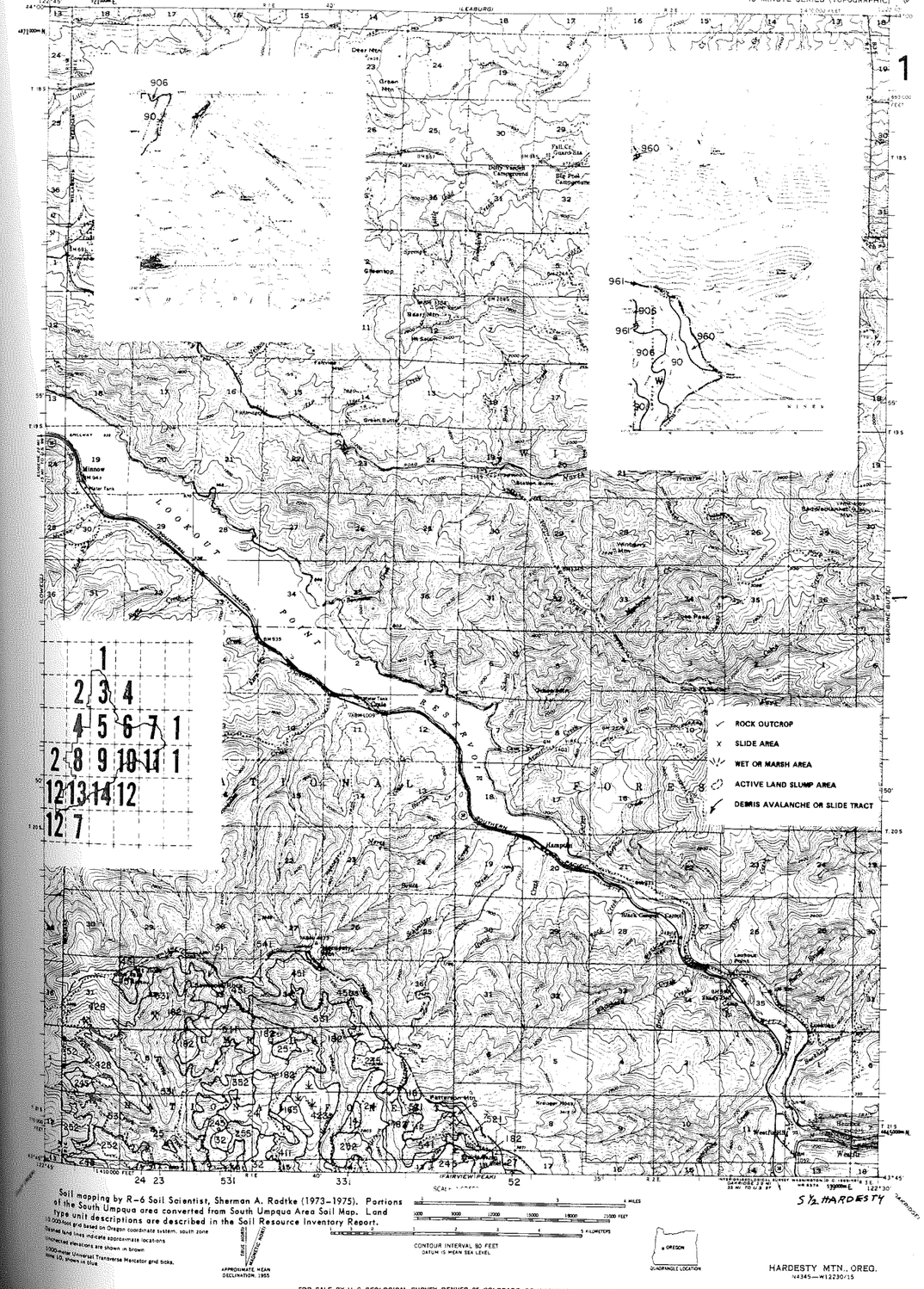
UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R-6 1975

N½ HARDESTY

HARDESTY MTN. QUADRANGLE
OREGON - LANE CO.
15 MINUTE SERIES (TOPOGRAPHIC)



1

1

1 2 3 4 4 5 6 7 1 2 8 9 10 11 1 12 13 14 12 12 7

S½ HARDESTY

UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CULP CREEK QUADRANGLE
OREGON
15 MINUTE SERIES TOPOGRAPHIC

2

ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT

1
2 3 4
4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7

Mapped, edited, and published by the Geological Survey

Soil mapping by R–6 Soil Scientist, Sherman A. Radtke (1973–1975). Portions of the South Umpqua area converted from South Umpqua Area Soil Map. Land type unit descriptions are described in the Soil Resource Inventory Report.

Dashed land lines indicate approximate locations
Unchecked elevations are shown in brown

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Medium-duty —— Light-duty ——
Unimproved dirt .....

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CULP CREEK, OREG.
N4330—W12245/15
1955

UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975

N½ FAIRVIEW ?TERIOR EY

FAIRVIEW PEAK QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)

1
2 3 4
4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7

3

ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT

522

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Heavy-duty
Medium-duty

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1955

OREGON
QUADRANGLE LOCATION

FAIRVIEW PEAK, OREG.
N4330—W12230/15

1955

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 2, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

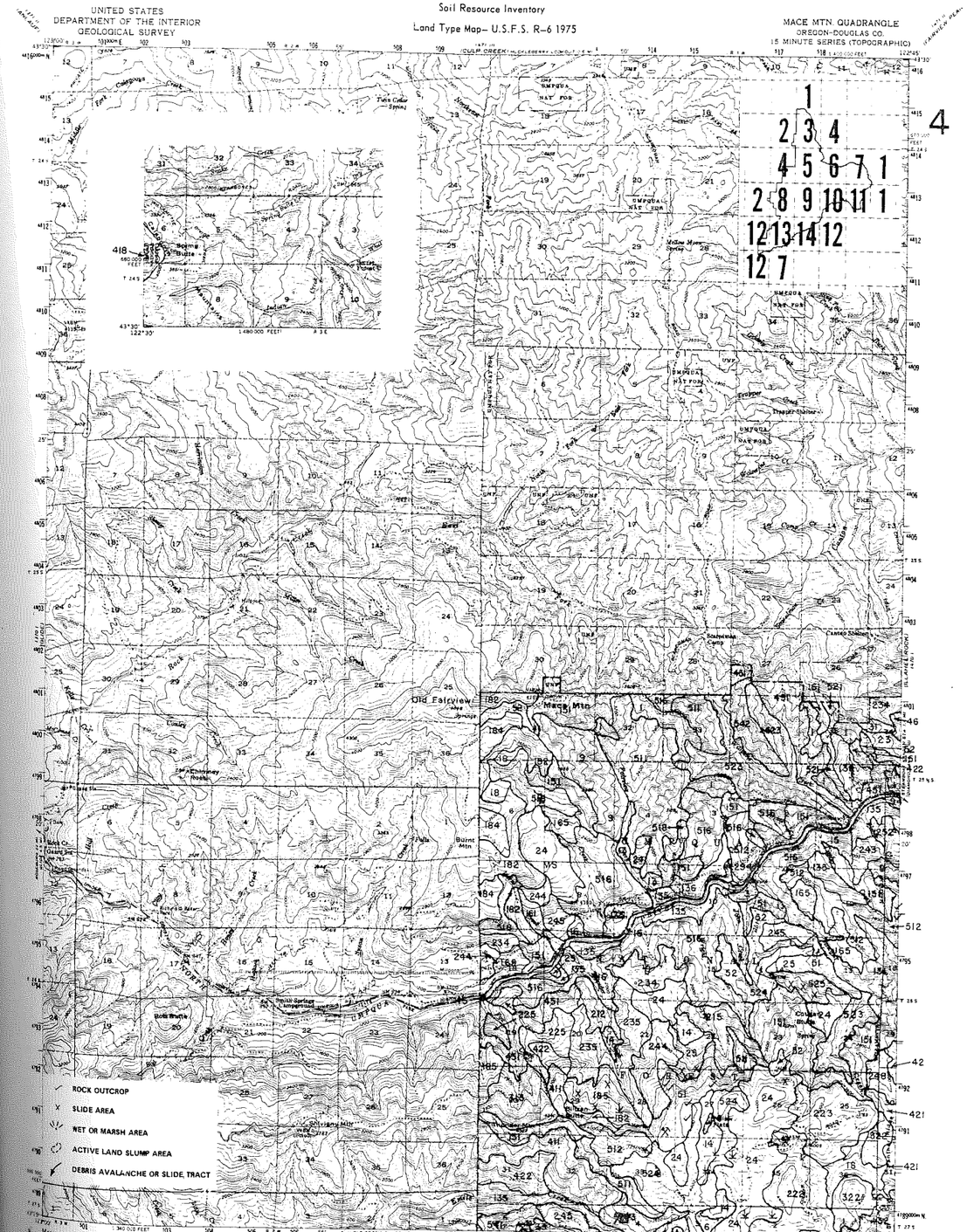
UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R-6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MACE MTN. QUADRANGLE
OREGON-DOUGLAS CO.
15 MINUTE SERIES (TOPOGRAPHIC)


Old Fairview
Mace Mtn
Burnt Mtn
Boulder Butte
Bulls Mountain
Chimney Rock
Mace Ch.
Grange Hall
Mace Mtn. Lookout
Cougar Mountain
Cougar Spring
Cougar Butte
Cougar Snowpark Shelter
Cougar Creek
Cougar Trail
Cougar Spring Trail
Cougar Mountain Trail
Cougar Mountain Lookout
Cougar Mountain Lookout Trail
Cougar Mountain Lookout Road
Cougar Mountain Lookout Road
Cougar Mountain Lookout Road

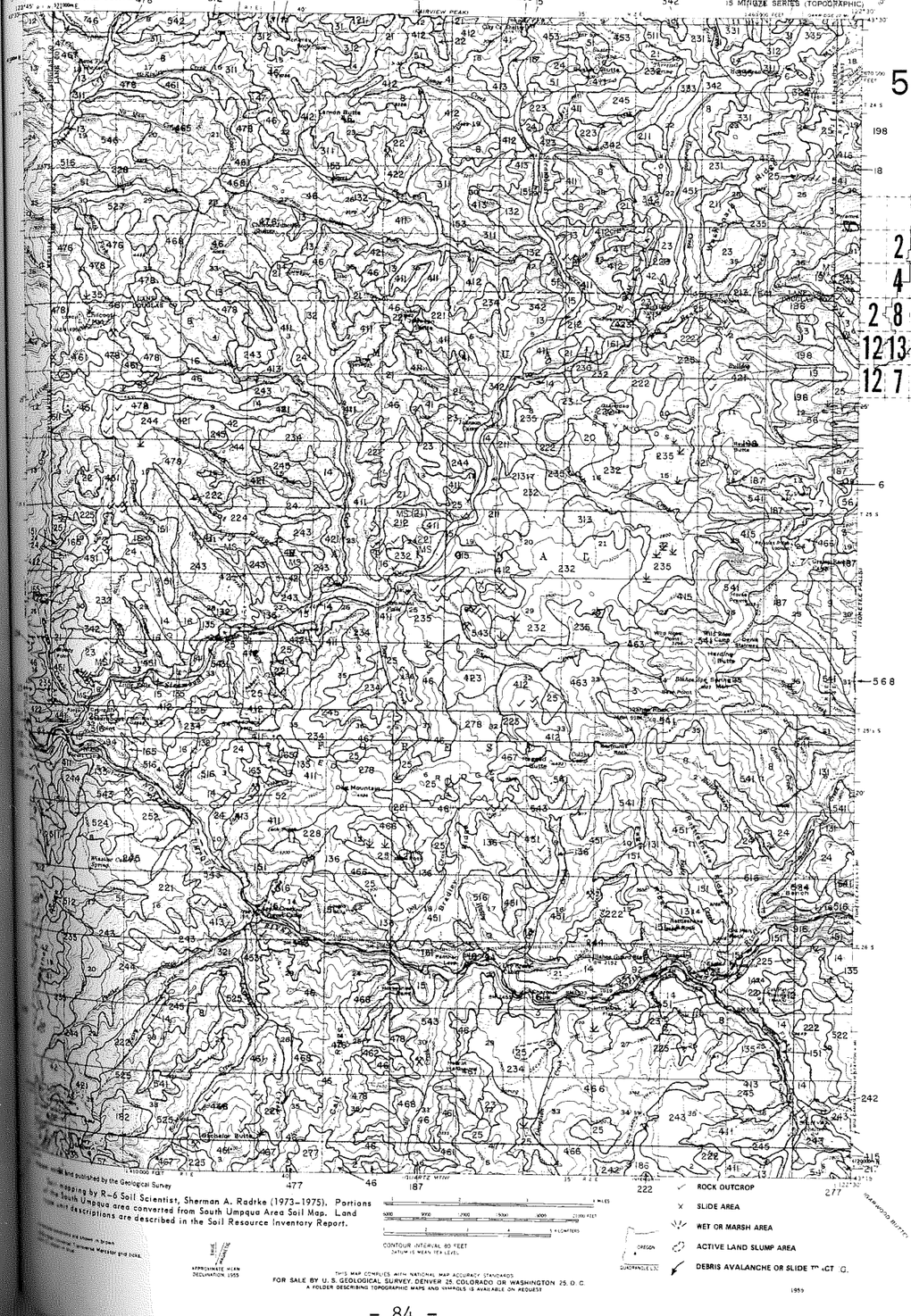
UMPQUA NATIONAL FOREST

Soil Resource Inventory

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Type Map– U.S.F.S. R–6 1975

ILLAHEE ROCK QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)


Illahee Rock
Illahee Butte
Illahee Creek
Illahee Flat
Illahee Ridge
Illahee Spring
Illahee Trail
Illahee Trail Camp
Illahee Trail Shelter
Illahee Trail Spring
Illahee Trail Spring
Illahee Trail Spring

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Soil Resource Inventory

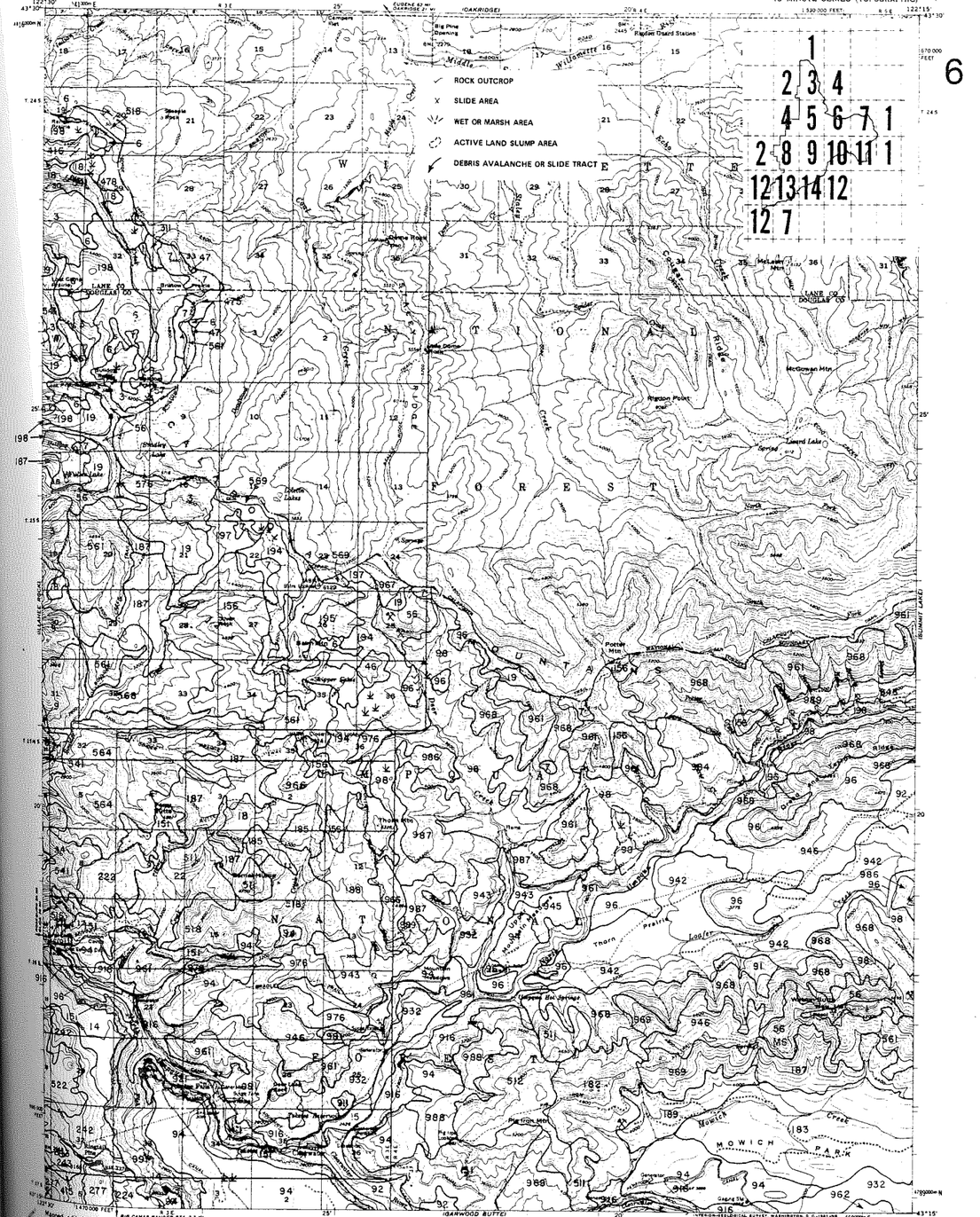
Land Type Map– U.S.F.S. R-6 1975

TOKETEE FALLS QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)

6

1
2 3 4
4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7

ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT


Rainbow Point
Big Pine Opening
Ripplebrook Guard Station
Willamette
Middle Fk
Shadow Park
Lemolo Reservoir No 1
Lemolo Reservoir No 2
Lemolo Falls
Lemolo Falls Park
Lemolo Falls Campground
Lemolo Falls Overlook
Lemolo Falls Viewpoint
Lemolo Falls Trail
Lemolo Falls Road
Lemolo Falls Dam
Lemolo Falls Powerhouse
Lemolo Falls Penstock
Lemolo Falls Transmission Line
Lemolo Falls Substation
Lemolo Falls Switchyard
Lemolo Falls Reservoir
Lemolo Falls Spillway
Lemolo Falls Intake
Lemolo Falls Tailrace
Lemolo Falls Forebay
Lemolo Falls Penstock Trail
Lemolo Falls Penstock Road
Lemolo Falls Penstock Bridge
Lemolo Falls Penstock Tunnel
Lemolo Falls Penstock Portal
Lemolo Falls Penstock Surge Tank
Lemolo Falls Penstock Valve House
Lemolo Falls Penstock Manhole
Lemolo Falls Penstock Access Road
Lemolo Falls Penstock Access Trail
Lemolo Falls Penstock Access Bridge
Lemolo Falls Penstock Access Tunnel
Lemolo Falls Penstock Access Portal
Lemolo Falls Penstock Access Surge Tank
Lemolo Falls Penstock Access Valve House
Lemolo Falls Penstock Access

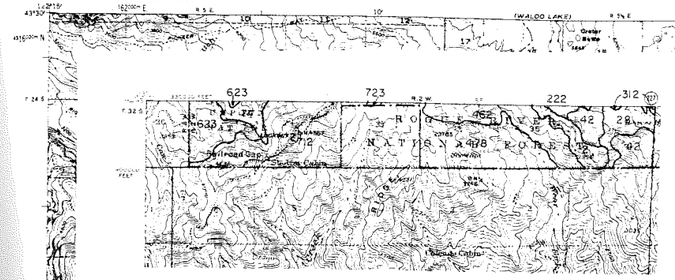
UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUMMIT LAKE QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)


623
723
222
312
ROGUE RIVER NATIONAL FOREST
Diamond Lake
Crater Butte
Railroad Gap
Fawn Lake
Hemlock Butte
Big Swamp
Windy Lakes
Thielsen Creek
Thielsen Lakes
Mt. Bailey
Mt. Thielsen
Summit Lake
Lake Creek
Lemolo Lake
Lake Creek Butte
Tipsoo Peak
Diamond Peak
Diamond Lake
Lake Of Pines Camp
Thielsen Forest Camp
Fawn Lake Forest Camp
Lemolo Lake Forest Camp
Lemolo Lake Resort
Lemolo Falls
Lemolo Falls Overlook
Lemolo Falls Campground
Lemolo Falls Trail
Lemolo Falls Trailhead
Lemolo Falls Parking
Lemolo Falls Picnic Area
Lemolo Falls Viewpoint

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975

RED BUTTE QUADRANGLE
OREGON—DOUGLAS CO.
15 MINUTE SERIES (TOPOGRAPHIC)

8

ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT

1
2 3 4
4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Soil mapping by R–6 Soil Scientist, Sherman A. Radtke (1973–1975). Portions of the South Umpqua area converted from South Umpqua Area Soil Map. Land type unit descriptions are described in the Soil Resource Inventory Report.

Unchecked elevations are shown in brown

1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

APPROXIMATE MEAN DECLINATION, 1965

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Light-duty ——— Unimproved dirt - - - - - -

OREGON
QUADRANGLE LOCATION

RED BUTTE, OREG.
N4300—W12245/15
1965

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UMPQUA NATIONAL FOREST

Soil Resource Inventory

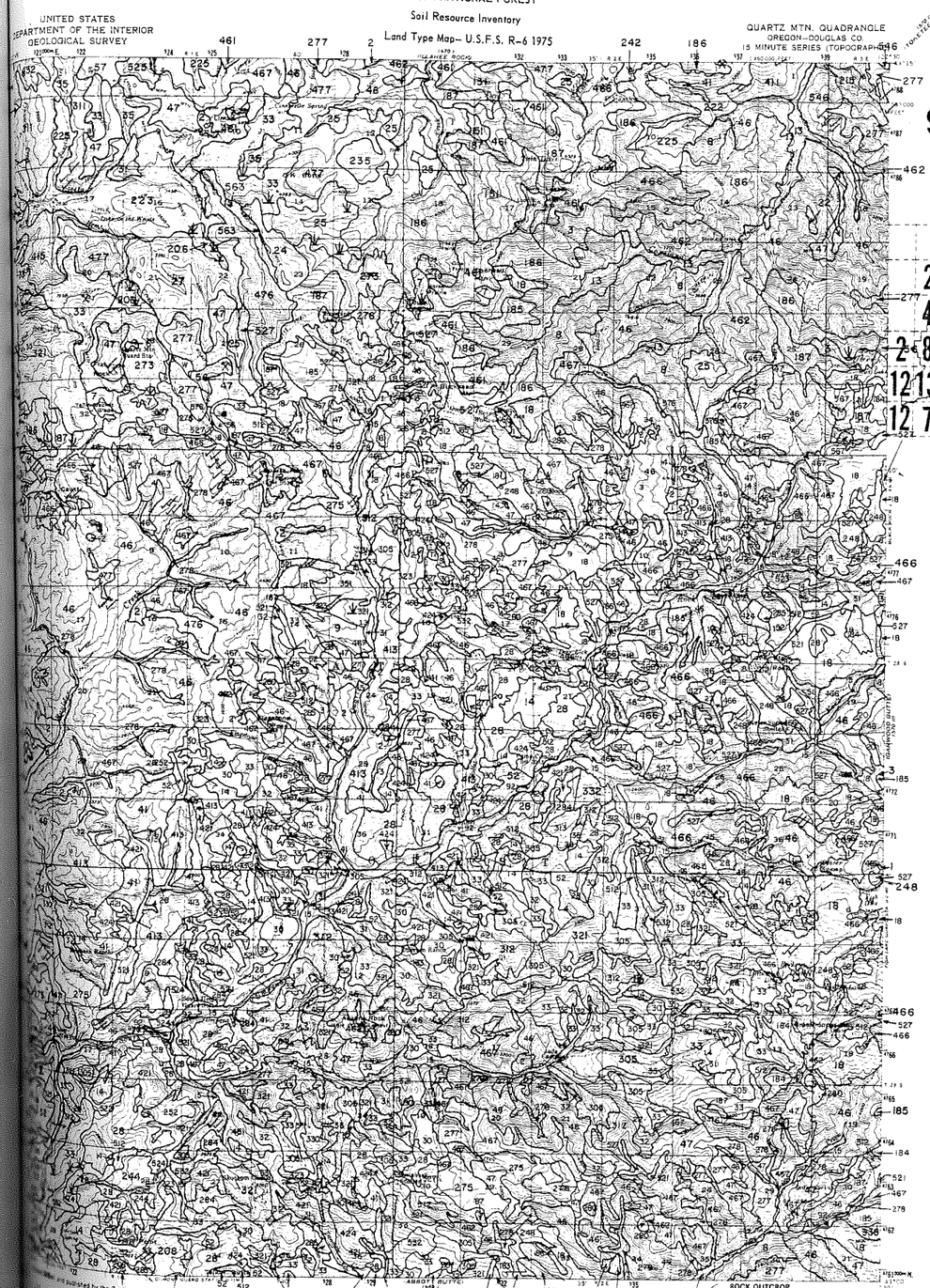
Land Type Map– U.S.F.S. R-6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

QUARTZ MTN. QUADRANGLE
OREGON–DOUGLAS CO.
15 MINUTE SERIES (TOPOGRAPHIC)

9

1
2 3 4
4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7



Mapping by R-6 Soil Scientist, Sherman A. Radtke (1973–1975). Portions of South Umpqua area converted from South Umpqua Area Soil Map. Land type descriptions are described in the Soil Resource Inventory Report.

ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1975 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

1955
AMS 1470 II–SERIES V792

UMPQUA NATIONAL FOREST

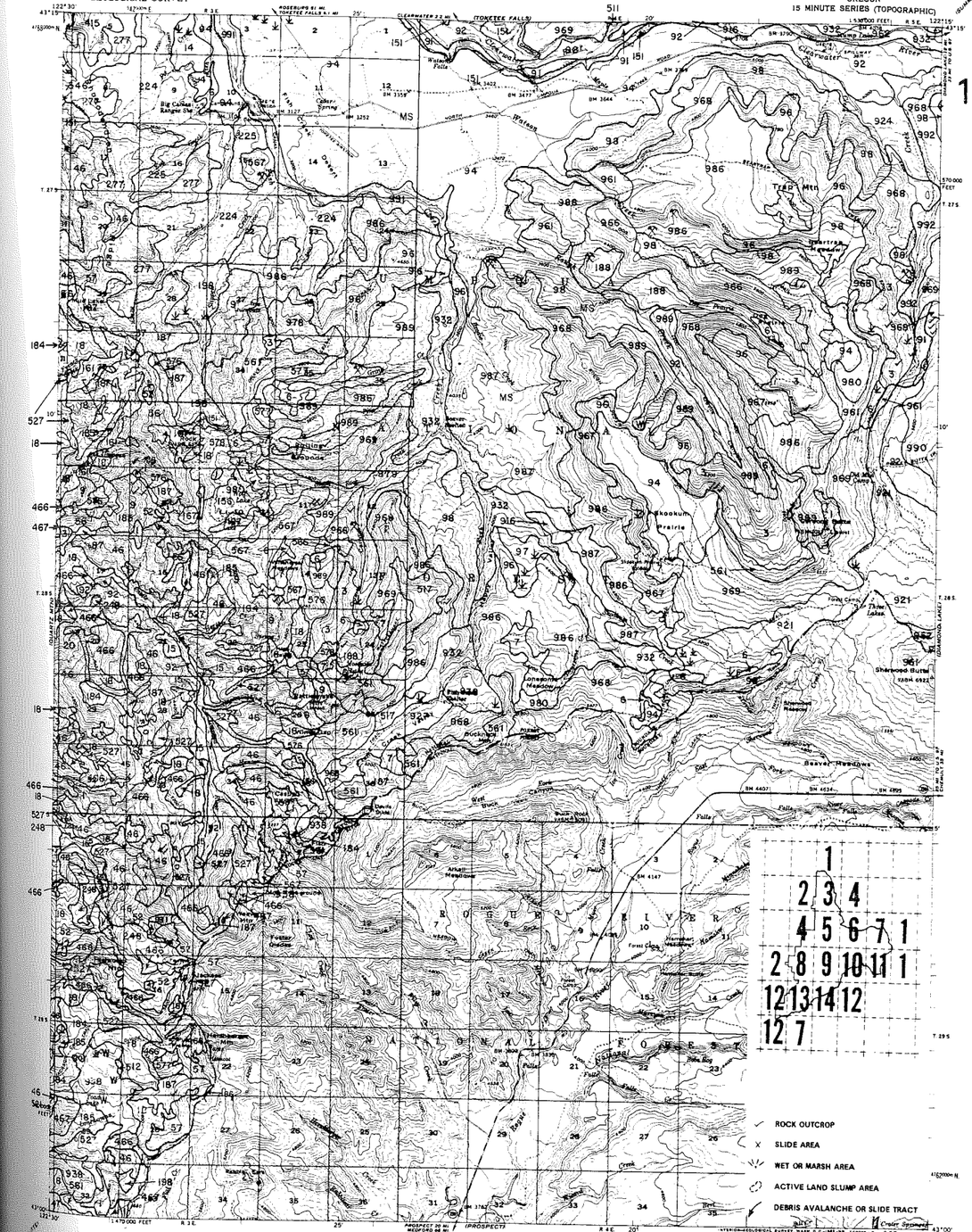
Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GARWOOD BUTTE QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)

10


Trap Mtn
Sherwood Butte
Beaver Meadows
Arbuckle Meadows
Forest Glen
Skookum Prairie
Three Lakes
Clearwater
Wheeler Falls
Big Cedars Ranger Sta
Celery Spring
Deadfall
Peyton
Creek
Fork
Butte
Mtn
Meadows
Prairie
Lake
Spring
Ridge
Canyon
Falls
Cave
Pond
Camp
Trail
Road
Tank
Dam
Mine
Cabin
Ranger Sta
Lookout
Campground
Picnic Ground
Airstrip
Helispot
Corral
Guard Station
Work Center
Forest Service Road
Forest Boundary
Wilderness Boundary
Roadless Area
Township
Section
Quarter Section
Meridian
Base Line
Latitude
Longitude
Contour
Index Contour
Depression Contour
Intermittent Stream
Perennial Stream
Lake
Marsh
Glacier
Rock
Sand
Gravel
Quarry
Pit
Mine
Tunnel
Bridge
Ford
Dam
Levee
Pipeline
Power Line
Telephone Line
Fence
Building
Church
School
Cemetery
Campground
Picnic Ground
Lookout
Ranger Station
Work Center
Guard Station
Airstrip
Helispot
Corral
Trail
Road
Tank
Spring
Ridge
Canyon
Falls
Cave
Pond
Camp
Meadows
Prairie
Lake
Creek
Fork
Butte
Mtn
Cabin

UMPQUA NATIONAL FOREST

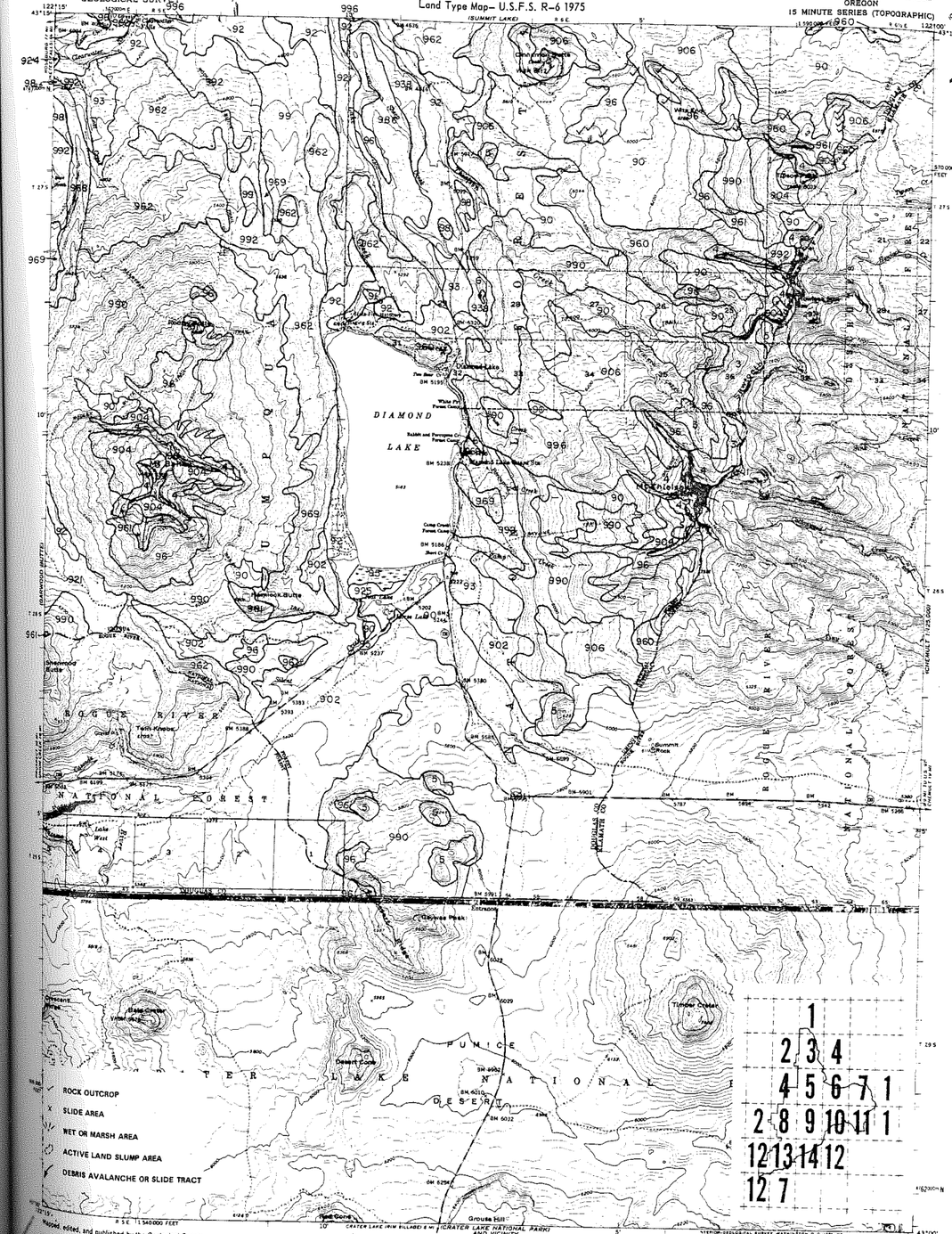
Soil Resource Inventory

Land Type Map– U.S.F.S. R-6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DIAMOND LAKE QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)

11



1 2 3 4 4 5 6 7 1 2 8 9 10 11 1 12 13 14 12 12 7

Mapped, edited, and published by the Geological Survey

Soil mapping by R-6 Soil Scientist, Sherman A. Radtke (1973-1975). Portions of the South Umpqua area converted from South Umpqua Area Soil Map. Land type unit descriptions are described in the Soil Resource Inventory Report.

