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I N I T I A L D R A F T

SOIL-HYDROLOGIC RECONNAISSANCE SURVEY

Lowman Ranger District

Boise National Forest

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PURPOSE

The purpose of the Soil-Hydrologic Reconnaissance Survey is to provide an information base for use in revision of Multiple Use Plans and broad Resource Management and Activity planning.

The land system inventory used in this report provides an information base from which the land manager can make technically sound and defensible land management decisions for definitive and manageable units of land.

Although the above were the primary reasons for initiating the survey, other uses can be made of the report. General information about capabilities and hazards can be extracted for early planning stages. Kinds of soils can be identified for development of a statewide general soils map with other agencies. Benchmark soils can be identified for more detailed study. Soils are being identified and named to fit in the National Cooperative Soil Survey.

DEVELOPMENT

A land system inventory has been developed in the context that land is the basic medium of management. Land as we use it in management, encompasses both the living and non-living portion of the earth that can be owned as property. In this sense, land can be equated to the ecosystem concept with both biotic and abiotic elements. Using natural and visual units to stratify land, the concept of the land system inventory has been developed. This concept can be divided into four sections: (1) land stratification, (2) inventory procedures, (3) evaluation, and (4) application.

Land Stratification

All disciplines need a nomenclature system or language to describe the universe covered by that discipline. In order to do this, each discipline needs a classification system. In simple terms, classification is an orderly arrangement of objects. In the effort to map natural units of land, the land system inventory is stratified from the general to the specific. The initial unit is the planet and the system ends with the individual site. The stepdown units in the system are: (1) planet, (2) continent or island, (3) province, (4) section, (5) subsection, (6) landtype association, (7) landtype, (8) landtype phase, and (9) site.

This system is described in detail in Land Systems Inventory by Wertz and Arnold.[1/]

1/ Wertz, William A. and Arnold, John F., 1972, Land Systems Inventory, USDA, USFS, Intermountain Region.

For planning purposes, we are primarily interested in units at the section level or lower. Sections are large areas such as the Southern Idaho Batholith section of the Northern Rocky Mountain Province. Subsections are geographic areas within a section which are separated primarily on climatic or structural differences. A further separation for management purposes occurs at the landtype association level. The landtype association level would be separated on differences in geomorphic processes, geology, vegetation and soils. This level would be useful for planning at a forest-wide level.

The unit most suited for broad planning needs is the landtype. Landtype is the basic unit of the land system inventory. Landtypes are natural portions of the landscape resulting from geomorphic and climatic processes that have predictable behavior patterns.

It should be emphasized that units at the landtype level are suited to broad level planning purposes on ranger districts. Project planning and special projects require a more detailed level of survey in the system such as a landtype phase or taxonomic unit level.

Inventory Procedures

Inventory procedure relates to the mechanics of making the survey and gathering the basic data. This includes: (1) assembling available data pertaining to the survey area, such as geology and topographic maps, climatic data, research data, and other related information; (2) pre-mapping the landtypes on aerial photos prior to field work. Using the previously assembled information and with the aid of a stereoscope, the survey area is stratified into natural units of land or landtypes; (3) the stratified units are sampled in the field in order to gain additional information about characteristics, performance, or behavior of the individual areas of land. Information on similar landtypes is checked against one another for field correlation purposes.

Evaluation

After the information has been collected by the above described procedure, the results are evaluated and assembled into the Soil-Hydrologic Reconnaissance Report. Landtype characteristics, previous experience, and results of activities and research data are used in developing criteria, descriptions and behavior predictions for each area of land. This provides the information base for management planning.

Application

This report is designed initially for use at the Multiple Use Planning level. It is a working tool to help the land manager make management decisions about specific areas of land. Other uses of the report are for broad resource and activity planning, such as transportation and timber management planning.

This is a reconnaissance survey. It should not be used for specific project planning, except in a very general way. As an example, this report should not be used to determine the suitability of a particular site for a campground, building site or recreation area. Areas such as these require information beyond the scope of this survey. The report can be used to select potential areas for more intensive investigation for projects such as these. Following are some suggestions for the best use of this report:

1. Read and study the report thoroughly. Get help if any part of the report is not clear or is not understood.

2. Check the report in the field. Become familiar with the landtypes and the soils that are described. Call attention to any apparent errors in mapping. Add your own comments and observations about how the various landtypes perform under certain management practices. The management evaluation section in the landtype description is provided for this use.

3. Correlate the report with the Multiple Use Plan.

a. Use the Land Type Soil Association Map as an overlay for the Multiple Use Map.

b. Use the landtype and landtype association descriptions to more clearly define existing management areas and management units.

c. Use the Land Type Soil Association Map to adjust the management area boundaries, where appropriate.

d. Use report as a basis for additional management direction for management areas and units.

e. List functional management considerations for each landtype.

f. Identify, describe, and write management decisions for landtypes or groups of landtypes which qualify as new management units.

4. With help from Hydrology and Soils personnel, develop interpretive maps for erosion and stability hazards for use in transportation and timber management plans. Develop other interpretive maps as needed.

5. Use report for broad resource and activity planning.

6. Use the report as a basic document for continuing training program of District and Forest personnel.

7. Make additions or corrections as new data becomes available.

GENERAL DESCRIPTION OF THE DISTRICT

Location and Extent

The Lowman Ranger District is located in Elmore, Boise, and Valley counties, approximately 60 air miles north and east of Boise, Idaho. This District is in the Northern Rocky Mountain Province and encompasses about 531,894 acres of the Boise National Forest. This area of land is drained by the South Fork of the Payette River, the North Fork of the Boise River, and the Middle Fork of the Salmon River.

General Characteristics

The Lowman Ranger District is dominated by granitics of the Idaho Batholith where glaciation, cryoplanation, faulting, fluvial action and mass wasting have been the major formative processes of the present landforms. Precipitation is dominantly received as snow, and most areas are moderately to well forested.

In general, the District contains contrasting areas of steep and gentle topography. Slopes along major drainages, especially the South Fork of the Payette, North Fork of the Boise River and tributaries, are deeply incised with gradients dominantly in excess of 50 percent. In contrast, the rolling mature topography in the Bear Valley Creek drainage is dominated by slopes with gradients less than 50 percent. Elevations range from approximately 3,500 to 9,000 feet.

Vegetation

The Lowman District is dominantly well vegetated with a variety of vegetative associations. Some species have a wide range throughout the survey area; however, many species occur in definable communities. These communities or habitat types have strong associations with climate, soils and landtype. For this reason, habitat types were identified for the dominant soils on individual landtypes. Identification was made possible with the help of personnel from the Intermountain Forest and Range Experiment Station. This classification is still in the development stages, and some changes may occur as more information becomes available. The habitat types listed in this report will give a variety of management implications including relative productivity, suitability for specific seral species, broad climatic and micro-climatic conditions within a landtype.

In general, south slopes at lower elevations are dominated by brush/grass communities and dry ponderosa pine and Douglas-fir habitat types. Mid elevations are dominated by Douglas-fir and subalpine fir habitat types with Douglas-fir and ponderosa pine the major productive seral components. Higher elevations are almost entirely subalpine fir habitat types with Douglas-fir and some Engelmann spruce as dominant seral components.

Generally, productivity potentials over the District are moderate to high for the timber producing habitat types and low to moderate for range production. Historic grazing practices have resulted in a severe reduction in forage production to localized areas, but current trends are upward.

Climate

The Lowman Ranger District has extremely variable climatic conditions. This is a result of the considerable variation in elevation, aspect and configuration of the lands, and its local influence on the macro-climate of the South Central Idaho area. This macro-climate is the result of seasonal movement of two opposing weather systems; the Aleutian Low and the Pacific High. The Aleutian Low is an extensive, moisture-laden maritime air mass that reaches its southern-most position in winter. It brings a strong flow of generally moist air into the Central Idaho region from the west and northwest. As summer approaches, the Pacific High begins to dominate the weather greatly reducing available moisture.

Dry continental air masses are normally blocked from movement into this region by the mountain ranges to the east. However, this dry air occasionally seeps into the Bear Valley area. Moist air masses from the Gulf of Mexico may reach this area in the fall and stimulate thunderstorm activity. On occasion, warm sub-tropical Pacific storms reach this region from the South Pacific during November through January. Major warm rainstorms result from these occurrences.

Temperature. The warmest locations on the District are the south-facing, low elevation slopes near Lowman. The coldest locations are the small enclosed basins at high elevations such as Bear Valley and Bull Trout Lake basin. These basins have poor air drainage and tend to accumulate the dense cold air draining from higher slopes. Figure 1 shows mean monthly and annual temperatures for stations at Lowman, Deadwood Dam, and Stanley. The Elk Creek-Bear Valley-Bruce Meadows Basins are likely to have temperatures very close to those at Stanley.

Daily fluctuation in temperature is greatest in summer in the deep canyons where the mean daily range is 48° F. in August. The high basins have approximately 43° F. mean daily temperature fluctuation in August. Winter mean daily fluctuation is much less; 26° F. for high basins and 19° F. for Lowman.

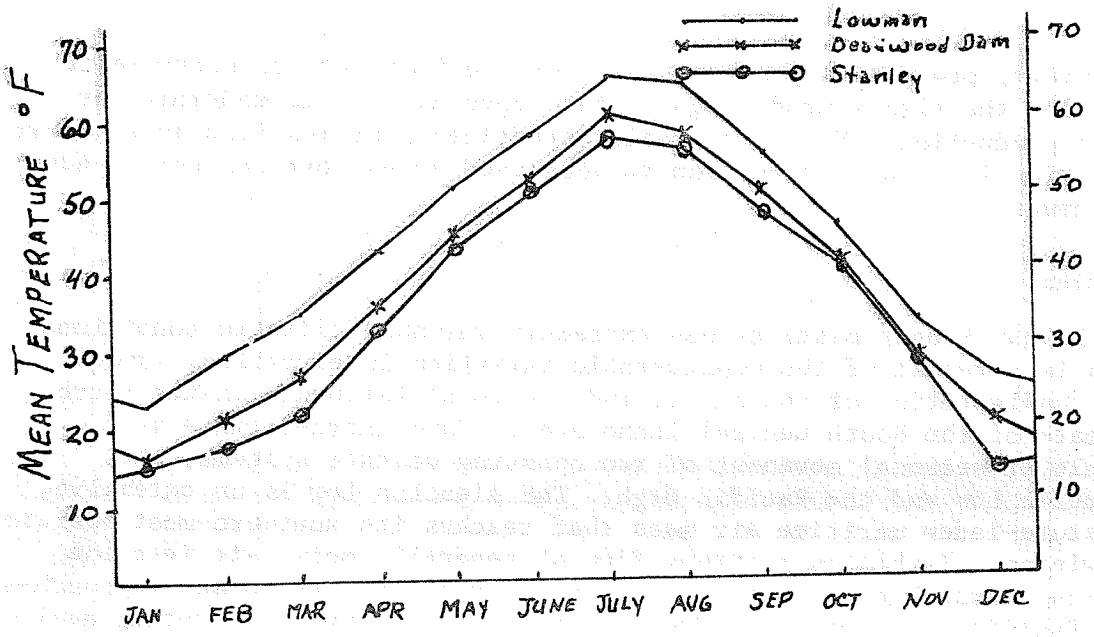


Figure 1. Mean monthly temperature for Lowman, Deadwood Dam, and Stanley, Idaho.

Precipitation. The amount of precipitation is well correlated with elevation. It also appears that for areas of equal elevation, the annual precipitation amount decreases moving from west to east across the District. This is likely because of lifting and cooling of the moist air from the west by the Sunset-Pilot Peak and Scott Mountain-Rice Peak Ridge systems, thus extracting some of the moisture before it reaches the mountains and ridges further east.

Figure 2 is an isohyetal map showing the generalized mean annual precipitation for the District. Seasonal distribution of precipitation is shown by Figure 3, monthly mean precipitation for Deadwood Dam and Lowman.

Approximately 50 percent of the annual precipitation at the 5,000 foot level falls as snow; approximately 70 percent falls as snow at 7,000 feet.

This snowpack is released by melting at times and rates determined by elevation, aspect, degree of exposure, and other factors affecting micro temperature regimes. Generally, the southern exposed slopes at low elevations have snowmelt completed by sometime in March, while northerly aspect, high elevation slopes often have considerable unmelted snow into July.

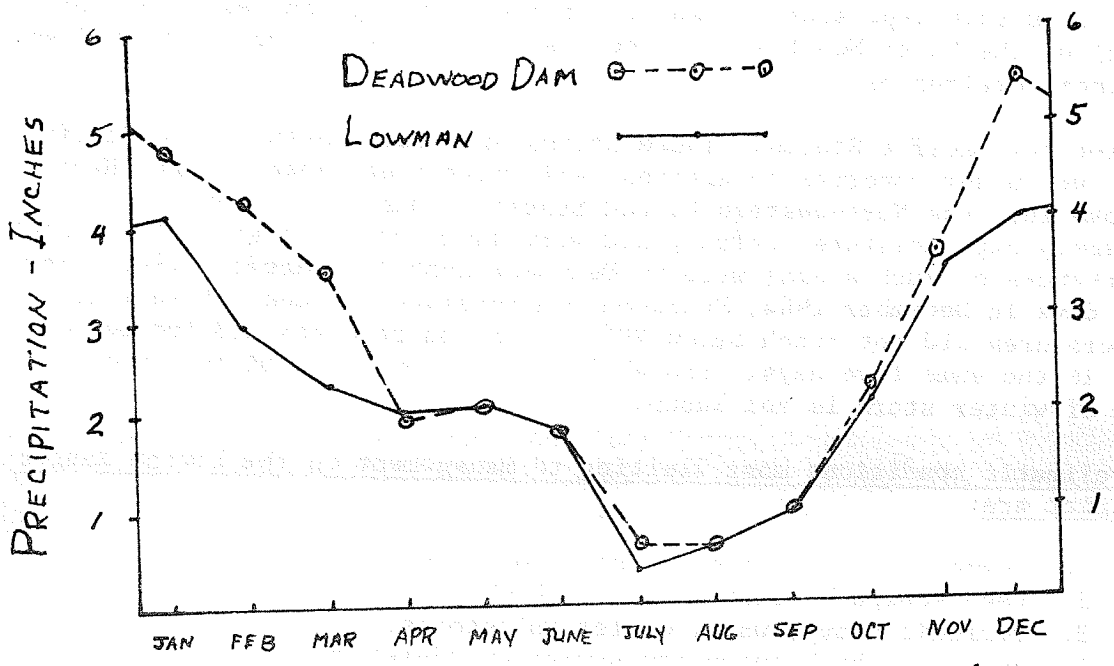


Figure 3. Monthly mean precipitation for Lowman and Deadwood Dam, Idaho.

Storm Types. The rain and snow producing storms in this area can be separated into three groupings: summer thunderstorms, normal frontal rain and snow storms, and tropical Pacific warm rainstorms.

Summer Thunderstorms: These storms occur over the District from about May through October and are caused by relatively small cells of moist air, cooled from vertical lifting and circulation by heated convection currents. Many of these storms have very little moisture and produce little or no rain or hail. Others drop rain and hail at very high intensities on local areas for periods of one hour or less. In this area, thunderstorm precipitation records are scarce and the probability of storms of given intensities and durations is not well established. A storm of one inch of precipitation in one hour is believed to have about a 4 percent chance of occurring in any given year at a given location.

Normal Frontal Storms: These are widespread storms that produce rather steady rain or snowfall for periods of a few hours to a few days. In normal years they produce by far the greatest part of the annual precipitation of Central Idaho. In spring and fall they produce rain. In winter they produce snow at all but the lowest elevations. Air accompanying these storms is not unusually warm since it comes from the northern Pacific area (Aleutian Low). Chance of 4 inches of precipitation in 24

hours from this type storm is about 4 percent in a given year (25-year storm) on the Scott Mountain to Rice Peak ridge system and slightly less on other portions of the District.

Subtropical Pacific Storms: These storms originate south of the Pacific High and, under abnormal conditions, slip past a weakened Pacific High to move into the Northwestern United States. This storm type has extremely high moisture content, and very warm, unstable air. Two recent occurrences of such storms were in December 1955 and December 1964. For five days in December 1964, Deadwood Dam received 9 inches of rain and temperatures did not reach below 29° F. Lowman received 4.3 inches of rain in the same five days. Probability of occurrences of this warm type of winter storm is not known.

The climatic conditions most limiting to management on the Lowman Ranger District are:

1. Summer drought period, June through September.
2. Deep snowpack accumulation on higher elevations.
3. Periodic heavy, warm, winter rainstorms.
4. Recurrent high intensity summer thunderstorms.
5. Cold air entrapment and storage in upland basins.

Geomorphology

Geomorphology deals with the forms of the earth, the general configuration of its surface and the changes and processes that take place in the evolution of land forms.

The geomorphic processes most active on this District are of two distinct kinds - internal and external.

Internal processes include all movements or faulting of any part of the earth crust (diastrophism). Volcanism is also an internal process where heated rock material or gasses move to or toward the earth's surface resulting in intrusive dikes.

External processes may include any agency or activity of any sort that operates directly on the surface of the earth. The four major processes in this area involve glaciation, cryoplanation*, fluvial action and mass wasting.

Alpine glaciation was a major formative process at the highest elevations. Glaciers originated under heavy snowpacks in the heads of U-shaped stream cut canyons. As the climate became more severe, snow and ice packs increased in magnitude. Glaciers began moving downstream. Heavy ice packs combined with freezing and thawing have resulted in "ice plucking," rock quarrying and scouring. The end result has been the cirques, rocky

*See Glossary Cryoplanated

ridges and steep rocky headlands at the heads of glaciated valleys. As glaciers gained in mass, downstream scouring, polishing and truncation altered the stream cut V-shaped valleys to U-shaped. Common landforms are truncated spur ridges, over-steepened slopes with parallel dissection, hanging valleys, ice deposited morainal materials, water-worked outwash and stream-laid sediments. These processes have been dominantly responsible for landtype development on many areas of the District at higher elevations.

Cryoplanation is the reduction of the land surfaces by processes associated with climatic changes brought about by alpine glaciation. The effects of nivation, freezing, thawing, ice and permanent snow field action were mainly localized. Snow and rock materials were not carried by major ice currents nor was the bedrock deeply stripped. The resultant landforms have weakly expressed drainage patterns, rounded and subdued topography over deeply weathered granite bedrock. These processes have dominantly been responsible for landtype development in Bear Valley Creek drainage.

Fluvial action is characterized by steep V-shaped valleys, sharp ridges and strongly expressed drainage patterns. The dominant factor is the erosive force of running water. Other processes, including mass wasting, are commonly associated with the fluvial processes.

The materials and sediment generated by all of these processes are generally transported by gravity, streams, or ice to a lower position in drainage where depositional accumulations result. These areas of deposition occupy bottoms of glacial troughs, streams, basins, toe slopes and terraces adjacent to major streams.

Although glaciation, cryoplanation, fluvial action, mass wasting, faulting, volcanism and other processes are often independently responsible for the dominant appearance of an individual landtype, several or all processes are generally inter-related. Many areas of cryoplanation have been modified by rejuvenation or faulting and subsequent acceleration of the fluvial processes. Other areas that were highly eroded to a mature stage by fluvial processes have been buried by extruded volcanics and moved back into the earliest stages of the fluvial cycle. This varied inter-relationship is the dominant factor responsible for segregating areas of land into landtypes or landtype associations. A knowledge of these inter-relationships also becomes significant when understanding or interpreting the management qualities of a landtype.

Soils

The soils of the District have been classified and described according to the criteria established in Soil Taxonomy of the National Cooperative Soil Survey (Dec. 1970). Soils have been classified to the soil family level. Soil families are differentiated primarily on the basis of

properties which are important to the growth of plants. Differentiating criteria are not the same for all categories in the classification system, but primarily include texture, mineralogy, reaction, soil temperature, and depth. Table V in Appendix B gives the classification of the soil to the family level.

Factors which affect the appearance of soils on the District are vegetation, animal activity, climate and parent material. The thickness of the surface horizon is generally related to the amount and type of organic matter deposited by the vegetation growing in the soil. Soils which have the thickest surface horizon generally support dense stands of brush and herbaceous vegetation. Soils under conifer stands generally have thinner surface horizons. Thin surface horizons are also found on very warm slopes where oxidation of organic matter is rapid. Vegetation also retards surface erosion resulting in the formation of thicker surface horizons.

Climate is one of the most important formative processes in the development of soil. No soil development would be possible without the effects of moisture and temperature. The fluctuations of temperature, with the resultant freezing and thawing, are the basic processes by which parent rocks are broken down into smaller particles. The major soil profile characteristics attributable to climate, is the color of the subsoil. In the glaciated and cryoplanated areas, the color of the subsoil is brighter (higher in chroma) than the soil color on the warmer sites of fluvial or depositional landtypes.

Parent material refers to the nature of the underlying bedrock or other material giving origin to the surface soils. Coarse textured parent materials like granite or glacial outwash from granite generally produce coarse textured soils that develop very slowly. Fine textured basalt, however, weathers rapidly, developing soils with more horizonation and fine loamy textures.

Landtype has strongly influenced the development of soils on the District. Slopes generally have three segments:

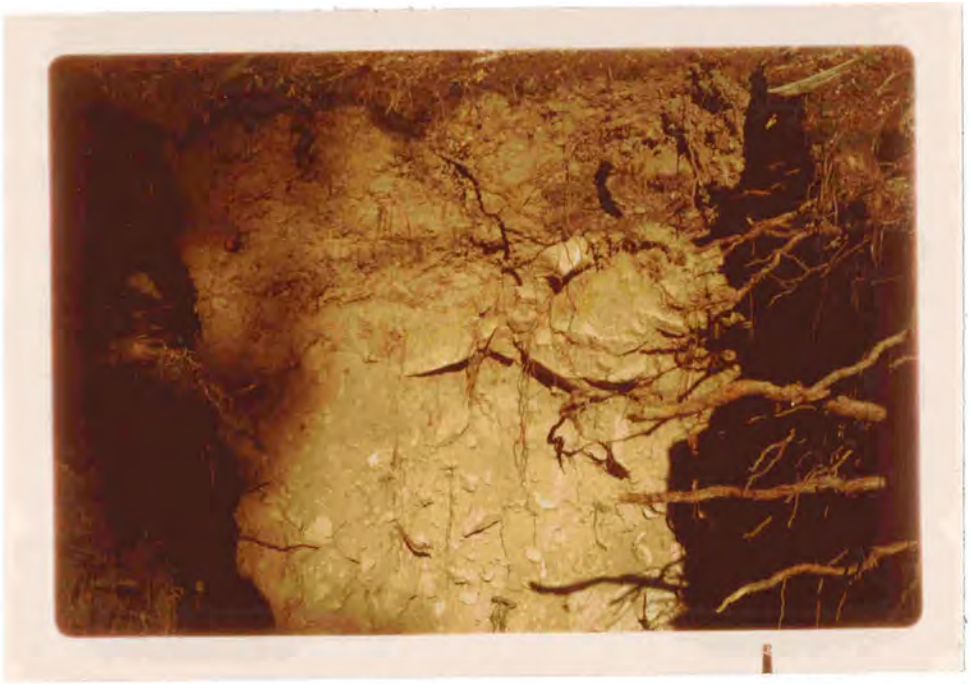
(1) Areas of soil loss (ridgetops and upper one-third of side slope),

(2) The transitory part of the slope where gains in soil materials equal losses (straight mid-slopes), and

(3) The part of the slope where materials accumulate (lower one-third, concave toe slopes and swales).

Slope shape, therefore, controls two important features of the soil: soil depth and soil moisture. Shallow droughty soils are more common on convex positions and deep, moist soils are more common on concave

The shallow, coarse-textured soils on steep, strongly dissected landscapes result in fragile slopes with high impacts from soil disturbance.



Soil profiles are described and separated into horizons on the basis of color, soils content, texture, and other significant characteristics.

Revegetation success is often related to favorable soil characteristics.

Mass failures can many times be related to soil and/or bedrock characteristics.

positions such as swales. The most strongly developed soils are in the accumulative, concave positions.

The soils formed on the different types of granite rock on the District are quite similar; however, some minor differences were noted. The soils from granodiorite and quartz diorite have slightly finer textures, finer sands, and micas are more conspicuous than in the soils from quartz monzonite, which generally have loamy, coarse sand textures. The reason for the differences lies in the amount of quartz and the amount of mica present in the parent material. Granodiorite and quartz diorite are low in quartz and high in the micas as compared to the gray, high quartz and low mica content of quartz monzonite. Quartz monzonite is the dominant mineralogy for the District, with granodiorite and quartz diorite being mostly confined to the glaciated areas.

A common characteristic of soils on the District is their youthful appearance. This is expressed by weak horizon development and coarse textures. These soils are very young in terms of geologic age.

Hydrology

The hydrology of the Lowman District will be discussed by major drainages of the District. These are: (1) Upper South Fork Payette River upstream from the confluence of the Deadwood River; (2) the Deadwood River drainage; and (3) the Bear Valley Creek drainage. These watersheds do not include the entire Ranger District. The omitted portions will be treated as part of the major watershed of which they are a part.

The mean annual water yield of the three major drainages is approximately 1,147,000 acre feet of which 188,000 acre feet comes from the Sawtooth National Recreation Area. The total area of the three drainages is approximately 577,000 acres of which 68,000 acres are Sawtooth National Recreation Area.

Figure 4 shows the area and water yield for each of the drainages.

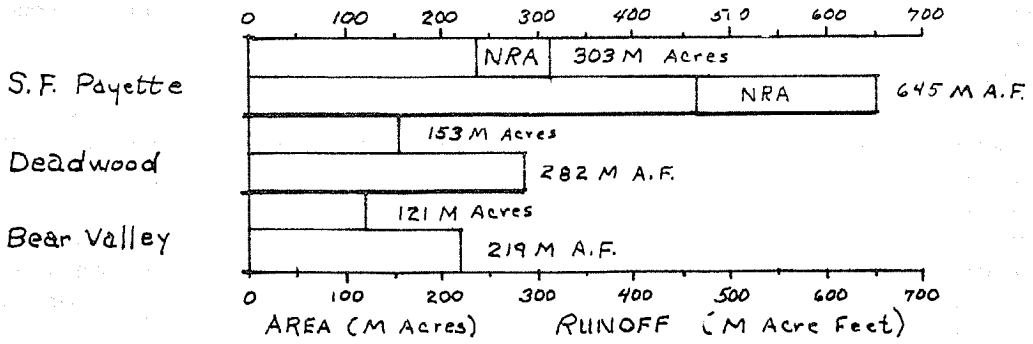


Figure 4. Area and runoff for major drainages of Lowman District.

Bear Valley Drainage. The water yield for the drainage average 22 inches per year. This equals approximately 50 percent of the mean annual precipitation (43 inches). Snowpacks present on April 1, amount to about 60 percent of the mean annual precipitation.

Highest streamflows of the year typically occur between mid-May and mid-June. The highest flow recorded by the stream gage near Fir Creek between 1923 and 1960 was 3,860 cubic feet per second on May 27, 1956. This event has about a 2.5 percent chance of being equalled or exceeded in any given year. Annual hydrographs show the beginning of snowmelt runoff normally starts in late March; the general rate of flow increase is consistent through April and into May. In low snowpack years, the recession of runoff begins as early as mid-May, but in high snowpack years, the recession does not start until late June. Once recession starts, the rate is about the same for both low water years and high water years, but low flows are reached earlier in the summer or fall for low snowpack years. It follows that low snowpack years will have lower flows during critical temperature periods in late July and August.

At the confluence of Elk Creek and Bear Valley Creek, Elk Creek averaged 58 percent of the total combined flow during the late summer of 1972. See Figure 5 for monthly mean discharge for a year of near average flow.

A reconnaissance study of Bear Valley Creek in 1972 indicated [1/] no water chemistry or temperature problems during above average streamflow years. However, the conditions for below average streamflow years is yet to be determined.

Suspended sediment and turbidity is a potential problem due to deposits of clay mine tailings adjacent to Bear Valley Creek channel. Bedload sediment is a serious problem on the upper Bear Valley Creek. A reconnaissance survey of the upper Bear Valley Creek channel in 1972 showed very high volumes of sandy bedload sediment in the eight miles immediately below a dredge-mined area. Elk Creek channel has moderately high quantities of bedload sediment.

The major stream channels in the drainage are in glacial outwash and fine alluvial materials in a meadow environment. These streams have a meandering alignment for most of their length. Considerable bank erosion is occurring at the outside of meanders. It is not known if this erosion is caused primarily by natural channel and streamflow conditions, excessive sediment accumulation, streamside livestock use, or a combination. The channel of Bear Valley Creek through dredge tailings is heavily eroding its bank to develop a length and gradient consistent with its materials and streamflow energies.

1/ Cole, Gene, Hydrology of the Bear Valley Creek Drainage, December 1972, Boise National Forest, Unpublished.

Upper South Fork Payette Drainage. The mean annual water yield for the upper South Fork Payette drainage is 25.5 inches. For the years of record 1941 to 1970, the greatest annual yield was 37 inches in 1965. The minimum yield was 17.7 inches in 1944.

All recorded annual peak flows have come from spring snowmelt between May 20 and June 22. The highest flow recorded between 1941 and 1970 was 7,050 cubic feet per second on May 24, 1956. The minimum flow typically occurs after August and before February. The lowest flow recorded was 135 cubic feet per second on September 10, 1966.

Water quality is very good. Eight samples have been analyzed by the State of Idaho from above the Deadwood River since April 1970. These data indicate water characteristics that easily meet the criteria for public water supplies. Turbidities may exceed the criteria for short periods during heavy runoff.

Suspended sediment is very low for all but short periods of heavy runoff. Bedload sediment is present in moderate amounts, usually concentrated in pools and eddies where streamflow energies are lower than the dominant. The South Fork Payette and tributaries are characteristically high energy streams and sediment is flushed through the system rather rapidly. Stream channel stability conditions are dominantly good with only local channel reaches in poor and fair condition.

Sediment recruitment is a problem on local areas. Natural sediment source problems exist on barren, steep, weathered granitic sore spots along the south side of the Payette River and in the Chapman and Warm Springs tributary drainages. Accelerated sedimentation is occurring from many miles of streamside roads and from areas depleted by grazing. No quantitative sedimentation studies have been conducted on the drainage and the magnitude of natural and accelerated sedimentation is not known. General observations indicate the sedimentation rate to be substantially less than that for the Middle Fork Payette River drainage, the Mores Creek drainage, and the Arrowrock portion of the Boise River drainage. From these commparisons, a rough estimate is 200 ± 50 cubic yards of sediment per square mile per year. It is also estimated that natural sedimentation rate is slightly above that for the upper Middle Fork Boise drainage and the upper South Fork Salmon drainage, or approximately 80 ± 20 cubic yards per square mile per year.

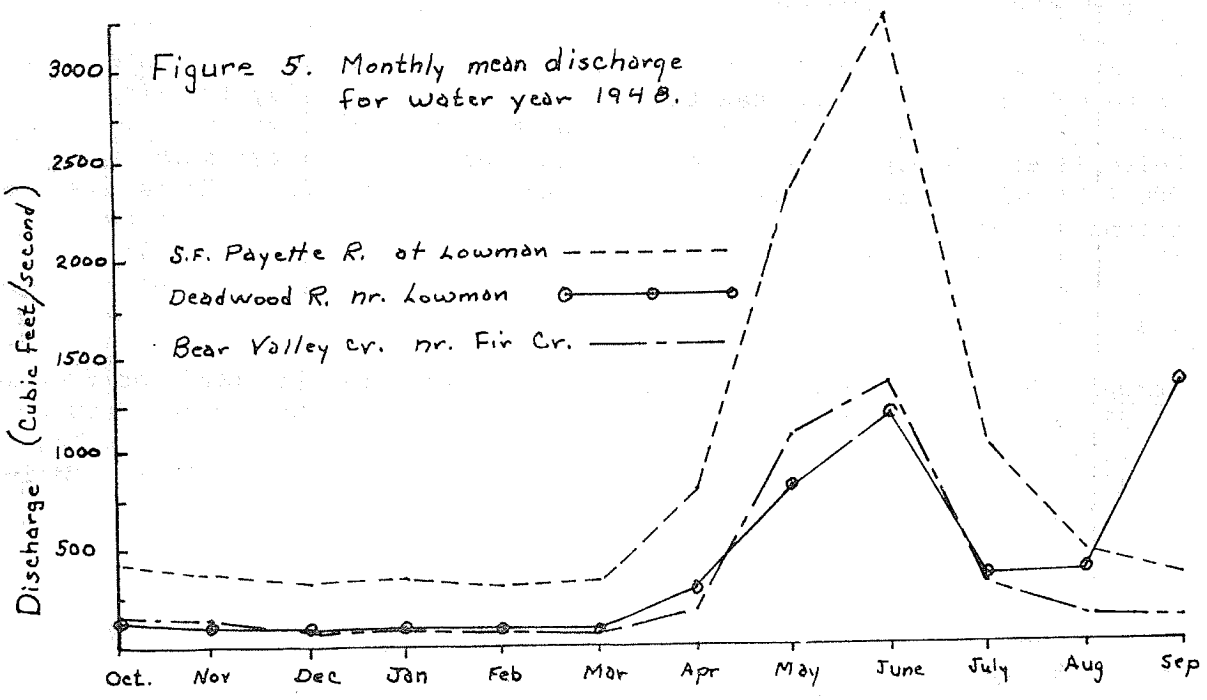
Deadwood River Drainage. Mean annual water yield for the Deadwood drainage is 23 inches. For the years of record, 1921 to 1953, the lowest annual yield was 11.6 inches in 1924; the highest annual yield was 39.4 inches in 1951. Maximum discharge recorded was 4,230 cfs on May 9, 1928. Minimum flow recorded was 28 cfs on November 4, 1935.

Since 1939, the flow of the lower Deadwood River has been severely altered from the natural regime by the Deadwood Dam. From 1921 to 1930, prior to regulation, annual peak flows occurred between May 3 and May 26. Since 1930, annual peak flows have been generally lower and have occurred irregularly between May 8 and September 15. The present timing of streamflow is largely due to the annual operation of the Deadwood Dam, which is as follows: Headworks are closed during latter September each year and remain closed until June. On occasion, headworks are closed for short periods between June and September but normally they are left open this entire period. In the spring of heavy runoff years, the reservoir spillway flows during May and early June. In low runoff years, no water flows over the spillway. Figure 5 shows the mean monthly flow at the river mouth.

Water quality is good. Eight samples taken at the river mouth since 1970 indicate no problems with organic contents, chemical quality or temperature.

Sedimentation rates above Deadwood Reservoir appear to be relatively low, probably less than 50 cubic yards per square mile per year, and this is trapped in the reservoir. Sedimentation rate for the area draining to the river below Deadwood Dam is significantly higher. The rate is probably between 100 and 200 cubic yards per square mile per year.

Present bedload sediment increased from very low immediately below the dam to moderate in the vicinity of Scott Creek to high below Lorenzo Creek. Much of the sediment is probably due to debris slides in 1964-65. Additional sediment is due to road construction along the lower seven miles of Deadwood River.



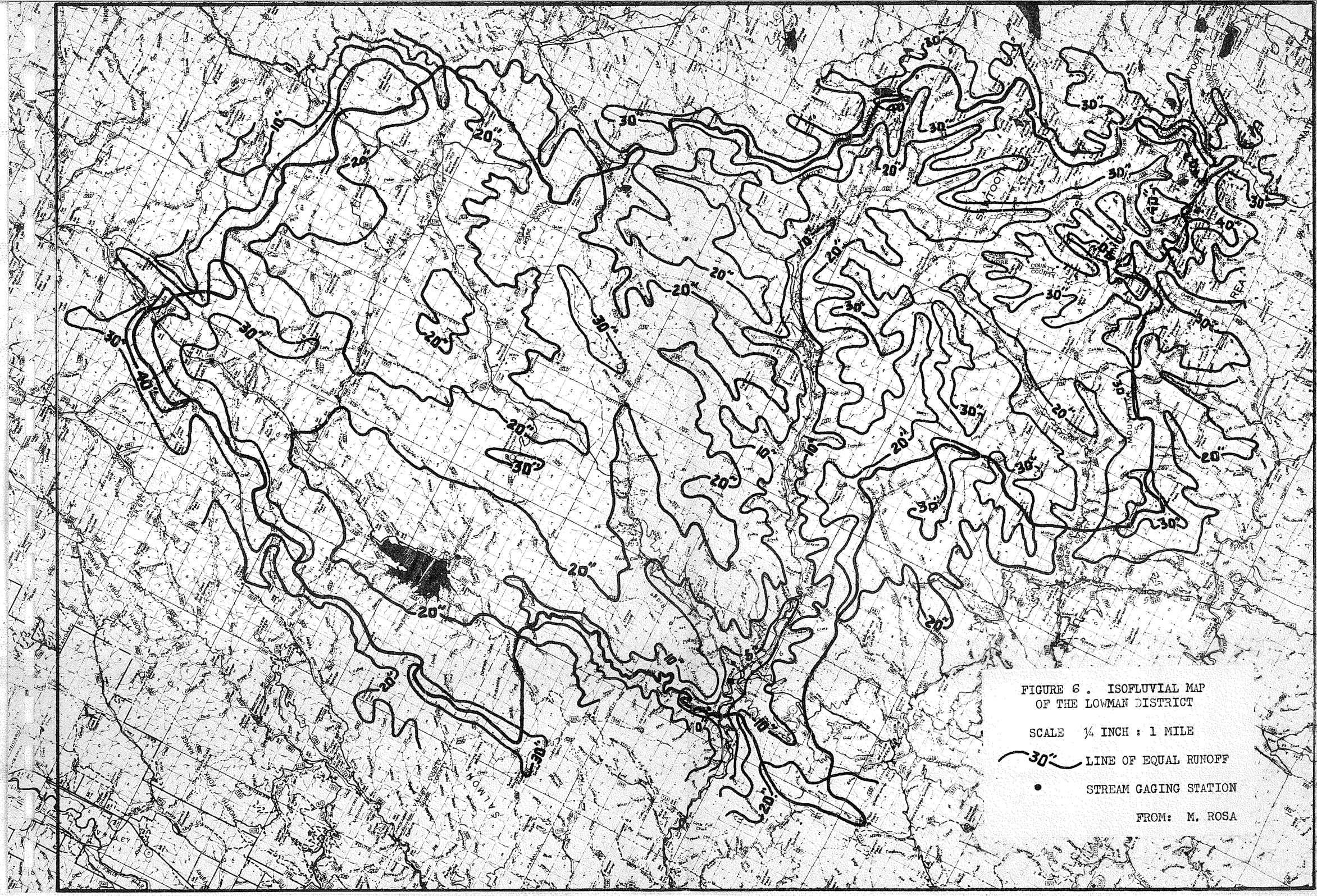


FIGURE 6 . ISOFLUVIAL MAP
OF THE LOWMAN DISTRICT

SCALE ¼ INCH : 1 MILE

30" LINE OF EQUAL RUNOFF

• STREAM GAGING STATION

FROM: M. ROSA

MANAGEMENT RELATIONSHIPS

This section discusses management relationship of the significant features of the landscape to water, timber, road construction, recreation, range, and wildlife. These various functional resource activities are related to soils, landtype, character of bedrock and other significant landscape features.