Blue tint shows water

Dashed land lines indicate approximate locations

Contour elevations are shown in brown

APPROXIMATE MEAN DECLINATION, 1956

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Medium-duty ——— Light-duty ———
Unimproved dirt - - - - - - - -
State Route

OREGON
QUADRANGLE LOCATION

DIAMOND LAKE, OREG.
N4300—W12200/15
1956

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

UMPQUA NATIONAL FOREST

Soil Resource Inventory

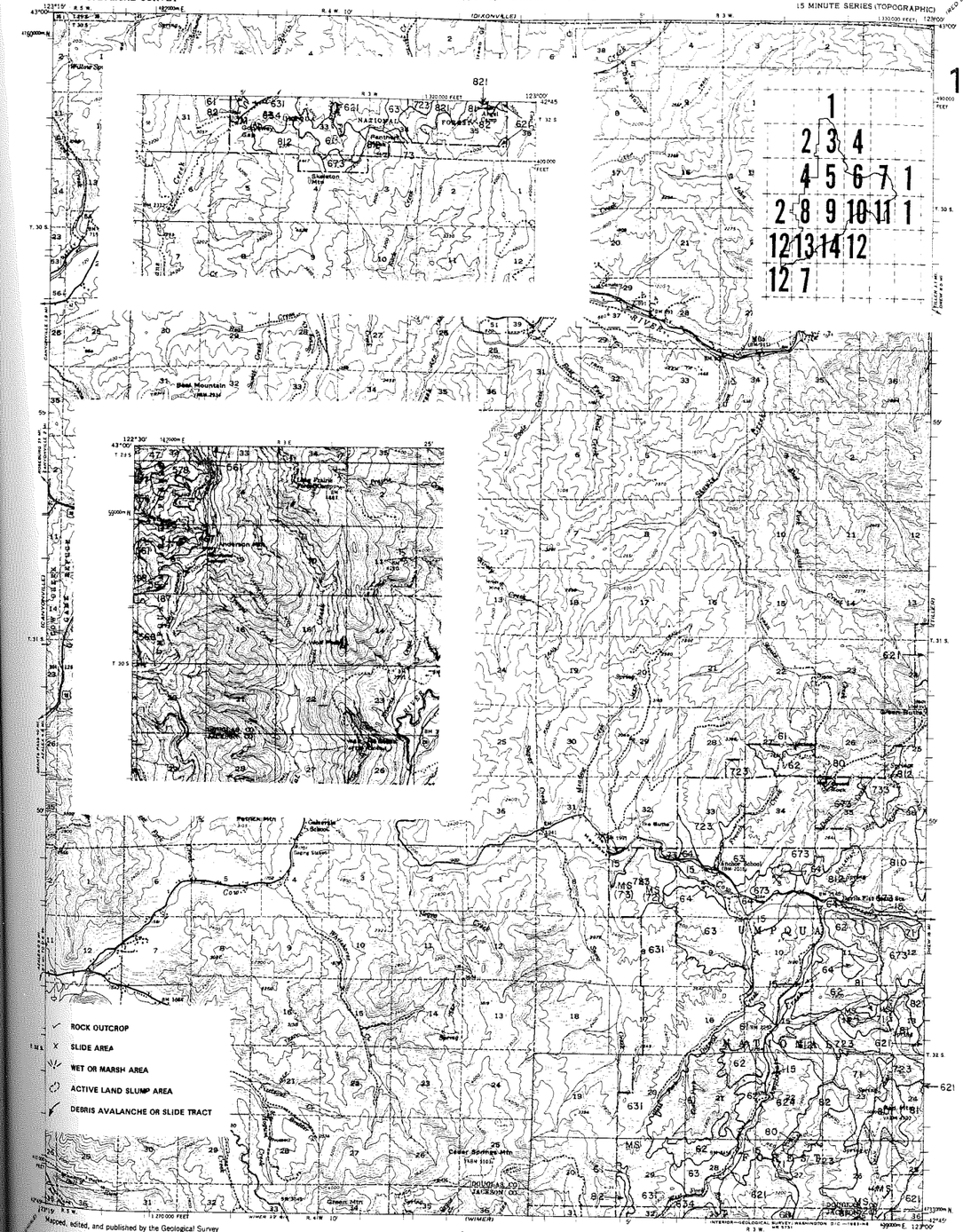
Land Type Map– U.S.F.S. R–6 1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DAYS CREEK QUADRANGLE
OREGON
15 MINUTE SERIES (TOPOGRAPHIC)

12

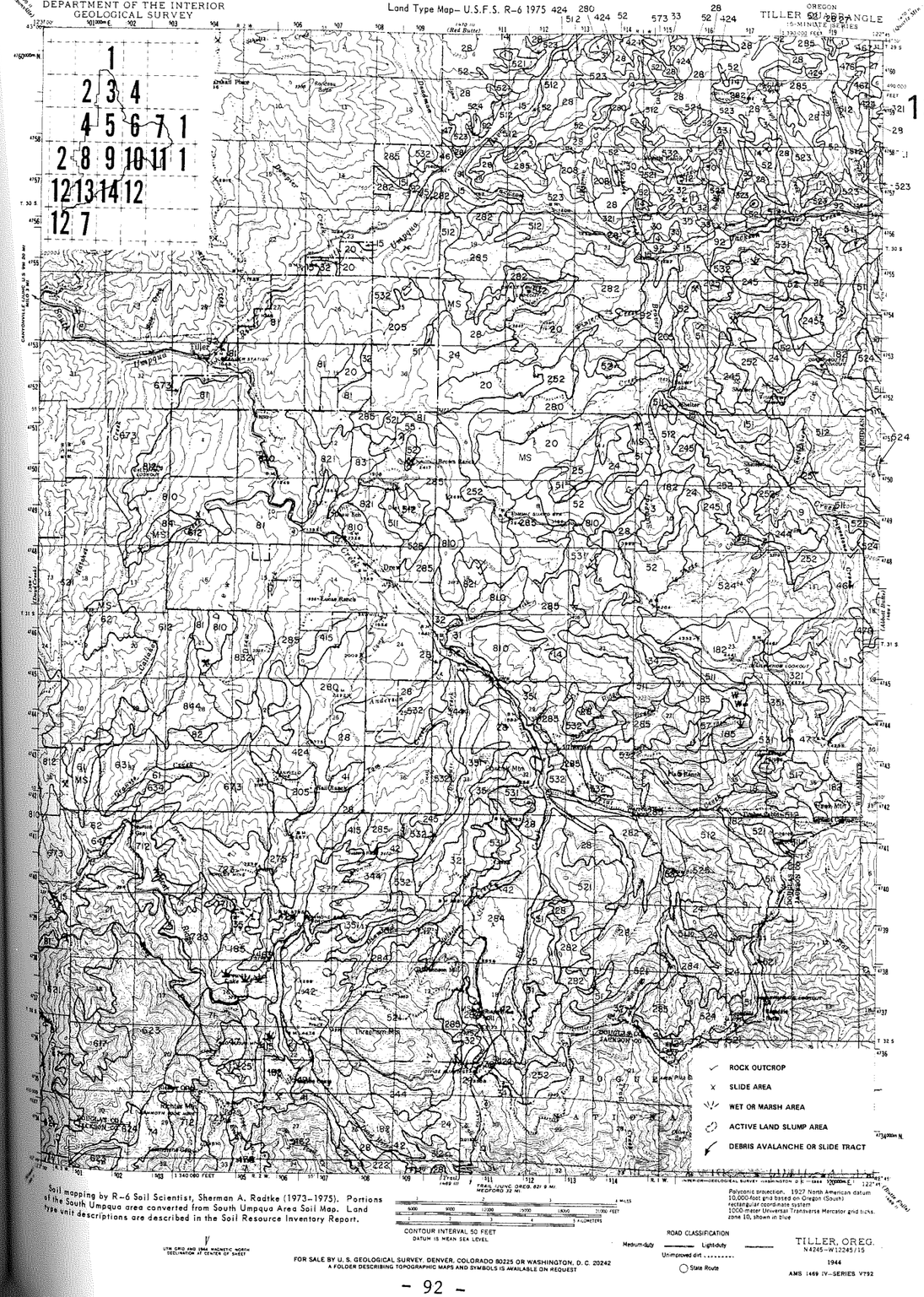
1
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4 5 6 7 1
2 8 9 10 11 1
12 13 14 12
12 7


ROCK OUTCROP
SLIDE AREA
WET OR MARSH AREA
ACTIVE LAND SLUMP AREA
DEBRIS AVALANCHE OR SLIDE TRACT
Days Creek
Cleveland Mtn
Bear Mountain
Anderson Hill
Cedar Springs Mtn
Green Mtn
Peavine Mtn
Patrick Mtn
Galesville Reservoir
Galesville Dam
Galesville Campground
Days Creek Cutoff Main Canal
Days Creek Cutoff Main Canal Tunnel
Days Creek Cutoff Main Canal Siphon
Days Creek Cutoff Main Canal Waste Gate
Days Creek Cutoff Main Canal Check Gate
Days Creek Cutoff Main Canal Turnout
Days Creek Cutoff Main Canal Flume
Days Creek Cutoff Main Canal Bridge
Days Creek Cutoff Main Canal Culvert
Days Creek Cutoff Main Canal Drop
Days Creek Cutoff Main Canal Inlet
Days Creek Cutoff Main Canal Outlet
Days Creek Cutoff Main Canal Spillway
Days Creek Cutoff Main Canal Weir
Days Creek Cutoff Main Canal Gauging Station
Days Creek Cutoff Main Canal Pumping Station
Days Creek Cutoff Main Canal Power Plant
Days Creek Cutoff Main Canal Substation
Days Creek Cutoff Main Canal Transmission Line
Days Creek Cutoff Main Canal Telephone Line
Days Creek Cutoff Main Canal Telegraph Line
Days Creek Cutoff Main Canal Radio Tower
Days Creek Cutoff Main Canal Fire Lookout
Days Creek Cutoff Main Canal Ranger Station
Days Creek Cutoff Main Canal Guard Station
Days Creek Cutoff Main Canal Work Center
Days Creek Cutoff Main Canal Campground
Days Creek Cutoff Main Canal Picnic Area
Days Creek Cutoff Main Canal Boat Launching Site
Days Creek Cutoff Main Canal Swimming Area
Days Creek Cutoff Main Canal Fishing Area
Days Creek Cutoff Main Canal Hunting Area
Days Creek Cutoff Main Canal Trailhead
Days Creek Cutoff Main Canal Trail
Days Creek Cutoff Main Canal Road

UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R–6 1975



Soil mapping by R–6 Soil Scientist, Sherman A. Radtke (1973–1975). Portions of the South Umpqua area converted from South Umpqua Area Soil Map. Land type unit descriptions are described in the Soil Resource Inventory Report.

Polyconic projection. 1927 North American datum
10,000-foot grid based on Oregon (South) rectangular coordinate system
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

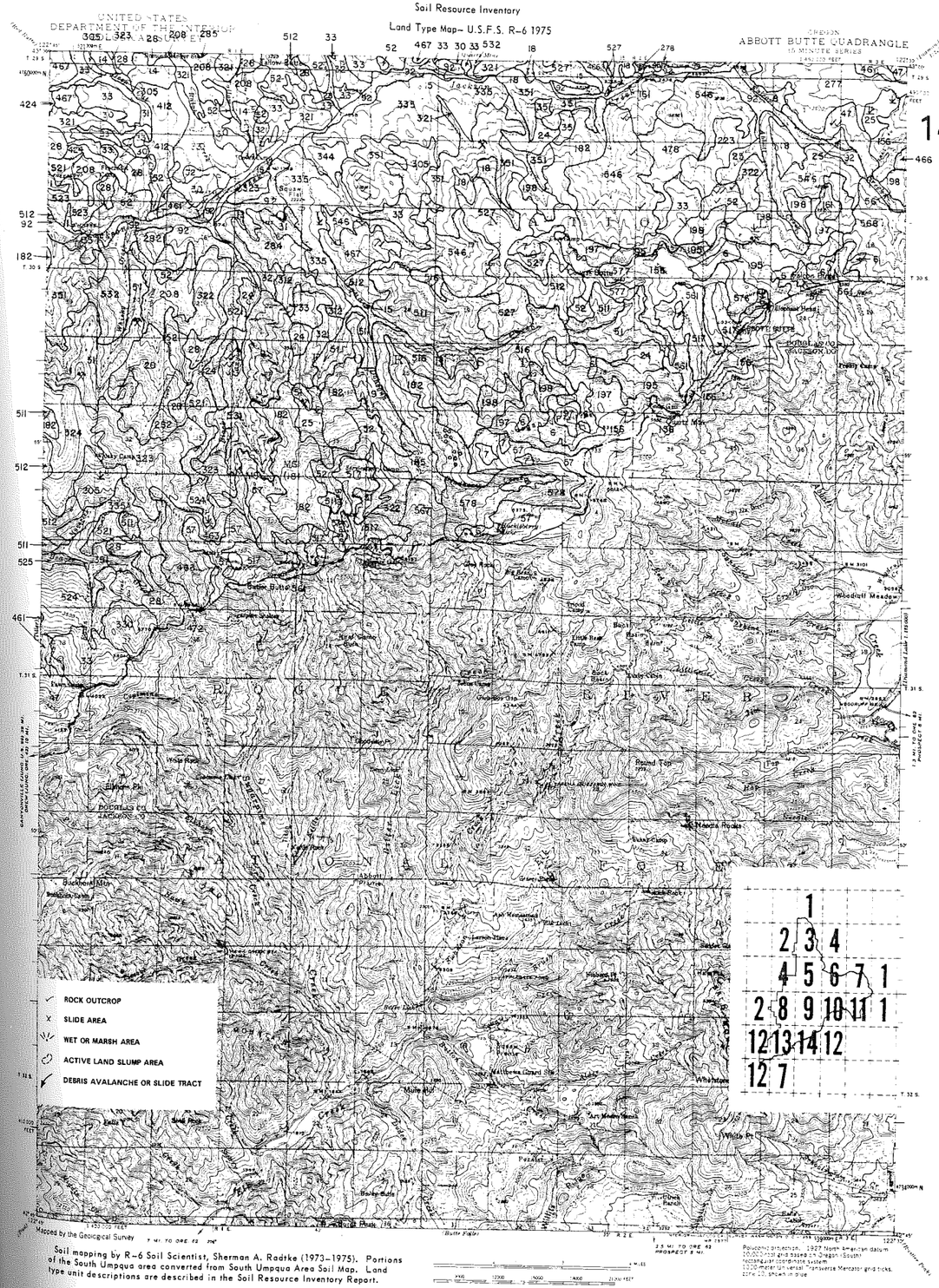
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13

UMPQUA NATIONAL FOREST

Soil Resource Inventory

Land Type Map– U.S.F.S. R-6 1975



14

ACREAGES IN UMPQUA NATIONAL FOREST SOIL SURVEY[1/]

Soil Mapping Unit	Acres	Soil Mapping Unit	Acres	Soil Mapping Unit	Acres	Soil Mapping Unit	Acres
1	9,919	72	719	213	362	332	906
2	3,610	73	58	214	570	333	181
3	9,232	74	1,317	215	1,263	335	4,831
4	2,000	80	63	220	437	336	74
5	2,127	81	3,199	221	1,487	342	991
6	2,682	82	730	222	4,319	344	997
7	3,402	90	25,477	223	3,285	351	10,170
8	9,477	91	826	224	3,487	352	2,229
9	5,866	92	16,165	225	3,621	411	11,226
13	2,602	93	1,045	227	31	412	5,471
14	7,716	95	1,397	228	469	413	4,927
15	12,154	96	13,642	230	762	414	218
16	1,573	97	410	231	378	415	3,109
18	10,261	98	9,402	232	3,706	416	1,343
19	1,413	99	2,026	233	239	418	1,333
20	3,989	131	1,658	234	3,493	421	7,583
21	1,637	132	1,893	235	7,210	422	1,818
22	1,733	135	4,170	242	2,661	423	1,194
23	2,543	136	1,748	243	3,823	424	5,055
24	7,637	151	11,413	244	4,943	427	330
25	7,093	153	1,178	245	6,303	428	837
27	2,719	156	3,018	248	2,079	432	1,077
28	20,453	161	1,594	252	3,530	433	31
30	911	165	1,007	255	1,045	451	8,751
31	4,202	182	13,402	273	2,805	453	3,791
32	3,647	183	2,912	275	2,090	461	13,578
33	13,221	184	2,021	276	138	462	5,183
34	303	185	4,389	277	6,751	463	4,703
35	1,423	186	1,786	278	3,082	465	1,077
41	4,367	187	10,165	280	2,058	466	12,921
42	4,373	188	1,781	282	2,714	467	13,647
46	58,687	189	570	284	3,679	468	6,698
47	9,930	193	5	305	3,125	472	2,053
51	8,650	195	431	311	8,965	476	5,338
52	13,189	196	1,679	312	4,602	477	3,381
56	3,045	197	1,487	313	917	511	7,781
57	3,530	198	5,711	315	149	512	11,103
61	1,855	205	1,269	321	7,089	513	1,551
62	2,117	206	213	322	3,396	516	6,399
63	1,205	208	1,418	323	4,370	517	1,759
64	895	211	1,466	330	458	518	2,255
71	1,866	212	869	331	2,250	521	7,839

1/ These are unadjusted acres. The source is a Forest-wide computer map storage system which utilizes a Harvard grid with the minimum cell being 5.33 acres. The error is approximately 0.3% high.

Soil Mapping Unit	Acres	Soil Mapping Unit	Acres	Soil Mapping Unit	Acres
522	3,994	623	2,383	939	1,690
523	10,565	624	714	942	63
524	7,738	631	2,789	943	1,151
525	2,810	634	495	946	3,210
526	10	673	5,242	960	7,226
527	8,655	712	1,109	961	7,114
531	10,911	723	4,106	962	8,751
532	4,431	733	250	966	1,738
533	191	801	271	967	1,018
541	7,791	810	3,002	968	12,357
542	1,797	812	1,813	969	4,421
543	4,117	821	1,157	972	911
546	3,546	823	218	976	1,167
561	6,533	901	4,213	980	506
563	303	902	4,597	986	10,565
564	1,957	904	1,359	987	5,242
566	117	906	14,058	988	554
567	1,861	911	159	989	6,047
568	2,245	916	2,330	990	18,309
569	234	921	4,661	991	1,535
576	1,754	924	4,245	992	4,111
577	575	925	591	996	2,426
578	1,850	927	298	998	2,346
612	1,514	932	3,882		
617	714	936	533		
621	5,077	938	3,749	Total Acres:	1,049,678

APPENDIX I

CLIMATE

This appendix contains a brief narrative description of the climate of the Soil Resource Inventory survey area. Also included in this appendix are tables of Average Mean Monthly Temperatures and Precipitation Data, and an Isohyetal Map of the survey area.

Climate

Normal annual precipitation ranges from about 34 inches at the lowest elevations to as high as 72 inches in the extreme headwater areas in the south end of the Forest. In the north end of the Forest annual precipitation ranges from about 50 inches at the lowest elevations to as high as 80 inches at the highest elevations.

About 80% of the annual precipitation normally occurs between October 1 and March 31. July and August are typically the hottest and driest months. Only one or two percent of the annual precipitation usually occurs during these two months. At the lowest elevations (about 1,000 feet above sea level) precipitation occurs as rainfall except for occasional brief periods. A snowpack usually persists through the winter at elevations above 3,000 feet. An isohyetal map of the normal annual precipitation is shown in Table 1.

Tables of Mean Temperature and Precipitation Data - TABLE 1

These tables include data from Pacific Northwest River Basins Commission Volumes I and II and Douglas County Rain Gauge Stations on the Forest.

Location: Crater Lake
Period : 1931-1960

Elevation: 6,475'
Period : 1931-1965

Month	Mean Temperature (°F)	Precipitation (Inches)
January	24.9	9.99
February	26.2	8.74
March	28.5	8.42
April	34.4	4.31
May	40.5	3.50
June	47.0	2.13
July	56.5	.69
August	55.7	1.22
September	50.3	2.20
October	41.8	5.58
November	33.5	9.78
December	28.0	11.15
Annual	38.9	67.71

Location: Dorena Dam
Period : 1931-1960

Elevation: 757'
Period : 1956-1965

Month	Mean Temperature (°F)	Precipitation (Inches)
January	40.0	6.24
February	41.9	5.93
March	43.2	5.94
April	49.1	3.49
May	54.0	3.64
June	59.0	1.86
July	64.5	.34
August	63.9	.62
September	60.6	1.20
October	52.9	3.86
November	45.0	6.52
December	41.8	6.58
Annual	51.3	46.22

Location: Roseburg
Period : 1931-1960

Elevation: 505'
Period : 1956-1965

Month	Mean Temperature (°F)	Precipitation (Inches)
January	40.3	5.29
February	43.3	5.13
March	46.6	3.88
April	51.5	1.89
May	56.5	2.10
June	61.5	1.18
July	67.9	.17
August	67.6	.28
September	62.8	.80
October	54.4	3.22
November	46.1	5.26
December	42.0	5.13
Annual	53.4	34.33

Location: Little River
Period :

Elevation: 1,250'
Period : 1955-1967

Month	Mean Temperature (°F)	Precipitation (Inches)
January	-	7.34
February	-	5.98
March	-	6.95
April	-	3.92
May	-	3.50
June	-	1.66
July	-	0.39
August	-	0.64
September	-	1.58
October	-	4.88
November	-	8.12
December	-	8.99
Annual		52.72

Location: Steamboat Ranger Station
Period :

Elevation: 1,200'
Period : 1955-1967

Month	Mean Temperature (°F)	Precipitation (Inches)
January	-	8.38
February	-	6.39
March	-	7.05
April	-	3.63
May	-	3.21
June	-	1.39
July	-	.33
August	-	.57
September	-	1.89
October	-	5.00
November	-	8.30
December	-	9.09
Annual		54.09

Location: Tiller Ranger District (Coyote Point)
Period :

Elevation: 2,500'
Period :

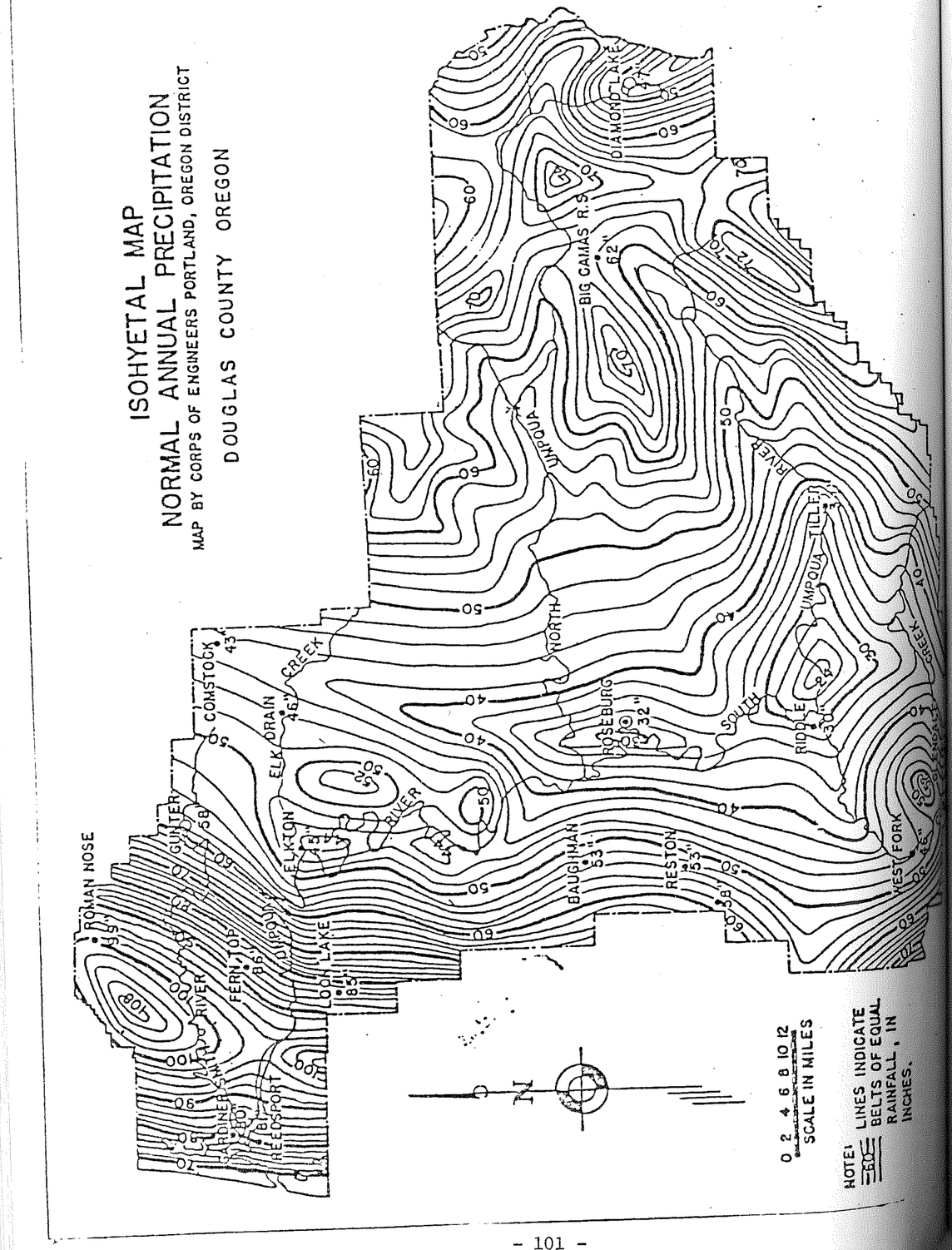
Month	Mean Temperature (°F)	Precipitation (Inches)
January	-	4.80
February	-	3.82
March	-	3.99
April	-	2.09
May	-	2.31
June	-	1.26
July	-	.18
August	-	.54
September	-	1.09
October	-	2.66
November	-	6.92
December	-	6.18
Annual		35.84

Location: Toketee Falls
Period :

Elevation: 1,950'
Period : 1956-1965

Month	Mean Temperature (°F)	Precipitation (Inches)
January	-	6.61
February	-	5.95
March	-	5.73
April	-	2.86
May	-	3.19
June	-	2.00
July	-	.44
August	-	.67
September	-	1.45
October	-	3.72
November	-	6.90
December	-	7.95
Annual		47.47

Figure 2 - Isohyetal Map



APPENDIX II

GEOLOGY

This appendix contains a brief narrative description of the Soil Resource Inventory area.

The reader is encouraged to consult the State of Oregon, Department of Geology and Mineral Industries, Portland, Oregon, and universities within the area to secure additional information on geologic mapping of the Cascade Range.

GENERALIZED GEOLOGY OF THE UMPQUA NATIONAL FOREST[1/]

The entire survey area lies within the headwaters of the major drainage systems (Row, North and South Umpqua). Elevation ranges from 1,000 to 9,182 feet. Most of the survey areas range from 1,000 to approximately 8,000 feet.

The Row drainage is confined to the Western Cascade Mountain Range. The Western Cascades are characterized by a dendritic drainage pattern developed on Tertiary volcanic rocks. The Row drainage is underlain entirely by the Little Butte Volcanic Series. Composition of the nonmarine volcanic rocks consists of various kinds of reddish colored volcanic tuffs, lapilli tuffs, welded tuffs, breccias and less abundant flows and small intrusions of andesite and basalt. A basaltic and andesitic flow rock make up no more than 25% of the area. These volcanic rocks range from hard to soft and are slightly fractured to massive. When exposed to weathering, they tend to break down easily. In contrast the andesitic and basaltic flow rock and other intrusives are moderately hard to hard, highly fractured and resistant to weathering. Locally, the rock materials of the Little Butte Volcanic Series have been altered by denitrification to a greenish color. These rock materials range from hard to saprolitic and tend to be massive. This condition gives rise to unstable materials. Deep colluvial and residual soils are usually high in clay content (15% to 30%) and are quite cohesive. These conditions are common in the areas of old landflows. On steep slopes an intense dissection pattern usually develops, attesting to the massive nature of the bedrock.

The North Umpqua drainage lies within the Cascade Mountain Range and covers two physiographic divisions; namely, the Western Cascades and the High Cascades. The Western Cascades Province is further subdivided into the Little Butte Volcanic Series which predominates over the drainage, the Sardine Formation and occasional outcroppings of Tertiary intrusives.

The Little Butte Volcanic Series constitutes the bulk of the Western Cascades physiographic province. This unit consists of massive beds of andesitic and dacitic tuff ash flow origin and lesser amounts of flow rock of andesitic and basaltic composition. Bedded tuffs and intrusives are minor. Total thickness of this formation approaches 15,000 feet in parts of the Western Cascades, but in general it ranges from 5,000 to 10,000 feet. The formation lies unconformable beneath the Sardine Formation.

The Sardine Formation consists of an upper series of layered hypersthene andesite flows and a lower series of basalt and dacite-andesite flows.

1/ The reader is encouraged to consult the following publications for detailed geologic information:

Baldwin, E. M., 1964, "Geology of Oregon," University of Oregon.

Corcorn, R. E., 1972, Geology and Mineral Resources of Douglas County, Oregon: Bulletin 75, Department of Geology and Mineral Industries, State of Oregon.

Included within this formation are areas of pyroclastic tuffs and breccias, tuff breccias of mudflow origin, and volcanic sedimentary rocks. The age ranges from mid-Miocene to late Miocene. The average thickness of this formation is 3,000 feet.

In general, the bedrock material within the Sardine Formation are less altered and exhibit greater stability than those found in the Little Butte Volcanic Series. The flow rock is moderately hard to hard, highly fractured and competent. The tuffaceous volcanic rocks range from moderately hard to soft and are moderately to slightly fractured and generally competent.

Bodies of Tertiary intrusive rock in the Western Cascades are generally small and consist of plugs, dikes, sills, domes, and stocks of variable composition and texture. They range in age from late Eocene to late Miocene and are divided into medium-grained and fine-grained types. The fine-grained intrusive bodies include small dikes, sills, pipes, plugs, and domes and are related to the volcanic rocks of the Little Butte Volcanics and the Sardine Formation. They are generally composed of basalt, andesite, dacite, and rhyodacite.

The High Cascades Province is characterized by high plateaus of Pliocene and Pleistocene volcanic rock capped by a variety of volcanic peaks which include Mt. Thielsen (9,182 feet), Mt. Bailey (8,368 feet), Trapp Mtn., Cowhorn Mtn., and Elephant Mtn. The rocks are essentially flat lying except for initial dips and are among the least deformed strata in the area. Rocks of the High Cascades Province are younger than the rocks of the Western Cascades Province. They range in age from Pliocene through Pleistocene and include a variety of flow rocks and air fall pumice deposits.

The South Umpqua drainage lies within three geomorphic provinces. These include the Western Cascades, the Klamath Mountains, and to a lesser extent the High Cascades. Each of these provinces is characterized by a unique sequence or composition of rock which in turn is responsible for the particular topographic expression and mineral resources of the area.

The Western Cascades Province is composed of andesitic breccias and colluvial sedimentary rocks, silicic ash flow tuffs and subordinate flow rock of andesitic to basaltic composition, and andesitic flow rock.

The Klamath Mountains Province, which occupies the area south and east of Tiller, is an area of complex geology and rugged topography. This area is divided into three subprovinces. These are the Applegate group, the igneous rocks group, and the serpentinite and minor peridotite group. The Applegate group consists of thousands of feet of amphibolite, slate, slaty siltstone, chlorite schists, quartz-mica schist, and occasionally quartzite meta volcanic and meta sediment over rocks. This is intimately folded with serpentinites and peridotites and is intruded by quartz diorite of Mesozoic age. The serpentinite is a dark, greenish rock composed of minerals of the serpentine group. The minerals are hydrated derivatives of parent ultramafic rocks which include peridotite and dunite. The remaining member of the Klamath Mountains Province is the igneous rock

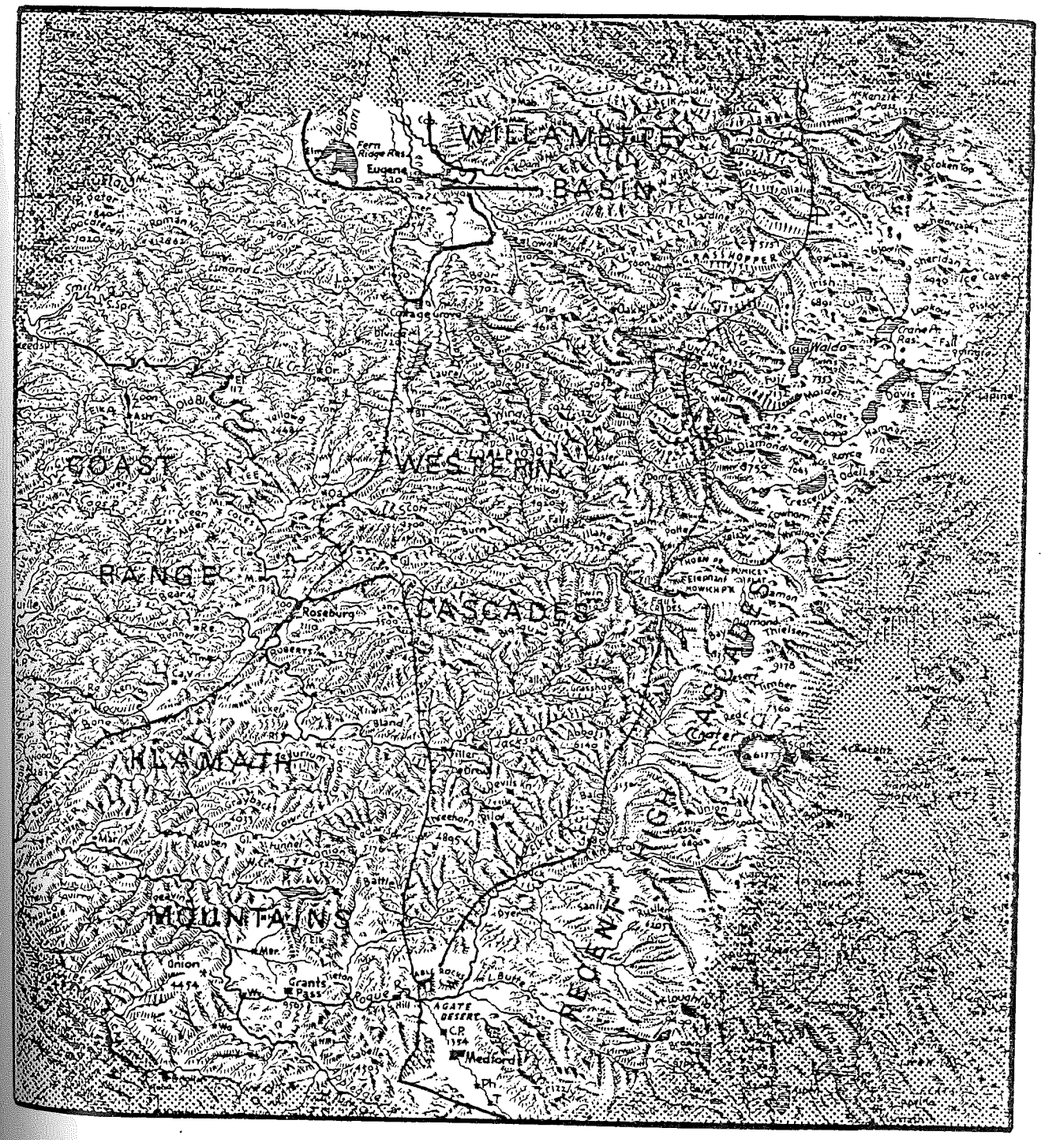
group. This includes several large bodies of granitic-textured igneous rocks.

The High Cascades Province is characterized by high plateaus of Pliocene and Pleistocene volcanic rock capped by a variety of volcanic peaks. These deposits occur at the highest elevation in the planning unit and are common only above 5,000 feet. Rocks of the High Cascades Province are younger than rocks of the Western Cascades Province.

Figure 3

GEOMORPHIC DIVISION MAP
of the
UMPQUA NATIONAL FOREST AND VICINITY

Scale: 0 _____ 20 mi.



APPENDIX III

ENGINEERING TEST DATA

This appendix contains the Engineering Laboratory Test Results of the soil materials from selected landtypes within the Soil Resource Inventory survey area.

All soil material testing and comments made on test results forms were made by the Engineering Materials Laboratories of the Fremont, Mt. Hood, Siskiyou, Siuslaw and Umpqua National Forests and the Regional Office.

The laboratory test data presented in this appendix is intended to be used as a guide and indicator for planning purposes only. The test samples were collected at the landtype locations.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 13A

Location: NE¼, NE¼, Sec. 35, T27S., R1W
Depth: 0-8" Unified: MH ASSHO: A-S(13)
Liquid Limit: 54 Plasticity Index: 6
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0254	69.3
	.0173	64.4
	.0106	56.9
	.0074	51.9
	.0057	46.9
	.0029	38.1
	.0013	28.1

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	88
1/2	73
3/8	68
#4	48
#10	36.5
#20	-
#40	27.6
#60	-
#100	-
#200	20.7

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 13-B

Location: NE¼, NE¼ Sec. 35, T27S., R1W
Depth: 8-27" Unified: GMu ASSHO: A-1-6(0)
Liquid Limit: 41 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0375	15.5
	.0246	14.0
	.0145	11.0
	.0098	9.6
	.0073	8.1
	.0036	4.7
	.0015	2.2

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	53
1/2	44
3/8	41
#4	36
#10	27.4
#20	
#40	24.7
#60	-
#100	-
#200	19.7

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 14-A

Location: SE¼, SW¼, Sec. 11, T26S., R2W
Depth: 0-9" Unified: ML ASSHO: A-4(3)
Liquid Limit: 34 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0240	49.5
	.0101	48.2
	.0072	39.3
	.0055	32.9
	.0030	18.9
	.0013	8.7

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	92
1/2	92
3/8	92
#4	90
#10	79.7
#20	-
#40	40
#60	-
#100	-
#200	55.5

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 14B

Location: SE¼, SW¼, Sec. 11, T26S., R2W
Depth: 0-44" Unified: MH ASSHO: A-5(13)
Liquid Limit: 54 Plasticity Index: 6
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0254	69.3
	.0173	64.4
	.0106	56.9
	.0074	51.9
	.0057	46.9
	.0029	38.1
	.0013	28.1

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	-
1/2	-
3/8	-
#4	-
#10	100
#20	-
#40	94
#60	-
#100	-
#200	83.3

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 16A

Location: NE¼, SW¼, Sec. 12, T25S., R1E
Depth: 0-17" Unified: GMd ASSHO: A-1-6(0)
Liquid Limit: NA Plasticity Index: N.P.
Plastic Limit: N.P.