Water

Many of the soils on the District have very high infiltration and percolation rates. They also have, because of their coarse textures, low water-holding capacities. They readily take in and transmit water. Unless the soils are disturbed, surface runoff is rare on much of the District, except when very high intensity storms occur. Thus, much of the moisture that falls on the slopes is delivered to the stream as subsurface flow rather than surface flow. This is true on most of the lands in the District with the exception of rocky areas where surface flow is dominant.

The character of the bedrock is an important factor in the transmitting of moisture. Well weathered and/or well fractured bedrock has the capacity to store and transmit water as does the soil. In areas of land where the bedrock is well fractured, deep subsurface flow is dominant.

In areas of massive bedrock, subsurface flow is still a factor. Water that has percolated down through the soil flows over the surface of the massive or slightly fractured bedrock. This is known as the subsurface flow interface. When roads or contour trenches are built on these lands, the subsurface flow interface may be intersected and the subsurface flow is converted to surface flow. This increases soil loss by erosion of the road surface and may weaken fill slopes by saturation. The danger of intersecting the subsurface flow line is quite high on the warm south-facing slopes in the Fluvial Lands, due to the dip of the jointing plane. Landtypes where this condition is most prevalent are Oversteepened Canyon Lands, Rocky Headlands, and Dissected Mountain Slope Lands.

Bedrock that is deeply weathered, as in some fluvial lands, and/or highly fractured, as in glaciated lands, permits moisture to penetrate deep into the bedrock. The chance of intercepting large amounts of subsurface flow in lands with these types of bedrock is therefore much less.

The shape of the land and the drainage pattern also tells something about how it handles the moisture that falls on it. Lands which

have weakly expressed drainage systems as in the Cryoplanated Uplands and in most areas of the Strongly Glaciated Lands indicate that there is very little surface flow. These lands percolate water quite deeply and release the water slowly. They are responsible for maintaining stream flow through dry periods of the year. Lands which are deeply incised with a denritic stream pattern indicate that the bedrock is impermeable and that water is moving mostly as surface flow. These lands store very little water for sustained stream flow. Much of the area in the Fluvial Land is of this type.

It is important to understand how a slope transmits water. Relationships that exist between the shape of the land and the way it transmits water are very strong, but also very delicate. The balance is easily disrupted by engineering practices, such as road construction, contour trenching, and ditching. As nearly as possible we should not interfere with the natural way a slope transmits water. If, as a result of engineering practices, we increase the infiltration of water into the soil mantle, we increase the potentials for mass failure and decrease the surface erosion potentials. If we concentrate the surface runoff and intercepted subsurface flow into drainageways, we decrease the potentials for mass failure but increase the potentials for surface erosion.

On the steep granitic fluvial lands, a cyclic erosion-sedimentation pattern has been observed. The cycle begins with the downslope movement of materials to steep minor draws and drainageways by erosive agents such as creep, raindrop splash, wind and animal disturbance. The materials accumulate in these minor drainageways for variable periods, up to 50 or more years, until a runoff event occurs that flushes it to lower streams. Management of these slopes can affect this cycle in two ways - (1) increase the rate of material movement to drainageways, and (2) increase the runoff rate from the watershed and thus cause more frequent flushing of drainageways.

Timber

Soil depth and texture are two of the most important characteristics which influence tree growth. Soils that have sandy loam or loamy subsoil textures are usually more productive than soils with coarse textured subsoils. Likewise, deeper soils are usually more productive than the shallow soils. Certain soil characteristics also affect the composition of the regenerating vegetation after fires or logging activities. Soils that are very gravelly or cobbly and that are underlain by well fractured bedrock many times are regenerated by dense brush stands. Soils with these characteristics are common on the District. Natural regeneration of conifer species is quite slow in these areas.

The character of the bedrock influences tree growth several ways. The well weathered and/or highly fractured bedrock is a major source of moisture to the tree on many sites. This explains why some very shallow soils on the District have moderate to high timber productivity potentials. The bedrock also restricts the downward movement of moisture, thus holding it in the subsoil and within reach of the tree roots. The character of the bedrock influences stocking rates on many sites. Areas having highly weathered and/or highly fractured bedrock will support heavier stocking than similar areas which have massive unweathered bedrock.

Landform also influences tree growth. This relationship is generally connected with soil moisture. Areas such as basins, stream terraces, and north or east slopes receive and hold additional moisture and have higher timber productivity potentials than convex slopes or areas of moisture loss. The effect of landform on timber growth is amplified by the soil and bedrock characteristics. Benches and terraces generally have finer textured soils and are usually underlain by more deeply weathered bedrock than convex slopes and thus are more productive. Air drainage is also effected by landform. This will affect species, distribution, and growth rates.

The impact of timber harvesting on the Idaho Batholith and adjacent areas to the Idaho Batholith recently has been given much attention. Studies indicate that sedimentation from logging roads is the single largest impact of the timber harvesting operation. The cause of the sedimentation is surface erosion of the cut slopes, fill slope, and road surface. Other sources of sediment are debris slides above the cut slope and mass failure of the fill slopes. Interpretation of the erosion hazard and the mass stability hazard for each of the landtypes is given in Table 1, Appendix A.

Removal of vegetation and disturbance of the top soil by the logging operation increases the chances for surface erosion and thereby increases sediment production. The degree of this impact is influenced by the landform and the logging method used. The type of logging method used is therefore controlled by the slope gradient. Tractor skidding can be used without damage to the watershed on the more gentle slopes. As the slopes become steeper, skyline, high lead, or other systems must be used. Some areas of the District that have very steep slopes and high mass movement hazards will require helicopter or balloon logging for control of soil movement.

Road Construction

From past experience we know that road construction on steep mountainous lands with fragile granitic soils is a very difficult and costly job. In terms of impact to the watershed, it has in many cases been very damaging. In some cases, this damage can be avoided. However, on many of the lands and slopes where roads have been constructed, it would be almost impossible from a practical cost standpoint to construct logging roads without damaging the watershed. In other less hazardous areas, the damage to the watershed resulting in sedimentation can be reduced substantially with a full understanding of the hazards involved in building roads on these particular kinds of lands. A reconnaissance survey does not predict the particular kind and degree of hazard involved in road construction at any given point or on a station to station basis. However, we are able to predict the general hazards and the degree of hazards which will be encountered in road construction on a certain type of mountain slope or landtype. On most of the landtypes in the District the landform, the character of the bedrock, and soils determine the impact that construction of a road will have on the hydrologic function or stability of a given slope. The impact of any road construction is determined by the degree or extent with which the natural water transmitting properties of the slope have been altered.

Following is a brief discussion of the relationships of the landform, character of the bedrock,[2/] and soils with road construction:

Road construction and other engineering practices are much more hazardous on some landtypes than on others. Landtypes in the Fluvial Lands such as Moderately and Strongly Dissected Mountain Slope Land are more hazardous to road construction than the Cryoplanated Uplands which have a very weakly developed drainage pattern. The slope forming processes on the Cryoplanated Uplands produce slopes which have well graded soils, unconsolidated subsurfaces, and well weathered bedrock. Most of the moisture that falls on these slopes is percolated deeply into the soil mantle and bedrock and flows off as subsurface flow. The slope forming processes that are active in the Fluvial Lands concentrate moving surface water into draws which endanger road fills which may cross these draws. Soil materials on these lands are more uniform and usually have poor gradation, resulting in less stable fill slopes.

2/Clayton, James L. and Arnold John F., 1972, Practical Grain Size, Fracturing Density, and Weathering Classification of Intrusive Rocks of the Idaho Batholith. USDA, Forest Service General Technical Report INT.-2, 1972.

Landtypes such as Oversteepened Canyon Lands, which have been subjected to faulting and subsequent uplift, have oversteepened slopes which tend to be unstable. Debris slide hazards and surface erosion hazards are quite high on these lands. On north-facing slopes adjacent to the larger streams, slope gradients in excess of the angle of repose of the soil materials are made possible on these slopes by the dense vegetative cover. The possibility of cutbank failures on roads built on these kinds of slopes is very high.

The character of the bedrock is an important factor in road construction. Some of the characteristics of the bedrock which are important to engineering practices are the method and degree of weathering, degree of fracturing, minerology, and structure.

Roads constructed through bedrock that is highly fractured will generally cause less impact on the land than roads built through massive bedrock. Coarse fragments from the fractured bedrock provide strength to fills and subbases. However, there is the hazard of intercepting subsurface flow in bedrock of this type.

Granular exfoliation is a common form of weathering in granitic rocks. This is a mechanical weathering process caused by the fluctuation of temperature and moisture. In nature this process gradually rounds and reduces the rock outcrops. When the bedrock is exposed by a road cut, the rock, which appears to be hard and unweathered, is weakened by this process. This is referred to as spalling or air slaking and produces coarse sands and fine gravels which accumulate at the foot of the cut slopes. This causes maintenance problems. This material must be removed from the inside of the drainage ditch to prevent clogging of culverts and subsequent saturation of the road fill. Another type of weathering is chemical weathering. Some bedrock has been weathered to great depths and is weakly consolidated. Colors range from almost white to bright brown. Road cuts are easily made in these materials. Because of the somewhat finer materials, fills produced from this material are relatively stable and vegetation is easier to establish. However, there is a hazard of mass failures on steep cut slopes on this material.

Most of the bedrock in the District is moderate to well fractured. The spalling type granite occurs primarily in the lower lying Fluvial Lands along the South Fork of the Boise River.

Bedrock structure is also an important consideration in road construction. Slopes with the dominant jointing planes into the slope are more stable than slopes with the dominant jointing plane parallel to the slope.

A characteristic common to most of the soils on the District is the high content of coarse fragments in the subsoil. This characteristic adds stability to road fills and subbase. Some of the soils have a narrow range of soil particle size distribution. These kinds of textures are highly susceptible to surface erosion and mass stability hazards.

Soils which have formed from granitic material generally are quite low in clay content. Few of the soils of the District have clay contents higher than 20 percent. Many of them have clay contents in the 5 to 10 percent range. Because of this, the soil aggregates are very weak, especially when disturbed, and the soils are highly erosive. These soils also lack cohesive strength and have very low moisture-holding capacities which makes stabilization with vegetation on south slopes quite difficult. However, there are also several advantages to soils having low clay content. These soils are quite stable unless they become saturated. They have high infiltration and percolation rates, good drainage, and have a low shrink swell potential. Because of their good drainage and coarse texture, they are not affected by frost action and also provide a durable wearing surface.

As stated previously, some of the soils have clay contents of more than 20 percent. These usually run between 20 and 35 percent. These soils were formed on areas of structural alteration or areas with a mixture of underlying rock. These soils usually contain significant amounts of competent rock fragments in the profile. The finer textures and the competent rock fragments result in more stable soils in regard to surface erosion and mass stability hazards. These soils also have good water-holding capacities and reseeding potentials of cut and fill slopes are high. Bearing strength is considerably lower on these soils than on the sandy soils especially where the surface is relatively free of coarse fragments. The frost hazard potential is moderate for these soils.

The surface erosion and mass stability hazards for road construction are given for each landtype in Table Nos. 1 and 2, Appendix A.

Recreation

Strong relationships exist between soils and landform and the suitability of any given site for a campground, playgounds, or picnic area. Because of time limitations specific interpretations for campground suitability have not yet been made. Many of the soils on the District are generally satisfactory for campground development. These soils have high bearing strength, high infiltration rates and are well drained.

Some of the lardtypes are more suitable for campsites and campgrounds than others. This is due to soil characteristics and topographic limitations of the landtypes. Campgrounds will generally have to be located on low relief areas of Cirque Basin Lands, Cryoplanated Uplands, Basin Lands, and Depositional Lands. These are generally the landtypes which have slope gradients and relief which is consistently low enough to develop a campsite on. Areas with stony or cobbly surfaces, wet spots, steep slopes, or that are subject to flooding should be avoided.

Some of the landtypes offer better opportunities for hiking, trail bikes, and horseback riding than do others. Some of the landtypes in the Strongly Glaciated and Cryoplanated Uplands are easily traversed by foot or horseback and provide many viewpoints and scenic views which are aesthetically pleasing. Valley Train Lands, for example, are easily traversed by either foot or horseback and lead to areas such as Cirque Basins which provide excellent camping and fishing sites. Other landtypes, such as Rocky Ridge Land have severe restrictions, due to rock outcrops and rough terrain, for hiking, trail bikes, or horseback riding.

Range and Wildlife

The landtypes in the District have been rated for range productivity potential for livestock grazing. Only productivity potentials of useable forage were used in these ratings. Information was extracted from the range allotment analysis information for development of the ratings. The ratings are listed by landtype in Table No. 4, Appendix A. Other factors, such as erodibility hazards and steep slopes, need to be considered in evaluating the landtype for use.

Ratings for wildlife were not made, but the range productivity potential ratings made for livestock and habitat types should serve as broad guidelines for wildlife habitat ratings.

Competent bedrock with fracturing perpendicular to the slope gradient leads to the stability of the slope with disturbance.

Soft granitic bedrock of a spalling nature causes road maintenance costs after a road is built.

Poorly sorted fill materials and inadequate drainage result in failures as shown above.

Competent rock fragments as shown in the above exposed profile aid the stability of cut slopes caused by road construction.

BASIC INVENTORY DATA

This portion of the report has to do with the basic information compiled during the course of the survey. The information is divided into three sections: (1) Landtype Associations, (2) Landtypes, and (3) Valley Types. Descriptions of each unit in the three sections are described and interpretations concerning various resources and activity are discussed.

Landtype associations are important in gaining an overall picture of the planning unit and the relationship of one landtype or area to another. Certain characteristics in each landtype in an association are similar, and performance and predictions can be made from these relationships.

Landtypes are subdivisions of Landtype Associations and are the basic unit of this report. A landtype is the information base used for making management decisions at the multiple use and broad resource and activity planning level.

Valley types are similar to landtypes but are confined to major stream valley bottoms and their immediate, adjacent slopes. They differ slightly from landtypes be being influenced primarily by stream dynamics. Segments of valleys with similar conditions are grouped within one valley type. Valley types are useful for general land use planning including broad transportation and recreational development plans.

Landtype Associations

The relationships of one landtype to another is important in the evaluation of an area for management planning. The level of stratification in the Land System Inventory broader than landtype is the Landtype Association. These are landtypes that have been grouped according to geographic association and certain key formative characteristics. Criteria considered for grouping geographically associated landtypes are geomorphic process, geology, lithology, climate, and in some cases, topographic or behavior features.

Landtype associations as well as landtypes usually occur in more than one subsection. Variations within a landtype association that occurs in different geographic locations can be explained at the subsection level.

Lithology and geomorphic processes are basic criteria used in determining landtype associations. Certain performance characteristics and behavior patterns are common to landtypes at this level. The Landtype Associations in this report have been grouped by lithology and the broad geomorphic process primarily responsible for the development of the topographic features.

General descriptions of characteristics, performance, and behavior of each Landtype Association are given. A colored photograph representing the association and a listing of landtypes in the association are in the description. (Note: A landtype may occur in more than one association.) In addition, landtypes that occur as common inclusions are listed. Detailed descriptions of each major landtype or inclusion in the association can be found in the landtype description section of this report.

Landtype Association Descriptions

Glaciated Granitic Lands. These are lands formed on granitic materials that have been shaped primarily by alpine glacial action. These lands include the Glaciated Granitic Headlands and Glaciated Granitic Trough Lands Associations.

Glaciated Granitic Headlands (G-1)

This association includes Landtypes 110x, Scoured Cirque Basin Land and 113, Rocky Ridge Land.

Steep, high elevation, rocky peaks and ridges with widely dispersed basins, shaped by alpine glaciation, characterize these lands. Slopes are frequently in excess of 60 percent, cliff areas are common and rock outcrops are exposed on more than 40 percent of the landscape. The granite bedrock is hard and moderate to

well fractured. Cirque Basins and Scoured Cirque Basins are the only landtype with gentle slopes. Elevations range from 7,000 to 9,000 feet.

Soils in this landtype association are characterized by shallow depths (less than 10 inches deep), lack of horizon development, sandy textures, high inherent erosion hazards and low fertility. The soils on the Cirque Basin Lands, however, are deeper (more than 30 inches to bedrock), have sandy loam textures, well expressed horizons, are relatively fertile and have low to moderate erosion hazards.

These headlands are important as water producers and return as stream flow up to 70 percent of the moisture received. Surface runoff and avalanche potential is high on the steep landtypes in the association. Cirque Basins, containing small lakes, act as reservoirs and are a highly effective buffer between the steep rocky headlands and adjacent depositional lands. Sediment production is high from the steep rocky landtypes and accumulates in drainageways of lower lying lands. Disturbance of these downstream alluvial channels during high runoff periods causes high sediment yields. In some cases, dissection of mountain slopes can be traced to the runoff from higher lying rocky lands.

Herbage and timber production is generally low due to the sparse cover and limiting climatic and soil factors. White bark pine, subalpine fir and high elevation grass and brush vegetative types dominate this area. Exceptions to this are localized wet areas in Cirque Basins, which have a moderate to high productive capacity. Adverse soil and climatic factors limit the revegetation potential of these lands.

These lands have a high scenic and recreational value and produce moderate amounts of grass and brush type forage. Many of the Cirque lakes and streams provide habitat for fisheries. The heavy rapid runoff is a major management consideration.

Landtypes	Inclusions
110x	114
111d-3	
111x	
113	

Glaciated Granitic Trough Lands (G-2)

This landtype association is composed of lands that have been carved and shaped by moving glaciers, resulting in U-shaped valleys with steep sideslopes and gently sloping alluvial valley train lands in the valley bottoms. These lands are usually adjacent to and below the high peaks, rocky ridges, and cirque basins in the Glaciated Granitic Headland landtype association. Elevations range from 6,000 to 8,000 feet. The underlying granitic bedrock is variable, ranging from slightly to well weathered and well fractured or masked.

The relationships of Glacial Trough (111b, 111d-3, 111x) and Valley Train (104) landtypes are shown in this picture.

Soils in this landtype association are characterized by sandy or loamy textures with more than 35 percent rock fragments. Depths vary from shallow to deep and are generally related to the amount of slope dissection and scouring action of the glacier. Lack of horizon development and low fertility levels are characteristic of the shallow soils. Inherent erosion hazard is moderate to high on the sideslopes and low on the alluvial valley train land.

These lands are important as water producers and return as stream flow much of the moisture received. Most of the runoff is by shallow and moderately deep subsurface flow, except on strongly dissected areas with shallow soils where water leaves as surface flow. The valley train lands in the bottoms of the troughs act as regulators for the water by receiving it from the above slopes and discharging it to streams in a sustained flow. Avalanche hazards on the sideslopes are high.

Herbage and timber productivity is generally low to moderate with the dominant limitations for revegetation and growth being cold climate and in some landtypes, shallow coarse-textured soils. Subalpine fir and high elevation grass-brush habitat types dominate these areas.

These lands provide a major access route to the mountain peaks and scenic Glaciated Granitic Headlands association. Activities that remove vegetation or disturb large areas of soil will significantly increase surface erosion, especially on the landtypes with numerous dissections and shallow soils. The large quantity of runoff is a major management consideration.

Landtypes	Inclusions
104	
108	
111a	
111a-1	
111b	
111b-1	
111c	
111g	

Cryoplanated Lands. These lands were formed under a climate influenced by the adjacent glaciers. These lands include the Cryoplanated Granitic Uplands and Rejuvenated Croplanated Mountain Slope Lands associations.

Cryoplanated Granitic Uplands (C-1)

Cryoplanated lands are located adjacent to and are sometimes intermingled with glaciated lands. The effects of ice and permanent snow field action were mainly localized on these lands. Soil and rock materials were not carried away by major ice currents nor was the bedrock deeply stripped. The bedrock is, therefore, more weathered and less fractured than in the glaciated lands. This association includes cryoplanated upland and cryoplanated basin landtypes. Slopes are gentle to moderately steep (less than 50 percent gradients), and undulating topography is common. Elevations range from 6,000 to 8,000 feet.

Soils are dominantly moderately deep and deep skeletal sandy or loamy textures. Surface layers commonly have sand fractions, which are high in the fine and medium sizes and high silt contents. Inherent erosion is low to moderate.

The rounded topography of Landtype 109-9 and the inclusions of wet meadow lands (101-3) are typical of this association.

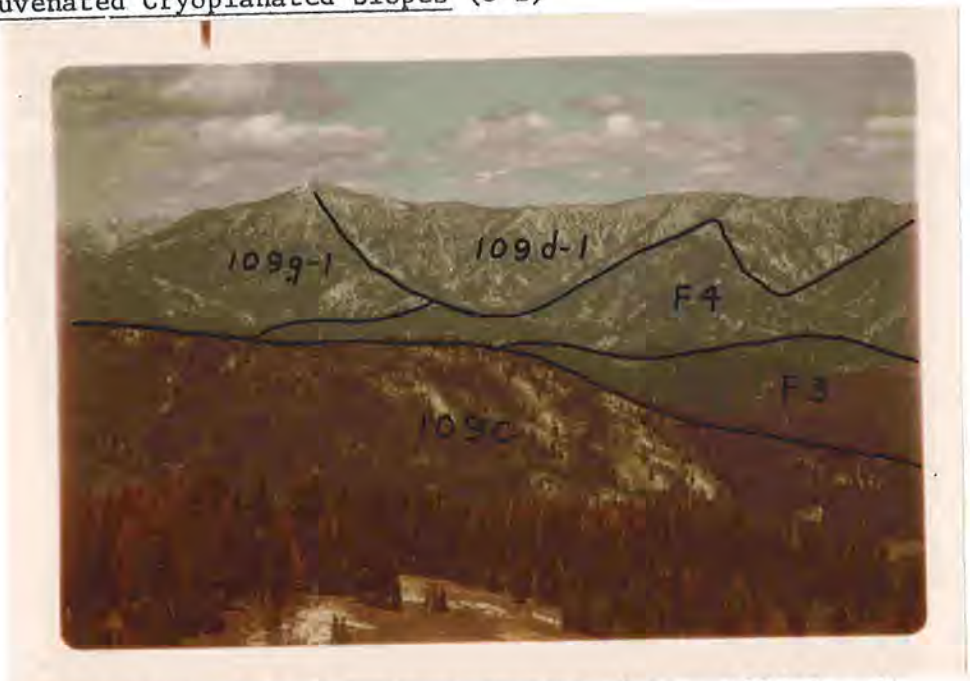
These lands have high infiltration and percolation rates and almost all the precipitation that falls becomes subsurface moisture. The well weathered bedrock becomes relatively impermeable with depth, and excess moisture is yielded as subsurface flow. The deep soils and well weathered bedrock acts as a storage reservoir. High amounts of precipitation are received on these lands and much of this is returned to streams as sustained flow. Sediment rates are low unless the vegetation and/or surface soil is disturbed.

The vegetative cover on these lands varies from open brush-grass communities to dense stands of subalpine fir habitat types. At lower elevations Douglas-fir habitat types are common. Herbage and timber productivity and revegetation potential is low to moderate and is restricted primarily by cold climate.

These lands are valuable for the production of wood, forage, and water. The fine fraction of surface soils may result in dust problems on disturbed areas. Roads located on the upper one-third portion of the slope will reduce the possibility of intercepting subsurface water.

Landtypes	Inclusions
109-9	101-3
109n-1	

Rejuvenated Cryoplanated Slopes (C-2)



Drainageways in Cryoplanated units (109c, 109d-3 and 109g-1) are evidence of fluvial influence.

These mountain slope lands are located adjacent to or intermingled with glaciated lands and cryoplanated uplands. In addition to the local effect of ice and permanent snow fields in shaping the landscape, these lands have been or are being rejuvenated by fluvial processes. Slopes are moderately steep and steep and are weakly to strongly dissected. The granitic bedrock is usually well weathered and fracturing is often masked. Elevations range from 6,000 to 8,000 feet.

Soils are dominantly shallow and moderately deep with skeletal sandy or loamy textures. Coarse fragments are commonly more than 35 percent by volume. The soils have weak or no horizon development and have a moderate to high inherent erosion and surface creep hazard. Silt and fine sand size fractions are common in the surface soils because of the relatively impermeable bedrock.

Infiltration and percolation rates are high but most of the precipitation that falls leaves the slope as shallow and moderately deep sustained subsurface flows. The strongly dissected landtypes have fragile slopes and surface erosion is greatly accelerated upon disturbance or removal of vegetative cover.

The vegetative cover on these lands varies from open grass-brush south-facing slopes to dense stands of subalpine fir and lodgepole pine. At lower elevations Douglas-fir habitat types are common. Herbage and timber productivity and revegetation potential is low to moderate and is restricted primarily by cold climate.

These lands are valuable as timber producing areas. They are also important for the production of forage and seasonal water yields. However, the access needed for livestock grazing and timber harvest often results in serious acceleration of erosion and sedimentation.

Landtypes	Inclusions
109-2	
109a-1	
109b	
109c	
109d-1	

Fluvial Lands. These mountainous lands have been shaped primarily by the action of water or stream cutting. The five landtype associations making up these landtypes are: (1) Fluvial Granitic Lands, (2) Mature Relief Fluvial Lands, (3) Structurally Controlled Granitic Fluvial Lands, (4) Strongly Dissected Granitic Fluvial Lands, and (5) Steep Granitic Canyon Slopes.

Fluvial Granitic Lands (F-1)

These are mountain slope lands that have been formed primarily by fluvial or stream cutting action. Slopes are steep (commonly over 60 percent) and have strongly expressed V-shaped drainageways that dissect the slope at moderate to wide intervals. The underlying quartz-monzonite or granitic type bedrock is moderately well to well weathered and fracturing is often masked. The bedrock commonly tends to spall when exposed to the atmosphere. These lands usually occur at elevations less than 6,000 feet.

A high timber producing landtype 120b-4 represents part of the lands in this association.

Soils are quite variable as to depth, but generally have sandy or loamy textures which may or may not be skeletal (more than 35 percent coarse fragments). For the most part, the soils in these lands have little profile development other than dark colored "A" horizons and have moderately low or low fertility levels. Erosion hazards range from low on the low gradient loamy soils to high on the steep, coarse-textured sandy soils.

Infiltration and percolation rates are generally high and a good portion of the moisture that falls leaves as moderately deep and deep subsurface water. The steep slopes with sandy soils are very fragile and disturbance of the soils or removal of vegetative cover will accelerate the sediment production.

Vegetative cover ranges from open grass-brush on drouthy south-facing slopes to dense stands of Douglas-fir and ponderosa pine habitat types. Herbage productivity and revegetation potential is low to high, and timber productivity and revegetation potentials are low to moderate. Principle limitations are drouthy soils, vegetative competition and high evapotranspiration ratios.

These lands are valuable for the production of wood, forage and water. The fine fraction of surface soils may result in dust problems on disturbed areas. Roads located on the upper one-third of the slope will reduce the possibility of intercepting subsurface water.

Landtypes	Inclusions
120b-4	120a-8
120b-6	120b-3

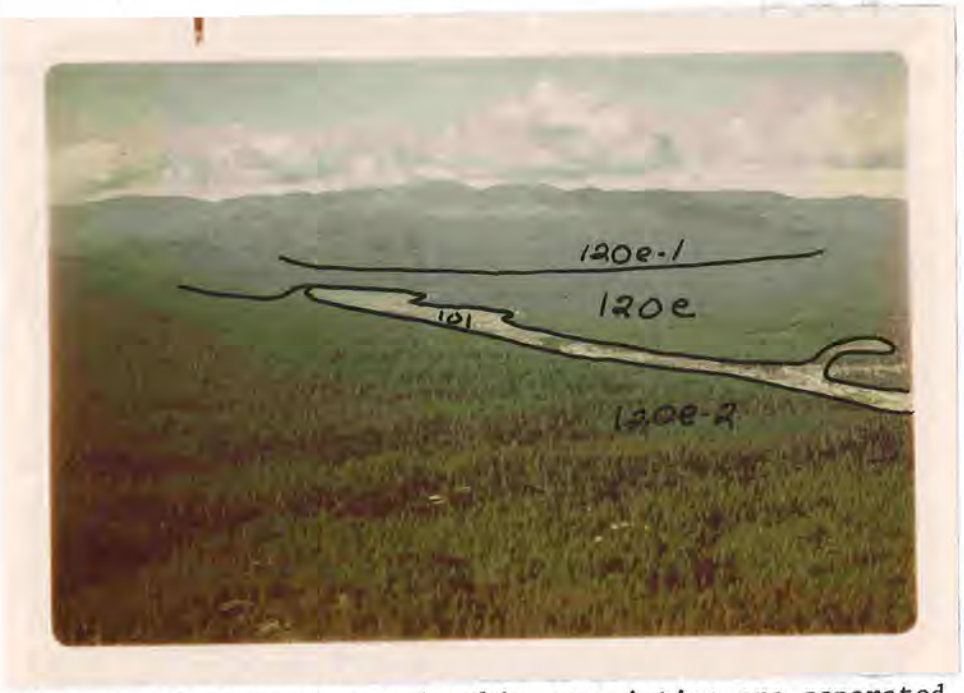
Mature Relief Fluvial Lands (F-2)

These are moderately steep to steep mountain slopes with well rounded ridge tops and drainageways. The stream cutting or fluvial process acting on areas of well weathered granitic bedrock has resulted in the rounded appearance and the finely meshed dendritic pattern of the drainageways characteristic of these lands. This landtype association is found on structurally altered landscapes at elevations under 6,000 feet.

Soils are variable as to depth but generally have sandy or coarse loamy textures. Because normal soil removal is low on these lands the soils have more well defined horizons than the soils on other fluvial lands. Surface erosion hazard is low to moderate for most of the slopes but is high on the steep slopes with sandy soils.

Infiltration and percolation rates are generally high for the soil mantle, but the well weathered bedrock restricts further downward movement of water. Therefore, most of the excess water that falls on the slope leaves as moderately deep subsurface water. Poor gradation of materials in the soil and underlying weathered bedrock result in a fragile erosive slope. Concentration of water or change to surface runoff will greatly increase the sediment production from these slopes.

Vegetative cover ranges from open grass-brush on drouthy south-facing slopes to dense stands of Douglas-fir and ponderosa pine habitat types on the moist sites. Revegetation and productivity potentials for herbage and timber production are moderate to high.



Mature relief landtypes in this association are separated mainly on differences in relief and slope.

These lands are used primarily for timber production and grazing. Activities that remove the vegetative cover, disturb the surface soil, or change the hydrologic function tend to greatly accelerate the surface erosion or sediment yield of these slopes.

Landtypes	Inclusions
120e	121e
120e-1	

Structurally Controlled Granitic Fluvial Lands (F-3)

The Faulted Benchland Landtype (123-1) representing this association is adjacent to Cryoplanated Lands (C-2) at this location.

These are mountain lands that have been altered by faulting action. Upon faulting these lands exhibited a bench or basin-like appearance. In some cases subsequent fluvial or stream cutting action has incised the lands with moderately deep and deep drainageways. The resulting topography of ridge tops with a common base level and steep sideslopes in the drainageways is characteristic.

Soils range from shallow to deep and generally have coarse loamy or loamy skeletal (more than 35 percent coarse fragments) textures. Little profile development occurs in the soils on the sideslopes, but those on the more level ridge tops or areas exhibit moderate horizon development. The underlying bedrock is generally well weathered with marked fracturing and spalls upon exposure to the atmosphere.

Infiltration and percolation rates are high; but, due to the shallow depth of soils over bedrock on the sideslopes, excess water leaves as shallow subsurface flow. Erosion hazards are low on the ridge tops, but disturbance on the sideslopes tend to greatly increase the hazard of sediment production from both surface erosion and mass failures.

Vegetation is dominantly ponderosa pine and Douglas-fir habitat types. Revegetation potential is low to moderate and is restricted primarily by soils with low water-holding capacity. Timber productivity potential is moderate to high.

The erosion hazard on these lands is generally low to moderate with the exception of the steep fragile sideslopes in drainageways, which is high. Safe access across the drainageways is often the limiting factor to development of these lands.

Landtypes	Inclusions
112-1	
121e-1	
123-1	
123c	

Strongly Dissected Granitic Fluvial Lands (F-4)

These are mountain slope lands that have been formed by fluvial or stream cutting action. Slopes are steep (commonly over 60 percent) and have relatively narrow sharp ridge tops and V-shaped drainages that dissect the slope at close intervals. Characteristically the drainages form a strongly expressed dendritic pattern. The underlying-quartz-monzonite, or granitic type bedrock, is moderate to well weathered and tends to spall when exposed to the atmosphere. These lands are generally located between 4,500 and 6,000 feet in elevation.

Soils are shallow and moderately deep and have sandy or coarse loamy textures for the most part. Some subsoils are skeletal (have more then 35 percent coarse fragments). These soils exhibit little or no profile development because of the removal of materials from the slope by natural causes. Both surface erosion and mass failure hazards are high on these lands.

Infiltration and percolation rates are generally high in the soil profile, but the well weathered bedrock restricts downward movement of water. Therefore, most of the excess moisture that falls on the slope leaves as subsurface water. Disturbance of the surface, removal of vegetative cover, or change of the hydrologic function will tend to accelerate the sediment production from these fragile slopes.

Vegetative cover ranges from open grass-brush on drouthy south slopes to moderate to dense stands of Douglas-fir, grand fir or ponderosa pine habitat types on moist sites. Revegetation and productivity potentials for herbage and timber are low to moderate.

Steep Headland landtypes such as 120d-3 are closely associated with the Strongly Dissected Mountain Slope landtypes in this association.

These lands are rather extensive and used primarily for grazing and timber production. Erosion hazards are high due to the critical nature of the coarse-textured soils, hydrologic function of the steep fragile slopes, and the presence of moist oversteepened slopes immediately adjacent to drainageways.

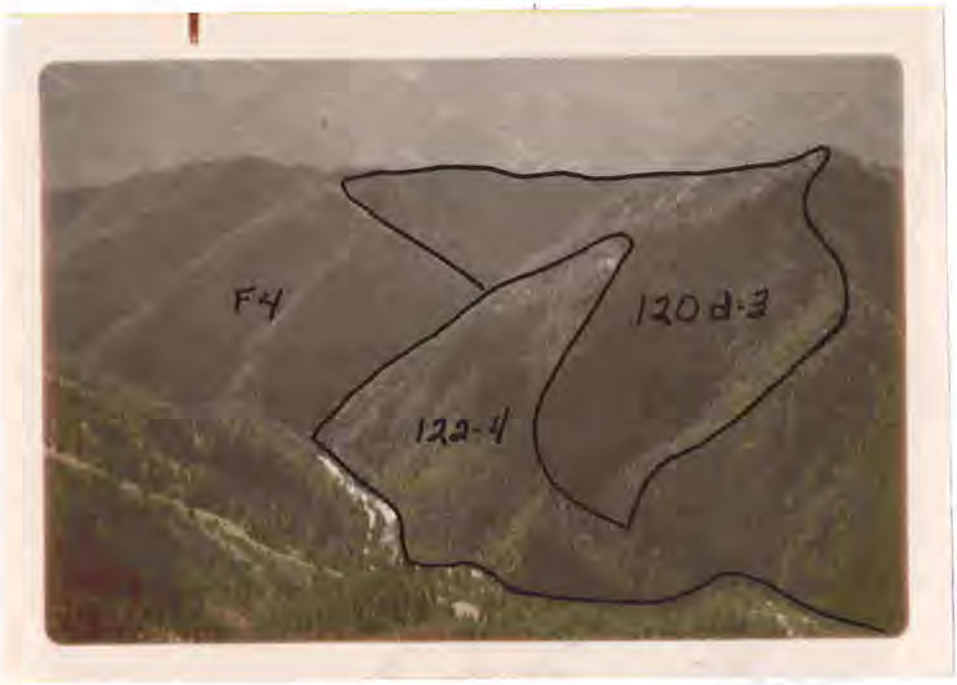
Landtypes	Inclusions
120c	120d-3
120c-1	120c-2
120c-3	
120c-11	

Steep Granitic Canyon Slopes (F-5)

These are mountain slope lands that have been oversteepened by stream cutting action. They are adjacent to deep canyons, which have live streams in many cases. Characteristically, slopes are very steep (over 70 percent) and are dissected by shallow parallel drainage systems. The drainages vary considerably in spacing due

to the variable underlying parent rock, which ranges from hard, massive to well weathered, masked fractured, granitic bedrock. Steep headland units located at the upper ends of the drainageways are also included in this landtype association. These lands are located adjacent to deep canyons at all elevations on the Forest.