Hydrometer Analysis:	Diameter MM	% Passing
	.0411	18
	.0237	14
	.0179	10
	.0043	8.8
	.0056	5.0
	.0037	4.5

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	-
1/2	88
3/8	-
#4	60
#10	40
#20	34
#40	-
#60	28
#100	-
#200	20

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 16B

Location: NE¼, SW¼, Sec. 12, T25S., R1E
Depth: 17-54" Unified: GMu ASSHO: A-1-6(0)
Liquid Limit: 33 Plasticity Index: 4
Plastic Limit: 29

Hydrometer Analysis:	Diameter MM	% Passing
	.0300	20
	.0243	19
	.0162	18
	.0057	14
	.0024	8
	.0013	4.5

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	-
1/2	89
3/8	-
#4	48
#10	40
#20	34
#40	-
#60	30
#100	-
#200	24

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 18-A

Location: NE¼, SW¼, Sec. 31, T26S., R5E
Depth: 0-11" Unified: ML ASSHO: A-7-5(4)
Liquid Limit: 43.0 Plasticity Index: 8.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0262	38.81
	.0173	35.27
	.0105	30.93
	.0077	27.39
	.0056	23.93
	.0029	16.38
	.0012	8.67

Mechanical Analysis

Sieve Size	% Passing
3	100
3/4	92.36
1/2	87.10
3/8	83.74
#4	75.01
#10	69.75
#20	64.63
#40	57.98
#60	52.03
#100	47.76
#200	43.35

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 18-B

Location: NE¼, SW¼, Sec. 31, T26S., R5E
Depth: 11-41" Unified: ML ASSHO: A-7-5(4)
Liquid Limit: 42.0 Plasticity Index: 11.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0249	43.15
	.0164	39.37
	.0099	34.94
	.0073	30.42
	.0053	26.64
	.0027	19.36
	.0012	12.52

Mechanical Analysis

Sieve Size	% Passing
3	100.0
3/4	96.38
1/2	90.98
3/8	85.98
#4	78.78
#10	75.48
#20	71.48
#40	65.68
#60	59.98
#100	55.28
#200	50.48

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 19-A

Location: SW¼, SE¼, Sec. 6, T24S., R2E
Depth: 0-12" Unified: SM ASSHO: A-1-6(0)
Liquid Limit: 61 Plasticity Index: 0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0365	20.0
	.0236	15.0
	.0140	13.0
	.0100	9.0
	.0072	8.0
	.0035	2.0
	.0015	1.7

Mechanical Analysis

Sieve Size	% Passing
3	100.0
3/4	98.0
1/2	90.0
3/8	68.0
#4	58.0
#10	34.0
#20	18.0
#40	10.0
#60	5.0
#100	4.2
#200	3.8

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 20A

Location: SE¼, SE¼, Sec. 3, T31S., R2W
Depth: 0-13" Unified: SMu ASSHO: A-4(2)
Liquid Limit: 34 Plasticity Index: 3
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0315	40.1
	.0214	35.8
	.0128	30.1
	.0088	25.8
	.0067	21.4
	.0034	14.2
	.0015	8.5

Mechanical Analysis

Sieve Size	% Passing
3	-
3/4	99.5
1/2	99.4
3/8	98.6
#4	96.2
#10	83.3
#20	-
#40	65.1
#60	-
#100	-
#200	49.8

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 20B

Location: SE¼, SE¼, Sec. 3, T31S., R2W
Depth: 13-41" Unified: SMu ASSHO: A-4(2)
Liquid Limit: 37 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
		41.5
		37.3
		31.8
		27.6
		23.4
		16.5
		5.4

Mechanical Analysis

Sieve Size	% Passing
3	-
3/4	100
1/2	99.8
3/8	99.3
#4	91.9
#10	69.4
#20	-
#40	58.9
#60	-
#100	-
#200	46.8

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 21-A

Location: NW¼, SW¼, Sec. 24, T25S., R1E
Depth: 0-16" Unified: SMu ASSHO: A-2-6(0)
Liquid Limit: 37 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0330	25.51
	.0212	22.95
	.0125	19.36
	.0090	16.79
	.0064	15.77
	.0032	10.63
	.0013	

Mechanical Analysis

Sieve Size	% Passing
3	100
3/4	97.52
1/2	96.11
3/8	94.03
#4	88.58
#10	77.56
#20	66.96
#40	56.47
#60	47.30
#100	39.71
#200	31.40

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 21-C

Location: NW¼, SW¼, Sec. 24, T25S., R1E
Depth: 0-16" Unified: SMd ASSHO: A-4(0)
Liquid Limit: 28 Plasticity Index: 26
Plastic Limit: 2

Hydrometer Analysis:	Diameter MM	% Passing
	.0339	31.61
	.0219	27.13
	.0127	25.64
	.0091	22.65
	.0065	19.96
	.0032	15.47
	.0013	9.11

Mechanical Analysis	
Sieve Size	% Pas
3	100.0
3/4	98.5
1/2	97.8
3/8	97.1
#4	93.1
#10	84.5
#20	76.8
#40	66.2
#60	56.0
#100	47.0
#200	38.4

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 22-A

Location: SW¼, SE¼, Sec. 24, T25S., R1E
Depth: 0-9" Unified: SMu ASSHO: A-4(0)
Liquid Limit: 39 Plasticity Index: N.P.
Plastic Limit: NP

Hydrometer Analysis:	Diameter MM	% Passing
	.0311	49
	.0200	44
	.0143	40
	.0095	39
	.0063	29
	.0042	20
	.0024	14

Mechanical Analysis	
Sieve Size	% Pas
3	100.0
3/4	99.3
1/2	98.0
3/8	98.0
#4	98.0
#10	89.0
#20	80
#40	80
#60	69
#100	-
#200	49

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 22-B

Location: SW¼, SE¼, Sec. 24, T25S., R1E
Depth: 9-16" Unified: ML ASSHO: A-7-6(15)
Liquid Limit: 46 Plasticity Index: 18
Plastic Limit: 28

Hydrometer Analysis:	Diameter MM	% Passing
	.0223	74
	.0147	69
	.0098	60
	.0070	59
	.0050	50
	.0025	49
	.0013	30

Mechanical Analysis	
Sieve Size	% Pas
3	100
3/4	100
1/2	100
3/8	100
#4	100
#10	98
#20	-
#40	94
#60	-
#100	80
#200	

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 23-A

Location: SW¼, NE¼, Sec. 22, T25S., R1E
Depth: 0-10" Unified: GMu ASSHO: A-2-7(4)
Liquid Limit: 87 Plasticity Index: 32
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.037	29.2
	.024	27.7
	.0145	23.2
	.0997	19.4
	.0075	17.2
	.0037	14.9
	.0015	12.0

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	-
1/2	100
#3/8	99.00
#4	72.00
#10	36.80
#20	-
#40	35.80
#60	-
#100	-
#200	33.20

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 24-A

Location: NE¼, SE¼, Sec. 3, T26S., R1W
Depth: 0-9" Unified: MH ASSHO:A-5(7)
Liquid Limit: 56 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0309	46.8
	.0212	40.2
	.0130	32.0
	.0091	25.4
	.0069	20.5
	.0036	9.0
	.0016	0.8

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	-
1/2	-
#3/8	100.00
#4	99.00
#10	89.60
#20	-
#40	72.10
#60	-
#100	-
#200	59.90

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 24-B

Location: NE¼, SE¼, Sec. 3, T26S., R1W
Depth: 9-34" Unified: ML ASSHO: A-4(9)
Liquid Limit: 38 Plasticity Index: 4
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0278	74.3
	.0191	70.8
	.0118	64.7
	.0082	60.0
	.0065	53.9
	.0035	40.7
	.0016	29.9

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	-
1/2	100
3/8	99.90
#4	99.80
#10	96.40
#20	-
#40	91.50
#60	-
#100	-
#200	83.30

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 27-A

Location: SE¼, SE¼, Sec. 19, T28S, R2W
Depth: 0-10" Unified: MH ASSHO: A-7-5(9)
Liquid Limit: 56 Plasticity Index: 16
Plastic Limit: 40

Hydrometer Analysis:	Diameter MM	% Passing
	.0463	58
	.0235	54
	.0145	48
	.0112	44
	.0073	40
	.0047	34
	.0014	28

Mechanical Analysis	
Sieve Size	% Pass
3	100
3/4	100
1/2	100
3/8	-
#4	99
#10	98.00
#20	90.00
#40	-
#60	78.00
#100	-
#200	60.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 27-B

Location: SE¼, SE¼, Sec. 19, T28S., R2W
Depth: 10-31" Unified: MH ASSHO: A-7-5(15)
Liquid Limit: 67 Plasticity Index: 26
Plastic Limit: 41

Hydrometer Analysis:	Diameter MM	% Passing
	.0314	58
	.0221	54
	.0114	48
	.0063	44
	.0031	38
	.0010	34

Mechanical Analysis	
Sieve Size	% Pass
3	100
3/4	100
1/2	100
3/8	-
#4	98.00
#10	98.00
#20	84.00
#40	-
#60	78.00
#100	-
#200	60.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 28-A

Location: SW¼, NE¼, Sec. 30, T.30S., R2W
Depth: 0-16" Unified: SM ASSHO: A-5(3)
Liquid Limit: 55 Plasticity Index: 9
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0312	38
	.0231	34
	.0143	30
	.0092	26
	.0056	20
	.00315	14
	.0013	8

Mechanical Analysis	
Sieve Size	% Pass
3	-
3/4	100
1/2	99
3/8	98
#4	94
#10	82
#20	72
#40	62
#60	56
#100	50
#200	48

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 28-B

Location: SE¼, SE¼, Sec. 3, T31S., R2W
Depth: 16-40" Unified: MH ASSHO: A-7-5(16)
Liquid Limit: 62 Plasticity Index: 23
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0341	64
	.0225	60
	.0151	56
	.0081	50
	.0063	44
	.0033	39
	.00136	30

Mechanical Analysis	
Sieve Size	% Passing
3	-
3/4	-
1/2	-
3/8	100.00
#4	100.00
#10	96.00
#20	88.00
#40	82.00
#60	78.00
#100	74.00
#200	69.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 30-A

Location: NW¼, NW¼, Sec. 21, T21S., R1E
Depth: 0-6" Unified: SMu ASSHO: A-4(0)
Liquid Limit: 33.0 Plasticity Index: 5.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0257	38.87
	.0172	34.96
	.0105	30.30
	.0077	26.92
	.0057	22.55
	.0030	15.26
	.0013	8.10

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	98.95
1/2	97.14
3/8	95.54
#4	90.71
#10	78.82
#20	69.34
#40	60.22
#60	53.55
#100	48.53
#200	43.63

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 30-B

Location: NW¼, NW¼, Sec. 21, T21S., R1E
Depth: 6-64" Unified: SMu ASSHO: A-5(0)
Liquid Limit: 45.0 Plasticity Index: 3.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0291	31.13
	.0192	27.73
	.0117	23.38
	.0085	20.19
	.0062	17.95
	.0032	11.07
	.0014	3.12

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	98.59
1/2	97.09
3/8	95.24
#4	84.28
#10	64.28
#20	54.94
#40	47.75
#60	42.79
#100	39.34
#200	36.09

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 31-A

Location: SE¼, SE¼, Sec. 19, T28S., R2W
Depth: 0-6" Unified: SMu ASSHO: A-1-6(0)
Liquid Limit: 58 Plasticity Index: 0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0328	17.77
	.0213	15.34
	.0126	13.24
	.0091	11.14
	.0065	9.76
	.0033	6.08
	.0014	3.07

Mechanical Analysis	
Sieve Size	% Pas
3	100
3/4	97.84
1/2	93.29
3/8	85.67
#4	64.14
#10	47.31
#20	38.83
#40	30.65
#60	25.33
#100	22.02
#200	20.46

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 31-B

Location: SE¼, SE¼, Sec. 19, T28S, R2W
Depth: 6-15" Unified: GMu ASSHO: A-1-6(0)
Liquid Limit: 50.0 Plasticity Index: 0
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing
	.0305	8.96
	.0199	7.89
	.0118	6.88
	.0086	5.94
	.0062	5.01
	.0031	3.01
	.0013	1.67

Mechanical Analysis	
Sieve Size	% Pas
3	100
3/4	96.1
1/2	85.4
3/8	68.6
#4	39.4
#10	27.2
#20	24.8
#40	22.1
#60	19.9
#100	18.2
#200	16.7

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 32-A

Location: SW¼, NE¼, Sec. 33, T32S., R2W
Depth: 0-7" Unified: GMu ASSHO: A-5(1)
Liquid Limit: 57 Plasticity Index: 10.00
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0268	34.63
	.0177	31.82
	.0110	26.54
	.0080	23.79
	.0059	19.68
	.0032	12.12
	.0014	6.02

Mechanical Analysis	
Sieve Size	% Pas
3	100
3/4	96....
1/2	89....
3/8	81....
#4	68....
#10	60....
#20	55....
#40	50....
#60	45....
#100	42....
#200	39....

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 32-B

Location: SW¼, NE¼, Sec. 33, T32S,R2W
Depth: 7-28" Unified: SMu ASSHO: A-5(3)
Liquid Limit: 50 Plasticity Index: 10
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0258	44.52
	.0174	39.53
	.0105	34.98
	.0078	30.08
	.0057	26.46
	.0030	16.23
	.0013	7.28

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	98.21
1/2	92.27
3/8	89.29
#4	82.06
#10	74.95
#20	69.87
#40	63.43
#60	57.28
#100	52.22
#200	47.60

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 33-A

Location: NW¼, NE¼, Sec. 22, T24S, R2W
Depth: 0-4" Unified: SMu ASSHO: A-5(2)
Liquid Limit: 49.0 Plasticity Index: 6.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0288	42.86
	.0188	39.32
	.0112	35.43
	.0081	31.57
	.0059	27.05
	.0031	16.70
	.0013	7.50

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	100
1/2	99.52
3/8	98.56
#4	91.57
#10	78.56
#20	71.67
#40	62.68
#60	56.09
#100	51.69
#200	47.30

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 33-B

Location: NW¼, NE¼, Sec. 22, T24S., R2W
Depth: 4-19" Unified: SMu ASSHO: A-5(2)
Liquid Limit: 48.0 Plasticity Index: 7.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0226	41.19
	.0150	38.12
	.0092	33.70
	.0068	29.95
	.0051	25.46
	.0027	16.99
	.0012	9.20

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	100
1/2	99.42
3/8	98.22
#4	89.81
#10	77.94
#20	70.83
#40	63.27
#60	56.97
#100	52.18
#200	47.06

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 34-A

Location: NE¼, NW¼, Sec. 34, T31S, R1E
Depth: 0-4" Unified: ML ASSHO: A-5(4)
Liquid Limit: 48.0 Plasticity Index: 9.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0303	51.72
	.0199	47.31
	.0121	40.99
	.0088	36.81
	.0064	32.40
	.0033	22.46
	.0014	11.72

Mechanical Analysis

Sieve Size	% Pas
3	100
3/4	99.0
1/2	97.8
3/8	96.7
#4	92.8
#10	82.0
#20	73.6
#40	66.5
#60	61.4
#100	57.3
#200	53.4

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 34-B

Location: NE¼, NW¼, Sec. 34, T31S, R1E
Depth: 4-23" Unified: MH ASSHO: A-7-5(19)
Liquid Limit: 59 Plasticity Index: 2.2
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0221	65.04
	.0148	60.42
	.0089	55.91
	.0066	51.84
	.0048	49.37
	.0025	41.69
	.0011	34.55

Mechanical Analysis

Sieve Size	% Pas
3	100
3/4	100
1/2	99.5
3/8	99.3
#4	98.5
#10	96.6
#20	91.2
#40	85.9
#60	82.9
#100	80.2
#200	76.0

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 41-A

Location: Center of Sec. 21, T25S, R1E
Depth: 0-6" Unified: SMu ASSHO: A-2-7(0)
Liquid Limit: 60 Plasticity Index: 11
Plastic Limit: 49

Hydrometer Analysis:	Diameter MM	% Passing
	.0200	29
	.0100	20
	.0073	18
	.0045	10
	.0016	5

Mechanical Analysis

Sieve Size	% Pas
3	100
3/4	100
1/2	98
3/8	-
3/8	-
#10	58.0
#20	49.0
#40	-
#60	40.0
#100	-
#200	30.0

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 41-B

Location: Center of Sec. 21, T25S, R1E
Depth: 6-21" Unified: ASSHO:
Liquid Limit: 47 Plasticity Index: 9
Plastic Limit: 38

Hydrometer Analysis:	Diameter MM	% Passing
	.0321	28
	.0196	24
	.00953	20
	.0078	18
	.0032	15
	.0014	8

Mechanical Analysis

Sieve Size	% Passing
3	100
3/4	100
1/2	84
3/8	-
#4	64.00
#10	54.00
#20	47.00
#40	-
#60	38.00
#100	-
#200	34.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 42-A

Location: SE¼, NE¼, Sec. 22, T25S, R1E
Depth: Unified: SMu ASSHO: A
Liquid Limit: 50 Plasticity Index: 5-5(1)
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0346	37.8
	.0233	34.1
	.0140	29.2
	.0096	24.3
	.0074	19.4
	.0038	9.7
	.0017	1.1

Mechanical Analysis

Sieve Size	% Passing
1½	100
1	99
3/4	99
1/2	98
3/8	94
#4	85
#10	61.7
#40	47.3
#200	38.4

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 42-B

Location: SE¼, NE¼, Sec. 22, T25S, R1E
Depth: Unified: SMu ASSHO: A-4(3)
Liquid Limit: 36 Plasticity Index: 9
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing
	.0303	43.8
	.0202	40.2
	.0121	35.5
	.0084	29.5
	.0064	24.8
	.0033	14.0
	.0015	5.7

Mechanical Analysis

Sieve Size	% Passing
1½	100
1	98
3/4	97
1/2	97
3/8	96
#4	92
#10	71.6
#40	54.2
#200	43.8

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 46-A

Location: NW¼, NE¼, Sec. 20, T28S, R2W
Depth: 0-5" Unified: SMu ASSHO: A-2-6(0)
Liquid Limit: 40.0 Plasticity Index: 5.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0309	23.54
	.0203	19.86
	.0122	15.33
	.0087	14.17
	.0063	12.63
	.0031	8.96
	.0013	4.90

Mechanical Analysis	
Sieve Size	% Pa
3	98.06
3/4	96.49
1/2	93.28
3/8	88.56
#4	74.08
#10	56.66
#20	45.26
#40	36.85
#60	32.45
#100	29.98
#200 26.78	

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 46-B

Location: NW¼, NE¼, Sec. 20, T28S, R2W
Depth: 5-18" Unified: SMu ASSHO: A-2-6(0)
Liquid Limit: 33.0 Plasticity Index: 2.0
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing
	.0289	21.57
	.0194	18.53
	.0116	16.48
	.0085	14.47
	.0062	12.46
	.0032	8.39
	.0014	4.80

Mechanical Analysis	
Sieve Size	% Pa
3	98.11
3/4	97.40
1/2	93.71
3/8	88.80
#4	70.61
#10	51.54
#20	41.71
#40	34.43
#60	30.21
#100	27.61
#200	25.53

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 47-A

Location: NE¼, NE¼, Sec. 19, T28S, R2W
Depth: 0-16" Unified: SM ASSHO: A-2-2(1)
Liquid Limit: 42 Plasticity Index: 14
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0341	26
	.0260	22
	.0091	16
	.0064	14
	.0032	10
	.0014	6

Mechanical Analysis	
Sieve Size	% Pa
3	100
3/4	98
1/2	93
3/8	90
#4	80
#10	61
#20	50
#40	43
#60	40
#100	36
#200	32

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 47-B

Location: NE¼, NE¼, Sec. 19, T28S, R2W
Depth: 16-36" Unified: SM ASSHO: A-4(2)
Liquid Limit: 39 Plasticity Index: 6
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0431	42
	.0247	38
	.0086	32
	.0065	28
	.0032	22
	.0015	16

Mechanical Analysis	
Sieve Size	% Passing
3	98
3/4	98
1/2	98
3/8	98
#4	98
#4	98
#20	74
#40	62
#60	57
#100	52
#200	48

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 51-A

Location: SW¼, NW¼, Sec. 4, T31S, R1E
Depth: 0-9" Unified: SMu ASSHO:A-2-4(0)
Liquid Limit: 39 Plasticity Index: N.P.
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0419	22.7
	.0285	17.0
	.0170	11.3
	.0117	6.7
	.0087	3.3
	.0043	1.3

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	90.00
1/2	86.00
3/8	80.00
#4	69.00
#10	56.70
#20	-
#40	46.9
#60	-
#100	-
#200	34.60

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 51-B

Location: SW¼, NW¼, Sec. 4, T31S, R1E
Depth: 9-28" Unified: SMu ASSHO: A-3(0)
Liquid Limit: 29 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.032	26.1
	.023	25.3
	.014	20.1
	.009	17.7
	.007	14.9
	.0035	10.1
	.0015	4.5

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	98
1/2	95
3/8	93
#4	79
#10	53.4
#20	36.00
#40	-
#60	32.10
#100	-
#200	26.10

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 52-A

Location: SW¼, NW¼, Sec. 30, T21S, R1E
Depth: 0-10" Unified: ML ASSHO: A-4(6)
Liquid Limit: 31 Plasticity Index: 3
Plastic Limit: 28

Hydrometer Analysis:	Diameter MM	% Passing
	.0271	58.3
	.0184	53.0
	.0112	45.5
	.0079	38.0
	.0062	30.1
	.0031	26.2
	.0015	6.9

Mechanical Analysis

Sieve Size	% Passing
3	100.0
3/4	99.0
1/2	99.0
3/8	99.0
#4	97.0
#10	95.1
#20	-
#40	85.6
#60	-
#100	-
#200	73.1

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 52-B

Location: SW¼, NW¼, Sec. 30, T21S, R1E
Depth: 10-51" Unified: ML ASSHO: A-4(5)
Liquid Limit: 33 Plasticity Index: 4
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0280	55.9
	.0190	50.8
	.0120	43.8
	.0080	37.7
	.0060	29.7
	.0030	23.7
	.0015	10.5

Mechanical Analysis

Sieve Size	% Passing
3	100.0
3/4	98.0
1/2	95.0
3/8	94.0
#4	92.0
#10	87.0
#20	-
#40	79.3
#60	-
#100	-
#200	69.0

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

Location:
Depth: Unified: ASSHO:
Liquid Limit: Plasticity Index:
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing

Mechanical Analysis

Sieve Size	% Passing

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 56-A

ation: SW¼, NE¼, Sec. 25, T26S, R4E
th: 0-9" Unified: SMu ASSHO: A-2-4(0)
uid Limit: 0 Plasticity Index: NP
stic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0342	27.19
	.0225	19.91
	.0134	14.03
	.0096	10.63
	.0069	8.04
	.0034	5.13
	.0014	2.68

Mechanical Analysis

Sieve Size	% Passing
3	100
3/4	99.30
1/2	95.59
3/8	93.44
#4	82.91
#10	69.59
#20	60.98
#40	52.11
#60	45.05
#100	39.40
#200	31.85

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 56-B

ation: SW¼, NE¼, Sec. 25, T26S, R4E
th: 9-20" Unified: SMu ASSHO: A-2-7(0)
uid Limit: 55.0 Plasticity Index: NP
stic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0319	21.39
	.0211	15.92
	.0126	11.72
	.0090	9.03
	.0065	6.68
	.0032	3.58
	.0013	.91

Mechanical Analysis

Sieve Size	% Passing
3	89.67
3/4	87.19
1/2	84.94
3/8	82.69
#4	74.33
#10	62.66
#20	56.02
#40	48.84
#60	42.64
#100	36.53
#200	28.71

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

ation:
th: Unified: ASSHO:
uid Limit: Plasticity Index:
stic Limit:

drometer Analysis:	Diameter MM	% Passing

Mechanical Analysis

Sieve Size	% Passing

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 57-A

Location: SE¼, NW¼, Sec. 3, T30S, R1E
Depth: 0-8" Unified: SMu ASSHO: A-2-7(0)
Liquid Limit: 43.0 Plasticity Index: 3.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0319	24.55
	.0210	18.76
	.0125	13.77
	.0090	11.71
	.0064	8.77
	.0031	7.51
	.0013	3.02

Mechanical Analysis	
Sieve Size	% Pa
3	99.0
3/4	94.4
1/2	90.4
3/8	86.1
#4	75.6
#10	67.7
#20	57.3
#40	48.7
#60	42.3
#100	36.9
#200	30.3

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 57-B

Location: SE¼, NW¼, Sec. 3, T30S, R1E
Depth: 8-25" Unified: SMu ASSHO: A-1-6(0)
Liquid Limit: 55.0 Plasticity Index: 6.0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0323	20.24
	.0212	15.65
	.0125	12.30
	.0090	8.95
	.0065	6.21
	.0032	4.02
	.0013	2.54

Mechanical Analysis	
Sieve Size	% Pa
3	100.0
3/4	100.0
1/2	99.7
3/8	98.7
#4	94.9
#10	81.6
#20	62.0
#40	50.2
#60	42.3
#100	33.0
#200	23.8

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

Location:
Depth: Unified: ASSHO:
Liquid Limit: Plasticity Index:
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing

Mechanical Analysis	
Sieve Size	% Pa

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 61-A

ation: SW¼, NW¼, Sec. 17, T31S, R2W
th: 0-6" Unified: SMu ASSHO: A-2-4(0)
uid Limit: 25 Plasticity Index: NP
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0342	20.0
	.0227	16.0
	.0135	12.0
	.0092	7.9
	.0069	6.6
	.0034	2.6
	.0014	1.2

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
1/2	99.80
3/8	99.0
#4	95.80
#10	82.20
#20	-
#40	56.60
#60	-
#100	-
#200	33.70

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 61-B

ation: SW¼, NW¼, Sec. 17, T31S, R2W
th: 6-23" Unified: SMd ASSHO: A-2-4(0)
uid Limit: 22 Plasticity Index: 2
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0403	16.2
	.0265	14.8
	.0156	10.7
	.0106	8.0
	.0080	5.3
	.0040	1.2

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	99.00
1/2	99.00
3/8	98.00
#4	93.00
#10	74.60
#20	-
#40	50.60
#60	-
#100	-
#200	30.20

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 62-A

ation: SW¼, NW¼, Sec. 17, T31S, R2W
th: 0-8" Unified: SM ASSHO: A-4-(3)
uid Limit: 25.5 Plasticity Index: 2
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0321	36
	.0211	32
	.0083	23
	.0063	20
	.0045	12
	.0013	6

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
1/2	100.00
3/8	100.00
#4	100.00
#10	98.00
#20	88.00
#40	74.00
#60	68.00
#100	60.00
#200	49.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 62-B

Location: SW¼, NW¼, Sec. 17, T31S, R2W
Depth: 8-38" Unified: ML ASSHO: A-4-(4)
Liquid Limit: 28 Plasticity Index: 5
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0311	43
	.0213	37
	.0086	30
	.0065	26
	.0034	22
	.0012	14

Mechanical Analysis	
Sieve Size	% Pas
3	100
3/4	100
1/2	100
3/8	100
#4	100
#10	98
#20	93
#40	83
#60	75
#100	66
#200	56

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 63-A

Location: SW¼, SW¼, Sec. 29, T32S, R3W
Depth: 0-9" Unified: SMu ASSHO: A-2-4(0)
Liquid Limit: 39 Plasticity Index: MP
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing
	.0455	18.8
	.0302	15.0
	.0178	11.2
	.0121	8.2
	.0091	5.9
	.0045	2.2

Mechanical Analysis	
Sieve Size	% Pas
3	100.0
3/4	100.0
1/2	100.0
3/8	99.0
#4	88.0
#10	56.5
#20	-
#40	42.6
#60	-
#100	-
#200	27.5

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 63-B

Location: SW¼, SW¼, Sec. 29 T32S, R3W
Depth: 9-37" Unified: SMu ASSHO: A-4(2)
Liquid Limit: 31 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0324	34.0
	.0216	30.1
	.0132	22.2
	.0088	20.9
	.0067	17.0
	.0034	10.4
	.0015	6.4

Mechanical Analysis	
Sieve Size	% Pas
3	100.
3/4	100.
1/2	100.
3/8	100.
#4	98.
#10	78.
#20	-
#40	67.
#60	-
#100	-
#200	49.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 64-A

Location: SE¼, SW¼, Sec. 14, T31S, R3W
Depth: 0-9" Unified: SMu ASSHO: A-4(0)
Liquid Limit: 0 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0351	34
	.0200	30
	.0173	20
	.0096	18
	.0073	17
	.0031	14
	.0014	12

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
1/2	100.00
3/8	100.00
#4	98.00
#10	84.00
#20	80.00
#40	-
#60	65.00
#100	-
#200	50.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 64-B

Location: SE½, SW¼, Sec. 14, T31S, R3W
Depth: 9-16" Unified: Cl ASSHO: A-6(7)
Liquid Limit: 36 Plasticity Index: 15
Plastic Limit: 21

Hydrometer Analysis:	Diameter MM	% Passing
	.0314	48
	.0210	44
	.0121	40
	.0093	38
	.0064	30
	.0035	28
	.0014	20

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
½	100.00
3/8	100.00
#4	-
#10	98.00
#20	88.00
#40	-
#60	80.00
#100	-
#200	60.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 71-A

Location: NW¼, NE¼, Sec. 13, T31S, R3W
Depth: 0-7" Unified: GM ASSHO: A-1-b (0)
Liquid Limit: 32 Plasticity Index: 0
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0300	14
	.0200	10
	.0123	6
	.0091	4
	.0063	3
	.0030	1.57
	.0014	1

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
½	98.00
3/8	95.00
#4	-
#10	87.25
#20	75.15
#40	-
#60	58.35
#100	-
#200	50.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 71-B&C

Location: NW¼, NE¼, Sec. 13, T31S, R3W
Depth: 7-35" Unified: GM ASSHO: A-1-6(0)
Liquid Limit: 30.5 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0030	14
	.0200	10
	.0113	6
	.0084	4
	.0060	3
	.0030	1.5
	.0012	1

Mechanical Analysis	
Sieve Size	% Pa
1	100
3/4	100
1/2	99.0
3/8	97.0
#4	-
#10	85.0
#20	77.0
#40	-
#60	65.1
#100	-
#200	47.3

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 72-A

Location: SE¼, NE¼, Sec. 5, T31S, R3W
Depth: 0-13" Unified: SMu ASSHO: A-4(0)
Liquid Limit: 28 Plasticity Index: NP
Plastic Limit: NP

Hydrometer Analysis:	Diameter MM	% Passing
	.0416	31.4
	.0284	22.7
	.0175	13.4
	.0120	8.3
	.0091	5.4

Mechanical Analysis	
Sieve Size	% Pa
3	100.
3/4	98.0
1/2	98.0
3/8	95.0
#4	82.0
#10	80.0
#20	75.0
#40	52.3
#60	-
#100	-
#200	45.2

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 72-B

Location: SE¼, NE¼, Sec. 5, T31S, R3W
Depth: 13-29" Unified: ML ASSHO: A-4(4)
Liquid Limit: 39 Plasticity Index: 10
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0341	40.4
	.0239	29.6
	.0149	18.1
	.0104	12.3
	.0079	8.2
	.0039	3.3

Mechanical Analysis	
Sieve Size	% Pa
3	100.
3/4	99.0
1/2	99.0
3/8	95.0
#4	95.0
#10	85.0
#20	-
#40	75.0
#60	-
#100	-
#200	57.0

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 73-A

ation: NW¼, SE¼, Sec. 6, T31S, R3W
th: 0-11" Unified: ML ASSHO: A-4(6)
uid Limit: 33 Plasticity Index: NP
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0290	49.2
	.0200	39.0
	.0129	24.5
	.0090	19.2
	.0069	13.3

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
1/2	99.50
3/8	99.00
#4	96.60
#10	86.20
#20	-
#40	79.10
#60	-
#100	-
#200	71.10

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 73-B

ation: NW¼, SE¼, Sec. 6, T31S, R3W
th: 11-20" Unified: ML ASSHO: A-4-(6)
uid Limit: 33 Plasticity Index: NP
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0301	55.1
	.0213	46.3
	.0133	35.7
	.0092	30.8
	.0070	26.0
	.0035	20.2
	.0015	14.5

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	100.00
1/2	99.00
3/8	98.00
#4	97.00
#10	87.60
#20	-
#40	81.50
#60	-
#100	-
#200	72.80

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 74-A

ation: NW¼, SW¼, Sec. 8, T30S, R2W
th: 0-14" Unified: ML ASSHO: A-4-(5)
uid Limit: 29 Plasticity Index: NP
stic Limit: -

rometer Analysis:	Diameter MM	% Passing
	.0293	46.3
	.0203	37.2
	.0122	31.6
	.0084	27.1
	.0064	24.0
	.0032	19.5
	.0014	14.9

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	99
1/2	98
3/8	98
#4	97.00
#10	90
#20	-
#40	84.30
#60	-
#100	-
#200	84.30

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 74-B

Location: NW¼, SW¼, Sec. 8, T30S, R2W

Depth: 14-42" Unified: ML ASSHO: A-5(7)

Liquid Limit: 43 Plasticity Index: NP

Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0300	47.2
	.0206	40.6
	.0125	34.0
	.0085	30.1
	.0065	26.2
	.0033	22.2
	.0014	19.6

Mechanical Analysis	
Sieve Size	% P
3	100
3/4	100
1/2	100
3/8	99.
#4	98.
#10	79.
#20	-
#40	78.
#60	-
#100	-
#200	69.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 81-A

Location: SE¼, NW¼, Sec. 12, T32S, R2W

Depth: 0-13" Unified: SM ASSHO: A-5(4)

Liquid Limit: 44 Plasticity Index: 1

Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0300	24
	.0200	22
	.0131	14
	.0096	10
	.0072	6
	.0031	4
	.0011	1

Mechanical Analysis	
Sieve Size	% Pa
3	100
3/4	98
1/2	92
3/8	86
#4	78
#10	68
#20	62
#40	56
#60	53
#100	49
#200	43

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 81-B

Location: SE¼, NW¼, Sec. 12, T32S, R2W

Depth: 13-30" Unified: ML ASSHO: A-4(2)

Liquid Limit: 35 Plasticity Index: 3.0

Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0229	40.03
	.0163	31.47
	.0103	23.30
	.0076	18.91
	.0055	16.11
	.0028	11.87
	.0012	8.00

Mechanical Analysis	
Sieve Size	% Pa
3	95.
3/4	94.
1/2	93.
3/8	92.
#4	90.
#10	85.
#20	83.
#40	80.
#60	77.
#100	73.
#200	64.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 82-A

tion: SE¼, SE¼, Sec. 17, T32S, R3W

h: 0-11" Unified: SM ASSHO: A-5(2)

id Limit: 44 Plasticity Index: 2

tic Limit: -

ometer Analysis:

Diameter MM	% Passing
.0300	34
.0200	35
.0100	29
.0080	16
.0060	9
.0031	8
.0014	4

Mechanical Analysis	
Sieve Size	% Passing
3	96
3/4	94
1/2	92
3/8	90
#4	83
#10	74
#20	68
#40	60
#60	55
#100	52
#200	47

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 82-B

tion: SE¼, SE¼, Sec. 17, T32S, R3W

h: 11-27" Unified: ML ASSHO: A-4(5)

id Limit: 35.5 Plasticity Index: 9

tic Limit: -

ometer Analysis:

Diameter MM	% Passing
.0221	40
.0184	32
.0146	28
.0081	23
.0061	18
.0030	12
.0012	10

Mechanical Analysis	
Sieve Size	% Passing
3	95
3/4	92
1/2	91
3/8	90
#4	86
#10	82
#20	77
#40	72
#60	68
#100	64
#200	60

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 90-A

ation: NE¼, SW¼, Sec. 16, T26S, R5E

h: 0-3" Unified: SM ASSHO: A-1-6(0)

id Limit: 0 Plasticity Index: NP

tic Limit: -

ometer Analysis:

Diameter MM	% Passing
.0400	23
.0247	17
.0155	12
.0100	8
.0765	6
.0040	3
.0015	1

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	100
1/2	99
3/8	97
#4	89
#10	73
#20	57
#40	43
#60	36
#100	31
#200	32

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 90-B

Location: NE¼, SW¼, Sec. 16, T26S, R5E
Depth: 5-20" Unified: ASSHO:
Liquid Limit: NP Plasticity Index: NP
Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing
	.0412	15
	.0224	12
	.0151	6
	.0113	5
	.0073	3
	.0041	1
	.0016	0

Mechanical Analysis

Sieve Size	% Pa
3	99
3/4	99
1/2	95
3/8	90
#4	76
#10	55
#20	38
#40	24
#60	21
#100	19
#200	16

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 91-A

Location: NE¼, SW¼, Sec. 21, T26S, R2E
Depth: Unified: ASSHO:
Liquid Limit: 0 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0400	36
	.0351	28
	.0152	16
	.0100	10
	.0072	7
	.0040	2
	.0015	0

Mechanical Analysis

Sieve Size	% Pa
3	100
3/4	100
1/2	99
3/8	98
#4	96
#10	90
#20	79
#40	62
#60	48
#100	38
#200	26

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 92-A

Location: SW¼, NW¼, Sec. 36, T26S, R5E
Depth: 0-19" Unified: SMu ASSHO: A-2-7(0)
Liquid Limit: 67.0 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0365	21.67
	.0236	15.19
	.0139	10.32
	.0099	6.27
	.0070	5.13
	.0034	3.03
	.0014	3.24

Mechanical Analysis

Sieve Size	% Pa
3	10
3/4	99.
1/2	97.
3/8	91.
#4	80.
#10	69.
#20	56.
#40	44.
#60	33.
#100	27.
#200	23.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 92-B

tion: SW¼, NW¼, Sec. 36, T26S, R5E
h: 19-60" Unified: SMd ASSHO: A-2-4(6)
id Limit: 0 Plasticity Index: NP
tic Limit: -

ometer Analysis:	Diameter MM	% Passing
	.0341	22.42
	.0226	16.28
	.0138	9.09
	.0099	6.37
	.0071	3.83
	.0035	1.19
	.0014	1.05

Mechanical Analysis

Sieve Size	% Passing
3	100
3/4	99.77
1/2	98.90
3/8	97.69
#4	92.87
#10	80.75
#20	70.05
#40	56.42
#60	45.71
#100	38.14
#200	32.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 93-A

tion: SE¼, NW¼, Sec. 11, T25S, R5E
h: 0-9" Unified: SMd ASSHO: A-1-6(0)
id Limit: 0 Plasticity Index: NP
tic Limit: -

ometer Analysis:	Diameter MM	% Passing
	.0392	19.58
	.0259	11.16
	.0151	9.20
	.0108	6.67
	.0077	4.20
	.0038	2.58
	.0016	0.79

Mechanical Analysis

Sieve Size	% Passing
3	100.00
3/4	94.17
1/2	89.17
3/8	85.38
#4	78.33
#10	68.32
#20	56.69
#40	44.70
#60	36.44
#100	30.82
#200	25.38

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 93-B

tion: SE¼, NW¼, Sec. 11, T25S, R5E
h: 9-27" Unified: SMd ASSHO: A-1-6(0)
id Limit: 0 Plasticity Index: NP
tic Limit: -

ometer Analysis:	Diameter MM	% Passing
	.0326	17.84
	.0218	11.38
	.0129	7.53
	.0093	5.28
	.0067	2.99
	.0033	2.05
	.0013	.72

Mechanical Analysis

Sieve Size	% Passing
3	98.58
3/4	95.94
1/2	89.34
3/8	85.00
#4	77.96
#10	69.07
#20	58.30
#40	46.28
#60	37.91
#100	31.97
#200	25.23

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 94-A

Location: SE¼, SW¼, Sec. 7, T26S, R4E
Depth: 0-9" Unified: SM ASSHO: A-1-6(0)
Liquid Limit: 0 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0410	30
	.0253	23
	.0152	15
	.0110	10
	.0072	7
	.0041	3
	.0015	1

Mechanical Analysis	
Sieve Size	% Passing
3/4	100
3/4	100
1/2	100
3/8	99
#4	96
#10	88
#20	78
#40	65
#60	55
#100	46
#200	35

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 94-B

Location: SE¼, SW¼, Sec. 7, T26S, R4E
Depth: 9-18" Unified: SM ASSHO: A-16(0)
Liquid Limit: 0 Plasticity Index: NP
Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0401	27
	.0251	21
	.0151	13
	.0121	9
	.0073	7
	.0045	3
	.0015	1

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	100
1/2	100
3/8	99
#4	95
#10	85
#20	73
#40	60
#60	51
#100	45
#200	36

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 94-D

Location: SE¼, SW¼, Sec. 7, T26S, R4E
Depth: 18-60" Unified: MH ASSHO: A-7-5(28)
Liquid Limit: 73.0 Plasticity Index: 20.0
Plastic Limit: 53

Hydrometer Analysis:	Diameter MM	% Passing
	.0265	84.46
	.0173	78.59
	.0104	71.24
	.0074	67.38
	.0053	63.89
	.0026	60.22
	.0011	55.98

Mechanical Analysis	
Sieve Size	% Passing
3	100.
3/4	100.
1/2	100.
3/8	100.
#4	99.
#10	99.
#20	98.
#40	97.
#60	95.
#100	93.
#200	90.

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 96-A

cation: NW¼, SW¼, Sec. 23, T26S, R5E
pth: 0-14" Unified: SM ASSHO: -
quid Limit: 0 Plasticity Index: NP
astic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0400	18
	.0261	13
	.0162	9
	.0211	6
	.0082	4
	.0042	2

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	96
1/2	91
3/8	89
#4	86
#10	81
#20	73
#40	64
#60	56
#100	50
#200	40

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 96-B

cation: NW¼, SW¼, Sec. 23, T26S, R5E
pth: 14-36" Unified: SM ASSHO: -
quid Limit: 0 Plasticity Index: NP
astic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0394	12
	.0254	8
	.0157	6
	.0091	5
	.0072	3
	.	

Mechanical Analysis	
Sieve Size	% Passing
3	92
3/4	80
1/2	78
3/8	74
#4	64
#10	55
#20	47
#40	41
#60	39
#100	37
#200	30

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

cation:
pth: Unified: ASSHO:
quid Limit: Plasticity Index:
astic Limit:

drometer Analysis:	Diameter MM	% Passing

Mechanical Analysis	
Sieve Size	% Passing

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 97-A

Location: NE¼, SW¼, Sec. 32, T27S, R4E

Depth: 0-12" Unified: SMd ASSHO: A-2-4(0)

Liquid Limit: 0 Plasticity Index: NP

Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0353	18.29
	.0228	15.31
	.0136	10.03
	.0097	7.53
	.0070	5.71
	.0034	4.29
	.0014	2.86

Mechanical Analysis	
Sieve Size	% Passing
3	100
3/4	98.38
1/2	96.45
3/8	94.67
#4	87.13
#10	74.47
#20	66.19
#40	50.70
#60	38.33
#100	30.68
#200	23.78

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 97-B

Location: NE¼, SW¼, Sec. 32, T27S, R4E

Depth: 12-33" Unified: SMd ASSHO: A-1-6(0)

Liquid Limit: 0 Plasticity Index: NP

Plastic Limit: -

Hydrometer Analysis:	Diameter MM	% Passing
	.0318	21.82
	.0213	16.02
	.0127	12.40
	.0091	10.51
	.0065	8.40
	.0032	5.63
	.0013	3.53

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	96.37
1/2	93.37
3/8	88.44
#4	75.65
#10	61.99
#20	52.84
#40	40.94
#60	33.69
#100	28.79
#200	23.01

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

Location:

Depth: Unified: ASSHO:

Liquid Limit: Plasticity Index:

Plastic Limit:

Hydrometer Analysis:	Diameter MM	% Passing

Mechanical Analysis	
Sieve Size	% Passing

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 98-A

ation: NE¼, NW¼, Sec. 28, T27S, R4E

th: 0-20" Unified: SM ASSHO: A-2-5(0)

uid Limit: 48 Plasticity Index: 1

stic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0312	22
	.0210	20
	.0132	18
	.0091	15
	.0071	10
	.0035	7
	.0015	3

Mechanical Analysis	
Sieve Size	% Passing
3	100.00
3/4	96.00
1/2	94.00
3/8	91.00
#4	80.00
#10	61.00
#20	51.00
#40	44.00
#60	39.00
#100	34.00
#200	30.00

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO. 99-A

ation: SE¼, NW¼, Sec. 12, T26S, R5E

th: 0-10" Unified: SM ASSHO: -

uid Limit: 0 Plasticity Index: NP

stic Limit: -

drometer Analysis:	Diameter MM	% Passing
	.0512	22
	.0251	14
	.0152	7
	.0090	6
	.0071	3
	.0035	1.5
	.0015	

Mechanical Analysis	
Sieve Size	% Passing
3	93.10
3/4	88.00
1/2	81.70
3/8	77.30
#4	70.50
#10	62.60
#20	53.70
#40	45.10
#60	38.50
#100	32.20
#200	24.30

SOIL MATERIALS TESTING RESULTS

LANDTYPE NO.

ation:

th: Unified: ASSHO:

uid Limit: Plasticity Index:

stic Limit:

drometer Analysis:	Diameter MM	% Passing

Mechanical Analysis	
Sieve Size	% Passing

TABLE 2

SUMMARY OF ENGINEERING TEST DATA

SRI Land-type	SOIL PROFILE STRATA				CLASSIFICATION		PHYSICAL PROPERTIES			
	Surface	Subsoil	Sub-stratum	Weathered Rock	AASHTO	Unified	Liquid Limit	Plastic Limit	Plasticity Index	CBR @ 95%
13	X				A-2-5(0)	GMu	54	-	6	
		X			A-1-b(0)	GMu	41	-	NP	
			X							5.8
14	X				A-4(3)	ML	34	-	NP	
		X			A-5(13)	MH	54	-	6	
			X							2.7
				X						2.4
16	X				A-1-6(0)	GMd	0	0	NP	
		X			A-1-b(0)	GMu	33	29	4	
18	X				A-5(1)	SMu	43	-	8	
		X			A-7-5(4)	ML	42	-	11	
										1.1
19	X				A-1-b(0)	SM	61	-	NP	
			X							6.5
20	X				A-4(2)	SMu	34	31	3	
		X			A-4(2)	SMu	37	37	NP	
			X							1.8
21	X				A-2-6(0)	SMu	37	37	NP	
		X			A-4(0)	SMd	28	26	2	
				X						4.8
22	X				A-4(0)	SMu	39	-	NP	
		X			A-7-6(15)	ML	46	28	18	
			X							6.2
23	X									
		X			A-2-7(4)	SMu	87	-	32	
			X							3.1
				X						4.4
24	X				A-5(7)	MH	56	-	NP	
		X			A-4(9)	ML	38	-	4	
			X							6.2

SRI Land-type	SOIL PROFILE STRATA				CLASSIFICATION		PHYSICAL PROPERTIES			
	Surface	Subsoil	Sub-stratum	Weathered Rock	AASHTO	Unified	Liquid Limit	Plastic Limit	Plasticity Index	CBR @ 95%
27	X									
		X			A-7-5(9)	MH	56	-	16	
			X		A-7-5(15)	MH	67	-	26	
28	X			X						3.0
		X			A-5(3)	SM	55	-	9	3.6
					A-7-5(16)	MH	62	-	23	
30	X			X						
		X			A-4(0)	SMu	33	-	5	9.5
			X		A-5(0)	SMu	45	-	3	
31	X									
		X			A-1-b(0)	SMu	58	-	NP	3.6
			X		A-1-b(0)	GMu	50	-	NP	
32	X									
		X			A-5(1)	GMu	57	-	10	12.8
			X		A-5(3)	SMu	50	-	10	
33	X									
		X			A-5(2)	SMu	49	-	6	4.2
				X	A-5(2)	SMu	48	41	7	
34	X									
		X			A-5(4)	ML	48	-	9	9.5
			X		A-7-5(19)	MH	59	-	22	
41	X									
		X			A-2-7(0)	SMu	60	49	11	5.1
42	X				A-2-5(0)	GMu	47	38	9	
		X			A-5(1)	SMu	50	-	5	
			X		A-4(3)	SMu	36	-	9	
46	X									
		X			A-2-7(0)	SMu	40	-	5	3.0
				X	A-2-6(0)	SMu	33	-	2	
47	X									
		X			A-2-7(1)	SM	42	-	14	10.4
			X		A-4(2)	SM	39	-	6	
										9.2

SRI Land-type	SOIL PROFILE STRATA				CLASSIFICATION		PHYSICAL PROPERTIES			
	Surface	Subsoil	Sub-stratum	Weathered Rock	AASHTO	Unified	Liquid Limit	Plastic Limit	Plasticity Index	CBR @ 95%
51	X				A-2-4(0)	SMu	39	-	NP	
		X			A-3(0)	SMu	29	-	NP	
			X							4.8
52	X				A-4(6)	ML	31	28	3	
		X			A-4(5)	ML	33	-	4	
			X							3.1
56					A-2-4(0)	SMd	0	-	NP	
					A-2-7(0)	SMu	55	-	NP	-
57	X				A-2-7(0)	SMu	43	-	3	
		X			A-1-b(0)	SMu	51	-	6	
										7.5
61	X				A-2-4(0)	SMu	25	-	NP	
		X			A-2-4(0)	SMd	22	-	2	
										5.0
62	X				A-4(3)	SM	25.5	-	2	
		X			A-4(4)	ML	28	-	5	
			X							3.0
63	X				A-2-4(0)	SMu	39	-	NP	
		X			A-4(2)	SMu	31	-	NP	
			X							4.0
64	X				A-4(0)	SMd	0	0	NP	
		X			A-6(7)	CL	36	21	15	
			X							2.1
71	X				A-1-b(0)	GM	32	-	NP	
		X			A-1-b(0)	GM	30.5	-	NP	
			X							17.8
72	X				A-4(0)	SMu	28	-	NP	
		X			A-4(4)	ML	39	-	10	
			X							7.0
73	X				A-4(6)	ML	33	-	NP	
		X			A-4(6)	ML	33	-	NP	
			X							2.1
74	X				A-4(5)	ML	29	-	NP	
		X			A-5(7)	ML	43	-	NP	
			X							3.8

SRI Land-type	SOIL PROFILE STRATA				CLASSIFICATION		PHYSICAL PROPERTIES			
	Surface	Subsoil	Sub-stratum	Weathered Rock	AASHTO	Unified	Liquid Limit	Plastic Limit	Plasticity Index	CBR @ 95%
81	X				A-5(2)	SM	44	-	1	
		X			A-4(2)	ML	35	-	3	
			X							9.0
82	X				A-5(2)	SM	44	-	2	
		X			A-4(5)	ML	35.5	-	9	
			X							8.3
90	X				A-1-6(0)	SM	0	-	NP	
		X			A-1-6(0)	SM	0	-	NP	
91	X					SM	0	-	NP	
		X								19.0
92	X				A-2-7(0)	SMu	67	-	NP	
			X		A-2-4(0)	SMd	0	-	NP	
			X		A-2-4(0)	SMd	0	-	NP	
										18.0
93	X				A-1-b(0)	SMd	0	-	NP	
		X			A-1-b(0)	SMd	0	-	NP	
			X							6.5
94	X				A-1-b(0)	SM	0	-	NP	
		X			A-1-b(0)	SM	0	-	NP	
			X		A-7-5(28)	MH	73	53	20	9.0
96	X					SM	0	-	NP	
		X				SM	0	-	NP	
			X			SM	0	-	NP	
97	X				A-2-4(0)	SMd	0	-	NP	
		X			A-1-b(0)	SMd	0	-	NP	
					A-5(4)	ML	41	-	7	
98	X				A-2-5(0)	SM	43	-	1	
		X								
			X							14.0
			X							10.0
99										
			X		A-1-b(0)	SM	0	-	NP	12.4

APPENDIX IV

SOIL LABORATORY ANALYSIS

This appendix contains the Soil Laboratory Analysis results from selected landtypes within the Soil Resources Inventory survey area.

All laboratory analyses were performed by the Soil Testing Laboratory, Oregon State University, Corvallis, Oregon.

The laboratory test results presented in this appendix are intended to be used as a guide and indicator for planning purposes only. The test samples were collected at the landtype locations.

TABLE 3

LABORATORY ANALYSIS OF SELECTED LANDTYPES

Land Type No.	pH[1]	P (PPM)	K (PPM)	Ca Meq/100g	Mg[2] Meq/100g	Total Bases (Meq/100g)	CEC Meq/100g	Soil Water Bar Tension 0.1	0.33	1.0	5.0	15.0
13A	5.7	23	364	6.6	1.3	8.83	23.95	55.57	48.66	42.97	27.77	20.94
13B	5.0	6	72	3.8	.30	4.28	8.55	---	41.55	---	---	21.50
14A	6.6	11	404	17.9	2.2	21.13	33.50	48.04	40.37	33.19	24.36	19.83
14B	5.4	6	216	13.3	2.7	15.15	28.05	---	40.27	---	---	24.77
16A	5.7	81	180	5.1	.59	6.15	17.30	36.46	32.47	25.87	13.74	9.98
16B	5.8	38	180	5.3	.92	6.68	11.50	---	---	---	---	---
18A	6.4	13	76	24	6.9	31.09	37.20	---	---	---	---	---
18B	6.6	8	72	24	7.4	31.58	22.65	---	---	---	---	---
19A	6.1	12	156	6.1	.82	7.32	17.72	70.05	54.65	34.67	25.45	23.12
19B	6.4	8	164	3.5	.92	4.84	26.99	---	40.53	---	---	20.61
20A	5.7	11	240	10.3	3.2	14.11	17.80	38.03	32.82	28.13	25.65	16.03
20B	5.8	7	256	9.5	3.4	13.55	16.70	---	32.81	---	---	15.91
21A	6.4	22	346	9.1	.89	10.87	14.76	---	---	---	---	---
21B	---	---	---	---	---	---	---	---	---	---	---	---
21C	---	---	---	---	---	---	---	---	---	---	---	---
22A	6.1	22	274	6.1	.82	7.62	15.79	38.47	31.68	23.86	15.68	11.13
22B	5.4	8	156	4.0	1.7	6.10	13.77	29.83	---	---	---	17.23
23A	5.7	22	404	23	6.9	30.93	49.60	50.95	43.19	37.46	32.21	28.35
23B	4.9	8	216	5.6	3.6	9.75	58.08	50.50	---	---	---	38.41

1/ pH test determined on 1:2 soil water part.

2/ Extractable cations test determined by flame photometer method.

Land Type No.	pH[1/]	P (PPM)	K (PPM)	Ca Meq/100g	Mg[2/] Meq/100g	Total Bases (Meq/100g)	CEC Meq/100g	Soil Water Bar Tension 0.1	0.33	1.0	5.0	15.0
24A	6.0	20	544	7.7	3.0	12.09	28.43	48.93	40.25	31.67	21.48	17.02
24B	5.8	7	418	8.3	2.5	11.87	19.84	30.70	---	---	---	17.77
25A	---	---	---	---	---	---	---	---	---	---	---	---
25B	---	---	---	---	---	---	---	---	---	---	---	---
27A	5.7	23	364	6.6	1.3	8.83	23.95	43.98	36.83	31.00	27.94	21.22
27B	5.7	9	116	4.2	.92	5.41	23.35	34.36	---	---	---	22.75
28A	6.4	22	204	21	3.4	24.92	32.18	49.07	43.07	35.23	28.47	22.52
28B	5.1	11	140	13.7	5.3	19.36	33.71	38.73	---	---	---	26.07
30A	5.4	29	146	5.9	1.5	7.77	13.5	---	---	---	---	---
30B	5.8	72	152	6.8	1.1	8.29	16.1	---	---	---	---	---
31A	5.5	73	72	10.3	1.5	11.98	38.85	---	---	---	---	---
31B	5.8	69	124	8.6	1.1	10.2	20.30	---	---	---	---	---
32A	5.9	60	640	16.5	2.2	20.30	25.10	---	---	---	---	---
32B	5.9	31	330	16.7	2.3	19.84	21.9	---	---	---	---	---
33A	5.7	15	198	12.4	2.5	15.40	22.25	---	---	---	---	---
33B	5.8	16	156	14.1	2.5	17.00	21.60	---	---	---	---	---
34A	5.9	18	388	13.3	2.7	16.99	23.65	---	---	---	---	---
34B	5.9	6	310	18.7	6.2	25.69	44.40	---	---	---	---	---
35A	---	---	---	---	---	---	---	---	---	---	---	---
35B	---	---	---	---	---	---	---	---	---	---	---	---
41A	6.5	68	1060	24	2.9	29.60	31.35	49.84	45.33	37.34	31.15	23.04
41B	6.0	18	516	1.32	2.3	18.52	24.9	39.88	---	---	---	19.79
42A	6.6	11	404	17.9	2.2	21.13	33.50	46.33	40.20	33.58	27.78	19.74
42B	6.2	9	244	13.3	2.7	16.62	18.25	35.41	---	---	---	17.07

Land Type No.	pH[1/]	P (PPM)	K (PPM)	Ca Meq/100g	Mg[2/] Meq/100g	Total Bases (Meq/100g)	CEC Meq/100g	Soil Water Bar Tension 0.1	0.33	1.0	5.0	15.0
46A	5.8	62	174	8.8	.82	10.06	12.90	---	---	---	---	---
46B	5.8	48	174	4.7	.46	5.60	10.10	---	---	---	---	---
47A	4.6	12	60	.6	.20	.95	8.8	41.14	34.78	28.41	22.56	15.77
47B	5.0	6	72	3.8	.30	4.28	8.55	31.13	---	---	---	16.50
51A	6.2	19	330	181	3.4	23.34	28.40	41.12	35.91	28.91	24.66	17.90
51B	5.9	8	164	13.7	5.3	19.42	31.10	29.98	---	---	---	18.94
52A	6.0	6	164	9.1	2.7	12.22	19.00	36.81	31.92	28.22	22.65	13.85
52B	5.9	6	156	7.9	3.8	12.10	15.25	33.42	---	---	---	14.86
56A	6.4	6	170	10.4	1.7	12.53	23.90	---	---	---	---	---
56B	6.2	7	164	13.7	.92	15.04	25.20	---	---	---	---	---
57A	6.1	28	280	30.0	7.6	38.31	31.60	---	---	---	---	---
57B	6.0	38	146	42.0	9.2	51.57	34.30	---	---	---	---	---
61A	6.3	76	192	7.5	1.7	9.69	12.58	24.74	20.84	14.38	9.37	7.21
61B	---	---	---	---	---	---	---	---	18.79	---	---	7.98
62A	6.2	53	152	7.7	1.1	22.34	28.40	---	---	---	---	---
62B	6.0	7	106	86	1.2	10.17	9.50	---	---	---	---	---
63A	6.5	26	186	7.5	.63	8.60	14.76	34.45	30.03	18.74	11.04	7.86
63B	5.6	10	106	3.7	.63	4.60	7.95	---	25.93	---	---	10.98
64A	6.4	36	152	6.8	1.1	8.29	13.67	---	---	---	---	---
64B	5.8	8	60	6.8	3.2	10.15	11.50	---	---	---	---	---
71A	6.7	164	174	9.9	.99	11.33	17.12	---	---	---	---	---
71B	---	---	---	---	---	---	---	---	---	---	---	---
72A	6.2	53	64	.16	1.1	6.76	11.60	39.66	27.35	15.60	11.11	7.02
72B	6.4	8	8	5.9	2.7	8.62	9.62	---	27.41	---	---	7.77

Land Type No.	pH[1/]	P (PPM)	K (PPM)	Ca Meq/100g	Mg[2/] Meq/100g	Total Bases (Meq/100g)	CEC Meq/100g	Soil Water Bar Tension 0.1	0.33	1.0	5.0	15.0
73A	6.1	13	44	.11	2.1	7.31	10.96	---	---	---	---	---
73B	---	---	---	---	---	---	---	---	---	---	---	---
74A	5.1	7	232	3.7	2.9	7.19	14.8	36.20	29.19	24.74	19.71	14.73
74B	5.4	5	204	2.9	4.1	7.52	10.80	---	34.71	---	---	17.11
80A	---	---	---	---	---	---	---	---	---	---	---	---
80B	---	---	---	---	---	---	---	---	---	---	---	---
81A	6.5	17	174	5.3	14	19.48	27.73	---	---	---	---	---
81B												
82A	6.6	9	72	5.3	14	19.48	27.73	49.43	37.58	26.61	19.42	13.25
82B	6.8	7	44	1.6	11	12.71	16.83	---	35.82	---	---	14.27
90A	5.9	12	72	.9	.20	1.28	17.91	56.64	29.35	16.00	12.44	11.82
90B	---	---	---	---	---	---	---	---	---	---	---	---
91A	6.3	13	152	3.0	.36	3.75	15.25	---	---	---	---	---
91B	---	---	---	---	---	---	---	---	---	---	---	---
92A	6.0	10	60	.9	.20	1.25	13.28	48.97	26.87	16.76	13.36	12.48
92B	---	---	---	---	---	---	---	---	---	---	---	---
93A	6.0	9	208	4.7	.82	6.05	14.36	68.62	46.74	33.50	27.98	25.46
93B	---	---	---	---	---	---	---	---	38.99	---	---	20.93
94A	6.4	7	156	2.7	.36	3.46	14.56	60.54	31.43	19.42	13.58	11.64
94B	6.2	12	418	3.5	2.9	7.47	22.26	---	40.89	---	---	20.27
95A	---	---	---	---	---	---	---	---	---	---	---	---
95B	---	---	---	---	---	---	---	---	---	---	---	---
96A	6.0	9	164	2.9	.36	3.68	29.07	69.32	42.66	28.44	22.11	20.28
96B	---	---	---	---	---	---	---	---	---	---	---	---

Land Type No.	pH[1/]	P (PPM)	K (PPM)	Ca Meq/100g	Mg[2/] Meq/100g	Total Bases (Meq/100g)	CEC Meq/100g	Soil Water Bar Tension 0.1	0.33	1.0	5.0	15.0
97A	5.6	47	170	2.3	.25	2.98	10.75	---	---	---	---	---
97B	6.3	16	316	8.1	.46	9.37	15.55	---	---	---	---	---
98A	---	---	---	---	---	---	---	46.02	37.09	29.22	22.89	18.26
98B	6.1	12	268	7.40	2.50	10.58	20.48	---	35.87	---	---	17.74
99A	6.4	8	180	4.30	.69	5.45	30.10	---	---	---	---	---
99B	---	---	---	---	---	---	---	---	---	---	---	---

APPENDIX V

DEFINITIONS OF MANAGEMENT INTERPRETATIONS

A. MASS WASTING POTENTIALS

Following are the definitions and explanations used in Table 4.

Column 2 defines what type mass movement is to be expected on the various SRI landtypes on the Umpqua National Forest.

Columns 3, 4, 5 and 6 relate to the effect or impact of man's activities as expected in the Fish Habitat Management Policy, FSM 2600, Emergency Directive No. 2. The impact is expressed in terms of potential risk for causing mass wasting in amounts exceeding 10 cubic yards in a seven-year period. This is further defined by the fact that the 10 cubic yard mass must enter a water course. Wasted material that does not reach a water course is not considered in these ratings.

For comparison purposes probabilities for natural mass wasting to occur are given in Column 1.

The risk is expressed in terms of percent chance of causing the mass wasting failure within the seven-year period. The breakdown of the risk ratings is as follows:

Low Risk	-	Less than 25% chance
Moderate Risk	-	25% to 50% chance
High Risk	-	Greater than 50%

In order to determine the effect of man's activities for purposes of this rating system, the following activity categories are used:

1. Timber Removal

   a. Intermediate (nonregeneration) timber harvest systems (< 50% removal).

   b. Standard shelterwood regeneration harvest (50% to 70% removal).

   c. Standard clearcut regeneration harvest (>70% removal).

2. Logging Activity

   a. Intermediate Harvest - Includes all treatments which remove less vegetation than would be removed in a regeneration cut.

   b. Shelterwood regeneration harvest with varying methods of slash disposal.

   c. Standard, 20± acre clearcut; hi-lead system; broadcast slash.

3. The following definition was developed for Column 6, Table 4:

   Road Construction - Single lane, LUP road at less than 6 miles per square mile density.

4. Column 7 is the combined impact of clearcutting and road construction. This interpretation applies to areas where roads are constructed and adjacent clearcuts are harvested within the same seven-year period.

TABLE 4

MASS WASTING - LAND STABILITY

SRI Legend No.	(1) Natural Mass Wasting Potential	(2) Nature of Mass Movement	TIMBER REMOVAL - No Roads % Vegetation Removed (3) Less Than 50%	(4) 50-70% (HSH)	(5) Greater Than 70% (HCC)	ROAD CONSTRUCTION No Timber Removal (6) LUP Road Low Density	(7) Combined Impact of Clearcutting and Road Construction
1	Mod.	Rock fall	Mod.	Mod.	Mod.	High	High
2	Mod.	Rock fall	Mod.	Mod.	Mod.	High	High
3	Mod.		Mod.	Mod.	Mod.	Mod.	Mod.
4	Low	Talus slides, rock avalanches	Low	Low	Mod.	Mod.	Mod.
5	Low	Raveling	Low	Low	Low	Low	Mod.
6	Low		Low	Low	Low	Low	Low
7	Low		Low	Low	Low	Low	Low
8	Mod.	Debris slide, channel scour, slumps	Mod.	Mod.	Mod.	High	High
9	Mod.	Debris slides, channel scours, slumps	Mod.	Mod.	Mod.	Mod.	High
13	Low	Slumps, slides	Low	Low	Low	Low	Mod.
14	Low	Slumps, slides, landflows	Low	Low	Low	Low	Low
15	Low		Low	Low	Low	Low	Low
16	Low	Debris slides, channel scours	Low	Low	Low	Low	Mod.
18	Low	Slides, slumps	Low	Low	Low	Mod.	Mod.
19	Low	Slumps, slides, debris slides, channel scours	Low	Low	Low	Mod.	Mod.
20	Low	Landflows	Low	Low	Low	Low	Low
21	Mod.	Headwall failure, channel scours, raveling, slumps	Mod.	High	High	High	High
22	Low	Slumps, raveling, channel scour	Low	Low	Low	Mod.	Mod.
23	Low	Slumps, slides, channel scour	Mod.	Mod.	Mod.	Mod.	Mod.
24	Low	Slumps, slides	Low	Low	Low	Low	Mod.
25	Low	Landflows	Low	Low	Low	Low	Low
27	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
28	Low	Slumps, slides	Low	Low	Low	Low	Low
30	Low	Landflows	Low	Low	Low	Low	Low
31	Mod.	Channel scour, debris slides	Mod.	Mod.	Mod.	High	Mod.
32	Low	Slides, slumps	Low	Low	Mod.	Mod.	Mod.
33	Low	Slumps, slides	Mod.	Mod.	Mod.	Mod.	Mod.
34	Low		Low	Low	Low	Low	Low
35	Low	Landflows	Low	Low	Low	Low	Low
41	Mod.	Channel scours, debris slides	Mod.	Mod.	Mod.	Mod.	Mod.
42	Low	Slumps, slides, channel scours	Low	Low	Low	Low	Low
46	Mod.	Debris slides, channel scours, slumps, mod. failures	Mod.	Mod.	Mod.	High	High
47	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
51	Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	Mod.
52	Low	Slumps	Low	Low	Low	Low	Low
56	Low	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
57	Low	Slumps	Low	Low	Low	Low	Low
61	Mod.	Headwall failures, slumps, channel scours, raveling	High	High	High	High	High
62	Low	Slumps, slides, channel scours, raveling	Mod.	Mod.	Mod.	Mod.	Mod.
63	Low	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.
64	Low		Low	Low	Low	Low	Low
71	Mod.	Headwall failure, debris slides, channel scours, raveling	Mod.	High	High	High	High
72	Low	Slides, debris slides, channel scours	Low	Mod.	Mod.	Mod.	Mod.
73	Low	Slides, landflows	Mod.	Mod.	Mod.	Mod.	Mod.
74	Low		Low	Low	Low	Low	Mod.
80	Mod.		Mod.	Mod.	Mod.	Mod.	Mod.
81	Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	Mod.
82	Low	Slumps, debris slides	Mod.	Mod.	Mod.	Mod.	Mod.
90	Low		Low	Low	Low	Low	Low
91	Low	Channel scours, raveling	Low	Low	Low	Low	Low

(1) Mass Wasting Potential	(2) Nature of Mass Movement	TIMBER REMOVAL - No Roads % Vegetation Removed (3) Less Than 50%	(4) 50-70% (HSH)	(5) Greater Than 70% (HCC)	ROAD CONSTRUCTION No Timber Removal (6) LUP Road Low Density	(7) Combined Impact of Clearcutting and Road Construction
Low		Low	Low	Low	Low	Low
Low		Low	Low	Low	Low	Low
Low		Low	Low	Low	Low	Low
Low		Low	Low	Low	Low	Low
Low	Raveling, channel scours	Low	Low	Low	Low	Low
Low	Slumps, raveling	Low	Low	Low	Low	Low
Low	Slumps, channel scours, raveling	Low	Low	Low	Low	Mod.
Low		Low	Low	Low	Low	Mod.
Mod.	Slumps, debris slides, scouring	Low Mod.	Low Mod.	Low Mod.	Low Mod.	Low Mod.
Low	Slumps	Low	Low	Low	Low	Mod.
Low	Landflows, slumps	Low	Low	Low	Low	Mod.
Low	Slumps	Low	Low	Low	Low	Mod.
Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	High
Low	Streambank failures, slumps	Low	Low	Low	Low	Mod.
Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	High
Low	Landflows, debris slides, slumps	Low	Low	Low	Low	Mod.
Low	Slumps, scouring	Low	Low	Low	Low	Mod.
Low	Slumps	Low	Low	Low	Low	Mod.
Low	Slumps, slides, debris slides	Low	Low	Low	Low	Mod.
Low	Slides, landflows	Low	Low	Low	Low	Mod.
Mod.	Slides, debris slides, channel scours	Mod.	Mod.	Mod.	Low	High
Low	Slumps, debris slides	Low	Low	Low	Low	Mod.
Low	Slumps, debris slides, channel scours	Low	Low	Low	Low	Mod.
Low	Slumps	Low	Low	Low	Low	Mod.
Low	Slumps, slides, debris slides	Low	Low	Low	Low	Mod.
High	Slumps, slides	Low	Low	Low	Mod.	Mod.
Low	Channel scours, rockfalls	Low	Low	Low	Mod.	Mod.
Mod.	Slumps, slides, debris slides	Low	Low	Low	Low	Low
Low	Slumps, slides, debris slides, channel scours	Low	Low	Low	Low	Mod.
Low	Landflows	Low	Low	Low	Mod.	Mod.
High	Landflows	Low	Low	Low	Low	Low
Mod.	Landflows	Low	Low	Low	Low	Low
High	Channel scours, debris slides, raveling	Mod.	High	High	High	High
Mod.	Slides, debris slides, channel scours, raveling	Mod.	Mod.	High	High	High
Mod.	Slides, channel scours, raveling	Mod.	High	High	High	High
Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
Mod.	Slides, channel scours, raveling	Mod.	High	High	High	High
Low	Slides, landflows	Low	Low	Low	Low	Mod.
Mod.	Slides, channel scours, headwall failures, raveling	Mod.	Mod.	Mod.	Mod.	Mod.
Low	Slumps, slides, channel scours	Low	Low	Low	Mod.	Mod.
Low	Slumps, slides, channel scours	Low	Mod.	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Low	Low	Low	Mod.
Low	Slumps, slides, landflows	Low	Low	Low	Low	Mod.
Low	Slumps, slides, channel scours	Low	Low	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
Low	Slides, landflows	Low	Mod.	Mod.	Mod.	Mod.
Low	Debris slides, channel scours	Mod.	High	High	High	High
Low	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
Low	Slides, landflows, raveling	Low	Mod.	Mod.	Mod.	Mod.

	(1)	(2)	TIMBER REMOVAL - No Roads % Vegetation Removed (3)	(4)	(5)	ROAD CONSTRUCTION No Timber Removal (6)	(7)
SRI Legend No.	Mass Wasting Potential	Nature of Mass Movement	Less Than 50%	50-70% (HSH)	Greater Than 70% (HCC)	LUP Road Low Density	Combined Impact of Clearcutting and Road Construction
242	Low	Slumps, slides	Low	Low	Low	Low	Mod.
243	Low	Slumps, slides	Low	Low	Low	Low	Mod.
244	Low	Slumps, slides	Low	Low	Low	Low	Low
245	Low	Slides, landflows	Low	Low	Low	Low	Mod.
248	Low	Slumps, slides	Low	Low	Low	Low	Mod.
252	Low	Slumps, slides	Low	Low	Low	Low	Mod.
255	Low	Slumps, slides, landflows	Low	Low	Mod.	Mod.	Mod.
273	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
275	Low	Slides, landflows	Low	Low	Low	Low	Mod.
276	Low	Slides	Low	Low	Low	Mod.	Mod.
277	Low	Slumps, slides	Low	Low	Mod.	Mod.	Mod.
278	Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
280	Low	Slumps, slides	Low	Low	Low	Low	Low
282	Low	Slumps, slides	Low	Low	Low	Low	Mod.
284	Low	Slides, slumps	Low	Low	Low	Low	Mod.
285	Low	Landflows, slides	Low	Low	Low	Low	Mod.
305	Low	Landflows	Low	Low	Low	Low	Low
311	Mod.	Debris slides, channel scours, rockfalls	Mod.	Mod.	Mod.	High	High
312	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	High	High
313	Mod.	Debris slides, slumps, channel scours	Mod.	Mod.	Mod.	High	High
315	Mod.	Debris slides, slides, channel scours, landflows	Mod.	Mod.	Mod.	High	High
321	Mod.	Slides, slumps, debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
322	Low	Slides, slumps	Low	Low	Low	Mod.	Mod.
323	Low	Slides, slumps	Low	Mod.	Mod.	Mod.	Mod.
330	Low	Slides, landflows	Low	Low	Mod.	Mod.	Mod.
331	Mod.	Slumps, slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
332	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
333	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
335	Low	Slides, landflows	Low	Low	Mod.	Mod.	Mod.
336	Low	Slides, debris slides, channel scours	Low	Low	Mod.	Mod.	Mod.
342	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	High	High
344	Low	Slumps, slides	Low	Low	Low	Low	Low
351	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	High	High
352	Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
411	Mod.	Debris slides, channel scours, rockfalls	Mod.	Mod.	Mod.	High	High
412	Mod.	Debris slides, channel scours	Mod.	Mod.	High	High	High
413	Mod.	Debris slides, channel scours, slides	Mod.	Mod.	Mod.	Mod.	High
414	Mod.	Debris slides, channel scours, slides	Mod.	Mod.	Mod.	Mod.	High
415	Mod.	Debris slides, channel scours, slides, landflows	Mod.	Mod.	Mod.	Mod.	High
416	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
418	Mod.	Debris slides, channel scours, slides	Mod.	Mod.	Mod.	Mod.	High
421	Mod.	Slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
422	Low	Slumps, slides, channel scours, raveling	Low	Low	Low	Low	Mod.
423	Low	Slumps, slides, channel scours	Low	Low	Mod.	Mod.	Mod.
424	Low	Slumps, slides	Low	Low	Low	Low	Mod.
427	Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
428	Low	Slumps, slides	Low	Low	Low	Low	Mod.
432	Mod.	Debris slides, channel scours, rockfalls	Mod.	Mod.	Mod.	High	High
433	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	High	High
451	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
453	Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
461	Mod.	Debris slides, channel scours, slumps	Mod.	Mod.	Mod.	High	High

(1)	(2)	TIMBER REMOVAL - No Roads % Vegetation Removed (3)	(4)	(5)	ROAD CONSTRUCTION No Timber Removal (6)	(7)
Mass Wasting Potential	Nature of Mass Movement	Less Than 50%	50-70% (HSH)	Greater Than 70% (HCC)	LUP Road Low Density	Combined Impact of Clearcutting and Road Construction
Mod.	Debris slides, channel scours, slumps, rockfalls	Mod.	Mod.	High	High	High
Mod.	Debris slides, channel scours, slumps	Mod.	Mod.	Mod.	High	High
Mod.	Debris slides, channel scours, headwall failures	Mod.	Mod.	Mod.	High	High
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Low	Slumps, slides	Low	Low	Mod.	Mod.	Mod.
Mod.	Slumps, slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Low	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Low	Mod.	Mod.	Mod.
Mod.	Debris slides, channel scours, rockfalls	Mod.	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides, slides	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, slides	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Mod.	Slides, debris slides	Mod.	Mod.	Mod.	Mod.	High
Low	Slumps, slides	Low	Low	Low	Low	Mod.
Low	Slumps, slides, debris slides	High	Mod.	Mod.	Mod.	Mod.
Low	Slumps, slides	Low	Low	Low	Low	Mod.
Low	Slumps, slides, landflows	Low	Low	Low	Low	Mod.
Low	Slides, debris slides	Low	Low	Low	Low	Mod.
Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Low	Slumps, slides	Low	Low	Low	Mod.	Mod.
Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides, rockfalls	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, channel scours, rockfalls	Mod.	Mod.	Mod.	High	High
Mod.	Slides, debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	High
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	High	High
Mod.	Debris slides, rockfalls, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides, channel scours	Mod.	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides	Low	Mod.	Mod.	High	High
Mod.	Debris slides, slumps	Low	Mod.	Mod.	Mod.	Mod.
Mod.	Debris slides, slumps, channel scours	Low	Mod.	Mod.	Mod.	Mod.
Low	Slumps, debris slides	Low	Low	Low	Mod.	Mod.
Low	Slumps	Low	Low	Low	Low	Low
Low	Slumps, slides	Low	Low	Low	Low	Low
Mod.	Headwall failures, channel scours, raveling, slumps	High	High	High	Low	Mod.
Mod.	Headwall failures, channel scours, raveling, slumps	High	High	High	High	High
Low	Slumps, slides, headwall failures, channel scours, raveling	Mod.	Mod.	High	High	High
Low	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.
Mod.	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.
Low	Headwall failures, slumps, channel scours, raveling	Mod.	Mod.	High	High	High
Low	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.
	Slumps, slides, channel scours, raveling	Low	Mod.	Mod.	Mod.	Mod.