Soils are shallow to moderately deep and generally have coarse loamy or sandy textures, which may or may not be skeletal (have more than 35 percent coarse fragments). Soils exhibit little or no profile development because of the natural removal of materials from the oversteepened slopes. Surface erosion and mass failure hazards are very high on these lands.



Steep Headlands such as 120d-3 may occur in this association as well as in other Fluvial Landtype associations.

Infiltration and permeability rates of the soil mantle are high, but due to the somewhat impervious underlying bedrock most of the excess water leaves the slope as rapid, shallow subsurface flow. Disturbance of the surface soil, removal of vegetation, or change of the hydrologic function of these slopes tends to greatly accelerate the sediment production of these lands.

Vegetative cover ranges from open sparsely covered grass and brush types to dense stands of ponderosa pine or Douglas-fir

timber habitat types. Revegetation and productivity potential for these lands is low to moderate.

These lands are some of the most fragile lands on the forest and high impacts from disturbance can be expected on the adjacent streams.

Landtypes	Inclusions
122	120d-3
122-4	

Depositional Lands. These lands have been formed as a result of material being removed from higher lying slopes and deposited in lower areas. These lands include Moraine and Outwash Lands and Alluvial Lands Associations.

Moraine and Outwash Lands (D-1)

These depositional lands are formed from materials that have been moved and deposited by glacial action. The topography ranges from nearly level, smooth, micro-relief to moderately steep, hummocky appearance. Low lying wet meadow areas are characteristically a part of this landtype association. These lands are generally at elevations higher than 6,000 feet and are located in or at the lower end of glacial troughs.

The soils are deep with skeletal (more than 35 percent coarse fragments), sandy or coarse loamy textures. Little to moderate horizon development is characteristic of these soils. The underlying gravelly or cobbly material is dominanatly granitic in nature, but may have mixtures of other kinds of rock such as basalt, andesite, or rhyolite.

Infiltration and percolation rates are rapid and most of the excess water leaves the slopes as deep subsurface and ground water at moderately slow rates. This water may be intercepted in the drainageways and where bedrock is within shallow depths. Soil disturbances on the moderately steep slopes tend to increase production from these areas.

Vegetative cover ranges from dense stands of lodgepole pine, Douglas-fir, and subalpine fir on the higher lying areas to a willow-sedge type of cover in the wet areas. Timber and herbage revegetation and productivity potentials are low to moderate being restricted by cold climate. Forage productivity potential is high on the wet areas.

Wet meadow lands 101-3 are typically intermingled with moraine 106-1 or outwash lands.

These lands are relatively stable with surface erosion, cold climate, and wet areas being the dominant problems associated with the unit.

Landtype	Inclusions
103	101-3
103-1	104
106	
106-2	

Alluvial Lands (D-2)

These lands are the gently sloping accumulations of previously transported materials common to major and minor drainages at mid and low elevations. Slope gradients seldom exceed 20 percent and are generally less than 10 percent. Depth to bedrock is extremely variable and may range from less than 10 feet to over 100 feet. The geology of the underlying bedrock is also varied and will include granitics, rhyolites, silicic volcanics, basalts and others. The accumulated sediments over this bedrock will also be of varied origins.

Soils in this landtype association contain both stratified and nonstratified layers of extremely varied textures. Sandy and skeletal soils are dominant adjacent to or below the more moist granitic fluvial lands. Clay and sandy clay loams are more common adjacent to or below xeric fluvial lands or volcanic landtype associations. Soils are deep in all cases.

Infiltration and percolation rates are dominantly moderate to rapid and some overland flow does occur during periods of rapid snow melt, during high intensity storms, and locally in unregulated drainages where flooding occurs. At most times, however, these lands are conducive to buffering subsurface and overland flow from adjacent lands, yielding water dominantly in the form of slow lateral flow of saturated ground water.

Terrace Land (102) is one of the dominant landtypes found in this association.

Forage production is generally high within this association while timber productivity is extremely variable. Forage production is dominated by riparian communities in the wetter segments of this association, while drier areas are dominated by brush and grass communities. Timbered areas are extremely variable, confined to narrow drainages and protected areas with a water table below two feet. Species composition is dominated by ponderosa pine and Douglas-fir at lower elevations and subalpine fir and Engelmann spruce at higher elevations.

These lands are very significant because of their suitability for many competitive uses contrasted with their limited extent. Most hazards have external origins and include flash floods, mud flows, debris slides and seasonal high water or flooding. The presence of a high water table combined with poor trafficability is also a limitation in some areas.

Landtypes	Inclusions
101	112-1
102	
105	

Landtypes

The landtype is the basic unit of this report. This is the unit of land that has been described and interpreted. Landtypes are natural portions of the landscape, resulting from geomorphic and climatic processes with definable characteristics and soils that have predictable hydrologic, engineering, productivity, and other behavior patterns. Landtypes have strong life zone connotations. They have soil and vegetative associations that are unique to a particular landtype. This section includes a description of each landtype. Landtypes are listed in numerical order and contain the following information:

1. Map symbol and name of unit.

2. Landtype characteristics. (Key features are underlined.)

3. Soils - brief description, percentage, and location of each.

4. Vegetation - present vegetation and habitat types.

5. Hydrology.

6. Management Qualities - Relationships between landtype characteristics and management activities expressed as hazards or potentials. Management activities considered are roads, wood, water, forage, and recreation.

7. Management Evaluation - space for notes, observations, and decisions about the performance of the landtypes.

List of Landtypes

Description of Landtypes

Pages 49 through 159 contain all of the landtype descriptions for the District. To locate individual landtypes the reader's attention is directed to the above listed preceding section, List of Landtypes.

Map Symbol 101
Alluvial Land
Undifferentiated Soils

Location: This landtype is adjacent to most streams on the District but is most significant along the South Fork of the Payette River.

Landtype Characteristics: These alluvial lands are relatively flat, immediately adjacent to streams and include river-wash, bottom lands, and first-terrace positions. Stream meandering and channel cutting are very common. Forest crown densities are extremely variable, influenced most by the presence of a high water table or aspect. Soils are deep and have sandy skeletal textures with the percent coarse fragment increasing to as much as 80 percent with depth. Depth to bedrock will vary from 10 to over 100 feet, depending on the width and shape of the valley that has accumulated these materials. The underlying bedrock is granite having varied weathering and fracturing. The river-wash material is dominantly of granitic origin.

Soils: The dominant soil (70%--GDFA-2) is common to the more well drained higher portions of units or first-terrace positions. This soil has a thin organic layer over a very dark grayish brown to dark brown sandy loam to loamy sand, greater than five feet deep. The percent coarse fragments increases significantly with depth, and is composed mostly of rounded river-wash gravels and cobbles. A less extensive soil (30%--JADA-2) found adjacent to streams and seasonal flooding, has stratified layers of sand, loamy sand and gravel over the same bed of river-wash cobble. Percent gravel and cobbles is highly variable depending on the composition of the stratified layers. A water table is generally present in this soil at one to two feet below the surface.

Vegetation: This landtype is both timbered and non-timbered, depending upon the presence of a water table or exposure. The protected, more well drained areas often are dominated by ponderosa pine habitat types with inclusions of aspen and cottonwood communities. In the larger units adjacent to major streams the more moist soil is dominated by willows, alders, sedges and other riparian vegetation. In the smaller narrow units at higher elevations subalpine fir and Engelmann spruce communities become more dominant. Most areas, however, are quite brushy, with brush crown densities ranging fron 10 to 50 percent.

Hydrology: These lands receive approximately 25 to 35 inches of precipitation annually. Precipitation that occurs in the form of snow, melts throughout the winter months and is gone by early spring. Between 10 and 15 inches of water is yielded annually from these units. Infiltration and percolation of released precipitation is rapid for the most part and the landtype is highly conducive to buffering runoff from adjacent first and second order drainages. Almost all water yielded by these landtypes is percolated to the ground water table. Overland flow

is rare. These landtypes, which are average flow regulators, act as a good buffer for water yielded as subsurface and overland flow from higher adjacent landtypes.

Management Qualities: This landtype is very significant on the District because of its suitability for many competitive uses, contrasted with its limited extent. Most hazards on the landtype have external origins. These hazards include flash floods, mud flows, debris slides, and seasonal high water. The probability of these hazards occurring in a specific area can best be evaluated by examining the specific area and the adjacent landtypes.

Roads. Construction problems involve handling water and debris generated on higher adjacent landtypes and stream encroachment on road prisms. Particular attention must be given to points where drainages from adjacent landtypes enter these units. Such areas are sources of unseasonally high water, flash floods, debris slides, and varied sediments requiring special structures, large culverts, or bridging. Natural road surfaces in some areas are poor for trafficability, requiring that surfacing materials be hauled in.

Wood. Timber productivity for this landtype is dominantly low with 20 to 40 percent of the land surface in tree-producing habitat types. The ponderosa pine/wheatgrass habitat type occupies lower, well drained flats exposed to the sun most of the day. Although individual trees appear to grow fairly well, productivity is rated low because of comparative low density. In the ponderosa pine/snowberry type, productivity is moderate, increasing somewhat in the cooler more moist areas adjacent to north slopes. Along stream channels and low wet areas,cottonwoods and other riparian vegetation of non-commercial type are common. Site limitations to reforestation of commercial timber producing habitat types are rated moderate to severe, depending upon exposure of the site and vegetative competition. Many narrow or small units at mid elevations having subalpine fir and Engleman spruce vegetation associations have somewhat higher productivity potentials with more severe limitations to reforestation.

Water. The hazard of flooding by adjacent streams is often high. This depends on the characteristics and condition of the upstream watershed as well as the height of the land surface above the stream channel. These lands are also subject to flashy, debris-laden flows from adjacent slopes. The rapid percolation rate, high water table, and proximity to streams make this landtype especially important to water flow regulation and water quality. A careful examination of human activities on this landtype is needed relative to sewage and solid waste disposal, summer home development, grazing, and road construction. The by-products of

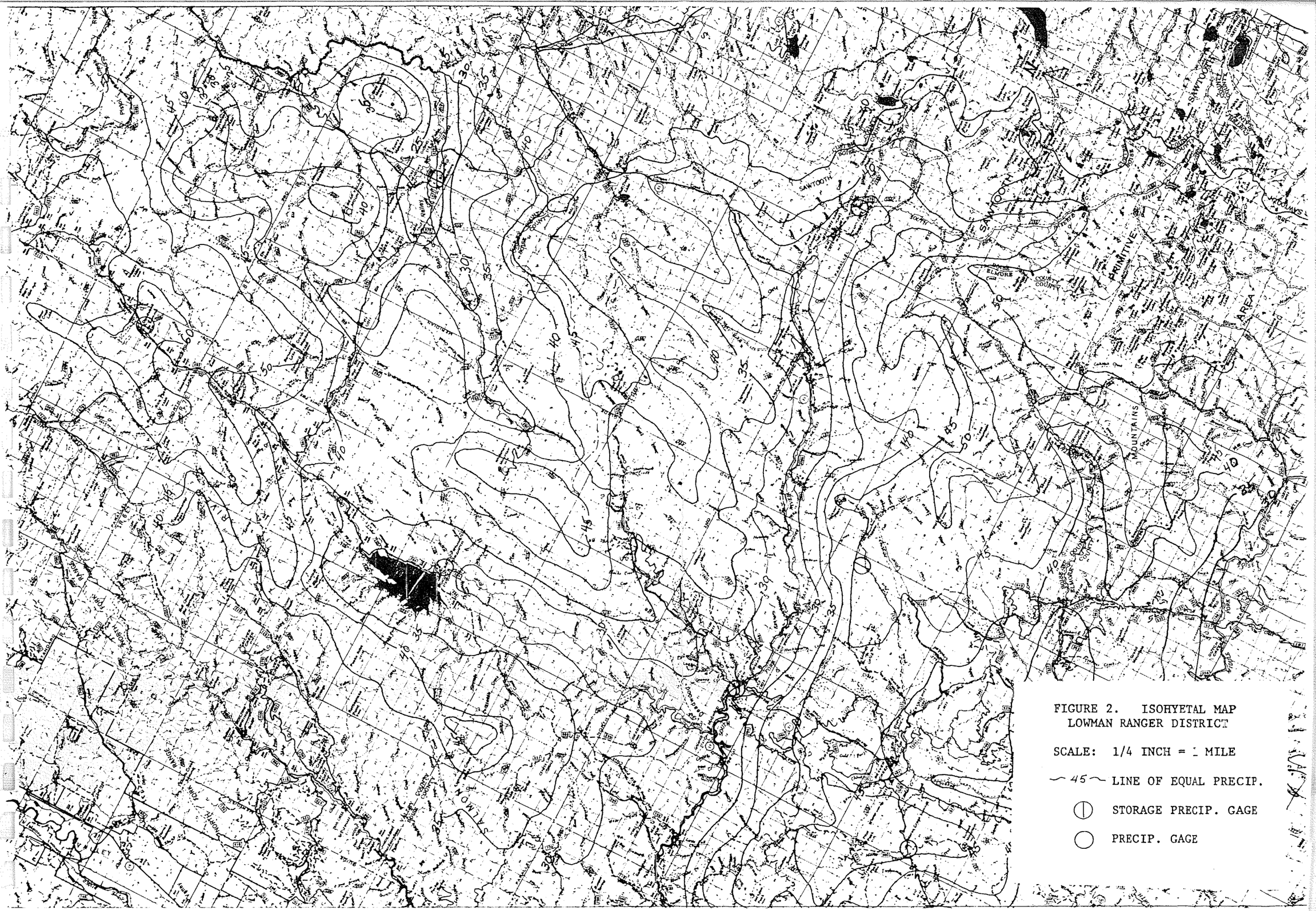


FIGURE 2. ISOHYETAL MAP
LOWMAN RANGER DISTRICT

SCALE: 1/4 INCH = 1 MILE

~45~ LINE OF EQUAL PRECIP.

STORAGE PRECIP. GAGE

PRECIP. GAGE

these and other activities may significantly contribute to the pollution of the adjacent stream.

Forage. These landtypes are among the most productive on the District. Species composition is dominated by grasses with production generally in excess of 700 pounds per acre of useable dry forage annually under present conditions. Potentials, however, are rated in excess of 1,000 pounds per acre per year. In most areas, good response can be expected from management practices designed to bring actual production near potentials.

Recreation. Due to flat topography and stream proximity, alluvial lands are the most utilized and sought after as sites for outdoor recreation and development. Consequently, these areas are subjected to considerable use and impact. Good response can be expected from attempts to revegetate overused areas, while vegetation manipulation is also practical on the more moist sites. Since trafficability of natural surfaces is often poor, artificial surfaces are desirable where improved traction, durability, and reduced site impact are necessary. The potential hazards to water pollution from human habitation are a major problem. Rapid permeability rates of the underlying river-wash combined with the high water tables are poor conditions for sewage treatment within the soil mantle. Currently, pit toilets, leaking vaults, and indiscriminate disposal of self-contained camping units are a major pollution source for the same reason. Flood hazard analysis is needed for most proposed developments on this landtype.

Management Evaluation:

Map Symbol 101-3
Meadow Land
Undifferentiated Soils

Location: This landtype is the typical high elevation wet meadow generally surrounded by dense stands of lodgepole pine. Mountain Meadow is a typical location.

Landtype Characteristics: This landtype is represented by the nearly level and gently sloping wet meadows at mid and high elevations. These grassy meadows are generally dissected by small meandering streams. The dominant portion of these units has a high water table and is often marshy throughout the year. The dominant soils are sandy skeletal and very deep, generally over gravel or cobbly glacial outwash. The bedrock is dominantly granite but highly variable as to fracturing and weathering.

Soils: The dominant soils (70%--IADA-2, 30%--IECA-2) have a thick organic layer over a dark brown to black loam or clay loam over a lighter loamy sand or gravelly sand. These soils are very deep, depths ranging from less than 10 feet to possibly more than 100 feet. The dominant soil generally has a high water table within two feet of the soil surface. The dominant soil contains approximately 40 percent fine gravels while the minor more well drained soil on the outer edge of the units has a somewhat higher percentage of coarse fragments in the medium and coarse gravel sizes.

Vegetation: This landtype is a non-timbered unit dominated by riparian, mid and high elevation communities. A subalpine fir/elk sedge habitat type is a common inclusion on the minor soil on outer edges of individual units. The forest crown density in these inclusions range from 5 to 10 percent while brush crown density for the entire unit may range from zero to 60 percent. The percent ground cover generally exceeds 70 percent.

Hydrology: These landtypes receive between 25 and 40 inches of precipitation annually. Snowpack, which accounts for most of the annual precipitation, melts at a moderate rate during the spring months. Approximately 10 to 20 inches of water is yielded annually from these landtypes. These units exhibit predominantly slow percolation rates and as a result drainage of spring melt is slow. Perched water tables and bogs are common during spring and early summer. Overland flow occurs during rapid spring melt and high intensity spring rainfall. Most of the water yielded from these landtypes is in the form of slow percolation to water table. These units act as good buffers and regulators for overland and subsurface flow input from small adjoining first and second order drainages. The landtypes are slow in the release of water input.

Management Qualities: The major limitation to activity on this landtype is a high water table throughout most of the year and very poor trafficability. Forage production, however, is one of this landtype's greatest assets because of the high production potential and rapid recovery rates expected following grazing use.

Roads. Construction problems involve water and the effects of undercutting on the bearing strength of road prisms. All units will require extensive ballast to provide the bearing strength necessary for expected wheel loads during the wet season. Many areas are so wet that they preclude the possibility of road location without special practices. Trafficability using natural surfaces is very poor.

Wood. This is dominantly a non-forested landtype with isolated trees along the outer edges of the units. These isolated stands are dominantly a subalpine fir/elk sedge habitat type, with low productivity potential. Reforestation site limitations are related to the severity of climate at these elevations and the low water holding capacity of these well drained soils.

Water. Because of the high water table in this landtype, any activities on these units can directly influence water quality on the unit. Road construction or excessive grazing and trampling can contribute sediment directly to the live streams passing through these units. The character and composition of the vegetation may also be altered through such activities if they tend to lower or raise the water table. Normally a natural control to stream downcutting exists at the low end of these meadows. Alteration of this control will allow rapid downcutting of streams through the meadows.

Forage. These units are among the most productive for forage on the Forest. Production potentials often exceed 1,500 pounds of useable dry forage per acre per year, and many of these areas are currently producing near potentials. Some problems have been noted where excessive grazing and trampling have caused a temporary reduction in production, but recovery is generally good. Trailing through these units may cause considerable compaction resulting in deep trenches or ruts which may lower the water table in other areas subsequently changing the vegetative composition of the entire landtype.

Recreation. These lands probably have their highest recreation value as scenic portions of the foreground. Suitability for campgrounds, construction or other developments is generally poor because of the high water table and very poor trafficability. These units also become extremely important during the hunting season as jumping off points for hunters to big game hunting areas.

Management Evaluation:

Map Symbol 102
Terrace Land
Deep Sandy and Loamy Skeletal Soils

Location: This landtype is depositional and is found at the lower elevations on the District along major drainages.

Landtype Characteristics: Terrace lands are flat to gently sloping lands deposited adjacent to major streams. Some terraces were deposited as glacial outwash during the Pleistocene Epoch and are left in their presently elevated position by stream entrenchment. The slopes of this landtype are moderately timbered with a neutral aspect, and 0 to 5 percent gradients. The deep sandy and loamy skeletal soils are underlain by granite which is variably fractured and weathered.

Soils: The dominant soil on this landtype (50%--JEFA-5) is deep and has a thin organic layer over a very dark brown, gravelly sandy loam, with 45 percent well graded coarse fragments. Another major soil (35%--JECA-2) on well drained warm sites, has thin organic layer over a very dark, grayish brown to brown gravelly loamy coarse sand, greater than five feet deep, with 40 to 50 percent coarse fragments. A minor soil (<15%--GDEA-5) in third terrace positions is similar to the dominant soil but has darker horizonation.

Vegetation: The slopes of this landtype are moderately well vegetated. The units are dominated by brush-grass communities, and timbered habitat types, including ponderosa pine/bitterbrush, ponderosa pine/Idaho fescue, Douglas-fir/pinegrass and Douglas-fir/ninebark. Forest crown density ranges from 0 to 40 percent and brush crown density is 10 to 60 percent.

Hydrology: These lands receive between 20 and 30 inches of precipitation annually. Precipitation in the form of snow melts throughout the winter months and is gone by early spring. Approximately 5 to 10 inches of water is yielded annually from these landtypes. Almost all water leaves these units as percolation to water table or into bedrock. Drainage is rapid, for the most part, and field capacity is reached soon after water input. Due to rapid infiltration, percolation, and low relief, overland flow on these landtypes is rare. These terraces act as a sediment buffer and regulator of overland and subsurface flow from adjacent landtypes.

Management Qualities: This landtype has major significance as a buffer to overland flow and sediment generated on adjacent landtypes. Some portions are important building sites, or gravel and mineral sources.

Roads. Engineering problems involve handling water and debris generated from higher adjacent landtypes and stream encroachment

on the bearing capacity of the road prisms. Otherwise, terrace lands provide little hazard to road building. Because of their favorable topography, they are ideal as administrative sites, air strips and campgrounds. Trafficability is fair to good over most of the landtype. Mass stability hazards originating on this landtype are not a consideration; however, mass stability hazards which originate on adjacent landtypes must be given serious consideration.

Wood. This is a moderately well forested landtype and timber productivity potentials range from low to high. The major habitat types are dominated by ponderosa pine.

Water. Concentration of surface water will lead to gullying and accelerated erosion but this hazard is relatively low compared to steeper landtypes. These units can become flooded, but their elevated position makes this very uncommon and in some places impossible. Water related hazards are generally low.

Forage. Brush/grass communities are common to this landtype. Potential production is rated moderate to high with current levels at about one-half this level. The amount of annual precipitation and the coarse nature of the soils combine to limit the ability of these units to recover from adverse use.

Recreation: Terrace lands are well suited for a variety of recreational activities and summer home development because of the topography. Special attention must be given to the hazards generated on adjacent landtypes, and their possible impact to development on lower lying units. Potential flash floods, debris slides, mud flows, and some avalanche hazards from above may significantly influence placement of structures, roads or other developments. Because of its river-wash base, coarse textured soils and proximity to streams, this landtype is not suitable for extensive leach fields or sanitary landfills.

Management Evaluation:

Map Symbol 103
Glacial Outwash Land
Deep Skeletal, Sandy and Loamy Soils

Location: These units are common along Bear Valley Creek and around Bull Trout Lake.

Landtype Characteristics: This landtype is represented by glacial outwash materials with a low, rolling topography interspersed by numerous nearly level bodies of wet soil. The outwash material is glacial drift that has been sorted and deposited by glacial melt water. The total difference in relief ranges from five to 20 feet. The slopes are convex, have gradients of less than 20 percent and occur on all aspects. Forest crown density ranges from zero percent in the lower wet meadowlike areas to 70 percent on the outer, higher more well drained portions of these units. This landtype is usually adjacent to large wet meadows and has deep sandy and loamy skeletal soils in the mantle of glacial outwash material, usually greater than 10 feet thick. This landtype differs from other glacial outwash and moraine units by having smoother topographic features and a predominance of stratified outwash materials in the cobble and gravel sizes.

Soils: The dominant soil (50%--IECA-2) on elevated more well drained benches and knobs has a 1-to-2-inch organic layer over a dark yellowish brown to yellowish brown coarse sandy loam to sandy clay loam, five to 20 inches thick over a gravelly coarse sand. The percent coarse fragments range from 40 to 50 percent. A more moist soil (30%--HBDA-5) on more moist cool sites has a 2-inch organic layer over a dark brown to brown gravelly loam to gravelly or cobbly sandy loam with stratified layers of gravelly sandy clay loam, greater than 60 inches deep. The percent coarse fragments is dominantly about 50 percent. A minor soil (20%--JEAA-2) in meadowlike areas has a thin organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly loamy sand greater than 60 inches deep. Coarse fragments are generally well graded and exceed 60 percent by volume.

Vegetation. This landtype is dominantly a timbered unit with 50 to 70 percent forest crown cover. Twenty percent of these units, however, have a meadow land vegetative association with no crown cover or scattered trees. Subalpine fir/elk sedge and subalpine fir/dwarf blueberry habitat types are common to the more well drained portions of these units. Meadow land grass communities and some subalpine fir/Idaho fescue are dominant in the meadow-like areas. Brush crown densities are generally less than 10 percent.

Hydrology: Average annual precipitation is 20 to 35 inches and water yield is 10 to 20 inches, most of which is released to the mantle in late April and May by snowmelt. Large amounts of subsurface water from higher areas move into the landtype as shallow to deep ground water

flow. The gravelly deposits of this landtype act as a sponge receiving and temporarily detaining rapid inflow of water from heavy runoff and releasing it at slower rates extending over longer periods. Water tables raise and lower as a result of this temporary storage.

Management Qualities: These lands are relatively stable under natural undisturbed conditions. The major limiting factors are localized high water tables and the severity of climate.

Roads. Construction problems on these lands are generally minimal, the major limitation being the minor wet areas which will require considerable ballast to cross and only fair trafficability. Some problems may be encountered with interception of ground water where excavation exceeds three or four feet. This will not be a common event, however.

Wood. Although dominantly very well timbered, these units are rated very low to low for productivity potential. A limiting factor to production is climate. The subalpine fir habitat types, currently dominated by lodgepole pine, consist of dense pole stands with elk sedge and dwarf blueberry understories. The severe climate, vegetative competition, and low water holding capacity of these soils should provide severe limitations to reforestation.

Water. This landtype has good overall water handling characteristics and hazard of disrupting the hydrology is generally low. The snowmelt rates, moderate percolation rates, plus relatively shallow ground water levels provide a situation where hazards of contamination of ground water from pit toilets or other surface contamination is moderately high.

Forage. The understory species composition in these units is dominated by elk sedge and dwarf blueberry with production potential generally less than 400 pounds per acre per year of useable dry forage. The meadowlike areas are more productive but generally minor in extent. The major impact from livestock grazing is compaction of these minor wet meadowlike areas and a subsequent reduction in their production capacity. Those areas under dense stands of lodgepole receive limited grazing use.

Recreation. These glacial outwash lands provide excellent sites for potential recreation development. Topography is generally level and well drained. The exception is the meadowlike areas which have seasonably high water tables and compactable soils. The extremely high percolation rates of the underlying outwash material combined with adjacent high water tables are poor conditions for sewage treatment within a soil mantle;

consequently, any facilities associated with recreational use, pit toilets, leaky vaults and indisciminate disposal of self-contained camping units can be a major pollution source for adjacent streams and ground water.

Management Evaluation:

Map Symbol 103-1
Glacial Outwash Land, Low Relief
Deep Skeletal, Sandy and Loamy Soils

Location: These units are common along Bear Valley and Elk Creek drainages.

Landtype Characteristics: This landtype is represented by the meadow-like areas over glacial outwash material adjacent to streams and having low, very flat topography. The outwash material is dominantly glacial drift that has been sorted and deposited by glacial melt water beyond the areas of glacial activity. Some alluvial, stream deposited materials are also present within these units. Slope gradients are predominantly less than 10 percent and occur on all aspects. Vegetative cover is variable, dominantly grasses and riparian communities in the central portion of units and open stands of subalpine fir and lodgepole pine on the sloping outer portions of units. Forest crown densities range from zero to 30 percent. Soils are deep sandy and loamy skeletal and highly stratified. Bedrock is highly variable but dominantly granite and may be 100 feet below the surface of the soil.

Soils: The dominant soil (50%--IECA-5) on sloping more well drained portions of units has a 2-to-4 inch organic layer over a dark grayish brown to yellowish brown gravelly sandy loam greater than 60 inches deep. Percent coarse fragments range from 30 to 40 percent and are dominated by stratified layers of fine gravels. The other soils (30%--IADA-2, 20%--JEAA-2) are common to more moist areas with a high water table and have a thinner organic layer over a black to very dark gray loam to gravelly sand greater than 60 inches deep. The wettest soil (IADA-2) often has restrictive gravelly clay loam layers in the profile and contains 40 percent fine gravels. The other soil (JEAA-2) contains a good gradation of coarse fragments that generally exceed 60 percent by volume.

Vegetation: This landtype is dominantly open, meadowlike and non-timbered with forest crown densities ranging from zero to 30 percent. A subalpine fir/elk sedge habitat type is dominant on the sloping more well drained portions of these units. Lodgepole pine in dense pole stands often dominates this habitat type at present. The remainder of these units contains scattered subalpine fir and lodgepole pine trees with an understory of riparian vegetation or meadowlike grassland communities. A subalpine fir/Idaho fescue habitat type has been noted on some of the more well drained open portions of some units.

Hydrology: Mean annual precipitation is 20 to 35 inches and water yield is five to 15 inches, most of which is released by snowmelt in April and May. Large amounts of subsurface water from higher areas moves into this landtype as shallow to deep ground-water flow. Water table is near the soil surface during wet periods, generally spring

and early summer, and recedes to lower depths in fall and winter. Lowest portions retain near surface water tables even during dry periods. These areas are very important regulators of flow received from adjacent slopes.

Management Qualities: Major limitations within this landtype are very poor to moderate trafficability and localized high water tables.

Roads. Construction problems in this landtype will generally involve the high water table and its effect on the bearing capacity of road prisms. Very poor to moderate trafficability of some soils will also require that surfacing materials be hauled in. Because of the relatively flat topography, these units are often ideal sites for road location. With locations providing buffer from streams and with special erosion control practices at stream crossings, sedimentation will be low.

Wood. Timber productivity potential in this landtype is rated very low to low because of climatic limitations to tree growth and the relatively low stand density. The subalpine fir/elk sedge which occurs on this unit is a typical habitat type and limitations for reforestation will be very severe because of the climatic conditions and low water holding capacities of the soils. The seasonal high water table is also a major limitation to the establishment of timber species in localized areas.

Water. Low lying areas are very subject to overflow flooding during the spring runoff. Channel erosion hazards from alteration is high. Improvements on the flood plains run a high risk of being damaged by future meandering. Continuous excavations, such as ditches, can intercept the shallow water table to create artificial drainage systems that lower the water table and create erosion problems.

Forage. These lands have a range production potential of from 100 to 1,200 pounds per acre per year of useable dry forage. Current production figures indicate production levels at about one-half to two-thirds of these potentials. Major limitations to achieving potential are past excessive grazing, compaction of soils during the wet season and a lowering of the water table through trailing and other forms of artificial drainage which alter the vegetative composition and production potential of the site. Excellent response and a rapid return to production potentials can be expected by a grazing system that reduces grazing activity and impact during the wet seasons.

Recreation. This unit is dominantly a poor site for recreational developments because of the seasonal high water tables. Some flooding is also common adjacent to live streams. The generally

rapid infiltration and rapid permeability rates of soils combined with high water tables are not conducive to sewage treatment which depends on purification within the soil mantle. Consequently, any activities associated with human habitation may directly reduce the water quality in these areas through pollution of ground water and live streams. These units may have a high esthetic value as fore and middle ground associated with travel influence areas. The wildlife associated with these units, especially elk and salmon, may also be significant scenic attractions.

Management Evaluation:

Map Symbol 104
Valley Train Lands
Deep Skeletal and Coarse Loamy Soils

Location: These units are located in the bottoms of glacial valleys.

Landtype Characteristics: Valley Train Lands comprise the bottoms and lower side slopes of U-shaped glaciated valleys. The units are composed of depositional materials which may include alluvial lands, glacial outwash, terrace remnants, lateral and ground moraine remnants, small alluvial fans, and colluvial toe slopes. These units are located at high elevations (above 6000 feet) and are found with all aspects. Slopes are partially to heavily timbered, short, and have gradients from 0 to 20 percent. Soils are deep skeletal and coarse loamy. There is no rock outcrop; depth to bedrock is generally greater than 10 feet.

Soils: The dominant soil (85%--LFBA-5) on this landtype has a zero to three inches organic layer over a very dark grayish brown gravelly sandy loam with greater than 60 inches thick, with 45 percent well graded coarse fragments. A minor soil (15%--IFBA-4) is a dark gray loam to clay loam, greater than 60 inches deep. This soil is restricted to wet meadows, seeps and streambanks.

Vegetation: This unit has scattered timber with areas of denser stands along streams. Habitat types found on this landtype are subalpine fir/grouse whortleberry on the more densely forested sections and subalpine fir/elk sedge and subalpine fir/pinegrass on the areas with scattered timber. A subalpine fir/bluejoint reedgrass type is confined to wet areas. Forest crown cover ranges from zero to 60 percent while brush crown densities are less than 30 percent.

Hydrology: Between 35 and 65 inches of precipitation is received on these landtypes annually. Of this amount, approximately 20 to 40 inches is yielded annually as stream flow. The water yielded from these units occurs as percolation to bedrock or water table and thence to the adjacent streams. Overland flow occurs only during rapid spring snowmelt and high intensity spring rain storms when the water table is at or near the soil surface. Perched water tables and bogs are common during the spring snowmelt period on approximately 15 to 20 percent of the landtype. These landtypes receive a high amount of surface and subsurface water from adjacent glacial trough landtypes. Most of this water accumulates in the deep soil reservoir and slowly drains into channels that incise the water table. These units are important regulators for sustained stream flow throughout the summer and outflow is slow compard to water input. Deep snow deposits accumulate at the base of avalanche paths and melt slowly through the summer.

Management Qualities: This landtype is an important buffer to sediment, debris, overland and subsurface flows coming from surrounding landtypes. Little runoff is delivered to adjacent streams as surface flow.

Roads. Engineering problems involve highly variable materials, numerous wet spots, avalanche hazards from above, stream encroachment, and probability of interception of subsurface flow by road cuts. End haul of materials is often necessary to get adequate bearing strength across depressions and wet spots.

Wood. Growth is variable on the timber producing habitat types and snow and avalanche damage are often limiting factors to the production of commercial sawtimber. These trees, however, serve two important functions; one from an esthetic standpoint, the other as a buffer to sediment produced on adjacent landtypes. They may also be important to wildlife habitat. Reforestation site limitations are moderate to severe, with the cold climate, vegetative competition, and flooding hazards the most limiting factors to reforestation.

Water. Interception of ground waterflow is a serious hazard during snowmelt runoff. Diversion, interruption and/or concentration of surface water will lead to gullying and accelerated erosion, but stony soils and gentle gradients make the hazard only moderate. Deposition of snow from bordering avalanche paths presents a hazardous situation for structures. Sewage disposal via soil intake will be poor and hazard of contamination of ground water and stream flow is high. The tremendous amounts of snowmelt water handled by the soils and channels are a major consideration for land use planning.

Forage. Forage production is extremely variable, high on open, well drained sites and low under dense stands of timber. Overall, the landtype has an excellent mix of shrubs, forbs, and grass species. The various communities or associations are patchy or scattered. This situation may be more suited to wildlife habitat than livestock grazing.

Recreation. Due to their proximity to quality streams and the glaciated landscape, Valley Train Lands are usually esthetically desirable areas for outdoor recreation activities. The opportunities to observe the rushing streams, the mountain grandeur, and the wildlife are many and varied. Because of hazards generated on adjacent units, caution is urged when planning construction, developments, or other facilities on this landtype. Trails can be expected to hold up quite well although seasonal maintenance will be necessary at the narrower portions of the units. Trafficability is best on the higher well drained sites.

Management Evaluation:

Map Symbol 105
Alluvial Fan Land
Deep Sandy and Loamy Skeletal Soils

Location: The units along the South Fork of the Payette River on the road to Grandjean are typical of this landtype.

Landtype Characteristics: These lands are the deposits of alluvium transported by streams and concentrated surface flows and accumulated as cone-shaped landforms at the mouths of drainages originating on steep north slopes. Slopes are relatively smooth and gradients range from zero to 20 percent. Forest crown densities range from 10 to 80 percent. The deep sandy and loamy skeletal soils have developed over river terraces and other forms of mixed granitic alluvium.

Soils: The dominant soil (80%--IECA-2) over entire units, has a zero to 2-inch organic layer over a dark yellowish brown to light yellowish brown gravelly coarse sandy loam to gravelly coarse sand, greater than 60 inches deep, with 30 to 40 percent moderately well graded coarse fragments. A minor soil (20%--IFBA-5) on the more well drained outer fringes of individual units, has a zero to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam greater than 60 inches deep, with 50 to 60 percent moderately well graded coarse fragments dominated by rock. Overall depth of all soil material may exceed 100 feet in localized areas.

Vegetation: The forest crown density on this landtype ranges dominantly from 40 to 80 percent. Douglas-fir/pinegrass, Douglas-fir/chokecherry and subalpine fir/pinegrass habitat types are most common. Brush crown densities range from 10 to 20 percent.

Hydrology: Mean annual precipitation ranges from 20 to 30 inches and water yield is 5 to 15 inches. Snowpack is moderate except on southerly aspects where it is generally light and sporadic. Periodic winter rain and snowmelt usually recharge the mantle, with spring rain and snowmelt providing surplus water which stimulates deep percolation to ground water tables. A significant amount of surface and subsurface water from the parent stream and adjacent slopes moves over and through these fan deposits. Water tables are generally below six feet and fluctuate in response to moderate to rapid inflow in relation to moderate to slow outflow.

Management Qualities: These lands provide few problems except for a moderate inherent erosion hazard. There are, however, hazards to these units that have their origin on adjacent landtypes. Flash floods, debris slides and mud flows are the most significant, although their frequency is relatively low.

Roads. These lands have few hazards to road construction except for a moderate erosion hazard and a high probability of intercepting subsurface flow for excavations exceeding 5 to 6 feet in depth. Most problems would still relate to handling of water generated on adjacent landtypes during periods of excessive or flashy runoff. Natural surfaces will provide good to very good trafficability.