SRI Legend No.	(1) Mass Wasting Potential	(2) Nature of Mass Movement	TIMBER REMOVAL - No Roads % Vegetation Removed (3) Less Than 50%	(4) 50-70% (HSH)	(5) Greater Than 70% (HCC)	ROAD CONSTRUCTION No Timber Removal (6) LUP Road Low Density	(7) Combined Impacts of Clearcutting and Road Construction
712	Mod.	Debris slides, headwall failures, channel scours	Mod.	High	High	High	High
723	Low	Slides, slumps	Low	Mod.	Mod.	Mod.	Mod.
733	Low	Slides, slumps, debris slides	Low	Low	Mod.	Mod.	Mod.
801	Mod.	Rockfalls, debris slides	Low	Low	Low	Mod.	Mod.
810	Mod.	Debris slides, rockfalls	Mod.	Mod.	Mod.	Mod.	Mod.
812	Mod.	Debris slides, slumps, rockfalls	Mod.	Mod.	Mod.	Mod.	Mod.
821	Low	Slumps, debris slides, rockfalls	Mod.	Mod.	Mod.	Mod.	Mod.
823	Low	Slumps, slides	Low	Mod.	Mod.	Mod.	Mod.
901	Low		Low	Low	Low	Low	Low
902	Low		Low	Low	Low	Low	Low
904	Low		Low	Low	Low	Low	Low
906	Low		Low	Low	Low	Low	Low
911	Low	Channel scours, raveling, rockfalls	Low	Low	Low	Low	Mod.
916	Low	Debris slides, channel scours, raveling	Low	Low	Low	Low	Mod.
921	Low	Channel scours	Low	Low	Low	Low	Low
924	Low		Low	Low	Low	Low	Low
925	Low		Low	Low	Low	Low	Low
927	Low		Low	Low	Low	Low	Low
932	Low		Low	Low	Low	Low	Low
936	Low	Raveling, channel scours	Low	Low	Low	Low	Low
938	Low	Slumps, channel scours, raveling	Low	Low	Low	Low	Mod.
939	Low		Low	Low	Low	Low	Low
942	Low		Low	Low	Low	Low	Low
943	Low		Low	Low	Low	Low	Low
946	Low		Low	Low	Low	Low	Low
960	Low		Low	Low	Low	Low	Low
961	Low	Debris slides, channel scours, rockfalls	Low	Low	Low	Low	Low
962	Low		Low	Low	Low	Low	Low
964	Low		Low	Low	Low	Low	Low
966	Low	Debris slides, channel scours, raveling	Low	Low	Low	Low	Mod.
967	Low	Slumps, channel scours, raveling	Low	Low	Low	Low	Low
968	Low	Slumps, channel scours	Low	Low	Low	Low	Mod.
969	Low	Debris slides	Low	Low	Low	Low	Low
972	Low	Slumps, raveling	Low	Low	Low	Low	Mod.
976	Low	Slumps, channel scours, raveling	Low	Low	Low	Low	Mod.
980	Low	Slumps, channel scours, raveling	Low	Low	Low	Mod.	Mod.
986	Low	Slumps, channel scours, raveling	Low	Low	Low	Low	Mod.
987	Low	Slumps, channel scours, raveling	Low	Low	Low	Mod.	Mod.
988	Low	Slumps, channel scours, raveling	Low	Low	Low	Mod.	Mod.
989	Low	Slumps, debris slides, channel scours, raveling	Low	Low	Low	Low	Mod.
990	Low	Debris slides, raveling	Low	Low	Low	Low	Low
991	Low	Debris slides, channel scours, raveling	Low	Low	Low	Low	Mod.
992	Low		Low	Low	Low	Low	Low
996	Low	Debris slides, raveling	Low	Low	Low	Low	Low
998	Low	Debris slides, channel scours, raveling	Low	Low	Low	Low	Mod.

HYDROLOGIC CHARACTERISTICS

Surface Erosion Potential

These ratings indicate potential annual soil losses to stream systems as a result of surface erosion if there is no ground cover. Quantitative estimates were derived using the EROSON computer program. Data employed include: Percent of gravel and rock cover; horizon depth, textures, permeability, and detachability; slope steepness; maximum precipitation intensity (2 year - 30 minute storm). Estimates are based on the average slope steepness for each soil type. Ratings for SRI Landtypes 62, 63 and 64 are based on field evidence rather than the EROSON program, since the program output shows only a moderate surface erosion potential. These are soils derived from decomposed granites. Such soils exhibit the highest surface erosion rates on the Umpqua National Forest.

For complexes the ratings indicate the range of ratings for major SRI landtypes.

Rating	Maximum Potential Surface Erosion (Tons/Acre/Year)
Low	0-10
Moderate	10.1-25
High	25.1-40

Turbidity Hazard

This indicates the potentials of soils to discolor water and make it appear muddy. It is caused by suspension of soil particles in water. Soil particles which stay in suspension the longest have the highest turbidity hazard. There is a strong relationship between turbidity and clay content of soils, and this is the basis for the ratings given below. Since different types of clay have different turbidity characteristics, ratings given should be considered tentative. Turbidity dispersal analysis tests can better indicate turbidity characteristics of SRI landtypes. Ratings given herein are based on the percent clay content as shown by the laboratory tests (hydrometer) in this report. This data was interpolated to indicate the percent clay content. Extropolation was necessary for SRI landtypes for which no hydrometer analyses were made. Separate ratings were given for surface and subsoil layers because the laboratory tests indicate frequent and substantial differences.

For complexes the ratings indicate the range of ratings for major SRI landtypes.

Turbidity Hazard	Percent Clay
Low	0-5
Moderate	5.1-15
High	15.1-25
Very High	25.1-45
Extreme	45.1-60

Sediment Yield Potential

Ratings for sediment yield potential are given for natural, undisturbed conditions and for a post-conversion managed forest with a sustained yield harvest rotation of 80 years. Values for each SRI landtype were derived by extrapolation from values for Resource Analysis Units (RAU's) developed for the Forest Land Use Plan. RAU's group SRI landtypes which behave similarly.

Natural sedimentation rates are based on surface erosion rates using the EROSON computer program. Some of the values were compared with those on comparable soils where measurements have been made to ascertain that projected sedimentation rates are reasonable. For each SRI the natural sedimentation rate was determined by (1) calculating the maximum potential erosion for the typical slope steepness and (2) multiplying this value by a cover co-efficient thought to be representative for the SRI under undisturbed conditions. This procedure is viewed as a systematic means of estimating natural sedimentation rates, recognizing that it does not necessarily simulate natural erosion processes on the Umpqua National Forest. Soil mantle creep and more rapid mass movements are recognized as important natural erosion processes.

Sedimentation rates for the post-conversion managed forest include estimates of both surface erosion (EROSON program) and mass movement from roads and timber harvest units. Estimates are based on a number of assumptions, the most important of which are:

1. An average slope steepness was selected for each SRI landtype as a base for analyses.

2. Roads have been previously constructed, are spaced 880 feet apart, and are single lane. A low level of sedimentation continually occurs from these roads--occasional cut and fill slope failures, sheet erosion and raveling from cut and fill slopes, and erosion from road gravel surfacing (primarily by vehicular traffic).

3. Timber is harvested from each SRI landtype uniformly by clearcutting on an 80-year rotation. Seventy percent of the ground is assumed to be initially bared following harvest, declining to 30% for the second year. Thereafter, negligible surface erosion is produced except for two small one-year duration increases (20% of the ground bared) during commercial thinning operations each rotation. Landslips are accelerated following clearcutting. Resultant sedimentation rates are estimated from studies in or near the Umpqua National Forest.

Rating	Sedimentation Yield Potential (Tons/Acre/Year)
Low	0-0.15
Moderate	0.16-0.40
High	0.41-1.00
Very High	1.01-3.00

Annual Water Yield Increase Potential

Ratings are given for the potentials on each SRI type to increase annual water yield, assuming a treatment of clearcutting and broadcase burning. These estimates were made using the BURP computer program, which simulates the hydrologic cycle. Values for each SRI landtype were derived by extrapolation from values for Resource Analysis Units (RAU's) developed for the Forest Land Use Plan. RAU's group SRI landtypes which behave similarly. Input data includes: Depths and moisture holding capacities of each horizon in SRI profiles; depletable soil moisture (function of root depths and density); average monthly precipitation and temperatures; and percent of precipitation lost through interception. The Thornthwaite method was used to calculate potential evapotranspiration.

For comparison purposes annual precipitation was held constant for all SRI's at 55 inches per year. Temperatures were varied for high elevation versus average elevation SRI landtypes, but this was found to cause little difference in annual water yield for a given SRI landtype. Computed natural annual runoff rates vary between SRI landtypes from 24 to 31 inches per year.

The first year following clearcutting and slash burning annual runoff is shown to increase approximately 50%. However, natural revegetation typically occurs quickly. Annual water yield increases from clearcutting typically decrease at a logarithmic rate and return to natural levels in about 20 years. The average annual water yield increase for the 20-year period was estimated to be 22% of the initial increase, based on correlation with information given in the following publication: "Increases in Water Yield Following Clear-Cut Logging in the Pacific Northwest," Jack Rothacher, Water Resources Research Vol. 6, No. 2, April 1970.

On an 80-year rotation the average annual streamflow increase is 22% for 25% of the rotation, .22 X .25 = .055, thus the average annual increase is estimated to be 5.5% over the 80-year rotation.

Rating	Initial Annual Water Yield Increases (Inches/Year)
Low	11-12
Moderate	13-14
High	15

Water Yield Class

This interpretation is an indication of the rate and amount of water yield expected from each soil. It is based on factors such as texture, structure, infiltration rate, permeability, depth, slope, climate, vegetation and drainage patterns.

Class I - These soils have a high water detention storage capacity and a low rate of runoff. Little water is yielded to peak flows until detention storage capacity is exceeded or unless the soils are initially saturated or frozen. They are important in sustaining high base flow due to a relatively large volume of water held in detention storage.

Class II - These soils have a moderate water detention storage capacity and a moderate rate of runoff. Water contributes to both peak flows and base flows.

Class III - These soils have a low water detention storage capacity and a high rate of runoff. The storage capacity is low and easily exceeded with most of the water contributing to peak flow. Little water is yielded to sustain base flow.

Hydrologic Group

This interpretation is a grouping of soils into four classes, indicating the general infiltration and water movement ability of the soil and bedrock materials. This method of ratings has been developed by the Soil Conservation Service. The four groups are the standard SCS groupings and definitions.

Group A - Soils having high infiltration rates, when thoroughly wetted, consisting chiefly of deep, well to excessively drained sand and/or gravel. These soils have a high rate of water transmission and would result in a low runoff potential.

Group B - Soils having moderate infiltration rates when thoroughly wetted, consisting of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C - Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movement of water, or (2) soils with moderately fine to fine texture and slow infiltration rate. These soils have a slow rate of water transmission.

Group D - Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of (1) clay soils with high swelling potential, (2) soils with a high permanent water table, (3) soils with claypan or clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmissions.

Bedrock Hydrologic Characteristics

This interpretation indicates the relative capacity of bedrock to store and transmit water. The rating is based on bedrock kind, texture, type and extent of fracturing, frequency of jointing, bedrock characteristics, and degree of weathering.

Class I - This indicates that the bedrock has a relatively high capacity to store water. The water transmission rate is low unless the storage capacity is exceeded. Rocks in this class include sandstone because of their texture, fracture and bedding characteristics, and basalt where water occurs in large tubes and other cavities or in the inter-flow zone between successive lava flows.

Class II - This indicates that the bedrock has a moderate capacity to store water. The rate of water transmission is moderate. Rocks in this class are generally hard to moderately hard, moderately fine textured, and moderately to highly fractured siltstone, mudstone, pyroclastics, argillite, and schist.

Class III - This indicates that the bedrock has a relatively low capacity to store water. The rate of water transmission is rapid. Rocks in this class are fractured coarse crystalline (i.e., granite, gabbro, and gneiss) and other hard-fractured rocks such as a conglomerate.

Class IV - This indicates that the bedrock has both low storage capacity and low rate of water transmission. Rocks in this case are generally highly weathered, fine textured, and lack open fracture channels.

Variable - Having qualities that meet two or more classes.

N/A - Not applicable.

TABLE 5

HYDROLOGIC AND EROSION POTENTIALS

SRI Legend No.	(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
1	Low	Low	Low	Low	Low	Low	III	D	I
2	Low	Low	Low	Low	Low	Low	III	D	II
3	Mod.	NR	NR	Mod.	Low	Mod.	II	C-D	I, II
4	Low	Low	Low	Low	Low	Mod.	II	A-C	I
5	Low	Low	Low	Mod.	Low	Low	II	A	I
6	Mod.	NR	NR	Mod.	Low	Low	I	D	I-IV
7	Low	NR	NR	Low	Low	Low	II	B-D	I, II
8	Mod.	NR	NR	High	Low	Mod.	II	C-D	II
9	Mod.	NR	NR	High	Low	Mod.	II	C-D	I, II
13	Low	Very High	Low	Mod.	Low	Mod.	I	C	I, II
14	Mod.	Mod.	Very High	Mod.	Low	Mod.	I	D	I, II
15	Low	Low	Low	Low	Low	Mod.	I	A-D	I, II, III
16	Low	Low	Mod.	Mod.	Low	Mod.	I-III	C	I, II
18	Low	Mod.	High	Mod.	Low	Mod.	I	C	I, II
19	Low	Low	Low	Mod.	Low	Mod.	I	C	I, II
20	Low	Mod.	Mod.	Mod.	Low	Low	II	C	IV
21	High	Mod.	Mod.	High	Mod.	Low	II	C	IV
22	Low	Mod.	Very High	Mod.	Mod.	Low	II	C	IV
23	Mod.	Mod.	Very High	Mod.	Low	Mod.	I	B	I, II
24	Low	Low	Very High	Mod.	Low	Low	I	C	N/A
25	Mod.	Mod.	Very High	Mod.	Low	Mod.	I	C	II, IV
27	Mod.	Very High	Very High	Mod.	Mod.	Low	II	D	IV
28	Mod.	Mod.	Very High	Mod.	Low	Low	I	D	IV
30	Low	Mod.	Mod.	Mod.	Low	Mod.	III	D	II
31	High	Low	Low	High	Mod.	Low	II	C	II
32	Mod.	Mod.	Mod.	Mod.	Low	Low	II	C	IV
33	Low	Mod.	Mod.	Mod.	Low	Low	I	C	II
34	Mod.	Mod.	Very High	Mod.	Low	Mod.	I	C-D	N/A
35	High	Mod.	Very High	Mod.	Low	Mod.	III	C-D	II
41	Mod.	Mod.	Mod.	High	Mod.	Low	II	C	II
42	Mod.	Low	Mod.	Mod.	Low	Low	III	C-D	II
46	Mod.	Mod.	Mod.	High	Low	Low	II	C	II-IV
47	Low	Mod.	High	Mod.	Low	Mod.	III	D	I
51	Mod.	Low	Mod.	High	Mod.	Low	II	C	I
52	Low	High	High	Mod.	Low	Low	II	D	I
56	Low	Low	Low	Mod.	Low	Low	I	C	I
57	Low	Low	Low	Very High	Mod.	Low	III	D	I
61	High	Low	Low	High	Low	Low	II	C	III
62	High	Mod.	High	High	Low	Low	II	C	III
63	High	Mod.	Mod.	Mod.	Low	Low	I	C	III
64	High	Mod.	High	High	Mod.	Low	III	D	II
71	High	Low	Low	Mod.	Low	Low	II	C	II
72	Mod.	Low	Low	Mod.	Low	Low	II	C	II
73	Mod.	Mod.	High	Mod.	Low	Low	I	B	II
74	Mod.	High	High	High	Mod.	Low	III	D	II
80	Mod.	Low	Mod.	High	Mod.	Low	II	D	II
81	High	Low	Mod.	Mod.	Low	Low	II	D	II
82	High	Mod.	Mod.	Low	Low	Low	I	A	N/A
90	Low	Low	Low	Mod.	Low	Low	I	A	N/A
91	Low	Low	Low	Low	Low	Low	I	A	N/A
92	Low	Low	Low	Mod.	Low	Low	I	B	I
93	Low	Low	Low	Low	Low	Low	I	C	N/A
94	Low	Low	Extreme	Low	Low	Low	III	D	N/A
95	Low	Low	Low	Mod.	Low	Mod.	I	B-D	I
96	Low	Low	Low	Mod.	Low	Mod.	I	C	II
97	Mod.	Low	Low	Mod.	Low	Mod.	I	C	I, II
98	Low	Low	Mod.	Mod.	Low	Mod.	I	C	I
99	Low	Low	Low	Mod.	Low	Mod.	I	C	I, II
131	Low to Mod.	Low to Very High	Low to Mod.	Mod.	Low	Low to Mod.	I-III	C, D	II
132	Low to Mod.	Low to Very High	Low to Mod.	Mod.	Low	Low to Mod.	I	C	I
135	Low to Mod.	Mod. to Very High	Low to Very High	Mod.	Low	Low to Mod.	I	C	I

(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
Low	High to Very High	Low to High	Mod.	Low	Mod.	I-II	C	I
Low to Mod.	Low	Low to Mod.	Mod.	Low	Low	III	D	I
Low	Low to Very High	Low	Low	Low	Mod.	I-III	A-D	N/A
Low	Low	Low	Mod.	Low	Low	III	D	I
Low to Mod.	Low	Mod.	High	Low	Low to Mod.	I-III	C, D	I
Low to Mod.	Low to Mod.	Mod. to Very High	Mod.	Low	Mod.	I	C	I
Low	Mod. to High	High	Mod.	Low	Mod.	I-II	C	I
Low	Low to Mod.	Low to Mod.	Mod.	Low	Mod.	I	B-C	I, II
Low	Low to Mod.	High to Very High	Mod.	Low	Mod.	I	B-C	I, II
Low to Mod.	Mod.	High to Very High	Mod.	Low	Mod.	I	C	II, IV
Low to Mod.	Mod.	Mod. to High	Mod.	Low	Low to Mod.	I, III	C, D	II
Low	Low to Mod.	Low to High	Mod.	Low	Low to Mod.	I	C	I
Low	Low to Mod.	Mod. to High	Mod.	Low	Mod.	I	C	I, II
Low	Low to Mod.	High to Extreme	Mod.	Low	Mod. to High	I	C	I, II
Low to Mod.	Low	Low	Mod.	Low	Mod.	I	C	I, II
Low to Mod.	NR	NR	Mod.	Low	Low to Mod.	I-III	C, D	I, II
Low	Low	Low	Low	Low	Low to Mod.	III	D	I
Low	Low	Low	Mod.	Low	Low to Mod.	I	C	I
Low	Low to Mod.	Low to Mod.	Mod.	Low	Mod.	I	C	I, II
Low to Mod.	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	I	D	IV
Low to Mod.	NR	NR	Mod.	Low	Low	I-III	D	IV
Mod.	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	I	D	IV
Mod. to High	Mod.	Mod.	High	Mod.	Low to Mod.	II-III	C	II, IV
Mod. to High	Low to Mod.	Mod.	High	Mod.	Mod.	II	C	II, IV
Mod. to High	Mod.	Mod. to Very High	High	Mod.	Mod.	II	C	IV
Mod.	Mod.	Very High	Mod.	Mod.	Mod.	I-II	C, D	II, IV
Mod. to High	Mod.	Mod. to Very High	High	Mod.	Mod.	I-II	C, D	IV
Low	Mod.	Mod. to Very High	Mod.	Low	Low	II	C, D	IV
Low to High	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	IV
Low to Mod.	Low to Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	II, IV
Low	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	IV
Low	Low to Mod.	Very High	Mod.	Low	Low to Mod.	I-II	C	II, IV
Low to Mod.	Mod.	Very High	Mod.	Low	Low to Mod.	I-II	C, D	IV
Low	Mod.	High to Very High	Mod.	Low	Low to Mod.	II	C, D	IV
Low	Mod.	High to Very High	Mod.	Low	Low to Mod.	I-II	C	II, IV

SRI Legend No.	(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
230	Low to Mod.	Mod.	Mod. to Very High	Mod.	Mod.	Low to Mod.	I-II	C, D	IV
231	Mod. to High	Low to Mod.	Low to Mod.	Mod.	Mod.	Low to Mod.	III	C, D	II, IV
232	Low to Mod.	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	IV
233	Low to Mod.	Mod.	Mod. to Very High	Mod.	Low	Mod.	II	C	IV
234	Low to Mod.	Low to Mod.	Very High	Mod.	Low	Mod.	I-II	B-C	II-IV
235	Mod.	Mod.	Very High	Mod.	Mod.	Mod.	I-II	C	IV
242	Low	Low to Mod.	Very High	Mod.	Low	Low to Mod.	I	B-D	II-IV
243	Low	Low to	Low to Very High	Mod. Very High	Low	Mod.	I	B-C	I-II
244	Low to Mod.	Low to Mod.	Very High	Mod.	Low	Mod.	I	B-D	I-II
245	Low to Mod.	Low to Mod.	Very High	Mod.	Low	Mod.	I	B-C	I-II-IV
248	Low	Low to Mod.	High to Very High	Mod.	Low	Mod.	I	B	I-II
252	Low	Low to High	High to Very High	Mod.	Low	Mod.	I, II	B-C	I
255	Low to High	Low to Mod.	Mod. to Very High	Mod.	Low	Mod.	I, II	B-C	II-IV
273	Low to Mod.	Mod. to Very High	Mod. to Very High	Mod.	Low	Mod.	II	C	IV
275	Mod.	Mod. to Very High	Very High	Mod.	Mod.	Mod.	II	C	IV
276	Mod.	NR	NR	Mod.	Mod.	Low to Mod.	II-III	C-D	II, IV
277	Low to Mod.	Mod. to Very High	High to Very High	Mod.	Low	Mod. to High	II	C	II-IV
278	Low to Mod.	Mod. to Very High	High to Very High	Mod.	Low	Mod.	I-II	C	II
280	Low to Mod.	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	I	D	IV
282	Low to Mod.	Mod. to High	High to Very High	Mod.	Low	Mod.	I-II	C-D	I, IV
284	Low to Mod.	Low to Mod.	Very High	Mod.	Low	Mod.	I	C-D	II, IV
285	Mod.	Mod.	Very High	Mod.	Low	Mod.	I	C-D	IV
305	Low to High	Mod.	Mod. to Very High	Mod.	Low	Mod.	I	C-D	IV
311	Mod. to High	Low to Mod.	Low to Mod.	High	Mod.	Low	III	C-D	II
312	Mod. to High	Low to Mod.	Low to Mod.	High	Low	Low to Mod.	II-III	C-D	II
313	Low to High	Low to Mod.	Low to Mod.	Mod.	Low	Low to Mod.	II-III	C-D	II
315	High	Low to Mod.	Low to Very High	High	Low	Low to Mod.	II-I	D	II
321	Mod. to High	Low to Mod.	Low to Mod.	Mod.	Low	Low to Mod.	II-III	C	II
322	Mod.	Low to Mod.	Mod.	Mod.	Low	Mod.	II	C	II
323	Low to Mod.	Mod.	Mod.	Mod.	Low	Mod.	II	C	II, IV
330	Low	Mod.	Mod.	Mod.	Low	Mod.	II	C-D	IV
331	Low to High	Low to Mod.	Low to Mod.	Mod.	Low	Low to Mod.	II-III	C-D	II, IV
332	Low	Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	II, IV
333	Low to Mod.	Mod.	Mod. to Very High	Mod.	Low	Mod.	II	C	IV
335	Low to High	Mod.	Mod. to Very High	Mod.	Low	Mod.	I-II	C	II, IV
336	Low	Low to Mod.	Mod.	Mod.	Low	Mod.	I-II	C	II

(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
Mod. to High	Low to Mod.	Low to Mod.	High	Mod.	Low to Mod.	III	C, D	II, IV
Low to Mod.	Low to Mod.	Very High	Mod.	Low	Mod.	I	B	II
Mod. to High	Low	Low to Mod.	High	Mod.	Low	III	D	I, II
Low to Mod.	Mod. to High	Mod. to High	Mod.	Low	Mod.	II	C	I, II
Mod. to High	Low to Mod.	Low to Mod.	High	Mod.	Low	III	D	II
Mod. to High	Mod.	Mod.	High	Mod.	Low to Mod.	II-III	C, D	II, IV
Low to Mod.	Low to Mod.	Mod. to High	Mod.	Low	Low to Mod.	II-III	C, D	II
Mod.	Low to Mod.	Mod.	High	Low	Low to Mod.	II-III	C, D	II
Mod.	Low to Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	III-I	C	II, IV
Low to Mod.	Low to Mod.	Mod.	High	Low	Low to Mod.	III-I	D	I, II
Low to Mod.	Low to Mod.	Mod. to High	Mod.	Low	Low to Mod.	III-I-II	C, D	II
Mod.	Low to Mod.	Mod.	Mod.	Low	Low to Mod.	II-III	C, D	II
Low to Mod.	Low to Mod.	Mod. to Very High	Mod.	Low	Low to Mod.	II	C	II, IV
Mod.	Low to Mod.	Mod. to Very High	Mod.		Mod.	II	C	II, IV
Low to Mod.	Low	Mod. to Very High	Mod.		Mod.	I-II	B, C	II
Mod.	Low to Very High	Mod. to High	Mod.		Mod.	II	C	II, IV
Low to Mod.	Low to Mod.	Mod. to High	Mod.		Low	III	D	II
Low to High	Low to Mod.	Low to Mod.	Mod.	Low	Low to Mod.	III-I	C	II
Low to High	Low to Very High	Low to Mod.	High	Low	Low to Mod.	III-I	D	I, II
Mod.	Low to Mod.	Mod.	High	Mod.	Low	III	D	I, II
Low to Mod.	Low to Mod.	Low to Mod.	Mod.	Low	Low	III	D	II
Mod. to High	Low to Mod.	Low to Mod.	High	Low	Low	III	D	II
Mod. to High	Low to Mod.	Low to Mod.	High	Low	Low to Mod.	III	D	I, II, IV
Low to Mod.	Low to Mod.	Low to Mod.	High	Low	Low	III	D	I, II
Low to Mod.	Mod.	Mod. to High	Mod.	Low	Low to High	II-III	C, D	II
Low to Mod.	Mod.	Mod. to High	Mod.	Low	Low to Mod.	III-I	C	II
Low to Mod.	Mod.	Mod. to High	Mod.	Low	Mod. to High	II	C	II
Low to Mod.	Mod.	Mod. to High	Mod.	Low	Low to High	II-III	C, D	II
Low to Mod.	Mod. to Very High	High to Very High	Mod.	Low	Mod. to High	II	C	II, IV
Low	Mod.	High	Mod.	Low	Mod. to High	I-II	C	II
Low to Mod.	Low	Low to Mod.	Mod.	Low	Low	III	D	I
Low to Mod.	Low to High	Mod. to High	High	Low	Low to Mod.	II-III	C, D	I

SRI Legend No.	(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
513	Low to Mod.	Low to Very High	Low to High	Mod.	Low	Low to Mod.	I-III	C, D	I
516	Low to Mod.	Low	Mod.	High	Low	Low to Mod.	III-I	C, D	I
517	Low to Mod.	NR	NR	Mod.	Low	Low	III	D	I
518	Low to Mod.	Low to Mod.	Mod. to High	High	Low	Low to Mod.	III-I	C, D	I
521	Low to Mod.	Low to High	Mod. to High	Mod.	Low	Low to Mod.	II-III	C, D	I
522	Low to Mod.	Low to High	Mod. to High	Mod.	Low	Mod.	II	C	I, II
523	Low to Mod.	Low to Very High	Low to High	Mod.	Low	Low to Mod.	II-III	C, D	I
524	Low	Low to High	High to Very High	Mod.	Low	Mod.	I-II	B, C	I
525	Low to Mod.	Low to High	Mod. to Very High	Mod.	Low	Mod.	I-II	C, D	I, II
526	Low	Low to High	Mod. to High	Mod.	Low	Mod.	I-II	C	I
527	Low	Mod. to High	High	Mod.	Low	Mod. to High	II	C	I, II
531	Mod. to High	Low to Mod.	Low to Mod.	High	Mod.	Low	III	D	I, II
532	Low to Mod.	Mod. to High	Mod. to High	Mod.	Low	Mod.	II	C	I, II
533	Low	Mod. to High	Mod. to High	Mod.	Low	Mod.	II	C	I, II
541	Low to Mod.	Low to Mod.	Low to Mod.	Mod.	Low	Low	III	D	I, II
542	Low to Mod.	Low to Mod.	Low to Mod.	Mod.	Low	Low	III	D	I, II
543	Low to Mod.	Low to Very High	Low to High	Mod.	Low	Low to Mod.	II-III	C, D	I, II
546	Mod.	Low to Mod.	Mod.	High	Low	Low	III	D	I, II
561	Low	Low	Low	Mod.	Low	Low	III	D	I
563	Low to High	Low	Low	High	Low	Low	III	D	I, II
564	Low to Mod.	Low to Mod.	Low to Mod.	High	Low	Low	III	D	I, II
566	Low	Low to Mod.	Low to High	Mod.	Low	Low to High	III	D	I, II
567	Low	Low	Low	Mod.	Low	Low	II-III	C, D	I
568	Low	Low to Mod.	Low to High	Mod.	Low	Low to Mod.	III-I	C, D	I
569	Low	Low	Low	Mod.	Low	Low to Mod.	III-I	C, D	I
576	Low to Mod.	NR	NR	Mod.	Low	Low	II-III	C, D	I
577	Low	NR	NR	Mod.	Low	Low	II	C	I
578	Low	Low to Mod.	Low to High	Mod.	Low	Low to Mod.	I	C	I
612	High	Low to Mod.	Low to High	Very High	Mod.	Low to Mod.	II-III	C, D	III
617	High	Low	Low	Very High	Mod.	Low	III	C	II, III
621	High	Low to Mod.	Low to High	Very High	Mod.	Low to Mod.	II-III	C, D	III
623	High	Mod.	Mod. to High	High	Low	Mod.	II	C	III
624	High	Mod.	High	High	Low	Mod.	I	B, C	III
631	High	Low to Mod.	Low to High	Very High	Mod.	Low to Mod.	II-III	C, D	III
634	High	Mod.	Mod. to High	High	Mod.	Mod.	I-II	B, C	III
673	Mod. to High	Mod.	High	High	Low	Mod.	II	C	II, III
712	Mod. to High	Low	Low	Mod.	Mod.	Low to Mod.	II-III	C, D	II

(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristics
Mod. to High	Low to Mod.	Low to High	Mod.	Low	Mod.	II	C	II
Mod.	Mod.	Mod. to High	Mod.	Low	Mod.	II	C	II
Mod. to High	Low	Mod.	High	Mod.	Low	III	D	II
Mod. to High	Low	Mod.	High	Mod.	Low	II	D	II
High	Low to Mod.	Mod.	High	Mod.	Low to Mod.	II	D	II
High	Low to Mod.	Mod.	High	Mod.	Low to Mod.	II	D	II
Mod. to High	Mod.	Mod. to Very High	Mod.	Low	Mod.	II	C, D	II
Low	Low	Low	Mod.	Low	Low to Mod.	I	A	N/A
Low	Low	Low	Low	Low	Low to Mod.	I	A	N/A
Low	Low	Low	Low	Low	Low to Mod.	I	A-D	I
Low	Low	Low	Low	Low	Low to Mod.	I	A-D	I
Low	Low	Low	Mod.	Low	Low to Mod.	I	A	I
Low	Low	Low	Mod.	Low	Mod.	I	A-D	I
Low	Low	Low	Mod.	Low	Mod.	I	A	N/A
Low	Low	Low to Extreme	Low	Low	Mod. to High	I	A	N/A
Low	NR	NR	Low	Low	Mod.	I-III	A-D	N/A
Low	Low	Low	Mod.	Low	Low to Mod.	I	A,C,D	I
Low	Low	Low	Mod.	Low	Mod.	I	A	I
Low	Low	Low	Mod.	Low	Mod.	I	A-D	I
Low	Low	Low to Extreme	Mod.	Low	Mod.	I	A, B	I, II
Low	Low	Low to Extreme	Low	Low	Mod. to High	I	A, B	N/A
Low	Low	Low to Extreme	Mod.	Low	Mod. to High	I	A, B	N/A
Low	Low	Low to Extreme	Mod.	Low	High	I	B,C-D	I
Low	Low	Low	Mod.	Low	Low to Mod.	I	A,C-D	I
Low	Low	Low	Mod.	Low	Low to Mod.	I	C, D	I
Low	Low	Low to Extreme	Mod.	Low	Mod.	I	A,C-D	I
Low	Low	Low	Mod.	Low	Mod. to High	I	B,C-D	I
Low	NR	NR	Mod.	Low	Low to Mod.	I	C, D	I
Low	Low	Low to Mod.	Mod.	Low	Low to Mod.	I	B,C-D	I, II
Low	Low	Low	Mod.	Low	Mod.	I	B,C-D	I
Low to Mod.	Low	Low	Mod.	Low	Mod.	I	A,C-D	I
Low to Mod.	Low	Low	Mod.	Low	Mod.	I	A, B	II
Low to Mod.	Low	Low	Mod.	Low	Mod.	I	B,C-D	I, II
Low to Mod.	NR	NR	Mod.	Low	Low to Mod.	I	B, D	I, II
Low	Low	Low to Mod.	Mod.	Low	Mod.	I	B,C-D	I
Low to Mod.	Low	Low to Mod.	Mod.	Low	Mod.	I	B	I, II
Low	Low to Mod.	Mod. to High	Mod.	Low	Mod.	I	B, C	I, II

SRI Legend No.	(1) Surface Erosion Potential	(2) Turbidity Hazard Surface Layer	(3) Turbidity Hazard Subsurface Layer	(4) Sediment Yield Potential Acceler.	(5) Sediment Yield Potential Natural	(6) Annual Water Yield Increase Potential	(7) Water Yield Class	(8) Hydrologic Group	(9) Bedrock Hydrologic Characteristic
989	Low	Low	Low to Mod.	Mod.	Low	Mod.	I	A, B	I
990	Low	Low	Low	Mod.	Low	Low to Mod.	I	A,C-D	I
991	Low	Low	Low	Mod.	Low	Mod.	I	A,C-D	I
992	Low	Low	Low	Low	Low	Mod.	I	A	I
996	Low	Low	Low	Mod.	Low	Mod.	I	A,C-D	I
998	Low	Low	Low to Mod.	Mod.	Low	Mod.	I	A,B	I

C. TIMBER

Table 6 presents the interpretation for timber. It is separated into two basic sections; namely, regeneration and harvest. The table is designed to allow maximum flexibility for the silviculturalist.

Following are the definitions and quantifications of the column headings and corresponding ratings exhibited in Table 6. The ratings are estimated unless otherwise indicated. The estimates are based on professional expertise coupled with field observations.

REGENERATION

Survival

Survival, as used in this context refers to the estimated number of trees remaining, in a viable condition, within five years of completion of the timber harvest. For purposes of this table, the survival ratings are based on stocking of 400 to 450 trees per acre or 10 x 10 spacing.

Many factors influence regeneration survival. This table attempts only to rate the relative potential of the various soil types to support regeneration effects. To some degree, climatic influences are incorporated in the SRI landtypes as expressed in the elevation ranges shown in the landtype descriptions. However, an important variable, aspect, is not considered. Aspect may influence the ratings on a localized basis.

Two harvest systems are rated for survival; namely, shelterwood and clearcut. No consideration is given to species selection, harvest system or treatment of slash.

Shelterwood - The term "shelterwood," as used in this table, refers to a uniform or compartment shelterwood which allows for an entire stand to be treated at one time. An assumption is made the treatment will leave a relatively uniform distribution of 10 to 12 trees per acre.

Clearcut - Removal of all merchantable trees from the site.

Following are the numerical ratings and corresponding quantifications:

Rating	No. of Trees Surviving/Acre
Very High	Greater than 50%
High	40%
Moderate	30%
Low	20%
Very Low	10%

Fertilizer Retention

Fertilizer retention in a soil is a very complex process. No attempt has been made, for purposes of this interpretation, to completely and entirely

analyze the ability of each soil to take up and retain applied fertilizer. However, one very important and influential variable has been explored and tested. It is the Cation Exchange Capacity of the soils. CEC has proven to be a useful indicator of soil nutrient capacity. CEC is generally positively correlated with site fertility although it is recognized that other factors also have an influence on productivity.

A model, or typical soil profile, has been identified, in the field, for each SRI landtype. Samples have been collected from the surface and subsoil of each site location. These samples have been analyzed for fertility levels at the Oregon State Soil Testing Laboratory. One element of the fertility analysis is the Cation Exchange Capacity, expressed in terms of meq/100 grams of soil.

The prediction for fertilizer retention is based entirely on the results of testing programs. Quantification of the ratings is shown below.

Rating	CEC (meq/100 grams)
Very Low	10.0 or less
Low	10.1 - 30.0
Moderate	30.1 - 40.0
High	40.1 - 50.0
Very High	Greater than 50.0

Site Class

These ratings categorize each SRI landtype into a potential cubic-foot site class for Douglas-fir. The ratings indicated are estimates based on soil characteristics, climatic variances, previous site index measurements and personal observations. The ratings reflect the soil-site potential under managed circumstances.

The site class quantifications shown below are taken from the published Site Index tables for Douglas-fir.

Rating (Cu.Ft. Site Class)	Site Index Range
Very High	170 - 200
High	130 - 160
Moderate	110 - 120
Low	70 - 100
Very Low	60

Grass, Forbs and Brush Competition

Brush, forbs and grass are deterrents to successful regeneration efforts. The most significant impact of brush and grass is the uptake of moisture which would normally be used by tree seedlings. Brush typically suppresses young tree growth as far as depletion of moisture status.

As a general rule, a fertile site for tree growth is also a fertile site for grass, sod, and brush. However, in the proper site preparation, the trees should be expected to compete and even outgrow the competition.

Two columns have been established to reflect the different consequences resulting from either grass or brush competition. Heavy grass and forbs may result in tree mortality and loss of stocking levels.

Following are the relative ratings and corresponding quantifications.

Grass and Forbs - This rating is expressed in terms of expected mortality within two years of planting.

Rating	Mortality
Very High	50%
High	40%
Moderate	30%
Low	20%
Very Low	10%

Forbs and Brush - This rating expresses the suppression effects of forbs and brush competition in terms of years normal growth is retarded:

Rating	Growth Retardation (Years)
Very High	Less than 1
High	2 - 5
Moderate	6 - 10
Low	10 - 15
Very Low	Greater than 15

The above ratings express the estimated relationship of soil-type growth-competition. For example, a productive site may exhibit a relatively heavy grass cover; however, if the tree seedling is well established, it may outgrow the detrimental effects of the grass competition. The subsequent rating would be low. Conversely, on a poor site a small amount may have a serious effect on a struggling seedling. Factors such as soil moisture and climatic influence are considered.

Windthrow Hazard

Windthrow hazard is an important consideration when prescribing shelterwood harvest systems. It is especially true with timber species such as Douglas-fir which is characterized by a shallow, laterally extending root system. In contrast, some species (pines) exhibit a deep penetrating tap root system.

Windthrow hazard is most applicable in soils which possess a dense, high clay content subsoil, or a very shallow soil. Water tables and rock also play roles in developing potential windthrow conditions.

This rating is intended for mature trees. However, consideration of the hazard is important when developing silvicultural prescriptions for an entire rotation.

Following are the ratings for windthrow hazard. Quantification is expressed in terms of an estimated number of trees likely to blow down in a shelter-

wood unit during winds exceeding 50 miles per hour. These ratings are intended only to rate the relative potential of each SRI landtype.

Rating	No. of Expected Blowdown (Trees/Acre)
Very Low	0 - 1
Low	2 - 3
Moderate	4 - 5
High	6 - 10
Very High	More than 10

Since this is rated for a shelterwood condition (10 to 15 leave trees per acre), the probabilities of the blowdown occurring in a dense, fully stocked, mature stand would be reduced.

Frost Heave Hazard

Frost heaving is recognized to be very damaging to young seedlings, especially within two years of planting. The damage is typically the result of frost uplifting the young seedlings and tearing the roots. The end result is generally mortality. As with most hazards affecting development of seedlings, conditions causing frost heaving are quite variable. In addition to soil properties, landscape position, slope, and air drainage patterns are factors which influence frost action.

For purposes of this interpretation, primary consideration in rating frost heave potential was given to SRI landtype characteristics. They include soil characteristics, landscape position, and slope. The soil characteristics are expressed in terms of surface texture, structure, permeability, and presence of seasonal water table.

The ratings indicated express the estimated hazard in terms of number of trees expected to be lost from frost heave damage, per acre, in the first two years of planting.

Rating	Mortality (Trees/Acre in Two Years)
Very Low	10%
Low	20%
Moderate	30%
High	40%
Very High	50%

Topographic Limitations

The intent of this section is to acquaint the logging engineer or logging planner with the typical topographic conditions for each SRI landtype. As with other columns in this table, it is accomplished by assigning a rating to each landtype. The rating ranges from 1 to 5 with 1 presenting few limitations and 5 possessing critical limiting factors.

The ratings are to be used as a guide and only for planning purposes.

Topographic limitations have been separated into two categories; namely, slope degree and slope shape. These separations are explained and quantified below.

Slope Degree - Five slope classes have been established. They are identical to the classes established stability risk computations (Table 1) and the TOPAS computer program. The classes include:

Rating	Slope Classes (%)
Very Low	Less than 10
Low	10 - 35
Moderate	36 - 50
High	51 - 70
Very High	Greater than 70

Slope Shape - Five classes have been established for slope shapes. Each separation is made on the basis of increasing complexities or increased limiting effects. The descriptions of each class indicate the typical condition for each landtype.

Rating	Slope Shape Descriptions
Very Low	Flat terrain.
Low	Predominately single slopes.
Moderate	Predominately complex slopes.
High	Single slopes (concave) with incised cross drainages or pressure ridges.
Very High	Complex slopes (convex and concave) with incised cross drainages.

Compaction Susceptibility

The compaction susceptibility ratings are the direct results of the moisture-density curve which is determined from the Standard Procter Test. This yields the maximum density of a soil type as related to a given weight, which has been applied to a soil at a certain moisture percentage.

The Procter Test densities which are measured in pound per cubic foot were converted to grams per cubic centimeter.

Following are the quantification of each compaction class rating:

Rating	Density Range (Grams Per Cubic Centimeter)
Very Low	0.80 - 1.10
Low	1.11 - 1.30
Moderate	1.31 - 1.40
High	1.41 - 1.50
Very High	1.51 - 1.60

Puddling Susceptibility

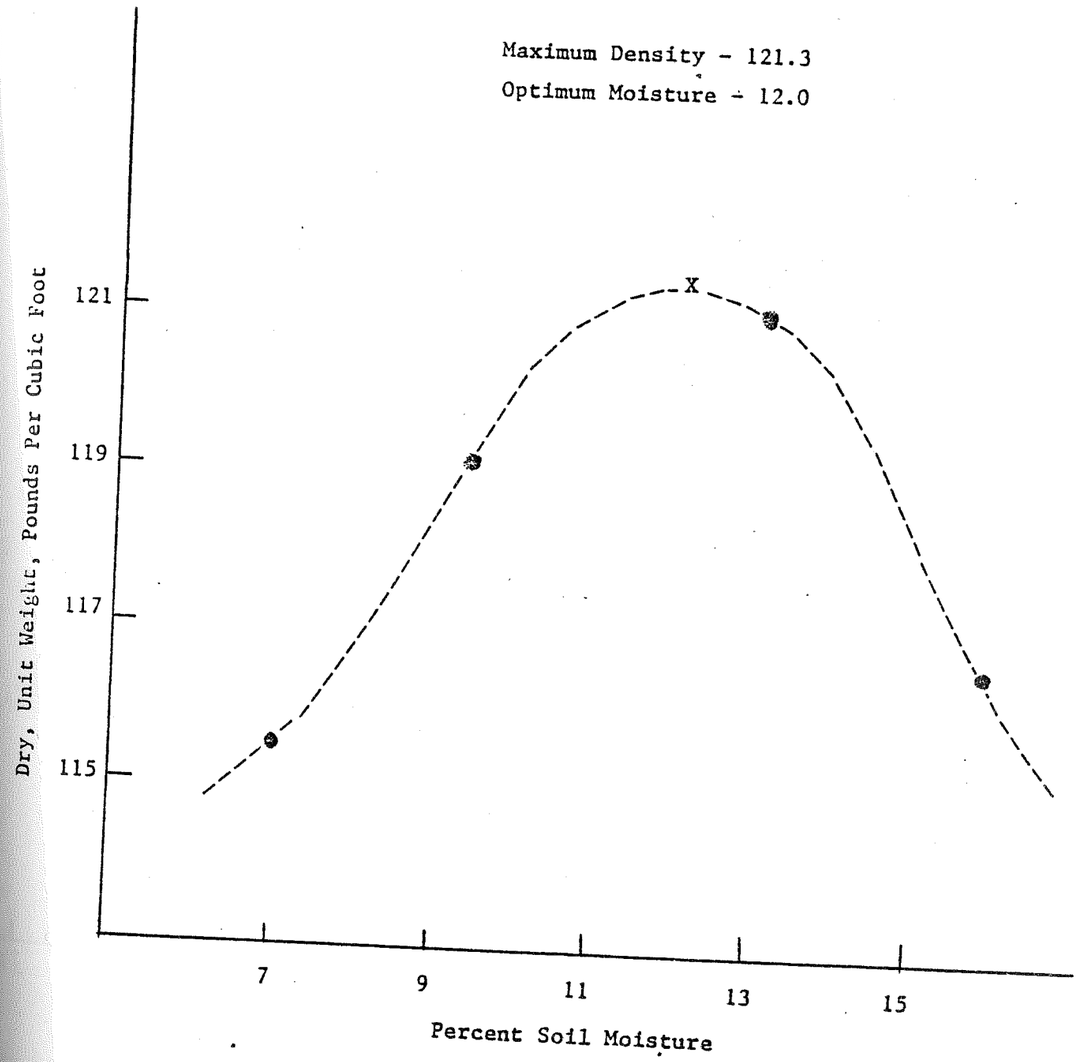
Puddling is the result of a breakdown in soil structure at the surface or within the upper six inches of the soil profile. The normal porous, granular structure and friable consistence of the surface soil is lost when puddling occurs. Instead, a compact, impervious layer results. This "crusty" layer prevents the soil from functioning normally in the regard to infiltration and permeability. There is a strong relationship between percent clay in a soil and puddling susceptibility.

Rating	Percent Clay Surface Layer
Low	0 - 5
Moderate	5.1 - 15
High	15.1 - 25

Procter Density for SRI Type 72

Maximum Density - 121.3

Optimum Moisture - 12.0



Procter Density for SRI Type 30

Maximum Density - 94.4

Optimum Moisture - 23.4

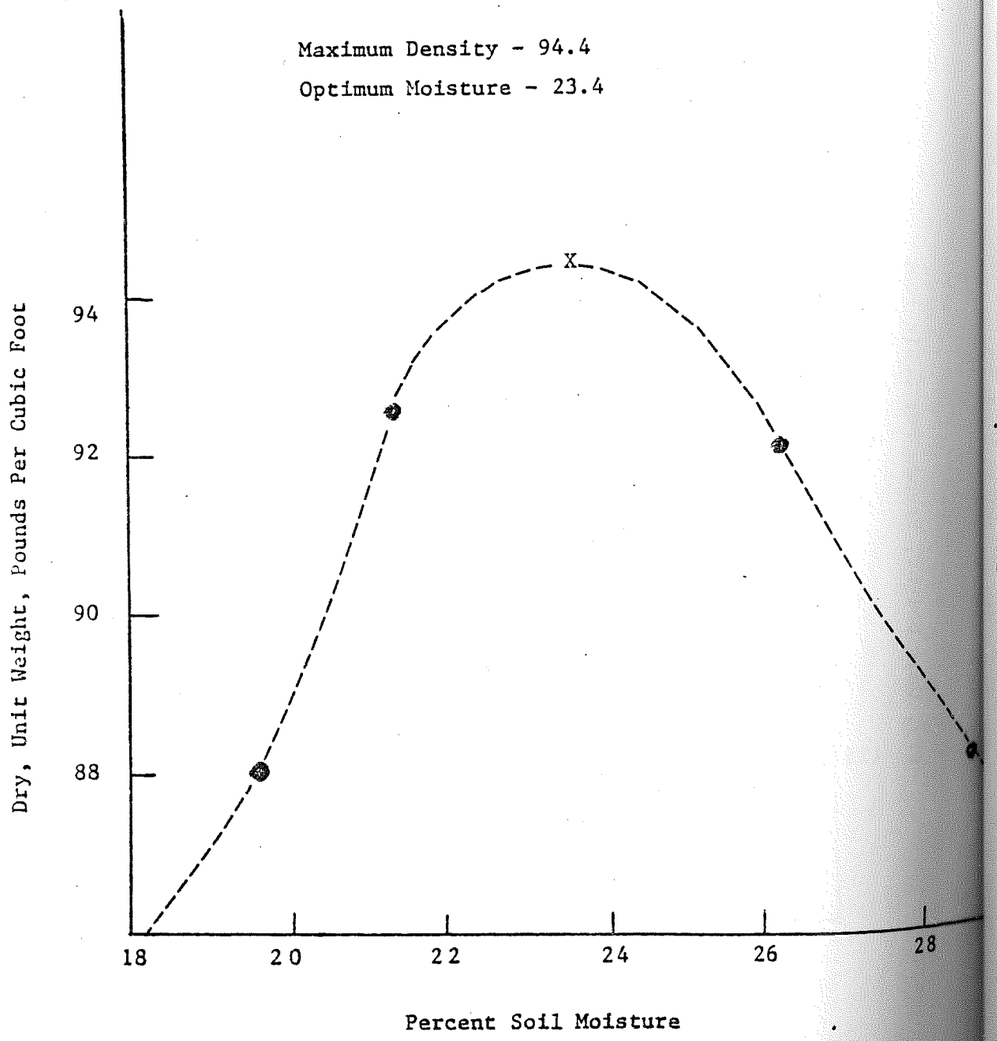


TABLE 6

TIMBER REGENERATION - TIMBER HARVEST

SRI Legend No.	Survival			Competition				TIMBER HARVEST			
	Shelter-wood	Clear-cut	Fertilizer Retention	Site Class	Grass	Forbs & Brush	Windthrow Hazard	Topogr. Limitations Slope Degree	Topogr. Limitations Slope Shape	Compaction Susceptibility	Puddling Susceptibility
1	Low	V. Low	-	-	-	-	-	-	-	-	-
2	Low	V. Low	-	-	-	-	-	-	-	-	-
3	Mod.	Low	-	Mod.	-	-	-	V. High	Mod.	High	-
4	V. Low	V. Low	-	-	-	-	-	-	-	-	Low
5	Low	V. Low	-	-	-	-	-	-	-	-	-
6	Low	Low	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-
8	Mod.	Mod.	-	Mod.	Low	V. High	V. High	V. High	V. Low	-	Low
9	High	Mod.	-	Mod.	Low	V. High	V. High	Low	V. Low	-	Mod.
13	High	High	Mod.	Mod.	High	High	V. High	High	Low	High	High
14	High	High	Mod.	Mod.	V. High	Mod.	Low	V. High	Low	Mod.	High
15	-	-	-	-	-	-	-	-	-	-	-
16	Mod.	Low	Low	Low	Mod.	High	High	Mod.	High	Mod.	High
18	High	Mod.	Mod.	Mod.	V. High	High	High	High	Low	High	High
19	Mod.	Low	Mod.	Low	V. High	High	High	High	Low	High	High
20	Mod.	Low	Low	V. Low	V. Low	V. Low	V. Low	V. High	V. Low	Mod.	High
21	Low	V. Low	Low	Low	Low	Mod.	Mod.	Mod.	Mod.	Mod.	Low
22	Mod.	Mod.	Low	Low	Low	High	High	High	High	High	High
23	V. High	High	High	Low	High	High	High	High	Low	Mod.	Mod.
24	High	High	Low	Low	High	V. High	Mod.	High	Low	High	High
25	High	High	Low	Mod.	Low	High	Mod.	High	Low	High	High
27	High	High	Mod.	Mod.	V. High	V. High	High	High	High	Mod.	High
28	V. High	Mod.	High	Mod.	High	High	Mod.	High	High	High	High
30	High	Mod.	Mod.	V. Low	Mod.	Mod.	Mod.	Mod.	High	Low	Low
31	Mod.	Low	Mod.	Low	Low	High	High	High	Low	V. High	Mod.
32	High	High	Low	Mod.	High	Mod.	Mod.	Mod.	V. Low	Mod.	Mod.
33	High	Mod.	Mod.	Low	High	High	High	High	Low	Low	Mod.
34	High	High	Low	Mod.	V. High	Mod.	Low	High	Low	Low	Mod.
35	High	High	Low	Mod.	High	Mod.	Mod.	High	Mod.	Mod.	Mod.
41	Mod.	Low	High	Low	Low	High	Mod.	Low	Low	Low	Mod.
42	High	High	High	Low	High	Mod.	Low	Low	Low	Low	Mod.
46	Low	V. Low	Low	V. Low	V. High	Mod.	Mod.	Low	Low	Low	Low
47	High	Mod.	V. Low	Mod.	Mod.	High	V. Low	Low	Low	Low	Low
51	Mod.	Mod.	Mod.	Low	Low	High	Mod.	High	High	High	High
52	High	High	Low	Mod.	V. High	Mod.	Low	Mod.	Mod.	Mod.	Mod.
56	Low	V. Low	Low	V. Low	Low	V. High	Low	Mod.	Mod.	Mod.	Mod.
57	Mod.	High	Low	Low	Mod.	Mod.	V. Low	High	Mod.	Mod.	Mod.
61	Mod.	Low	Low	Low	Low	Mod.	V. Low	Mod.	Mod.	Mod.	Mod.
62	High	Mod.	V. Low	Mod.	Mod.	High	Low	Mod.	Mod.	Mod.	Mod.
63	High	Mod.	Low	Mod.	Mod.	High	Low	High	High	High	High
64	High	Mod.	Low	Mod.	Mod.	High	Low	High	Mod.	Mod.	Mod.
71	Low	Low	High	Low	Mod.	High	Low	Mod.	Mod.	Mod.	Mod.
72	High	Mod.	Low	Mod.	High	Mod.	Mod.	Mod.	Mod.	Mod.	Mod.

SRI Legend No.	TIMBER REGENERATION: Survival: Shelterwood	Survival: Clearcut	Fertilizer Retention	Site Class	Competition: Grass	Competition: Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	TIMBER HARVEST: Topogr. Limitations: Slope Degree	Topogr. Limitations: Slope Shape	Compaction Susceptibility	Puddling Susceptibility
73	High	Mod.	Low	Mod.	Mod.	Mod.	Low	Low	Low	Low	Mod.	Mod.
74	High	Mod.	Low	Mod.	V. High	Mod.	Mod.	Mod.	Low	Low	Mod.	Mod.
80	–	–	–	–	–	–	–	–	–	–	–	–
81	Low	V. Low	Mod.	V. Low	Mod.	V. High	High	High	Mod.	Mod.	Low	Low
82	Low	V. Low	Mod.	Low	Mod.	High	Low	Low	Low	Low	Low	Mod.
83	Low	Low	Low	Low	Mod.	High	High	High	Low	Low	Low	Mod.
90	Low	V. Low	Low	Low	Mod.	High	V. Low	V. Low	V. Low	V. Low	Low	Low
91	Low	V. Low	Low	Low	Mod.	Mod.	V. Low	Low	V. High	High	Low	Low
92	Mod.	High	Low	Mod.	Mod.	Mod.	V. Low	Low	Low	Low	Low	Low
93	Mod.	High	Low	Mod.	High	Low	V. Low	Mod.	Low	Low	Low	Low
94	High	Mod.	Mod.	Mod.	Mod.	Low	Mod.	High	V. Low	V. Low	Low	Low
96	Mod.	Low	Mod.	Mod.	High	Mod.	V. Low	Low	Low	Low	Low	Low
97	High	Mod.	Mod.	Mod.	Mod.	Mod.	Mod.	Mod.	Low	Low	Low	Low
98	High	Mod.	Mod.	Low	Low	Mod.	Mod.	Mod.	Low	Low	Low	Low
99	Low	V. Low	High	Mod.	High	High	V. Low	V. Low	High	High	Low	Low
131	High	High	Mod.	Mod.	High	High	V. Low	Low	Low	Mod.	Low	Low
132	High	High	Mod.	Mod.	High	Mod.	Low	Low	Low	Low	Mod.	Mod.
135	High	High	Low	Mod.	High	Mod.	Low	Low	Mod.	Mod.	Mod.	Mod.
136	High	High	Low	Mod.	High	Mod.	Low	–	–	–	–	–
151	Mod.	Low	Mod.	Low	High	Low	–	–	Low	Low	–	–
153	–	–	–	–	–	–	–	–	High	V. High	Mod.	Mod.
156	Low	V. Low	Low	V. Low	Low	High	Low	V. Low	High	High	Mod.	Mod.
161	Mod.	Low	Mod.	Low	Mod.	High	Low	V. Low	Mod.	Mod.	High	High
165	High	Low	Low	Mod.	High	Mod.	Low	V. Low	Low	Mod.	Mod.	Mod.
182	High	High	Mod.	Mod.	V. High	Mod.	V. Low	Low	Low	Mod.	Low	Low
183	High	Mod.	Low	Mod.	V. High	Mod.	V. Low	Mod.	Low	Low	Mod.	Low
184	High	High	Low	Mod.	High	Mod.	V. Low	Low	Low	Mod.	Mod.	Low
185	High	High	Low	Mod.	V. High	Mod.	Low	Mod.	Mod.	High	Mod.	Low
186	High	High	Low	Mod.	High	High	Mod.	Mod.	Low	Low	Low	Low
187	High	Mod.	Low	Low	High	Mod.	V. Low	Low	Mod.	Mod.	Low	Low
188	High	Mod.	Mod.	Mod.	High	Mod.	Mod.	Mod.	Low	Low	Low	Low
189	High	Mod.	Low	Mod.	High	Mod.	Mod.	Low	Low	Mod.	Low	Low
193	High	Low	Low	Low	High	Mod.	Mod.	Mod.	Mod.	Mod.	Low	Low
196	–	–	Low	–	–	–	–	–	Mod.	Mod.	Low	Low
197	Mod.	Low	Low	–	–	–	–	–	Low to Mod.	Mod.	Low	Low
198	High to Mod.	Mod. to Low	Low	Mod. to Low	V. High to High	High to Mod.	Low to High	Low to High	Low	V. Low to Mod.	Low	Low
205	High to Mod.	Low to High	Low	Low to V. Low	High to Mod.	Mod. to Low	Mod. to V. High	Mod. to V. High	V. Low to Low	V. Low	Low	Low
206	Low	Low	Low	V. Low	Mod.	Low	V. High	V. High	V. Low to Low	V. Low to Low	Low	Low
208	V. High to Mod.	Mod. to Low	Low	V. Low to Mod.	High to Mod.	Mod. to Low	Mod. to V. High	High to V. High	High	High to V. High	Low	Low
211	Mod. to Low	Low	Low	Low to V. Low	Low	V. High	Mod.	V. Low	High	High	Low	Low
212	Low to High	V. Low to High	Low	Low to V. Low	Low	Mod.	Mod. to High	V. Low to High	High	High	Low	Low

SRI Legend No.	TIMBER REGENERATION: Survival: Shelterwood	Survival: Clearcut	Fertilizer Retention	Site Class	Competition: Grass	Competition: Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	TIMBER HARVEST: Topogr. Limitations: Slope Degree	Topogr. Limitations: Slope Shape	Compaction Susceptibility	Puddling Susceptibility
213	High to V. High	High to Mod.	High	Mod.	Low to High	High to Mod.	Mod.	V. Low to High	High	High	Mod.	Mod.
214	High	High	Mod.	Mod.	V. High to High	Mod.	High	High	Low to Mod.	Low	Mod.	Low
215	Low to High	V. High to Low	Mod.	Mod.	Low to High	V. High to Mod.	Mod.	V. Low to Mod.	High	V. High	Mod.	Low
220	Mod.	Low	Low	Low to V. Low	High to Mod.	High to Low	Low to V. High	Low to V. High	Low to Mod.	V. Low to Low	Low	Low
221	Mod to Low	Low to V. Low	Low	High to Low	V. High to High	High to Mod.	V. Low to Low	V. Low to Mod.	Mod. to High	High to V. High	Low	Low
222	High to Mod.	Mod. to Low	Low	Mod. to Low	High	High to Mod.	V. Low to Low	–	–	–	–	–
223	V. High to Mod.	High to Mod.	Low	Mod. to Low	Low	High to Low	Low to High	Low	V. Low to Mod.	High	Mod.	Mod.
224	V. High to Mod.	High to Mod.	Mod.	Mod. to Low	V. High to High	High to Mod.	V. High to High	Low to Mod.	V. Low to Mod.	Mod.	Mod.	Mod.
225	Mod.	Mod.	Mod.	Mod. to Low	High	High to Mod.	High to Mod.	Low to High	V. Low to Mod.	High	Mod.	Mod.
227	High to Mod.	Mod.	Mod.	Mod. to Low	V. High to High	High to Mod.	High	Low	V. Low to Mod.	High	Mod.	Mod.
228	V. High to Mod.	Mod.	Mod.	Mod. to Low	High	High	Low to V. Low	High to V. High	V. Low to Mod.	V. High to High	Mod.	Mod.
230	Mod. to Low	High to Low	Mod.	V. High to High	High to Mod.	Mod. to Low	Low	Low	V. Low to Mod.	Low	Low to Mod.	Mod.
231	High to Low	Low	Mod.	Low to V. Low	Low to High	V. High to High	Mod.	High	Low to Mod.	Low to V. Low	Mod.	Mod.
232	V. High to Mod.	High to Low	Mod.	Mod. to Low	High to Mod.	High	Low	Low to High	Low to High	Low to High	Mod.	Mod.
233	V. High to Mod.	High to Mod.	Mod.	Mod. to Low	V. High to High	High to Mod.	High to V. Low	Low to High	V. Low to Mod.	High	Mod.	Mod.
234	V. High to High	High	Mod.	Mod.	V. High to High	Mod.	High to V. Low	Low to High	V. Low to Mod.	High	Mod.	Mod.
235	V. High to High	High	Mod.	Mod.	High	Mod.	High to V. Low	Mod. to High	V. Low to Mod.	Mod.	Mod.	Mod.
242	V. High to Mod.	High to Mod.	Low	Mod. to Low	V. High to High	High to Mod.	V. Low to Low	Low	Low to Mod.	Low to Mod.	Mod.	Mod.
243	High	High	Low	Mod.	V. High to High	Mod.	V. Low	Low	Low to Mod.	Low	Mod.	Mod.
244	V. High to High	High	Low	Mod.	V. High	Mod.	Low to High	High	Low to Mod.	Low to Mod.	Mod.	Mod.
245	V. High to High	High	Low	Mod.	V. High to High	Mod.	Low to Mod.	Mod.	Low to Mod.	Mod.	Mod.	Mod.
248	High	High	Low	Mod.	V. High to High	Mod.	Low	Low to Mod.	Low to Mod.	Low to Mod.	Mod.	Mod.
252	High to Mod.	High	Low	Mod.	V. High to High	Mod.	V. Low to Low	Low	Low to Mod.	Mod.	Mod.	Mod.
255	High to Mod.	High to Mod.	Low	Mod. to Low	High	High to Mod.	Low	Low	Low to Mod.	Mod.	Mod.	Mod.
273	High to Mod.	Mod.	Low	Mod. to Low	V. High to High	High	Mod.	Low to High	Low to Mod.	Low to Mod.	Mod.	Mod.

SRI Legend No.	TIMBER REGENERATION								TIMBER HARVEST			
	Survival				Competition				Topogr. Limitations		Compaction	Puddling
	Shelter-wood	Clear-cut	Fertilizer Retention	Site Class	Grass	Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	Slope Degree	Slope Shape	Suscepti-bility	Suscepti-bility
275	High	High to Mod.	Low	Mod.	V. High	High to Mod.	Mod to Low	Mod.	Low to Mod.	Mod.	Mod.	Mod.
276	High	High to Mod.	Low	Mod.	V. High	High to Mod.	Low to Mod.	High	Low to Mod.	Low	Mod.	Mod.
277	High to Mod.	Mod.	Low	Mod.	V. High to Mod.	High	High to V. High	V. Low to Mod.	Low to Mod.	Mod.	Mod.	Mod.
278	High	High to Mod.	Mod.	Mod.	V. High	High	Low to Mod.	Mod.	Low to Mod.	Low to Mod.	Mod.	Mod.
280	V. High to Mod.	Mod. to Low	Mod.	Mod. to V. Low	High	Mod. to Low	High to V. High	High to V. High	Low	Low	Mod.	Mod.
282	High	Mod.	Mod.	Mod.	High	Mod.	Low to High	Low to High	Low to Mod.	Mod.	Mod.	Mod.
284	V. High to High	High to Mod.	Mod.	Mod.	V. High to High	Mod.	Low to High	Mod. to High	Low to Mod.	Low	Mod.	Mod.
285	High	Mod.	Mod.	Mod.	High	Mod.	Mod. to High	Mod. to High	Low to Mod.	Mod.	Mod.	Mod.
305	High to Mod.	High to Low	Mod.	Mod. to V. Low	High to Mod.	Mod. to Low	Mod. to V. High	Mod. to V. High	Low to Mod.	Low to Mod.	Mod.	Mod.
311	Mod. to Low	Low	Mod.	Low to V. Low	Low	V. High to High	Low to Mod.	V. Low	Low	High to V. High	Mod.	Mod.
312	High to Low	Mod. 59 Low	Mod.	Mod. to V. Low	High to Low	High to Mod.	Low	V. Low	High	High to V. High	Mod.	Mod.
313	Mod. to Low	Mod. to Low	Mod.	Low to V. Low	Mod. to Low	High	Low to Mod.	V. Low to Low	High	V. High	Mod.	Mod.
315	Mod. to Low	Mod. to Low	Mod.	Mod. to V. Low	High to Low	V. High to Low	Low to Mod.	V. Low to Mod.	High	High	Mod.	Mod.
321	High to Low	High to Low	Mod.	Low	High to Low	V. High to Low	Low	V. Low	High	Mod.	Mod.	Mod.
322	High	High to Mod.	Low	Mod. to Low	High	Mod.	V. Low to Low	V. Low	Mod.	Mod.	Low	Low
323	High	High to Mod.	Low	Low	High	High to Mod.	Low	V. Low to Low	Mod.	Low to Mod.	Mod.	Low
331	High to Low	Mod. to Low	Mod.	Low to V. Low	Mod. to Low	High	Low to Mod.	V. Low to Low	Mod. to High	High	Mod.	Low
332	High to Mod.	High to Mod.	Mod.	Low	High	High to Mod.	Low to Mod.	V. Low to Low	Low to Mod.	Low to Mod.	Mod.	Low
335	High	High to Mod.	Mod.	Low	High	Mod.	Mod.	Low to Mod.	Low to Mod.	Mod.	Mod.	Mod.
336	Mod.	Low	Mod.	Low	Mod.	High	Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
342	Mod. to Low	High	Low	Low to V. Low	High	Mod.	V. Low to Low	V. Low	High	High to V. High	Mod.	Mod.
344	Low	High	Low	Mod.	V. High	Mod.	V. Low to Mod.	Mod.	Low to Mod.	Low	Mod.	Mod.
351	Mod.	Low	Low	Low to V. Low	Low	High	Low to Mod.	V. Low	High	High	Mod.	Mod.
352	High	High to Mod.	Mod.	Mod. to Low	V. High to High	Mod.	V. Low to Low	Low	Mod.	Mod.	Mod.	Mod.
411	Mod. to	Low	Mod.	Low to								

SRI Legend No.	TIMBER REGENERATION								TIMBER HARVEST			
	Survival				Competition				Topogr. Limitations		Compaction	Puddling
	Shelter-wood	Clear-cut	Fertilizer Retention	Site Class	Grass	Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	Slope Degree	Slope Shape	Suscepti-bility	Suscepti-bility
412	Low	Low to V. Low	Mod.	Low to V. Low	Low	V. High to High	Low to Mod.	V. Low	High	High to V. High	Mod.	Mod.
413	High to Low	High to Low	Mod.	Low to V. Low	High to Low	High to Mod.	Low	V. Low	High	V. High	Mod.	Mod.
414	High to Low	Mod. to Low	Mod.	Low to V. Low	High to Low	High to Mod.	Low	V. Low	High	High to V. High	Mod.	Mod.
415	High to Low	Mod. to Low	Mod.	Low to V. Low	High to Low	High to Low	Low	V. Low	High	V. High	Mod.	Mod.
416	Mod. to Low	Low	Mod.	Low to V. Low	Low	High	Low to Mod.	V. Low	High	High	Mod.	Mod.
418	Mod. to Low	Low to High	Mod.	Low to V. Low	Low to High	High to Mod.	Low to Mod.	V. Low to Mod.	High	High to V. High	Mod.	Mod.
421	High to Low	High to Low	Mod.	Low	High to Low	High to Mod.	Low	V. Low	Mod. to High	High	Mod.	Mod.
422	High to Mod.	Mod. to Low	Mod.	Mod. to Low	High	High to Mod.	Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
423	High	High	Mod.	Mod.	High	Mod.	Low to High	V. Low to High	Low to Mod.	Mod.	Low	Low
424	High	High to Mod.	Mod.	Mod.	V. High to High	Mod.	V. Low to Low	V. Low to Low	Low to Mod.	Mod.	Low	Low
427	High	Mod.	Mod.	Mod.	V. High to High	High to Mod.	V. Low to Mod.	V. Low to Mod.	Low to Mod.	Mod.	Low	Low
428	High	Low to V. Low	Mod.	Mod.	High	Mod.	Low	V. Low to Mod.	Mod.	Mod.	Low	Low
432	Low to V. Low	Mod. to Low	Mod.	Low to V. Low	Low	V. High to High	Mod.	V. Low	High	High to V. High	Low	Low
433	Mod. to Low	Low to V. Low	Mod.	Low to V. Low	Low	V. High to High	Low to Mod.	V. Low	High	High to V. High	Low	Low
451	Mod. to Low	Low to V. Low	Mod.	Low	Low	High	Low to Mod.	V. Low	High	High	Low	Low
453	Mod. to Low	Low to V. Low	Mod.	Low to V. Low	Low	V. High to High	Low to Mod.	V. Low	High	High to V. High	Low	Low
461	Low	V. Low	Mod.	V. Low	Low to V. Low	V. High to High	Mod.	V. Low	High	High to V. High	Low	Low
462	Low to V. Low	V. Low	Low	V. Low	V. Low	V. High	Mod.	V. Low	High	V. High	Mod.	Mod.
463	Low	V. Low	Low	V. Low	Low to V. Low	V. High to High	Mod.	V. Low	High	V. High	Mod.	Mod.
465	Low	V. Low	Low	V. Low	Low to V. Low	V. High to High	Mod.	V. Low	High	V. High	Mod.	Mod.
466	Low to V. Low	V. Low	Low	V. Low	Low to V. Low	V. High	Mod.	V. Low	High	High to V. High	Mod.	Mod.
467	Mod. to Low	Low to V. Low	Low	V. Low to Mod.	Low	V. High to High	Low to Mod.	V. Low	High	High to V. High	Mod.	Mod.
468	Mod. to Low	Low to V. Low	Low	V. Low to Mod.	Low to High	V. High to Mod.	Mod.	V. Low to Mod.	High	High to V. High	Mod.	Mod.
472	High to Mod.	Mod.	Low	Mod.	High to Mod.	High to Mod.	V. Low to Low	V. Low	Mod.	Mod.	Mod.	Mod.