Wood. Although these units are relatively small and limited in extent, they do have a moderate productivity potential for commercial timber species. Limitation to reforestation will be moderate to severe because of vegetative competition.

Water. Portions of these units are vulnerable to flashy flooding and debris deposition from parent streams draining higher slopes. These characteristics plus shallow stream entrenchment make these streams easily diverted from their channels by obstructions - either natural or man-made.

Forage. These units have a low to moderate productivity rating for forage. Most units, however, are relatively small and in areas where grazing is currently not permitted. Little impact was noted on most units. Heavy grazing may significantly affect the ability of vegetation on this landtype to perform its buffering function to sediment carried by surface flows. Recovery rates will be slow to moderate.

Recreation. Although these units have relatively gentle slopes, suitability for recreational developments or administrative sites may be severely limited by hazards generated on higher adjacent landtypes. The soils are better suited to sewage treatment than other alluvial soils, but the proximity of adjacent streams and hazards from potential overland flow from higher adjacent units tends to offset this advantage.

Management Evaluation:

Map Symbol 106
Moraine Land, Undifferentiated
Deep Skeletal, Sandy and Loamy Soils

Location: Common to headwaters of Elk Creek and mouth of Porter Creek.

Landtype Characteristics. This depositional landtype is represented by low glacial moraine hills that have convex slopes with gradients of five to 30 percent. These hills are dissected by numerous shallow drainages and have a forest crown cover of from 10 to 20 percent. Slopes have all aspects and are generally between 100 and 700 feet long. Soils are dominantly deep and sandy skeletal in glacial moraine materials composed of gravel, cobbles, stones, and boulders. This material will exceed 10 feet in depth. The underlying bedrock is granite, and highly variable as to fracturing and weathering.

Soils: The dominant soil (80%--IECA-2) has a 1-to-2-inch organic layer over a dark yellowish brown gravelly coarse sand, greater than 60 inches deep, with 60 to 70 percent coarse fragments. A minor soil (20%--IECA-3), most common on steeper slopes, has a 2-inch organic layer over a yellowish brown loam to sandy loam, greater than 60 inches deep, with less than 20 percent coarse fragments.

Vegetation: This landtype is dominantly an open grown forested type unit with 10 to 30 percent forest crown cover. Subalpine fir/grouse whortleberry is the most common habitat type. Understory brush crown density ranges from 10 to 30 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 15 to 25 inches. Snow packs are moderately deep and melt rapidly during April and May. Nearly all of the water yield takes place from snowmelt as deep percolation. Most of these deposits are in low lying positions through which subsurface water from higher areas must pass in route to streams. Water flow through and outflow from this landtype is moderate to slow, thus helping to extend the flows into summer. Water tables exist at moderate depths in spring and recede to moderately deep in fall and winter.

Management Qualities: These are relatively stable lands under natural undisturbed conditions. Surface erosion has the greatest impact on disturbed soil areas.

Roads. Problems to construction relate to the moderate inherent erosion hazard of natural slopes and of disturbed soil material. The erosion hazard of cut and fill slopes is expected to be low

to moderate and trafficability is generally good to very good. A high percentage of well graded coarse fragments contribute to the stability of this unit.

Wood. This landtype is rated as having low productivity potential for timber growing species. Lodgepole pine is currently the dominate component of the subalpine fir/grouse whortleberry habitat type. Densities are generally from low to moderate and growth is expected to be very slow because of the climate. Revegetation potentials are expected to be moderate to severe because of vegetative competition and climatic conditions.

Water. Water handling characteristics are dominantly good and pose few hazards to improvements or activities. A few low lying areas have high water tables and are subject to flooding or channel erosion from streams. Improvements on such areas are undesirable. Hazards of serious disruption of hydrology is moderately low.

Forage. Forage production on this landtype is dominantly rated low because of the timbered overstory and an elk sedge and grouse whortleberry understory. Much of the production potential is also low because of numerous stones over the surface of the soil. Little grazing impact has been noted on these units.

Recreation. Due to their relatively low relief and proximity to quality streams and the glaciated landscape, moraine lands are often well suited for outdoor recreation activities. Trails are expected to hold up quite well, although some maintenance will be required at the more narrow portions due to erosion. Trafficability will be very good.

Management Evaluation:

Map Symbol 106-2
Lateral Moraine Land
Deep Skeletal, Sandy and Loamy Soils

Location: Limited in extent but common along Cache Creek.

Landtype Characteristics: Lateral moraines are associated with the major alpine glaciated valleys. These lands were deposited above and on the lateral margin of the valley glaciers. Most of these lands have a total relief of about 150 feet and slope gradients ranging from five to 30 percent. The convex slopes are 100 to 400 feet long, occur on most aspects and have a 20 to 60 percent forest crown cover. Soils are deep skeletal, sandy and loamy over glacial moraine materials composed of gravel, cobble, stones, and boulders. These materials may be greater than 10 feet deep. The underlying bedrock is dominantly granitic but variable as to fracturing and weathering.

Soils: The dominant soil (80%--IECA-2), on low relief gentle slopes, has a 1-to-2-inch organic layer over a yellowish brown gravelly coarse sand to sandy loam, greater than 60 inches deep, with 50 to 60 percent well graded coarse fragments. A minor soil (20%--JEAA-5), on elongated ridges and steeper sideslopes, has a 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, greater than 60 inches deep, with 50 percent well graded coarse fragments.

Vegetation: This landtype is timbered with a 20 to 60 percent forest crown cover. A subalpine fir/pinegrass habitat type is dominant with subalpine fir/elk sedge and brush/grass communities limited to the elongated ridges and steeper sideslopes. Brush crown densities are generally less than 10 percent. Some minor inclusions of subalpine fir, Engelmann spruce communities have been noted in the more moist wet inclusions.

Hydrology: Mean annual precipitation ranges from 30 to 40 inches and mean water yield ranges from 15 to 25 inches. Snow packs are moderately deep and melt rapidly during April and May. Nearly all the water yield takes place as deep percolation from snowmelt. Outflow from these moraines is moderate to slow and extends into summer.

Management Qualities: Under natural conditions these lands are relatively stable. Soil disturbance or exposure may create a moderate impact from surface erosion.

Roads. The dominant impact from construction on this landtype will be a moderate erosion hazard of the natural surfaces and the road prisms. A moderate hazard does exist from subsurface water interception, but the probability of this occurrence is

minimal. Trafficability will generally be good to very good because of a high percentage of well graded coarse fragments contained within the moraine materials.

Wood. This is a dominantly well timbered landtype with low to moderate timber productivity potentials. The subalpine fir/pinegrass ranks low to moderate with severe limitations for reforestation. Vegetative competition and climate are the most limiting factors. Lodgepole pine currently makes up most of the volume in the subalpine fir habitat types and currently occurs as dense pole stands in most areas. Minor inclusions of subalpine fir/elk sedge and brush/grass communities have very low to low productivity potentials with somewhat more severe limitations to reforestation.

Water. Water handling characteristics are dominantly good and pose few hazards to improvements or activities. Hazards of serious disruption of hydrology is moderately low.

Forage. Forage production is rated low to very low within these units because of the timbered overstory and the lack of highly palatable forage species in the understory. The subalpine fir/pinegrass may produce in excess of 800 pounds of useable dry forage per acre per year but under most circumstances this forage is not utilized by livestock. Impact from most grazing is negligible.

Recreation. These units do provide some of the scenic backdrops along major travel routes in the glaciated country. Individual units are generally too small and steep to be well suited to development of recreational facilities. The highly permeable nature of the moraine material again is not conducive to treatment of sewage. Contamination of the adjacent streams and ground water can be expected from such activity. In most areas, trails across and along these units can be expected to hold up quite well and trafficability will be good to very good.

Management Evaluation:

Map Symbol 108
Glacial Plastered Mountain Slope Land
Deep Skeletal, Sandy and Loamy Soils

Location: These units are not common but are present in the Glacial Trough Lands associated with the headwaters of the North Fork of the Boise River.

Landtype Characteristics: These landtypes are the glacially modified slopes that have had glacial material deposited on them rather than stripped away by the scouring action of glaciers. These lands are generally benchy with 30 to 60 percent slopes and have very dense forest crown covers ranging from 60 to 80 percent. Dissections are minimal and seeps are very common to the lower one-third of slopes. These lands contain considerable lateral moraine material with typically sub-rounded glacial worked rock fragments. Soils are deep and dominantly loamy skeletal over granite bedrock with variable fracturing and weathering.

Soils. The dominant soil (100%--JEAA-5) is very deep with a 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam with 50 percent coarse fragments dominated by stones and boulders. Many surface erratics are common to this soil.

Vegetation: This landtype is heavily timbered with 60 to 80 percent forest crown cover dominated by a subalpine fir/grouse whortleberry habitat type. The understory is dominated by grouse whortleberry and brush crown densities range from 10 to 30 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 15 to 25 inches. Snow pack is heavy and often persists through May. Snowmelt releases 20 to 30 inches of water to the soil in a few weeks in May and June. Runoff is dominantly by deep subsurface flow and deep percolation and extends well into the summer. Overland flow is rare. Surface and subsurface water flows across this landtype from more rocky, shallow landtypes above. Water table is near the surface on lower slopes during May, June, and July.

Management Qualities: The major problems on this landtype relate to a high probability of intercepting subsurface flow on lower slopes and a high mass stability hazard for cutslopes on lower slopes. Timber productivity is expected to be low to moderate with moderate limitations to reforestation.

Roads. These lands, because of their favorable gradation and benchy slopes, do present favorable road locations at some mid

and upper slope positions. Lower slopes have a moderate to high hazard for the interception of subsurface flow which will subsequently cause mass failures of road cuts and some fills. A moderate to high surface erosion hazard for the landtype will also be aggravated by construction activities on individual units.

Wood. The subalpine fir/grouse whortleberry habitat type that dominates these landtypes has a low to moderate productivity potential. The moderate rating is held to the seral species, lodgepole pine, and moderate limitations for reforestation will be reflected in vegetative competition and a severe climate. The very high rate of stocking on these units also contributes to this rating.

Water. Water handling characteristics will cause moderate overall hazard to improvements and activities on this landtype. First and second order streams crossing some units of this landtype are steep and peak flows are very high per unit area drained. The greatest hazard to the hydrology is the disturbance of runoff patterns by road construction, especially on lower and steeper slopes.

Forage. Forage production on these units varies from very low to moderate because of variability in the concentration of coarse fragments within the soil profile and on the soil surface. Also a reduction in production is expected where forest crown densities exceed 40 percent. The more open stands of subalpine fir or of lodgepole pine are expected to have a moderate range productivity potential dominated by grouse whortleberry, elk sedge, and pinegrass.

Recreation. Although limited in extent, these lands are an important part of the high value dispersed recreation areas associated with glaciated lands. Trail construction problems will be similar to roads with the greatest limitations associated with wet soils on lower slopes. Some maintenance will be required to remove rocks, debris, and sediment. Where surface flow or seeps are intercepted, erosion and sediment hazards will result. Trafficability will be fair to good.

Management Evaluation:

Map Symbol 109-2
Cryoplanated Ridge Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: These units are confined to relatively long, narrow, high elevation cryoplanated ridges like Blue Bunch Mountain.

Landtype Characteristics: These Cryoplanated landtypes lie on long narrow ridges adjacent to glaciated areas. These lands have been formed by the effects of permanent snow and ice field action as a result of climatic changes accompanying glaciation. The chief slope forming processes are those resulting from nivation, freezing and thawing, and wetting and drying which make mass wasting the dominant processes by which materials are moved downslope. This process keeps replacing materials that have been removed by the limited overland flow that has occurred. These units are commonly associated with Rejuvenated Cryoplanated landtypes. Slopes range from 10 to 50 percent and dissections are shallow or weakly expressed. The vegetative picture is one of scattered dense pockets of subalpine fir surrounded by extensive areas of brush grass communities. The shallow and moderately deep skeletal, sandy and loamy soils are over well to extremely well fractured, very weakly to well weathered granite bedrock.

Soils. The dominant soil (80%--IFBA-5), on all major side slopes, has a zero to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, 20 to 60 inches deep, with 35 to 40 percent coarse fragments. A less extensive soil (20%--IFBD-5), on upper slopes and spur ridges, has similar characteristics but is less than 20 inches deep with 60 to 70 percent well graded coarse fragments.

Vegetation: This landtype is dominated by open grown brush-grass communities with scattered dense patches of subalpine fir/elk sedge and scattered open stands of subalpine fir/whitebark pine. Forest crown cover ranges from zero to 70 percent while brush crown densities range from zero to 30 percent. Some minor areas of subalpine fir/Stipa have been noted.

Hydrology: These lands receive between 35 and 45 inches of precipitation annually. Snowpack is deep and remains well into June. Approximately 20 to 30 inches of water is yielded annually from these ridgelands. Almost all precipitation becomes subsurface moisture. Approximately one-third to one-half of the excess subsurface water enters the fractured bedrock. Subsurface flow which accounts for the balance of the water yielded from the units moves downslope above bedrock. Overland flow is common on areas where disturbance by animals or machines has taken place. These landtypes are slow in response (yield) to water input.

and upper slope positions. Lower slopes have a moderate to high hazard for the interception of subsurface flow which will subsequently cause mass failures of road cuts and some fills. A moderate to high surface erosion hazard for the landtype will also be aggravated by construction activities on individual units.

Wood. The subalpine fir/grouse whortleberry habitat type that dominates these landtypes has a low to moderate productivity potential. The moderate rating is held to the seral species, lodgepole pine, and moderate limitations for reforestation will be reflected in vegetative competition and a severe climate. The very high rate of stocking on these units also contributes to this rating.

Water. Water handling characteristics will cause moderate overall hazard to improvements and activities on this landtype. First and second order streams crossing some units of this landtype are steep and peak flows are very high per unit area drained. The greatest hazard to the hydrology is the disturbance of runoff patterns by road construction, especially on lower and steeper slopes.

Forage. Forage production on these units varies from very low to moderate because of variability in the concentration of coarse fragments within the soil profile and on the soil surface. Also a reduction in production is expected where forest crown densities exceed 40 percent. The more open stands of subalpine fir or of lodgepole pine are expected to have a moderate range productivity potential dominated by grouse whortleberry, elk sedge, and pinegrass.

Recreation. Although limited in extent, these lands are an important part of the high value dispersed recreation areas associated with glaciated lands. Trail construction problems will be similar to roads with the greatest limitations associated with wet soils on lower slopes. Some maintenance will be required to remove rocks, debris, and sediment. Where surface flow or seeps are intercepted, erosion and sediment hazards will result. Trafficability will be fair to good.

Management Evaluation:

Map Symbol 109-2
Cryoplanated Ridge Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: These units are confined to relatively long, narrow, high elevation cryoplanated ridges like Blue Bunch Mountain.

Landtype Characteristics: These Cryoplanated landtypes lie on long narrow ridges adjacent to glaciated areas. These lands have been formed by the effects of permanent snow and ice field action as a result of climatic changes accompanying glaciation. The chief slope forming processes are those resulting from nivation, freezing and thawing, and wetting and drying which make mass wasting the dominant processes by which materials are moved downslope. This process keeps replacing materials that have been removed by the limited overland flow that has occurred. These units are commonly associated with Rejuvenated Cryoplanated landtypes. Slopes range from 10 to 50 percent and dissections are shallow or weakly expressed. The vegetative picture is one of scattered dense pockets of subalpine fir surrounded by extensive areas of brush grass communities. The shallow and moderately deep skeletal, sandy and loamy soils are over well to extremely well fractured, very weakly to well weathered granite bedrock.

Soils. The dominant soil (80%--IFBA-5), on all major side slopes, has a zero to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, 20 to 60 inches deep, with 35 to 40 percent coarse fragments. A less extensive soil (20%--IFBD-5), on upper slopes and spur ridges, has similar characteristics but is less than 20 inches deep with 60 to 70 percent well graded coarse fragments.

Vegetation: This landtype is dominated by open grown brush-grass communities with scattered dense patches of subalpine fir/elk sedge and scattered open stands of subalpine fir/whitebark pine. Forest crown cover ranges from zero to 70 percent while brush crown densities range from zero to 30 percent. Some minor areas of subalpine fir/Stipa have been noted.

Hydrology: These lands receive between 35 and 45 inches of precipitation annually. Snowpack is deep and remains well into June. Approximately 20 to 30 inches of water is yielded annually from these ridgelands. Almost all precipitation becomes subsurface moisture. Approximately one-third to one-half of the excess subsurface water enters the fractured bedrock. Subsurface flow which accounts for the balance of the water yielded from the units moves downslope above bedrock. Overland flow is common on areas where disturbance by animals or machines has taken place. These landtypes are slow in response (yield) to water input.

Management Qualities: This landtype is important because of its water production capabilities and its range production potential. The units are not particularly steep and landtype hazards are dominantly rated low to moderate. Surface erosion hazards and a high probability of intercepting subsurface flow on lower steeper slopes are the major limitations. These units do, however, have a fragile ecosystem; disturbance that adversely affects vegetative cover will require considerable time to correct and will result in increased mass wasting and sediment production.

Roads. This landtype will not be as hazardous as other landscapes for road location. As indicated previously, the dominant slopes are not overly steep. Slope dissection is weak, deep water percolation is the rule. While the profile textures are uniformly gravelly sandy loams, bedrock fracturing under the shallow soils does provide a varied selection of coarse fragment sizes for roadbeds and fill slopes. In addition, the soil plus the coarse fragments have good trafficability. Dust will be a problem during the drier periods of the year. Revegetation of cutslopes and the possibility of some loose material sloughing from cutslopes may present a minor problem. Road locations restricted to upper slopes and the top of ridges will significantly reduce the possibility of intercepting subsurface flow.

Wood. More than one-half of this landtype is non-forested. On those areas or units where timber stands are located, the production potential is very low. The very severe to severe limitations to reforestation are related to the competitive ability of elk sedge, high evapotransporation losses and cold climate associated with this elevation.

Water. One of the most important qualities of this landtype is its water storage capability. High elevation snowpack and deep percolation of most of the spring snowmelt makes these units excellent water producers for sustained streamflow. These units are fragile and highly susceptible to gullying and accelerated erosion from reduction of infiltration capacity and/or water concentration by mechanical and animal disturbances. Deep road cuts on the lower one-half of units will intercept significant subsurface water. Alteration of runoff conditions on this landtype will likely cause gullying or channel erosion on lower areas.

Forage. This landtype has a high value for range use. Most of the area is open. Vegetation is grass and forbs and the landscape is not very steep. The landtype is, however, producing at about one-half its potential mainly because of earlier overuse. Dry weight forage production is currently between 400 and 700 pounds per acre per year. The potential for these units is from 400 to

1300 pounds per acre per year. Adverse grazing use has not only reduced the quantity of forage plants but has advanced the hazard of surface creep and surface erosion. Many areas within this landtype have a heavily pavemented surface which is not conducive to the establishment of forage plants.