SRI Legend No.	TIMBER REGENERATION: Survival: Shelter-wood	Survival: Clear-cut	Fertilizer Retention	Site Class	Competition: Grass	Competition: Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	TIMBER HARVEST: Topogr. Limitations: Slope Degree	Topogr. Limitations: Slope Shape	Compaction Susceptibility	Puddling Susceptibility
476	High to Low	Mod. to V. Low	Low	Mod. to V. Low	Mod. to Low	V. High to High	V. Low to Mod.	V. Low	Mod. to High	High	Mod.	Mod.
477	High to Mod.	Mod.	Low	Mod.	V. High to Mod.	High	Low	V. Low to Mod.	Low to Mod.	Mod.	Mod.	Mod.
478	High to Mod.	Mod.	Mod.	Mod.	High to Mod.	High	Low	V. Low to Mod.	Mod.	Mod.	Mod.	Mod.
511	Mod. to Low	Low	Mod.	V. Low	Low to V. Low	High	Mod.	V. Low	High	High to V. High	Mod.	Mod.
512	High to Low	High to Low	Mod.	Mod. to V. Low	High to Low	High to Mod.	Low	V. Low to Low	High	Mod. to High	Mod.	Mod.
513	High to Low	High to Low	Mod.	Mod. to V. Low	High to Low	High to Mod.	Low	V. Low to Low	High	High	Mod.	Mod.
516	Mod. to Low	Low	Mod.	Low to V. Low	Mod. to Low	High	Low	V. Low	High	Mod. to High	Mod.	Mod.
517	Low	Low to V. Low	Mod.	V. Low	Low to V. Low	Low	Mod.	V. Low	High	Mod.	Mod.	Mod.
518	Mod. to Low	Mod. to Low	Mod.	Low	Low to V. High	High to Mod.	Low to Mod.	V. Low to Mod.	High	High	Mod.	Mod.
521	High to Mod.	Mod.	Mod.	Mod. to Low	High to Low	High to Mod.	Low	V. Low to Low	Mod. to High	High	Mod.	Mod.
522	High	High to Mod.	Mod.	Mod.	V. High to High	Mod.	V. Low to Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
523	High to Mod.	Mod.	Low	Mod. to Low	High to Low	High to Mod.	Low to Mod.	V. Low to Mod.	Mod. to High	High	Mod.	Mod.
524	High	High	Low	Mod.	V. High to High	Mod.	V. Low to Low	Low	Low to Mod.	Low to Mod.	Mod.	Mod.
525	High	High to Mod.	Low	Mod.	High	Mod.	Low to Mod.	Low to Mod.	Mod.	Mod.	Mod.	Mod.
526	High to Mod.	Mod. to Low	Low	Mod. to V. Low	V. High to Mod.	High to Mod.	V. Low to Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
527	High to Mod.	Mod.	Low	Mod.	High to Mod.	High to Mod.	V. low to Low	V. low to Low	Mod.	Mod.	Mod.	Mod.
531	Mod. to Low	Low	Low	Low to V. Low	Low	High	Low to Mod.	V. Low to Low	High	High	Mod.	Mod.
532	High	High	Low	Mod.	High	Mod.	V. Low to Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
533	High to Mod.	Mod.	Low	Mod. to Low	High	High to Mod.	Low	Low	Mod.	Low to Mod.	Mod.	Mod.
541	High to Low	Low	Low	Low to V. Low	Low	High	Low to Mod.	V. Low to Low	High to V. High	High to V. High	Mod.	Mod.
542	Low	Low to V. Low	Low	Low to V. Low	Low to to High	V. High	Mod.	V. Low	High to V. High	V. High	Mod.	Mod.
543	Mod. to Low	Low	Low	Low to V. Low	High to Low	High to Mod.	V. Low to Mod.	V. Low to Low	High	High to V. High	Mod.	Mod.
546	Mod. to Low	Low to V. Low	Low	V. Low	Low to V. Low	V. High to High	Mod.	V. Low	High	High to V. High	Mod.	Mod.
561	Low to V. Low	V. Low	Low	V. Low	V. Low	V. High	Mod.	V. Low	High to V. High	V. High	Mod.	Mod.

SRI Legend No.	TIMBER REGENERATION: Survival: Shelter-wood	Survival: Clear-cut	Fertilizer Retention	Site Class	Competition: Grass	Competition: Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	TIMBER HARVEST: Topogr. Limitations: Slope Degree	Topogr. Limitations: Slope Shape	Compaction Susceptibility	Puddling Susceptibility
566	Low	V. Low	Low	V. Low	Low to V. Low	V. High to High	Mod.	V. Low	High	High to V. High	Mod.	Mod.
567	Mod. to Low	Low to V. Low	Low	V. Low	Mod. to V. Low	V. High to Mod.	Low to Mod.	V. Low to Low	High	Mod. to High	Mod.	Mod.
568	Mod. to Low	Low to V. Low	Low	V. Low	Mod.	V. High to Mod.	Low to Mod.	V. Low to Mod.	High	Mod. to High	Mod.	Mod.
569	Mod. to Low	Low to V. Low	Low	V. Low	Low to V. Low	V. High to Mod.	Low to High	V. Low to High	High	Mod. to High	Mod.	Mod.
576	Mod. to Low	Low to V. Low	Low	Low to V. Low	Mod. to Low	V. High to Mod.	Low	V. Low to Low	Mod. to High	High	Mod.	Mod.
578	High to Mod.	Low	Low	Low	High to Mod.	Mod.	Low	Low to Mod.	Low to Mod.	Low to Mod.	Mod.	Mod.
612	Mod.	Low	Low	Low to V. Low	Mod. to Low	High to Mod.	Low	V. Low to Low	High to V. High	V. High	Mod.	Mod.
617	Mod. to Low	Low to V. Low	Low	Low to V. Low	Mod. to Low	High to Mod.	Low	V. Low	High to V. High	High	Mod.	Mod.
621	Mod.	Low	Low	Mod. to Low	Mod. to Low	High to Mod.	Low	V. Low to Low	Mod. to High	High	Mod.	Mod.
623	High to Mod.	Mod. to Low	Low	Mod.	Mod.	High	Low	V. Low to Low	Mod.	Mod.	Mod.	Mod.
624	High to Mod.	Mod.	Low	Mod.	High to Mod.	High to Mod.	Low to Mod.	Low to Mod.	Low	Mod.	Mod.	Mod.
631	Mod.	Low	Low	Mod. to Low	Mod. to Low	High to Mod.	Low	V. Low to Low	High	Mod.	Mod.	Mod.
634	High to Mod.	Mod. to Low	Low	Mod.	High to Mod.	High to Mod.	Mod.	Low to Mod.	Low	High to V. High	Mod.	Mod.
673	High to Mod.	Mod. to Low	Low	Mod. to Low	Mod.	High to Mod.	Low	Low	Mod.	Mod.	Mod.	Mod.
712	High to Low	Low	Low	Mod. to Low	High to Mod.	High to Mod.	V. Low to Low	V. Low to Low	High	High to V. High	Mod.	Mod.
723	High	Mod. to Low	Low	Mod.	High to Mod.	Mod.	Low to Mod.	Low	Mod.	Mod.	Mod.	Mod.
733	Mod. to Low	Low to V. Low	Low	Low	Mod.	High to Mod.	Mod. to High	Low to High	Low	Low	Mod.	Mod.
801	–	–	–	–	–	–	–	–	–	–	–	–
810	V. Low	V. Low	Low	V. Low	Mod.	V. High	High	High	Mod.	Low	Mod.	Mod.
812	Low to V. Low	V. Low	Mod.	V. Low	High	High	High	High	Mod.	Mod.	Mod.	Mod.
821	Low to V. Low	V. Low	Mod.	V. Low	Mod.	V. High	High	High	Mod.	Mod.	Mod.	Mod.
823	Low	V. Low	Mod	Low	Mod.	High	High	High	Mod.	Mod.	Mod.	Mod.
832	Low	Low to V. Low	Mod.	Low	Mod.	High	High	High	Low	Mod.	Mod.	Mod.
901	Low to V. Low	Low to V. Low	Mod.	Low	Mod.	High	V. Low	Low	Low	Low	Mod.	Mod.
902	Mod. to V. Low	Low to V. Low	Mod.	–	Mod.	Mod.	Low	Low	Low	Low	Mod.	Mod.
904	Mod. to V. Low	Low to V. Low	Mod.	–	High	High	V. Low	Low	Low	Low	Mod.	Mod.

SRI Legend No.	TIMBER REGENERATION								TIMBER HARVEST			
	Survival				Competition				Topogr. Limitations			
	Shelter-wood	Clear-cut	Fertilizer Retention	Site Class	Grass	Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	Slope Degree	Slope Shape	Compaction Susceptibility	Puddling Susceptibility
906	Mod. to V. Low	Low to V. Low	Mod.	-	High	High	V. Low	Low	Low	Low	Mod.	Mod.
911	Low to V. Low	V. Low	Mod.	-	Mod.	Mod.	V. Low	Low	High	High	Mod.	Mod.
916	Mod. to Low	V. Low to Low	Mod.	-	Mod.	Mod.	Low	Low	High	High	Mod.	Mod.
921	Mod. to Low	V. Low to Low	Mod.	-	Mod.	Mod.	Low	Low	Mod.	High	Mod.	Mod.
924	High	Mod.	Low	-	Mod. to Low	Low	Low	Low to High	V. Low	V. Low	Low	Low
925	-	-	Low	-	-	-	-	-	Low	Low	Low	Low
927	High	Mod.	Low	-	Mod. to Low	Mod. to Low	Low	Mod.	Low to Mod.	Low	Low	Low
932	Mod.	Low	Mod.	-	High	-	V. Low	Mod.	Low	Low	Low	Low
936	-	-	Mod.	-	-	-	-	Mod.	Mod.	Low	Low	Low
938	Mod.	Low	Mod.	Mod.	High	Low	V. Low	Mod.	Low	Low	Low	Low
939	Mod.	Low	Mod.	-	High	High	V. Low	V. Low to Mod.	Low	Low	Low	Low
942	High to Mod.	Mod.	Low	-	Mod.	Low	V. Low	Low	Low	V. Low	Low	Low
943	High to Mod.	Mod.	Low	Mod.	High	Low	Low	Mod.	V. Lw	Low	Low	Low
946	High	Low	Low	-	High	High	V. Low	V. Low	Low	Low	Low	Low
960	Low	Low	Mod.	-	High	High	V. Low	V. Low	Low	Low	Low	Low
961	Low	Low	Mod.	-	Mod.	Mod.	Low	Low	Mod. to V. High	Low	Low	Low
962	Mod.	Low	Mod.	-	High	Mod.	V. Low	Low	Low to High	Mod.	Low	Low
964	High	Mod.	Mod.	-	High	Mod.	Low	Low	Low to High	Low	Low	Low
966	Low	V. Low	Mod.	-	High	V. High	Low	V. Low	Mod. to High	High	Low	Low
967	Low	Low	Mod.	-	High	Mod.	Low	Low	Mod.	Mod.	Low	Low
968	Mod.	Low	Mod.	-	High	Mod.	Low	Low	Mod.	Mod.	Low	Low
969	Low	V. Low	Mod.	-	High	High	V. Low	V. Low	Mod.	Mod.	Low	Low
972	Mod.	Low	Mod.	-	Mod.	Mod.	V. Low to High	Low to Mod.	Low to Mod.	Low to Mod.	Low	Low
976	Mod.	Low	Mod.	-	High	Mod.	V. Low to High	Low to Mod.	Mod.	Mod.	Low	Low
980	Mod.	Low	Mod.	Low	High	High	Mod. to High	Mod.	Mod.	High	Low	Low
986	Mod.	Low	Mod.	-	High	High	Mod. to High	Low to Mod.	Mod.	Mod.	Low	Low
987	High	Mod.	Mod.	-	High	Mod.	Mod.	Mod.	Low to Mod.	Low to Mod.	Low	Low
988	High	Mod.	Mod.	Mod. to Low	High	Mod.	Mod.	Mod.	Low to Mod.	Low to Mod.	Low	Low
989	Mod.	Low	Mod.	-	High	High	Low	Low	Low to Mod.	Low to Mod.	Low	Low

SRI Legend No.	TIMBER REGENERATION								TIMBER HARVEST			
	Survival				Competition				Topogr. Limitations			
	Shelter-wood	Clear-cut	Fertilizer Retention	Site Class	Grass	Forbs & Brush	Windthrow Hazard	Frost Heave Hazard	Slope Degree	Slope Shape	Compaction Susceptibility	Puddling Susceptibility
990	Low	V. Low	Mod.	-	High	Low	Low	Low	Low to High	Mod.	Low	Low
991	Low	V. Low	Mod.	-	High	Mod.	Low	Low	High to V. High	High	Low	Low
992	Low	V. Low	Mod.	-	Mod.	Low	Low	Low	Low	Low	Low	Low
996	Low	V. Low	Mod.	-	High	Low	Low	Low	Low to High	Mod. to High	Low	Low
998	Mod.	Mod.	Mod.	-	High	Low	Low	Low	Low to Mod.	Low to Mod.	Low	Low

D. FUEL MANAGEMENT

Forest residues accumulate as a result of logging and natural mortality. Most of this residue is in the form of branches, limbs, tops, broken chunks, cull sections and remnants of past mortality. Land managers are continuously faced with the problems of managing these residues to achieve rapid regeneration without adversely affecting the quality of the site.

Fire, and more specifically broadcast burning, is an effective management tool in treating accumulated fuels. However, as with many techniques of land and cover management, there are hazards associated with the use of fire. Principal among the hazards is damage to the soil.

The effects of fire on soils are complex and dependent on numerous variations in physical conditions of the soil as well as site. Elevation, aspect, landform, and topography are site conditions which influence the impact of fire on soils. Included among the affected soil characteristics are: Surface texture and structure, stoniness, organic matter, content, infiltration and percolation.

Table 7 is a summary rating of 14 characteristics and hazards important for fuel management. An attempt has been made to allow the land manager an option as to methods of treating slash and other fuels. Each of the columns presented in the table represent a soil characteristic or hazard to be considered when developing a prescription for fuel management. Each characteristic or hazard is represented by Public Land Statements as defined by a soils technical panel in "Forest Residues Management Guidelines for the Pacific Northwest," USDA Forest Service General Technical Report, PNW-33, 1975.

The Fuels Management Table is designed to show which of the 14 soil characteristics or hazards applies to each SRI landtype. No attempt has been made to quantify each rating. Instead, an assumption is made that an "X" is placed only if the soil characteristic or hazard applies and would result in adverse effects on the soil resource when fuel management prescriptions do not consider these factors.

Where an "X" is present, the characteristic or hazard is a limiting factor for fuel management treatments.

Following are the column headings and corresponding definitions. These headings, or soil objectives, as previously referred to, are intended to serve as guidelines for managing the forest fuels or residues.

Slopes Greater Than 50 Percent

These slopes are inconsistent. Steep slopes are a hazard to several forms of fuels management. These slopes are susceptible to sliding and are very likely to be subject to overland flow and soil erosion (refer to Table 4 for potential erosion).

Slopes of 35 to 50 Percent

Slopes greater than 35 percent without roads pose severe limitations to track and wheeled equipment. Experience has shown that erosion increases severely on slopes greater than 50 percent after burning. Slope-related limitations on residue treatment should begin at 35 percent for all areas.

Coarse Textured Soils

Texture governs the treatment which would increase the erosion rate of coarse-textured soils. Soil textures include sandy loam, loamy sand, and sand. These soils are most susceptible to nonwettability resulting from fire.

Medium and Fine Textured Soils

Soils of this group have a tendency to be compacted readily by equipment. Moisture content in these soils becomes especially critical when soil moisture exceeds 20 to 25 percent. Soil compaction is most frequently a factor in evaluating which equipment to use for piling and burning, crushing, and YUM (yarding unutilized material) operations.

Soil Depth of Less Than 18 Inches

Reduction in soil depth is considered important, particularly in combination with residue disposal by burning, because both reduce nutrient and moisture. With deep soils, the reserve is large and reductions are of little consequence; but when the reserve is low as in shallow soils, reduction of depth may be crucial. The Umpqua NF has designated 18 inches as a critical minimum soil depth. Leaving materials less than 3 inches in diameter would help offset soil damage resulting from machine piling on shallow soils.1/

Litter Less Than 1 Inch Deep

Litter on the soil surface serves several important roles including shading, reducing raindrop impact, and slowing overland flow. Sites on which this restriction of litter removal applies are generally hot, southerly exposures frequently with low amount of plant-available moisture.

A litter of at least one inch depth should be present over at least 70 percent of the land area. This should provide minimum satisfactory soil protection where raindrop impact, overland waterflow, and wind erosion are likely to occur.

Depth and distribution of litter are most strongly affected by broadcast burning, piling and burning, and ground contact YUM yarding.

1/ PNW-33, p. 210.

Soil Organic Matter of Less Than 2-3 Percent

Soil organic matter content of 2 to 3 percent is recognized as a critical minimum by consensus of the Soils Panel that developed the guides. Organic matter plays important roles in both physical and chemical properties of the soil that control water movement and available plant water storage, soil stability, and general life of the soil. As broadcast burning of residues usually results in destruction of organic matter, soils in which the reserve is already very low should not be subjected to this treatment. Low intensity spring burns which do not destroy the duff generally do not materially affect soil organic matter functions. Leaving materials less than 3 inches in diameter would help offset soil damage resulting from machine piling on soils of low organic content. Mineral soil exposed during broadcast burning on low organic matter soils should be limited to 20 percent of the area being treated.

High Frost Heave Hazard

Limitations are suggested for soils which tend to frost heave planted and natural seedlings. These limitations are most often applied to practices which leave no insulative layer of organic litter following treatment. Mulching and shading with residues may help to reduce frost heaving and seedling dislodgment.

Low Inherent Soil Fertlity

Low soil fertility contributes to slow growth of timber and associated understory plants. Soils with low fertility require conservation or improvement of existing plant nutrients. Practices such as burning or complete YUM yarding which tend to deplete nutrients are detrimental to site productivity. Crushing and incorporation of residue into the soil may also be detrimental since this results in an immediate, though temporary, reduction of nitrogen, an essential plant nutrient. A 7-inch maximum diameter for materials to be left in place is intended to leave most of the foliage since this residue component yields most of the essential elements.

Fertilization to offset effects of residue treatments on nutrients should be specified on the basis of factors such as: Intensity of burn, the presence of nitrogen-fixing species such as ceanothus and alder, the rate of return to normalcy after treatment in relation to management goals, and the extent to which residues are mixed with the soil.

Low Available Soil Moisture Holding Capacity

Soils with less than 2 inches available water per foot of depth are considered by the Soils Panel to be droughty soils. Infiltration rates should be protected and a surface organic mulch preserved to reduce soil moisture loss. This situation is commonly associated with shallow, coarse-textured soils. Practices negatively affecting this situation are broadcast burning and machine piling and burning (Gratkowski, 1974, p. 1-20). The consensus of Public Lands Management Decisions Panel is that a 25-percent shade cover in certain cases should offset the loss of

moisture holding capacity associated with machine piling of residues. Similarly, the Private Lands Management Decisions Panel agreed that sufficient shade for seedling establishment should offset the removal of residues.2/

Subalpine Forest Management

Management of harvesting residue and subsequent regeneration on subalpine forests frequently presents different problems because of the nature of the organic matter accumulated during the development of the forest. This forest area is characterized by low average temperature and summer moisture deficiency so that decomposition is slow, resulting in large surface accumulations of organic matter. These can build up to depths of 14 to 18 inches with a total weight of 6 to 12 tons of dry matter per acre.

After removal of overstory, this material dries out rapidly and not only constitutes a large amount of combustible material but is frequently a barrier to forest regeneration.

There is generally little incorporation of this organic matter into the upper soil layers, and mineralized nitrogen is frequently low. The material itself displays distinct hydrophobic properties when dry, and initial rains tend to run off the surface and may contribute to rapid streamflow peaks.

The following items are not covered in the residues management guidelines. However, they are important considerations on the Umpqua National Forest.

High Erosion Hazard

Erosion can be a serious consequence of treating forest residues. Prescribed burning can remove the protective layer of organic material as well as critical, erosion preventing live vegetation. Machine piling can produce rill erosion. YUM yarding can also accelerate rill and subsequent gully erosion. Leaving 3-inch maximum material in place will reduce the total erosion potential.

The SRI units checked in this column are those which possess a potential on-site soil loss of greater than an estimated 0.5 tons/acre/year from timber harvesting and/or residue treatment activities.

Susceptibility to Compaction

This section is described and defined in the discussion of the Timber Harvest Table. Soil compaction is a primary concern of machine piling. However, it may also apply to log gouging areas resulting from YUM activities.

2/ PNW-33, SI-3, p. 2.

Susceptibility to Puddling

Puddling is the result of a breakdown in soil structure at the surface or within the upper 6 inches of the soil profile. The normal porous, granular structure and friable consistence of the surface soil is lost when puddling occurs. Instead, a compact, impervious layer results. This "crusty" layer prevents the soil from functioning normally in the regard to infiltration and permeability. Seedlings do not have an opportunity to develop properly.

Working the soil when wet is an activity which contributes conditions conducive to puddling. This activity has a tendency to break down soil structures under proper conditions. Concern for working relates to soil moisture conditions. This concern applies when machine piling.

Medium (loams) and fine (clays) textured soils possess the highest susceptibility to puddling.

For additional information related to forest residue management refer to USDA Forest Service General Technical Reports, PNW-24 and PNW-33.

TABLE 7

SOIL CHARACTERISTICS AND HAZARDS FOR FUEL MANAGEMENT

SRI Legend No.	Greater Than 50% Slopes	35% to 50% Slopes	Coarse Textured Soils	Medium and Fine Textured Soils	Shallow Soil Less than 18"	Less Than 1" Layer of Litter-Humus	Organic Matter	High Frost Heave Hazard	Low Inherent Fertility	Low Avail. Soil Moisture Holding Cap.	Subalpine Forest Mgmt.	High Erosion Hazard	Compaction Susceptibility	Puddling Susceptibility
1														
2														
3	X		X											
4												X		
5														
6														
7														
8	X			X										
9	X			X								X	X	
13		X		X			X					X	X	
14							X	X					X	X
15							X						X	X
16		X	X			X	X						X	X
18		X		X			X		X	X			X	X
19		X		X			X	X					X	X
20				X			X	X			X		X	X
21	X								X				X	X
22		X		X			X		X			X	X	X
23		X		X			X						X	X
24		X		X			X	X		X			X	X
25				X			X						X	X
27		X		X			X						X	X
28				X			X						X	X
30				X			X	X					X	X
31	X		X				X	X					X	X
32		X		X			X						X	X
33		X		X			X						X	X
34				X			X						X	X
35				X			X						X	X
41	X						X						X	X
42		X		X			X					X	X	X
46	X						X		X				X	X
47	X			X			X		X			X	X	X
51	X		X				X						X	X
52		X					X					X	X	X
56	X						X						X	X
57		X					X				X	X	X	X
61	X		X				X				X		X	X
62		X	X				X		X	X		X	X	X
63		X	X				X		X	X			X	X
64							X		X				X	X
71	X						X		X				X	X
72		X		X			X		X			X	X	X
73		X		X			X		X				X	X
74				X			X		X				X	X
80							X		X				X	X
81		X		X			X						X	X
82		X		X			X	X	X				X	X
83				X			X	X					X	X
90			X				X						X	X
91			X			X	X		X		X		X	X
92			X			X	X		X				X	X
93			X				X		X		X		X	X
94			X				X		X		X		X	X
95			X				X	X	X				X	X
96			X				X				X		X	X
97			X				X		X		X		X	X
98			X				X				X		X	X
99			X				X				X		X	X
131							X		X		X		X	X
132		X					X						X	X
		X					X						X	X

SRI Legend No.	Greater Than 50% Slopes	35% to 50% Slopes	Coarse Textured Soils	Medium and Fine Textured Soils	Shallow Soil Less than 18"	Less Than 1" Layer of Litter-Humus	Organic Matter	High Frost Heave Hazard	Low Inherent Fertility	Low Avail. Soil Moisture Holding Cap.	Subalpine Forest Mgmt.	High Erosion Hazard	Compaction Susceptibility	Puddling Susceptibility
135		X					X						X	X
136		X					X						X	X
151	X		X		X	X	X					X	X	X
153							X						X	X
156	X				X	X	X				X	X	X	X
161		X	X		X	X	X					X	X	X
165							X						X	X
182		X					X						X	X
183		X					X				X		X	X
184		X		X			X						X	X
185		X		X			X						X	X
186		X		X			X	X					X	X
187		X		X			X				X		X	X
188		X		X			X						X	X
189		X		X			X				X		X	X
193		X		X			X				X		X	X
195		X		X			X	X			X		X	X
196			X		X	X	X		X				X	X
197		X		X			X				X		X	X
198		X		X			X				X		X	X
205				X			X	X					X	X
206				X			X	X					X	X
208				X			X						X	X
211	X			X			X					X	X	X
212	X			X			X					X	X	X
213	X			X			X					X	X	X
214		X		X			X	X					X	X
215	X			X			X					X	X	X
220		X		X			X						X	X
221		X		X			X						X	X
222		X		X			X						X	X
223		X		X			X						X	X
224		X		X			X						X	X
225		X		X			X						X	X
227		X		X			X						X	X
228		X		X			X						X	X
230		X		X			X	X					X	X
231	X		X				X					X	X	X
232		X		X			X						X	X
233		X		X			X						X	X
234		X		X			X						X	X
235		X		X			X						X	X
242		X		X			X						X	X
243		X		X			X						X	X
244		X		X			X	X					X	X
245		X		X			X						X	X
248		X		X			X						X	X
252		X		X			X						X	X
255		X		X			X						X	X
273		X		X			X						X	X
275		X		X			X						X	X
276		X		X			X	X					X	X
277		X		X			X						X	X
278		X		X			X						X	X
280				X			X	X					X	X
282				X			X						X	X
284				X			X						X	X
285				X			X						X	X
305				X			X						X	X
311	X		X				X					X	X	X
312	X			X			X						X	X
313	X			X			X						X	X

SRI Legend No.	Greater Than 50% Slopes	35% to 50% Slopes	Coarse Textured Soils	Medium and Fine Textured Soils	Shallow Soil Less than 18"	Less Than 1" Layer of Litter-Humus	Organic Matter	High Frost Heave Hazard	Low Inherent Fertility	Low Avail. Soil Moisture Holding Cap.	Subalpine Forest Mgmt.	High Erosion Hazard	Compaction Susceptibility	Puddling Susceptibility
315	X						X						X	X
321		X					X						X	X
322		X					X						X	X
323		X					X						X	X
331		X					X						X	X
332		X					X						X	X
335		X					X						X	X
336		X					X						X	X
342	X		X				X					X	X	X
344		X		X			X			X			X	X
351	X		X				X						X	X
352		X		X			X			X			X	X
411	X		X				X						X	X
412	X		X				X						X	X
413		X					X			X			X	X
414	X						X			X			X	X
415	X						X			X			X	X
416	X						X						X	X
418	X						X			X			X	X
421		X					X			X			X	X
422		X					X			X			X	X
423		X					X			X			X	X
424		X					X			X			X	X
427		X					X			X			X	X
428		X					X			X			X	X
432	X		X				X				X		X	X
433	X		X				X					X	X	X
451	X		X				X					X	X	X
453	X		X				X					X	X	X
461	X		X				X					X	X	X
462	X		X				X				X	X	X	X
463	X		X				X					X	X	X
465	X		X				X					X	X	X
466	X		X				X					X	X	X
467	X		X				X					X	X	X
468	X		X				X					X	X	X
472		X					X			X			X	X
476		X					X			X			X	X
477		X					X			X			X	X
478		X					X			X			X	X
511	X		X				X				X	X	X	X
512	X		X				X					X	X	X
513	X		X				X					X	X	X
516	X		X				X				X	X	X	X
517	X		X				X					X	X	X
518	X		X				X					X	X	X
521		X					X			X			X	X
522		X					X			X			X	X
523		X					X			X			X	X
524		X					X			X			X	X
525		X					X			X			X	X
526		X					X			X			X	X
527		X					X			X			X	X
531	X		X				X						X	X
533		X					X			X		X	X	X
541	X		X				X				X	X	X	X
542	X		X				X				X	X	X	X
543		X					X			X			X	X
546	X		X				X						X	X
561	X		X				X					X	X	X
563	X		X				X				X	X	X	X
566	X		X				X						X	X
567	X		X				X						X	X
568	X		X				X						X	X

SRI Legend No.	Greater Than 50% Slopes	35% to 50% Slopes	Coarse Textured Soils	Medium and Fine Textured Soils	Shallow Soil Less than 18"	Less Than 1" Layer of Litter-Humus	Organic Matter	High Frost Heave Hazard	Low Inherent Fertility	Low Avail. Soil Moisture Holding Cap.	Subalpine Forest Mgmt.	High Erosion Hazard	Compaction Susceptibility	Puddling Susceptibility
569	X		X				X				X	X	X	X
576		X		X			X				X		X	X
577		X		X			X				X		X	X
578		X		X			X				X		X	X
612	X		X				X					X	X	X
617	X		X				X					X	X	X
621		X	X				X						X	X
623		X		X			X						X	X
624		X		X			X						X	X
631		X	X				X						X	X
634		X		X			X						X	X
673		X		X			X						X	X
712	X		X				X					X	X	X
723		X					X						X	X
733		X					X						X	X
801		X		X	X	X	X						X	X
810		X		X	X	X	X	X					X	X
812		X		X			X	X					X	X
821		X		X			X	X					X	X
823		X		X			X	X					X	X
832		X		X			X	X					X	X
901			X			X	X		X		X		X	X
902			X			X	X		X		X		X	X
904			X				X		X		X		X	X
906			X				X		X		X		X	X
911	X		X			X	X		X		X		X	X
916	X		X			X	X		X		X		X	X
921			X			X	X		X		X		X	X
924			X				X	X			X		X	X
925							X						X	X
927			X				X		X		X		X	X
932		X	X				X				X		X	X
936		X	X				X				X		X	X
938		X	X				X				X		X	X
939		X	X				X				X		X	X
942			X				X				X		X	X
943			X				X				X		X	X
946			X				X				X		X	X
960			X				X		X		X		X	X
961		X	X		X	X	X		X		X		X	X
962			X				X		X		X		X	X
964			X				X		X		X		X	X
966	X		X				X				X		X	X
967		X	X				X				X		X	X
968		X	X				X				X		X	X
969		X	X				X				X		X	X
972		X	X				X				X		X	X
976		X	X				X				X		X	X
980		X	X				X				X		X	X
986		X	X				X				X		X	X
987		X	X				X				X		X	X
988		X	X				X				X		X	X
989		X	X				X				X		X	X
990		X	X				X				X		X	X
991	X						X				X		X	X
992		X	X				X				X		X	X
996		X	X				X				X		X	X
998		X	X				X				X		X	X

E. RECREATION SITE SUITABILITY

This table is designed to allow the landscape architect or recreation specialist an opportunity to determine site suitabilities of each SRI landtype. The ratings afford the user the opportunity to see the major or significant limiting factor and the relative severity of each. Needs can then be assessed and subsequent mitigation efforts considered. As with other tables in this SRI report, the ratings are relative to the Umpqua National Forest and are intended for planning purposes only. On-site investigations are required for local, site-specific problems and mitigation efforts.

Following are brief descriptions of the various columns exhibited in this table. Quantifications of ratings will be made where applicable.

Soil Profile Characteristics

Soil profile characteristics are extremely important in establishing a suitable, well-designed recreation site. Adverse soil features may lead directly to undesirable site conditions.

Shown below are the definitions and corresponding ratings and quantifications for each column.

Infiltration

Infiltration is the entrance of water into the surface soil. The infiltration rate refers to the ease and difficulty by which water can enter. Infiltration is independent of the internal permeability of the soil. It is responsible in large part for temporary ponding of surface water. It is also easily affected by compacting forces.

Rating	Infiltration Rates (inches/hour)
Very High	Greater than 5.0
High	2.5 - 5.0
Moderate	0.8 - 2.5
Low	0.2 - 0.8
Very Low	Less than 0.2

Infiltration and permeability rates (shown below) are estimated on the basis of surface soil textures and undisturbed soil structures.

Permeability

Soil permeability is that quality of the soil which enables it to transmit water and air within the profile. It is the characteristic which determines soil drainage conditions, including the potential for extended periods of ponded water. Permeability is influenced by soil texture and structure and more imposing features such as impeding soil horizons within the profile. Prolonged use of compacting forces may produce adverse results with the effects typically being long term (75 to 100+ years).

Permeability rates are the same as those expressed for infiltration.

Depth

This column indicates the normal or typical depth of soil within each landtype. It is the depth to bedrock. For this rating, no consideration is given to the presence of impeding soil horizon or the hardness and competence of underlying bedrock materials. Soils underlain by highly weathered rock are generally rated one step deeper to compensate for the soft, soil-like rock.

Following are the ratings and corresponding soil depths:

Rating	Soil Depths (Feet)
Very Deep	Greater than 12
Deep	6.1 - 12
Moderately Deep	3.1 - 6
Shallow	1.5 - 3
Very Shallow	Less than 1.5

Surface Stoniness

The stoniness rating refers to the relative proportion of stones over 10 inches in diameter on the surface or within the surface foot of soil. It is felt that stones of this size become limiting for recreation site development. The degree of limitation is dependent on the amount and concentration of the stones. The ratings, reflecting these conditions, are estimates based on physical observations of the representative sites for each SRI landtype. No consideration is given to composition, hardness, and competence of the stones.

Rating	Percent of Surface Occupied*
Very Low	Less than 5
Low	6 - 10
Moderate	11 - 25
High	26 - 75
Very High	Greater than 75

*Percent of surface occupied includes the surface soil to a depth of 12 inches.

Percent Rock Outcrop

This interpretative rating indicates the relative amount of each SRI landtype which is occupied by rock outcrops. No consideration

has been given to size of outcrop or composition of outcrop materials.

Rating	Outcrops Within Landtype (%)
Very Low	Less than 1
Low	2 - 5
Moderate	6 - 30
High	31 - 70
Very High	Greater than 70

The following interpretations relate to soil qualities which may be manipulated through management or, conversely, site degradation. These qualities or characteristics are primarily intended as site maintenance considerations. Two ratings are shown for each item. The first indicates the natural or unamended condition. The second rating shows the potential if amendments are added; in other words, if the soil is managed.

Slope

Slope ratings give the recreation specialist an insight as to the slope conditions which are typical for each SRI landtype. Five slope classes have been established. These classes are consistent with the classes used throughout all the SRI interpretations.

Rating	Slope Range (%)
Very Low	Less than 10
Low	11 - 35
Moderate	36 - 50
High	51 - 70
Very High	Greater than 70

Flooding Potential

This interpretation rates the potential of each SRI type for flooding. Primary consideration was given to two factors. These include (1) possibility of flooding and (2) duration of flooding. Soil texture, infiltration, permeability, presence of an impervious layer, water table and landform are factors which influence flooding.

For purposes of this interpretative section, the rating of the limiting effects of an existing water table is comparable to the rating for flooding potential. Because of the precipitation patterns on the Umpqua Forest, water table would have a significant impact, primarily during the winter or nonuse season. For this reason no additional rating column is being prepared for water table interpretations. Pertinent remarks concerning water table limitations will be indicated in the remarks column.

Following are the ratings and corresponding definitions:

Rating	Flooding* Possibility-Duration
Very Low	No possibility.
Low	Less than 10 days in winter in depressional areas.
Moderate	11 to 30 days in winter in depressional areas.
High	30 to 120 days in winter.
Very High	Greater than 120 days of flooding.

*Flooding refers to presence of surface water covering a portion of the landscape.

Site Suitability

The column shown is intended to serve as a summary of the effect various limitations as applied to the level of development indicated. The levels refer to amount of site modification required for each development. The levels are defined in the U.S. Forest Service RIM Handbook, Exhibit 1.

Three general ratings are used including: NS (not suitable), P (possible), and S (suitable). These ratings are assigned after considering all factors expressed in this table. A P rating implies that mitigation efforts can overcome the major limiting factors.

TABLE 8

RECREATION SITE SUITABILITY

Soil Profile Characteristics							
Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
N/A	-	-	-	-	Moderate	Very Low	NS
N/A	-	-	-	-	Moderate	Very Low	NS
High	-	-	-	-	High	Low	S
N/A	-	-	-	-	Moderate	Very Low	NS
N/A	-	-	-	-	Moderate	Very Low	NS
N/A	-	-	-	-	Very Low	Very High	NS
N/A	-	-	-	-	Low	Low	P
N/A	-	-	-	-	High	Low	NS
High	-	-	-	-	High	Low	NS
Moderate	Moderate	Deep	Moderate	Very Low	Moderate	Moderate	S
Very High	Very Low	Deep	Very Low	Very Low	Low	Low	S
N/A	Very High	Very Deep	Very High	Very Low	Very Low	Very High	P
High	-	-	-	-	-	-	-
	Moderate & Low	Deep & Mod. Deep	Low to Moderate	Very Low	Moderate	Very Low	S
Very High & High	High & Low	Deep	Moderate	Very Low	Moderate	Low	S
Moderate & Low	Very Low	Very Deep & Deep	Very Low	Very Low	Very Low & Low	High	P
N/A	-	-	-	-	-	-	-
Very High	High	Mod. Deep	Low	Very Low	Moderate	Very Low	S
High	Low & Very Low	Mod. Deep	Low	Very Low	Moderate	Very Low	S
Moderate	Moderate & Low	Deep	Low	Very Low	Moderate	Very Low	S
Very High & Mod. High	Mod. & Very Low	Very Deep	Low	Very Low	Low	High	P
Moderate	Very Low	Deep & Mod. Deep Very Deep & Deep	Very Low	Very Low	Low	Moderate	S
Moderate & Low	Very Low	Very Deep & Deep	Very Low	Very Low	Very Low & Low	High	P
N/A	-	-	-	-	-	-	-
High	Moderate	Mod. Deep	Low & Moderate	Very Low & Low	Moderate	Very Low	S
High	Moderate & Low	Mod. Deep & Shallow Deep	Low & Moderate	Very Low & Low	Moderate	Very Low	S
Moderate	Low	Very Deep & Deep	Very Low	Very Low	Low	Low	S
Very High & Mod.	Mod. & Very Low		Low & Moderate	Very Low	Low	High	P
N/A	-	-	-	-	-	-	-
High	Moderate	Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
-	-	-	-	-	-	-	-
High	Moderate	Mod. Deep	Low & Moderate	Low	Moderate	Very Low	S
N/A	-	-	-	-	-	-	-
High	Moderate	Mod. Deep	Low & Moderate	Very Low & Low	Moderate	Very Low	S
High	High	Shallow & V. Shallow	Low & High	Low & Moderate	High	Very Low	NS
High	Moderate	Mod. Deep	Low & Moderate	Low	Moderate	Very Low	S
N/A	-	-	-	-	-	-	-
Very High	High	Mod. Deep	Low	Very Low	Moderate	Very Low	S
High	High & Moderate	Deep & Mod. Deep	Low	Very Low	Moderate	Very Low	S
High	Moderate & Low	Deep	Very Low & Low	Very Low	Low	Moderate	S
N/A	-	-	-	-	-	-	-
High	Moderate	Deep & Mod. Deep	Low	Very Low	Moderate	Very Low	S
High	Moderate & Low	Shallow	Low	Very Low	Moderate	Low	S

SRI Legend No.	Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
74	High	Moderate & Low	Deep & Mod. Deep	Low	Very Low	Low	Very Low	S
80	N/A	-	-	-	-	-	-	-
81	N/A	-	-	-	-	-	-	-
82	Moderate	Low	Mod. Deep	Moderate & High	Low & Moderate	Moderate	Very Low	P
83	High	Moderate & Low	Deep & Mod. Deep	Moderate	Very Low & Low	Low	Very Low	P
90	Very High	Very High	Very Deep	Very Low	Very Low	Very Low & Low	Very Low	S
91	N/A	-	-	-	-	-	Very Low	-
92	Very High	Very High & High	Very Deep & Deep	Very Low	Very Low	Very Low & Low	Very Low	S
93	Moderate	High	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
94	Very High & High	High & Low	Very Deep & Deep	Low	Very Low	Very Low & Low	Very Low & Low	S
95	N/A	-	-	-	-	Very Low	Very High	NS
96	Very High	Very High & High	Deep & Shallow	Moderate	Very Low & Low	Moderate & High	Very Low	P
97	Very High	High & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
98	Very High & High	High & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	P
99	Very High	Very High	Deep	High	Very Low	Moderate	Very Low	P
131	High	Moderate	High to Low	Moderate	Very Low & High	Moderate to High	Mod. to Very Low	P
132	High	Moderate	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Mod. to Very Low	S
135	High	Moderate	Very Deep & Deep	Low & Moderate	Very Low	Moderate to Low	Moderate to High	S
136	High	Moderate	Deep & Mod. Deep	Low & High	Very Low & Low	Moderate	Mod. to Very Low	S
151	N/A	-	-	-	-	-	-	-
153	Very High & Low	Very High & Low	V. Deep & V. Shallow	Low & Very High	Very Low	Mod. to Very Low	Mod. to Very High	S
156	N/A	-	-	-	-	-	-	-
161	N/A	-	-	-	-	-	-	-
165	N/A	-	-	-	-	-	-	-
182	High	Mod. & Very Low	Deep & Mod. Deep	Low & Moderate	Very Low & Low	Moderate	Very Low	S
183	Very High & High	High & Very Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
184	High & Moderate	Moderate & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
185	Very High & Mod.	Moderate & Low	V. Deep & Mod. Deep	Low & Moderate	Very Low	Moderate to Low	Very Low to High	S
186	N/A	-	-	-	-	-	-	-
187	High	Moderate & Low	Deep & Mod. Deep	Low & Moderate	Very Low & Low	Moderate	Very Low	S
188	High	High & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
189	Very High & High	High & Low	V. Deep & Mod. Deep	Low & Moderate	Very Low	Moderate to Low	Very Low	S
193	Very High	High & Low	Deep & Mod. Deep	Moderate	Very Low	Moderate	Very Low	S
195	Very High & High	High & Very Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Mod. & Very High	S
197	High	High & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Low to Very Low	S
198	High	High & Low	Deep & Mod. Deep	Low & Moderate	Very Low	Moderate	Low to Very Low	S
205	Very High & Mod.	Mod. & Very Low	Very Deep & Deep	Very Low & Low	Very Low	Very Low & Low	High	P
206	Moderate & Low	Very Low	Deep & Mod. Deep	Very Low	Very Low	Very Low	High	P
208	Moderate & Low	Very Low	Deep	Very Low	Very Low	Very Low & Low	High to Moderate	P

SRI Legend No.	Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
14	High & Low	Low & Very Low	V. Deep & Mod. Deep	Low	-	Moderate to Low	Very Low & Low	S
15	N/A	-	-	-	-	High to Low	Very Low to High	NS
20	Very High & Low	-	-	-	-	Moderate to Low	Very Low	S
21	-	-	-	-	-	Moderate to High	Very Low	NS
22	Very High & High	High & Moderate	Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
23	Very High & High	High & Very Low	Mod. Deep	Low & Moderate	Very Low	Moderate	Very Low	S
24	Very High to Mod.	High & Low	Mod. Deep	Low	Very Low	Moderate	Very Low	S
25	Very High & Mod.	High & Very Low	Mod. Deep to V. Deep	Low	Very Low	Low to Moderate	Very Low to High	S
27	Very High & High	High & Moderate	Mod. Deep	Low	Very Low to Low	Moderate	Very Low	S
28	Very High & Mod.	High to Very Low	Mod. Deep & V. Deep	Very Low & Low	Very Low	Moderate	Very Low	S
30	High & Low	Low & Very Low	Mod. Deep & V. Deep	Very Low & Low	Very Low	Moderate to Low	Very Low to High	S
31	N/A	-	-	-	-	High	Very Low	NS
32	Very High & High	Low & Very Low	Mod. Deep	Low	Very Low	Moderate	Very Low	S
33	High	Moderate & Low	Mod. Deep	Low	Very Low	Moderate to Low	Very Low	S
34	High & Moderate	Moderate & Low	Deep & Mod. Deep	Low	Very Low	Moderate to Low	Very Low	S
35	Very High & Mod.	High & Low	Mod. Deep to V. Deep	Very Low to Low	Very Low	Moderate	Very Low	S
36	Mod. to Very High	Moderate	Deep & Mod. Deep	Low	Very Low	Moderate	Very Low	S
37	High & Moderate	Mod. to Very Low	Deep	Low & Moderate	Very Low	Moderate	Low & Moderate	S
38	Moderate	Mod. to Very Low	Very Deep to Deep	Very Low to Low	Very Low	Moderate to Low	Very Low to Low	S
40	Moderate	Moderate to Low	Deep	Low	Very Low	Moderate	Very Low to High	S
41	High to Moderate	Moderate	Deep to Mod. Deep	Low	Very Low	Moderate	Very Low	S
42	High to Moderate	Moderate	Deep to Mod. Deep	Low	Very Low Very Low	Moderate	Very Low to High	S
43	High	Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low	S
44	High	Moderate	Deep to Mod. Deep	Very Low to Low	Very Low	Moderate	Very Low	S
45	Very High to Mod.	Mod. to Very Low	Mod. Deep to V. Deep	Low	Very Low	Low to Moderate	Very Low to High	S
47	High to Low	Mod. to Very Low	Mod. Deep to Deep	Low	Very Low to Low	Moderate	Very Low	S
48	High	Moderate	Deep to Mod. Deep	Very Low	Very Low	Moderate	Very Low	S
50	Moderate	Very Low	Very Deep to Deep	Very Low	Very Low	Moderate to Low	Very Low to High	S
51	High to Moderate	Very Low to Mod.	Deep to Mod. Deep	Very Low to Low	Very Low	Very Low to Low	Moderate to High	S
52	Moderate	Mod. to Very Low	Very Deep to Deep	Very Low	Very Low	Low to Moderate	Mod. to Very Low	S
53	Moderate	Very Low	Very Deep	Very Low	Very Low	Low to Moderate	Mod. to Very Low	S
54	Moderate to Low	-	Very Deep to Deep	Very Low to Low	Very Low	Very Low to Low	Moderate to High	S
55	N/A	-	-	-	-	High	High	P
56	N/A	-	-	-	-	High to Low	Very Low	NS
57	-	-	-	-	-	Moderate	Very Low	NS

SRI Legend No.	Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
313	N/A	-	-	-	-	High to Moderate	Very Low	NS
315	N/A	-	-	-	-	High to Low	Very Low to High	NS
321	High	Moderate	Mod. Deep to Shallow	Moderate	Low	Moderate to High	Very Low	P
322	High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
323	High	Moderate	Mod. Deep	Low to to Mod.	Very Low to Mod.	Moderate	Very Low	S
330	High to Low	Low to Very Low	Very Deep to Mod.	Very Low to Low	Very Low	Moderate to Low	Low to High	P
331	High	Moderate to Low	Mod. Deep to Shallow	Low to Moderate	Very Low	Moderate to High	Very Low	P
332	High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
333	Very High to High	High to Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low	S
335	Very High to Mod.	Mod. to Very Low	Deep to Mod. Deep	Low to Moderate	Very Low	Moderate to Low •	Very Low to High	S
336	High	Moderate	Deep to Shallow	Moderate to High	Very Low	Moderate	Very Low	S
342	N/A	-	-	-	-	High	Very Low	NS
344	Moderate	Low	Deep	Very Low to Low	Very Low	Low to Moderate	Low to Very Low	S
351	N/A	-	-	-	-	High	Very Low	NS
352	High	Moderate	Mod. Deep	Low to Moderate	Low	Moderate	Very Low	S
411	N/A	-	-	-	-	High	Very Low	NS
412	N/A	-	-	-	-	High	Very Low	NS
413	N/A	-	-	-	-	High to Moderate	Very Low	NS
414	N/A	-	-	-	-	High to Moderate	Very Low	NS
415	N/A	-	-	-	-	High to Moderate	Very Low to High	NS
416	N/A	-	-	-	-	High	Very Low	NS
418	N/A	-	-	-	-	High to Moderate	Very Low	NS
421	High	-	-	-	-	Moderate to High	Very Low	P
422	Very High to High	High to Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low	S
423	High	Moderate to Low	Mod. Deep	Low	Very Low	Moderate	Very Low	S
424	High to Moderate	Moderate	Deep to Mod. Deep	Low	Very Low	Moderate	Very Low	S
427	High	Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low	S
428	High	Moderate	Mod. Deep	Low to Moderate	Very Low	Moderate	Very Low	S
432	N/A	-	-	-	-	High	Very Low	NS
433	N/A	-	-	-	-	High to Moderate	Very Low to Mod.	NS
451	N/A	-	-	-	-	High	Very Low	NS
453	N/A	-	-	-	-	High to Moderate	Very Low to Mod.	NS
461	N/A	-	-	-	-	High	Very Low	NS
462	N/A	-	-	-	-	High	Very Low	NS
463	N/A	-	-	-	-	High	Very Low	NS
465	N/A	-	-	-	-	High	Very Low	NS
466	N/A	-	-	-	-	High	Very Low	NS
467	N/A	-	-	-	-	High to Moderate	Very Low	NS
468	N/A	-	-	-	-	High to Moderate	Very Low	NS
472	High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
476	High	Moderate	Mod. Deep	Moderate	Low	Moderate to High	Very Low	P

Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
High	Moderate	Mod. Deep	Low	Very Low to Low	Moderate	Very Low	S
High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High to Moderate	Very Low	NS
N/A	-	-	-	-	High to Moderate	Very Low to Mod.	NS
N/A	-	-	-	-	High to Moderate	Very Low	NS
N/A	-	-	-	-	High	Very Low to Mod.	NS
N/A	-	-	-	-	High to Moderate	Very Low	NS
High	Moderate	Mod. Deep to Shallow	Moderate to High	Low to Moderate	Moderate to High	Very Low	P
High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
High	Moderate	Deep to Shallow	Moderate	Very Low to Low	Moderate to High	Mod. to Very Low	P
High to Moderate	Moderate	Deep to Mod. Deep	Low	Very Low	Moderate	Very Low	S
High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate to Low	Very Low to High	P
High	Moderate	Deep to Mod. Deep	Moderate to High	Very Low to Low	Moderate	Very Low	P
N/A	-	-	-	-	High	Very Low	NS
High	Moderate	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
High	Moderate	Mod. Deep to Shallow	Low to Moderate	Very Low	Moderate	Very Low	S
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	Moderate to High	Very Low to Mod.	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High to Moderate	Very Low	NS
N/A	-	-	-	-	High to Moderate	Very Low	NS
High	Moderate	Mod. Deep to Shallow	Low to High	Low to Moderate	Moderate to High	Very Low	P
High	High to Moderate	Mod. Deep to Shallow	Low to Moderate	Low	Moderate	Very Low to Mod.	S
High	Moderate to Low	Mod. Deep	Low to Moderate	Very Low to Low	Moderate	Very Low	S
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	High	Very Low	NS
N/A	-	-	-	-	Moderate to High	Very Low	NS
Very High to High	Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low	S
Very High to High	High to Low	Deep to Mod. Deep	Very Low to Low	Very Low	Moderate to Low	Very Low to Mod.	S
N/A	-	-	-	-	Low to Moderate	Very Low	NS
High	High to Low	Deep	Very Low to Low	Very Low	Moderate to Low	Very Low to Mod.	S
Very High to High	High to Moderate	Mod. Deep	Very Low to Low	Low	Moderate	Very Low	S

SRI Legend No.	Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
712	N/A	-	-	-	-	High to Moderate	Very Low	NS
723	High	Moderate	Mod. Deep	Low	Very Low	Moderate	Very Low to Low	S
733	High	Moderate to Low	Deep to Shallow	Low to Moderate	Very Low to Low	Moderate to Low	Low to Very Low	S
801	N/A	-	-	-	-	Moderate	Very Low	NS
810	N/A	-	-	-	-	Moderate	Very Low	NS
812	N/A	-	-	-	-	Moderate	Very Low	NS
821	Moderate	Low	Mod. Deep to Very Shallow	Moderate	Moderate	Moderate	Very Low	P
823	High to Moderate	Low	Mod. Deep	Moderate to High	Very Low to Mod.	Moderate to Low	Very Low	P
901	Very High	Very High to High	Very Deep to Deep	Very Low	Very Low	Very Low to Low	Very Low	S
902	Very High	Very High to High	Very Deep to Deep	Very Low	Very Low	Very Low to Low	Very Low	S
904	Very High	Very High to High	Very Deep to Deep	Very Low to Mod.	Very Low to Low	Very Low to High	Very Low	P
906	Very High	Very High to High	Very Deep to Deep	Very Low to Mod.	Very Low to Low	Very Low to High	Very Low	P
911	N/A	-	-	-	-	Very High	Very Low	NS
916	N/A	-	-	-	-	Very High to Mod.	Very Low	NS
921	Very High	Very High to High	Very Deep to Deep	Very Low	Very Low	V. Low to Very High	Very Low	P
924	Very High to High	Very High to Low	Very Deep to Deep	Very Low to Low	Very Low	Very Low to Low	Very Low to Low	S
925	Very High to V. Low	Very High to High	Very Deep to Deep	Very Low	Very Low	Very Low	Very Low	S
927	Very High	High	Very Deep to Deep	Very Low	Very Low	Very Low to Mod.	Very Low to Mod.	
932	Very High	High	Deep	Very Low to Low	Very Low	Low to Moderate	Low to Moderate	
936	Very High	High	Deep	Moderate	Very Low to Low	-	-	
938	Very High to High	High to Low	Deep to Mod. Deep	Low to Moderate	Very Low	Moderate	Moderate	P
939	Very High	Very High to High	Deep	Low to High	Very Low	Moderate	Moderate	P
942	Very High to High	Very High to Low	Very Deep to Deep	Very Low to Low	Very Low	Very Low to Low	Very Low to Low	S
943	Very High to High	High to Low	Deep	Low	Very Low	Very Low to Mod.	Very Low to Low	S
946	Very High to High	Very High to Low	Very Deep to Shallow	Low to Moderate	Very Low to Low	Very Low to High	Very Low to Low	S
960	Very High	Very High to High	Mod. Deep to V. Deep	Mod. to Very Low	Very Low to Low	Low to High	Very Low	P
961	Very High	High	Mod. Deep to V. Deep	Mod. to Very Low	Very Low to Low	Moderate to High	Very Low	P
962	Very High	Very High to High	Mod. Deep to V. Deep	Mod. to Very Low	Very Low to Low	Moderate to High	Very Low	P
964	Very High to High	Very High to Low	Deep to Mod. Deep	Low to Moderate	Very Low to Low	Mod. to Very Low	Very Low to Low	S
966	N/A	-	-	-	-	-	High	Very Low	NS
967	Very High	Very High to High	Deep to Shallow	Moderate	Very Low to Low	Moderate	Very Low to Low	P
968	Very High to High	Very High to Low	Deep to Shallow	Moderate	Very Low to Low	Moderate to High	Very Low	P
969	Very High	Very High	Deep to Shallow	Moderate to High	Very Low to Low	Moderate to High	Very Low	P
972	Very High	Very High to Low	V. Deep to Mod. Deep	Very Low to Mod.	Very Low	Very Low to Mod.	Very Low	S
976	Very High	Very High to Low	Deep to Shallow	Moderate	Very Low to Low	Moderate	Very Low	P
980	Very High to High	High to Very Low	Deep to Mod. Deep	Low to Moderate	Very Low	Moderate	Very Low to Mod.	P
986	Very High to High	High to Low	Deep to Shallow	Moderate	Very Low to Low	Moderate to High	Very Low	P

SRI Legend No.	Soil Profile Characteristics: Infiltration	Permeability	Depth (Feet)	Surface Stoniness	% Rock Outcrop	Slope Limit	Flooding Potential	Site Suitability Level
7	Very High to High	High to Low	Deep to Mod. Deep	Low to Moderate	Very Low	Moderate	Very Low	P
8	High	High to Low	Deep to Mod. Deep	Low to Moderate	Very Low	Moderate	Very Low	P
9	Very High	Very High to Low	Deep to Mod. Deep	Low to High	Very Low	Moderate	Very Low	P
0	Very High	Very High	Very Deep to Shallow	Very Low to High	Very Low to Low	Moderate to High	Very Low	P
1	Very High	Very High	Very Deep to Shallow	Mod. to Very Low	Very Low to Low	Mod. to Very High	Very Low	P
2	Very High	Very High	Very Deep to Deep	High to Very Low	Very Low	Moderate to Low	Very Low	P
6	Very High	Very High	Deep to Deep	Moderate to High	Very Low to Low	Moderate to High	Very Low	P
8	Very High	Very High to Low	Deep	Low to High	Very Low	Moderate	Very Low	P

APPENDIX VI

TERMS AND DEFINITIONS OF MAPPING UNIT CRITERIA[1/]

This appendix contains the terms and definitions used in soil resource inventories. These terms and definitions are used in compiling information for the Mapping Unit Descriptions.

Soil Characteristics

Soil - Any and all loose, unconsolidated, weathered material on the earth's surface resting on solid, consolidated, unweathered bedrock, regardless of origin, mode of formation, or type of weathering or deposition. Generally includes any material that may be manipulated by hand tools or heavy equipment without the need of blasting except soft, unweathered bedrock. In soil horizon designation, soil materials included "A," "B," and "C" horizons.

Depth of Soil to Bedrock - Distance from soil surface to consolidated, unweathered bedrock. Depth is in feet or inches.

Shallow - Less than 3 feet.

Moderately Deep - 3 to 6 feet.

Deep - 6 to 12 feet.

Very Deep - Greater than 12 feet.

Depth to Restrictive Layer in the Soil - Distance from soil surface to a layer in the soil that is highly restrictive to drainage, water transmission or root growth. Usually this is a discontinuity or stratification layer, but it may be bedrock. If it is bedrock, depth must be the same as recorded under depth to bedrock. A restrictive layer is generally not a genetic soil horizon, except in old soils that have developed claypan, hardpan, or cemented horizons. Depth is in feet.

Litter - Total depth in inches of decomposed and undecomposed organic matter.

Soil Layer - Each soil layer is a homogeneous layer of soil material. Soil layers are described when soil characteristics change significantly and have definite effects on management. Each layer may result from stratification or soil formation processes.

1/ Unless otherwise noted, the following definitions were developed for use in Soil Resource Inventories, R-6.

Soil Layer Thickness - Thickness of each soil layer in inches.

Soil Layer Thickness Classes - Thickness is in feet or inches.

Thin - Less than 3 feet.

Moderately Thick - 3 to 6 feet.

Thick - 6 to 10 feet.

Very Thick - Greater than 10 feet.

Color - Stated in narrative Munsel notations for each soil layer. Colors are taken of moist crushed soil. Mottling is noted, if present, especially in subsoil layers.

Texture - Relative proportions of sand (2.0 mm - .05 mm), silt (.05 mm - .002 mm), and clay (less than .002 mm). Standard USDA textural classes are used for each soil layer.

Textural Classes* - These classes apply when general textural terms are used for the profile sketch in the mapping unit descriptions.

Coarse-Textured Soils - Sands, loamy sands.

Moderately Coarse-Textured Soils - Sandy loam, fine sandy loam.

Medium-Textured Soils - Very fine sandy loam, loam, silt loam, silt.

Moderately Fine-Textured Soils - Clay loam, sandy clay loam, silty clay loam.

Fine-Textured Soils - Sandy clay, silty clay, clay.

Rock Fragment Quantity, Size, and Shape* - Percent by volume occupied by consolidated fragments larger than sand size (larger than 2 mm).

Size Classes - Gravel, 2 mm - 3 inches; cobbles, 3 inches to 10 inches; stones, greater than 10 inches.

Shape Classes - Round, thin, flat, subangular, subround, angular, blocky, etc.

Rock Fragment Classes - Used as an adjective to textural classes. Includes gravel, cobble and stone sizes.

0 - 35 percent - Not noted.
35 - 50 percent - Gravelly, cobbly or stony.
50 - 80 percent - Very gravelly, very cobbly or very stony.

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*Standard USDA Handbook 18 Definitions.

80 percent + - Extremely gravelly, extremely cobbly or extremely stony.

Soil Structure* - Includes grade, size and type of structure for each soil layer. If no structure exists, then the soil is massive or single-grained. Concretions or shot are recorded, if present. Applies to aggregate structural units (aggregates and peds).

Grade - Degree of aggregation and expression of the differential between cohesion within aggregates and adhesion between aggregates.

Weak - Indistinct peds, barely observable in place.

Moderate - Distinct peds, moderately durable and evident.

Strong - Distinct peds in place, durable.

Size - Refers to size of aggregates according to five size classes and type of structure.

	Platy	Prismatic	Columnar	(Angular) Blocky[1]	Subangular blocky[1]	Granular	Crumb
Very fine or very thin.	Very thin platy; <1 mm.	Very fine prismatic; <10 mm.	Very fine columnar; <10 mm.	Very fine angular blocky; <5 mm.	Very fine subangular blocky; <5 mm.	Very fine granular; <1 mm.	Very fine crumb; <1 mm.
Fine or thin	Thin platy; 1 to 2 mm.	Fine prismatic; 10 to 20 mm.	Fine columnar; 10 to 20 mm.*	Fine angular blocky; 5 to 10 mm.	Fine subangular blocky; 5 to 10 mm.	Fine granular; 1 to 2 mm.	Fine crumb; 1 to 2 mm.
Medium	Medium platy; 2 to 5 mm.	Medium prismatic; 20 to 50 mm.	Medium columnar; 20 to 50 mm.	Medium angular blocky; 10 to 20 mm.	Medium subangular blocky; 10 to 20 mm.	Medium granular; 2 to 5 mm.	Medium crumb; 2 to 5 mm.
Coarse or thick.	Thick platy; 5 to 10 mm.	Coarse prismatic; 50 to 100 mm.	Coarse columnar; 50 to 100 mm.	Coarse angular blocky; 20 to 50 mm.	Coarse subangular blocky; 20 to 50 mm.	Coarse granular; 5 to 10 mm.	
Very coarse or very thick.	Very thick platy; >10 mm.	Very coarse prismatic; >100 mm	Very coarse columnar; >100 mm.	Very coarse angular blocky; >50 mm.	Very coarse subangular blocky; >50 mm.	Very coarse granular; >10 mm.	

Type - Refers to relative shape of individual aggregates. There are four primary basic shapes.

Platy - Soils particles arranged around a plane, generally horizontal.

Prism-like - Soil particles arranged around a vertical line and bounded by relatively flat surface (prismatic, columnar).

Block-like - Soil particles arranged around a point and bounded by flat or rounded surfaces (angular blocky, subangular blocky).

Spheroidal - Soil particles arranged around a point and bounded by curved or very irregular surface (granular, crumb).

Structureless - No observable aggregation or no definite orderly arrangement of natural lines of weakness.

Massive - The soil material is coherent.

Single Grain - The soil material is incoherent.

*Standard USDA Handbook 18 Definitions.

Cementation* - Includes degree of cementation and the agent of cementation (Ca, Fe, Al, Si). Cementation is generally caused by a chemical process.

Degree of Cementation

Weak - Soil aggregates can be easily broken by hand, and usually nonrestrictive to water and roots. Example: fragipan.

Strong - Soil aggregates are difficult to break by hand or hand tools and resist movement and penetration of water and roots. Water may be perched or ponded for short periods. Aggregates can be penetrated by hand tools.

Indurated - Soil aggregates are insoluble in water and cannot be broken by hand tools. Aggregates are totally restrictive to water and roots, and usually require ripping or blasting.

Compaction - Relative increase in bulk density which is caused by natural pedogenic processes.

Degree of Compaction

Weak - Soil aggregates are easily broken by hand and are usually nonrestrictive to water and roots.

Moderate - Soil aggregates are difficult to break by hand and resist movement and penetration of water and roots. Water may be perched or ponded for short periods of time.

Strong - Soil aggregates cannot be broken by hand. The soil exhibits nearly total restriction to water and root penetration, and usually requires ripping or blasting.

Permeability - Water or air movement in and through the soil material. The classes are based on soil texture, rock fragment content, porosity and bulk density.

Class

Very Slow - Generally fine-textured soils - clay. Less than .05 inch/hour.

Slow - Generally moderately fine-textured soils - clay loams and silty clay loams. .05 inch/hour to 1 inch/hour.

Moderate - Generally medium-textured soils - loams, silt loams. 1 inch/hour to 5 inches/hour.

Rapid - Generally moderately coarse-textured soils, sandy loams, gravelly loams. 5 inches/hour to 20 inches/hour.

Very Rapid - Very porous soils. Generally coarse-textured soils - sands and gravels. Greater than 20 inches/hour.

*Standard USDA Handbook 18 Definitions.

Consistence* - Degree of cohesion and adhesion as indicated by the resistance of the soil aggregate to deformation or rupture under various moisture conditions.

Dry

Loose - Noncoherent.

Soft - Easily crushes to powder or single grain.

Slightly Hard - Easily broken between thumb and forefinger.

Hard - Can be broken in the hands without difficulty but difficult to break between thumb and forefinger.

Very Hard - Can be broken in hands without difficulty.

Extremely Hard - Cannot be broken in hands.

Moist

Loose - Noncoherent.

Very Friable - Crushes under gentle pressure.

Friable - Crushes easily under gentle to moderate pressure between thumb and forefinger.

Very Firm - Crushes under strong pressure, barely crushable between thumb and forefinger.

Extremely Firm - Crushes under very strong pressure, cannot be crushed between thumb and forefinger.

Wet

Stickiness is measured by pressing wet soil between fingers.

Nonsticky - Practically no adherence when pressure is released.

Slightly Sticky - After pressure, soil adheres to both thumb and finger but comes off one rather cleanly. Does not stretch appreciably.

Sticky - After pressure, soil adheres to both thumb and finger and tends to stretch somewhat before pulling apart from either digit.

Very Sticky - After pressure, soil adheres strongly to both digits and is markedly stretched when they are separated.

*Standard USDA Handbook 18 Definitions.

Plasticity is measured by rolling wet soil and observing wire.

Nonplastic - No wire is formable.

Slightly Plastic - Wire forms, but soil mass easily deformed.

Plastic - Wire forms, moderate pressure required to deform soil mass.

Very Plastic - Wire forms, much pressure required to deform soil mass.

Soil pH - Intensity of soil acidity or alkalinity expressed on a scale from 1 to 14:

	pH		pH
Extremely Acid	- Below 4.5	Neutral	- 6.5 - 7.3
Strongly Acid	- 4.6 - 5.5	Slightly Alkaline	- 7.4 - 8.4
Slightly Acid	- 5.6 - 6.4	Strongly Alkaline	- 8.5 - 9.0
		Very Strongly Alkaline	- Above 9.0

Classification - Estimated taxonomic classification at family level.

Root Distribution* - Includes root size, abundance and depth to zone of rooting. Not maximum depth of roots and zone of maximum concentration.

Size

Very Fine - 0.075 mm.

Fine - 1 to 2 mm.

Medium - 2 to 5 mm.

Coarse - Over 5 mm.

Abundance

Very Few - Less than 1 per unit[2/]

Few - 1 to 3 per unit.

Plentiful - 4 to 14 per unit.

Abundant - More than 14.

*Standard USDA Handbook 18 Definitions.

2/ Unit is a square inch for fine to very fine; a square yard for medium and coarse roots.

Depth - Recorded depth in inches of zone of rooting. Distance is measured from soil surface to depth of majority of roots.

Landform - Refers to the shape and configuration of a specific, identifiable part of the landscape common to the mapping unit.

Slope - Range of slope of landtype.

Aspect - Direction of slope exposure.

Elevation - Altitude above mean sea level expressed in feet.

APPENDIX VII

GLOSSARY

Accelerated Erosion	- See "Erosion."
Alluvium	- Material laid down in recent times in river beds, flood plains, and lakes and fans at the foot of mountains.
Andesite	- A dark gray to black, dense, fine-grained extrusive igneous rock. Very similar to basalt.
Ash (Recent Volcanic Ash)	- Silt and very fine sand-size volcanic ejecta as used in this report. The volcanic ash that is the surface soil material of some of the landtypes is considered to have been laid down in recent geologic times.
Associated Species	- As used in this report, includes white fir, Douglas-fir, western larch, and lodgepole pine.
Basalt	- A dark gray to black, dense, fine-grained extrusive igneous rock. Very similar to andesite.
Bedding	- A collective term signifying existence of beds or layers.
Bedrock	- The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
Breccia	- Rock composed of angular fragments in the finer ground mass.
Cirque Basin	- A half-amphitheater formed by alpine glaciation with three steep sides. Usually found at upper ends of valleys and along ridges.
Clay	- A soil separate less than .002 mm in diameter. As a soil textural class, soil material that is 40% or more clay; less than 45% sand, and less than 40% silt.
Cobble	- A rock fragment between 3 and 10 inches in diameter.
Colluvium	- Soil material or rock fragments moved downslope by gravitational force in the form of soil creep, slides, and local wash.

Compaction - The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density.

Complex - An association in which two or three mapping units or miscellaneous mapping units are so intricately mixed that it is not practical to show them separately at the scale of mapping used.

Conglomerate - A cemented clastic rock containing rounded fragments in a finer groundmass.

Debris Slide - A rapidly moving slide composed of soil, bedrock, or both.

Devitrification - The process by which glassy rocks break up into definite minerals.

Erosion - (1) The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep; (2) detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Evapotranspiration - Water transpired by vegetation plus that evaporated from the soil.

Extrusive Bedrock - This applies to those igneous rocks derived from volcanic lavas that cooled on the surface of the earth. This lava cools rapidly and forms fine-textured rocks such as basalt and andesite.

Faulted - Movement which has produced relative displacement of adjacent rock masses along a fracture.

Fold - A bend in a strata or any plane or structure.

Gabbro - A coarse-grained, basic, intrusive rock.

Geomorphology - The study of landforms as they relate to geologic composition and history.

Glacier - A mass of ice with definite lateral limits, with motion in a definite direction, and originating from the compacting of snow by pressure.

Glacial Soils - Soils derived from materials transported or influenced by glaciers.

Glacial Till - Nonsorted, nonstratified sediment carried or deposited by a glacier.

Glaciated Valley & Trough - U-shaped valley formerly cut out and occupied by a glacier.

Gravel - A rock fragment between 2.0 millimeters and 3 inches in diameter.

Hydrophobic - Lacking a strong affinity for water, water repellant.

Inclusion - Landtype found within a mapping unit that is not extensive enough to be mapped separately or as part of a complex.

Intrusive Bedrock - This term is applied to those rocks derived from magmas that have been injected into older rocks at depth without reaching the surface. These magmas are slow-cooling and form coarse-textured rocks, such as granite, granodiorite or gabbro.

Isohyetal Map - A map with lines along which all points receive the same amount of precipitation.

Jointing - Fracturing in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.

Landform - Structural configuration of the topography as a result of past and present geological activity.

Mapping Units & Landtypes - Mapping units are shown on the soil maps as numbers. Mapping units contain a dominant landtype which accounts for at least 70% of the mapping unit delineation. The dominant landtype of the mapping unit is described in the mapping unit description and identified by the same number as used for the mapping unit. Within the mapping unit, other landtypes occur. Those most commonly associated with the dominant landtype of the mapping unit are included in the descriptions as inclusions. These inclusions of other landtypes account for no more than 30% of the mapping unit.

Mapping Unit Complexes - Commonly, two or three numbers (46/47, 41/46/85) occur in a mapping delineation. This is called a Mapping Unit Complex. The mapping units within these delineations are present in an arrangement too complex or too small to separate at the one-inch-per-mile scale. Where a two-mapping unit complex occurs, each mapping unit makes up 40% to 60% of the complex, and for a three-mapping unit complex, each mapping unit makes up 30% to 40% of the complex. Refer to each mapping unit for information desired.

Massive - Soil structure or bedrock condition in which there is no observable aggregation or no definite orderly arrangement of natural lines of weakness.

Mass Wasting - Wearing away of the landscape through the process of mass movement.

Mass Movement - All movement of soil and bedrock materials occurring below the soil surface such as landslips, landflows, rock slides, slumps, etc.

Metasedimentary - Sedimentary rocks partially altered by heat and pressure.

Metavolcanic - Volcanic rocks partially altered by heat and pressure.

Miscellaneous Mapping Units - Mapping Units 1, 3, 5, 7, 8, 9 and 10 are considered miscellaneous mapping units that are too variable to be described by a profile description. They are described by a short narrative description. Soil materials are too variable to make all of the interpretations. More detailed mapping is necessary if additional information is needed.

Mixed Species - As used in this report, includes ponderosa pine, white fir, and Douglas-fir.

Peak Flow (Peak Runoff) - The greatest water discharge for any single runoff period.

Physiographic Divisions - Broad groupings based on the physical features of the landscape.

Plastic Soil - A soil capable of being molded or deformed continuously and permanently, by relatively moderate pressure, into various shapes.

Puddling and Puddled - The act of destroying soil structure by manipulating a soil when it is in a wet and plastic condition. Puddling reduces porosity and permeability.

Pumice - An excessively cellular, light-colored, volcanic ejecta.

Pyroclastic - A general term applied to rocks formed from volcanic material that has been explosively or aerially ejected from a volcanic vent.

Residuum - Soil material formed by rock weathering in place.

Rhyolite - A light-colored, fine-grained, acidic, extrusive rock.

Runoff - That part of the precipitation which appears in surface streams of either perennial or intermittent form.

Sand - A soil separate between .05 and 2.0 millimeters in diameter.

Sandstone - A rock composed primarily of cemented sand-size grains.

Sedimentary Rock - A rock formed by deposition of soil and rock particles by water, ice, or wind that later solidifies through cementation, ionic exchange or compression.

Serpentine - A rock consisting almost wholly of serpentine minerals derived from the alteration or previously existing olive and pyroxene.

Shale - Fine-grained rock, softer than slate, consisting of clay minerals and silt, which typically splits readily along closely spaced planes, parallel to stratification.

Silt - A soil separate consisting of particles between 0.002 and 0.05 millimeters in diameter.

Siltstone - A sedimentary rock consisting primarily of silt-size particles.

Slump - A deep-seated, rotational failure occurring in plastic materials, resulting in vertical and lateral displacements.

Soil - Any and all loose, incoherent, unconsolidated weathered material on the earth's surface resting on solid, consolidated, unweathered bedrock, no matter how formed, or origin, or method of weathering or deposition. Generally includes any material that may be moved or broken by hand tools or heavy equipment without the need of blasting except soft, unweathered bedrock. In soil horizon designation, soil materials included "A," "B," and "C" horizons.

Spot Symbols - Symbols used on soil maps to represent a landscape factor too small to delineate.

Stone - A rock fragment greater than 10 inches in diameter.

Toeslope - That portion of a slope that is transitional between the valley floor and the upper slope.

Topography - The relief features or surface configuration of an area.

U-Shaped Valley - Descriptive phrase of the cross profile of a valley which has been carved out by glacial movement.

Volcanic Ejecta - Any and all material forcibly blown out of volcanic cones, fissures, and vents.

V-Shaped Valley - A descriptive phrase of the cross profile of a valley which has been cut by stream action.

Welded Tuff - A tuff that has been indurated by the combined action of the heat retained by the particles and the enveloping hot gases.

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