Recreation. This landtype often acts as an access route to some highly desirable areas associated with the high elevation landscape. Esthetic qualities generally relate to the unit's position and association with adjacent landscapes. Scenic qualities from these units are often very good. Vistas and suitable areas for recreational development are common, but access is variable. Surface water is generally lacking except during the spring. Dusty roads with good trafficability will be the rule.

Management Evaluation:

Map Symbol 109-9
Cryoplanated Upland
Moderately Deep and Deep Skeletal, Sandy and Loamy Soils

Location: Many units are common along Elk Creek, Bear Valley Creek, and Cub Creek.

Landtype Characteristics: These Cryoplanated landtypes show evidence of having been influenced by many processes throughout geologic time, leading to the theory that these lands are old, remnant surfaces. Cryoplanation, however, had the latest and most significant impact, causing us to place these units in with other Cryoplanated lands. These uplands are low relief maturely dissected areas of land with all aspects and gentle slopes ranging from 10 to 40 percent. They are dominantly moderately to well timbered with forest crown density ranging from zero to 70 percent. The well developed mature dendritic drainage system handles a great deal of water as shallow subsurface flow as evidenced by the numerous seeps and springs in these units. The moderately deep and deep skeletal, sandy and loamy soils occur over masked, moderately well to well weathered granite bedrock.

Soils. The dominant soil (60%--IFBA-5), on upper and mid slopes and ridges, has a zero to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, 40 to 60 inches deep, with 40 to 50 percent coarse fragments dominated by fine gravels. A less extensive soil (40%--IFBA-3), on lower sideslopes, in drainages and depressions, is associated with minor soils in seeps. This soil has a zero to 3-inch organic layer over a dark grayish brown to yellowish brown gravelly sandy loam, greater than 60 inches deep, with less than 30 percent coarse fragments, dominated by fine gravels.

Vegetation. This landtype is timbered with forest crown density ranging from 30 to 70 percent on 70 percent of the unit. A subalpine fir/pinegrass habitat type is common to depressions, lower sideslopes, and drainages. Subalpine fir/grouse whortleberry is dominant on upper mid slopes and ridges with minor inclusions of Douglas-fir/elk sedge and subalpine fir/elk sedge habitat types. Understories are variable and have 10 to 30 percent brush crown densities.

Hydrology. Mean annual precipitation is 35 to 40 inches and mean water yield is 20 to 30 inches. Snowpacks are heavy and commonly persistent through May. Snowmelt releases 20 to 35 inches of water in a few weeks during April, May, and June, with peak snowmelt rates in May. Overland flow is rare on undisturbed areas. Runoff is by heavy moderately deep subsurface flow and moderate deep percolation. Depressions have high water tables well into the summer. Streamflow develops at drainageways on lower margins by natural interception of subsurface flow. Outflow to lower areas and streams is moderate to slow and extends well into summer.

Management Qualities. The major limitations within this landtype are a high probability of intercepting subsurface water in large quantities, a moderate to high erosion hazard, and a lack of well graded coarse fragments within the soil profile and bedrock.

Roads. Major construction problems involve the high probability of intercepting subsurface flow with deep cuts and a moderate to high erosion hazard to road cuts and fill slopes. Trafficability is fair because of a lack of well graded coarse fragments within the profile. There is also a problem because of a 5 to 10 percent inclusion of large boulders within the soil profile. These boulders make it difficult to estimate quantities of material necessary in designing roads with balanced cut and fill design. The end result is usually a shortage of materials during the construction phase. In some areas, because of the hazard for interception of subsurface water and the poor gradation of coarse fragments, surfacing materials will have to be hauled in from other sources.

Wood. This landtype is well timbered with a zero to 70 percent forest crown cover. Productivity potentials associated with a subalpine fir/pinegrass habitat type is low to moderate. Other habitat types, although more common, are generally less dense and have productivity potentials of very low to low. Limitations to reforestation are severe because of climatic conditions and vegetative competition.

Water: Improvements and activities are not subject to serious water-related hazards except for high water tables in depressions. Cuts more than four feet deep have a high hazard of intercepting large quantities of subsurface flow in the spring. This intercepted flow can be easily concentrated to very erosive quantities unless special dispersing drainage is accomplished. Major interception of subsurface flow over extensive areas will shorten the runoff period. This will stimulate adjustments in downstream channels to greater peak flows.

Forage: Because of the dominantly timbered nature of this landtype, forage production is rated very low to low. Domestic livestock will find the pinegrass, grouse whortleberry, and elk sedge understories only moderately palatable. Big game species, especially elk and bear, may fare much better. Some areas with heavy grazing or trailing show accelerated surface erosion. Some trampling and subsequent deterioration of water quality can be expected on wetter soils adjacent to seeps.

Recreation. These units do provide some of the most readily accessible back country big game hunting on the District. Many

roads and trails traverse these units and all units are easily accessible by horseback without trail or road development. Many areas on upper slopes and on gentle sideslopes are readily suited to recreational development, although the rapid infiltration and percolation rates of the soil are not well suited to disposal of sewage or the development of sanitary landfills. Most recreation roads and trails are expected to be dusty and have moderate to good trafficability characteristics.

Management Evaluation:

Map Symbol 109a-1
Weakly Dissected Cryoplanated Mountain Slopes
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: Typical locations are along Pass Creek, Rough Creek, and in the headwaters of Elk Creek.

Landtype Characteristics: These lands have been formed by the effects of permanent snow and ice field action resulting from climatic changes accompanying glaciation. However, these units have not been subjected to the scouring action. These units have been subsequently uplifted or rejuvenated through the mountain building processes. These units are located at high elevations (above 6000 feet) and are found on dominantly south and west aspects. Slopes are of moderate length, sparsely timbered, and have gradients from 20 to 50 percent. The soils are shallow and moderately deep, skeletal, sandy and loamy. There is only a trace of rock outcrop. The granitic bedrock is extremely well fractured or masked, very weakly to well weathered.

Soils: The dominant soil on this landtype (85%--IFBA-5), on most slopes has a thin organic layer over a dark grayish brown gravelly sandy loam, 20 to 40 inches deep, with 45 percent well graded coarse fragments. A minor soil (15%--IFBD-5), on upper south slopes and spur ridges, is similar but less than 20 inches deep.

Vegetation: This landtype is dominated by open brush/grass communities and pockets with subalpine fir/elk sedge, subalpine fir/pinegrass and subalpine fir/stipa habitat types. Forest crown cover ranges from zero to 40 percent while brush crown density is less than 20 percent.

Hydrology: These landtypes receive between 35 and 45 inches of precipitation annually. Snowpack is deep, and peak snowmelt occurs in April and May. Approximately 20 to 30 inches of water is yielded annually from these slopes. Overland flow is an uncommon occurrence. Most of the released snow and rainfall quickly enters and percolates into the soils to become subsurface water. The penetration of subsurface water into the bedrock accounts for a portion of the total water yield. The parallel drainage pattern does not greatly concentrate surface and subsurface flows within this landtype. However, subsurface water does tend to accumulate within the lower slopes.

Management Qualities: This landtype is important because of its water producing capability and range production potential. The units are moderately steep and most landtype hazards are rated low to moderate. The landtype has, however, a relatively fragile ecosystem and a moderate

to high erosion hazard. Disturbance that adversely affects vegetative cover will require considerable time to correct and will result in increased mass wasting, surface erosion, and sediment production.

Roads. This landtype will not be as hazardous as most other landscapes for road locations. Slopes are moderately steep, slope dissection is weak; subsurface flow is moderate. Soil consistency plus the coarse fragments in the profile combine to yield good trafficability. Revegetation of cut slopes will present a problem. Road location on the upper slopes will significantly reduce the impacts from surface erosion of freshly exposed surfaces.

Wood. More than two-thirds of the landtype is non-forest. On those areas where timber is located, the production potential is very low to low. Limitations to reforestation are severe to very severe with vegetative competition, climate, and low water-holding capacity the major limiting factors.

Water. Deep road cuts on the lower slopes near dissections and swales will intercept considerable subsurface water. Concentration of this water can result in serious erosion and sedimentation if insufficient buffer exists at water disposal sites.

Forage. This landtype is moderately suited for range use. Most of the area is open, vegetation is dominantly grass, elk sedge, and forbs and the slopes are moderately steep. The forage production potential for this landtype is from 100 to 800 pounds per acre per year and current levels are far below this potential. Accelerated surface erosion from adverse historic grazing practices is the major cause for reduction.

Recreation. This landtype is associated with high elevation landtypes and often functions as a scenic backdrop. Access is variable. Esthetic quality is variable. Surface water is lacking. These units are often used as access routes to more favorable areas and as hunting grounds. Trails will be highly erosive and trafficability will be good.

Management Evaluation:

Map Symbol 109b
Moderately Dissected Cryoplanated Mountain Slopes
Deep Skeletal, Sandy and Loamy Soils

Location: These units are quite common especially between the glaciated units and Bear Valley Creek.

Landtype Characteristics: These units are located near areas of glaciation but were not subjected to the scouring action of glacial ice. Climatic influences accompanying glaciation resulted in permanent ice and snow fields where movement of any material was essentially local. Through the processes of wetting and drying, nivation, freezing and thawing and mass wasting of materials, somewhat smooth and rounded slopes have developed. Subsequent rejuvenation followed by weak fluvial processes have resulted in these dominantly smooth, moderately dissected cryoplanated slopes. Dissections are somewhat infrequent, broadly concaved and somewhat parallel. These units are dominantly well-timbered with crown covers ranging from 40 to 80 percent and slope gradients ranging from 20 to 60 percent. The deep skeletal, sandy and loamy soils are over masked or well to extremely well fractured, weakly to well weathered granite bedrock.

Soils: The dominant soil (70%--IECA-5), on most sideslopes, has a zero to 4-inch organic layer over a dark grayish brown to dark yellowish brown gravelly sandy loam, 40 to 60 inches deep, with 30 percent fine gravel and 30 percent rock. The lack of coarse fragments in the one-half to 3-inch size leads to many problems on this soil, especially an accelerated surface erosion hazard associated with concentrations of overland flow. A less extensive soil (30%--IECA-2) on upper slopes and spur ridges has a zero to 2-inch organic layer over a dark yellowish brown to light yellowish brown gravelly coarse sand, 20 to 40 inches thick with 50 to 60 percent moderately well graded coarse fragments. Surface erratics are common to the surfaces of both soils.

Vegetation: This is one of the better timbered units of the cryoplanated landtypes, with 40 to 80 percent forest crown densities. The subalpine fir/grouse whortleberry and subalpine fir/elk sedge habitat types are common over entire units. Some minor inclusions of a subalpine fir/dwarf blueberry are present on some sideslopes. Understories are generally very brushy with brush crown densities ranging from 60 to 80 percent.

Hydrology: This landtype receives between 35 and 45 inches of precipitation each year. Snow, which makes up the majority of the precipitation, melts at very slow to slow rates and remains into June. Approximately 20 to 30 inches of water is yielded annually from the slopes. Overland flow is rare. However, streamflow is generated from the natural interception of subsurface water by the first order channels. Water is

yielded by moderately deep subsurface flow and by deep percolation through bedrock. The subsurface flow is heavy during May and June but the deep percolation extends through much of the year. Many draws without developed surface channels flow concentrated subsurface flow. Accumulations of ground water occur within the lower portion of slopes and adjacent to drainageways. These landtypes which produce a considerable amount of water, are important flow regulators and release considerable excess water slowly to streams.

Management Qualities: These lands are relatively stable with the major limitations being a moderate to high inherent surface erosion hazard, a moderate natural slump hazard on steeper lower slopes, and a moderate to high mass stability hazard for road cuts and fills. Most of these problems relate to the poor gradation of coarse fragments in the dominant soil and the moderate to high probability of intercepting subsurface water.

Roads. Construction problems are dominantly associated with a poor gradation of coarse fragments in the dominant soil and the moderate to high probability of intercepting subsurface flow on steeper portions of mid and lower slopes. Mass stability hazards of road cuts and fills will be moderate to high and erosion hazard of cuts and fills will also be moderate to high. Trafficability is expected to be good. A moderate slump hazard does occur but may not be significant to most construction activities except on steeper lower slopes.

Wood. These are the most heavily timbered of the Cryoplanated landtypes, with 40 to 80 percent forest crown densities. Timber productivity is dominantly low with some areas rated moderate because moisture and temperature relationships are better suited to timber growth. Limitations to reforestation are severe because of climate and the vegetative competition associated with elk sedge and grouse whortleberry understories.

Water. Deep road cuts on the lower one-half of slopes will intercept significant subsurface flow. With narrow roads, however, most slopes will require only cuts of moderate depths. Concentration of this water and normal road surface drainage water to non-buffered locations can result in increased sedimentation and more rapid runoff to streams. The water handling characteristics of these lands pose no serious threat to activities or improvements.

Forage. Forage production on this landtype is dominantly rated low for livestock because of the heavy timber cover and the predominance of grouse whortleberry and elk sedge in the understory. The severity of climate and short growing season also reduce the

productive potential of these sites. Some minor areas where grazing does occur have accelerated surface erosion to a limited extent especially in the more open subalpine fir/elk sedge habitat types. Most areas throughout the District, however, have not been subjected to much domestic grazing.

Recreation. These landtypes occur at mid and high elevation and act often as a heavily timbered scenic backdrop when looking north to south across the District. Some opportunity exists for recreational developments within these units especially roads. Current levels of recreation activity on these lands are dominated by hunting during the big game season.

Management Evaluation:

Map Symbol 109c
Strongly Dissected Cryoplanated Mountain Slopes
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: Common to the headwaters of major drainages but most extensive on the Deadwood Ridge.

Landtype Characteristics: These lands like other cryoplanated lands are located near areas of glaciation but were not subjected to the scouring action of glacial ice. Climatic influences accompanying glaciation resulted in permanent ice and snow fields where any movement of material was essentially local. Through the processes of wetting and drying, nivation, freezing and thawing, and mass-wasting, materials were moved and accumulated on the slopes, forming the somewhat smooth and rounded appearance. Rejuvenation and subsequent fluvial processes have altered these lands and resulted in strongly dissected slopes. The dissections are dendritic and of moderate density but deep. The resulting slopes are convex, occur on dominantly south and west aspects, and have slope gradients that range from 20 to 60 percent. Forest crown densities are extremely variable and patchy, with 10 to 60 percent forest crown densities. The dominantly shallow and moderately deep skeletal, sandy and loamy soils occur over well to extremely well fractured or masked, moderate to well weathered granite bedrock.

Soils: The dominant soil (70%--IECA-2), on timbered slopes, has a zero to 2-inch organic layer over a dark yellowish brown to light yellowish brown gravelly loamy coarse sand to gravelly sand, 20 to 60 inches deep, with 40 percent coarse fragments dominated by fine and medium gravels. A less extensive soil (30%--JEAA-2), on steeper south slopes and ridges, has a zero to 1-inch organic layer over a dark grayish brown to brown gravelly sandy loam to gravelly loamy sand, 20 to 60 inches deep, with 40 to 50 percent coarse fragments dominated by fine and medium gravels. A shallow eroded phase of this same soil does occur as localized inclusions over the landtype.

Vegetation: These units have dominantly open or patchy stands of timber, with 10 to 60 percent forest crown densities. Subalpine fir/grouse whortleberry and subalpine fir/elk sedge habitat types are common over these units. Minor habitat types on some of the dryer or exposed areas include subalpine fir/pinegrass, subalpine fir/Idaho fescue and subalpine fir/whitebark pine at higher elevations. Brush crown density varies from 10 to 40 percent.

Hydrology: These slopes receive between 35 and 50 inches of precipitation annually. Snowpack, is heavy and melts at moderate rates in April, May, and June. Approximately 20 to 35 inches of water is yielded

annually by these slopes. Overland flow is uncommon. Natural interception of subsurface water by the numerous drainage channels converts a large volume of the water yielded to streamflow. The dendritic drainage pattern of the landtype tends to accumulate surface and subsurface flow and concentrate it at focal points at lower slopes. Deep seepage of water is significant but variable depending upon the degree of bedrock weathering. The moderate to rapid response of runoff of water delivered mades these landtypes moderately flashy.

Management Qualities: Most problems on this landtype are related to a high to very high hazard of disrupting natural runoff patterns by roads and an overall high erosion hazard. Surface creep has a moderate to very high rating on the steeper sandy slopes.

Roads. Major problems to construction will involve a high hazard on mid and lower slopes of intercepting large quantities of subsurface water and its subsequent impact on road cuts and fill slopes. Drainage in many areas will be difficult and the concentration of water on road surfaces and in inside ditches will produce considerable potential sediment. The sandy soils and poorly graded coarse fragments contribute to the significance of this problem. Some difficult stream crossing situations will be encountered. Although roads may be somewhat dusty, trafficability is expected to be good.

Wood. Overall timber productivity for this landtype is rated very low to low although some areas of moderate may be included. The severity of the climate and the generally low to moderate stand densities are not conducive to higher timber productivity potentials. Limitations to reforestation are dominantly severe to very severe with the dominant limitations being the severity of climate, heavy snowpack, low water-holding capacity of the soils, and vegetative competition in some habitat types.

Water. Control of road eroded particles will be difficult to prevent from entering dissections as sediment due to high drainage densities. Roads crossing major dissections on the lower slopes will be subjected to rapid discharge conditions during and immediately following high intensity rainfall and spring snowmelt. Road cuts over four feet deep on lower slopes will intercept significant quantities of subsurface water.

Forage. Forage production potential for domestic livestock within this landtype is rated very low to low because of the predominance of elk sedge and grouse whortleberry in the understory of the partially forested canopy. Climate and low water-holding capacities of the soils are limiting factors to vegetative growth. Many units have been grazed severely in the past accelerating surface erosion and significantly reducing productivity

potential in localized areas. Recovery rates are expected to be extremely slow. Grazing on steeper sideslopes significantly contributes to accelerated surface creep, resulting in a reduction in productivity potential.

Recreation. This landtype is currently involved in the recreation experience to a limited extent. Most units are used as access to some of the high elevation backcountry or wilderness experience areas. Access is variable and esthetic qualities of this landcype may be questionable in some areas. These units do, however, contribute to the scenic backdrop when observed from such vantage points as lookouts and ridges. Hunting is a major recreational pursuit on these units. Most of this activity, however, is restricted to the big game season during the late summer and early fall months.

Management Evaluation:

Map Symbol 109d-1
Cryoplanated Headlands
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: Mid to high elevations along the west side of Clear Creek.

Landtype Characteristics: This landtype comprises the headlands of minor drainages in the Cryoplanated Lands. The formative process on this landtype has been the effect of water concentrated on very steep slopes. The result is a broad, very steep, fan-shaped dissection at the head of some drainages. Water moving off the very steep slopes has been confined to stream flow because of weathered bedrock; little deep percolation occurred, and locally soft bedrock permitted stronger dissection than that on adjacent cryoplanated units. The processes above are in addition to the general geomorphology of cryoplanation. The slopes of this landtype are timbered and non-timbered, straight to concave, with 40 to 70 percent gradients and all aspects. The shallow and moderately deep skeletal, sandy and loamy soils are underlain by very weakly to moderately well weathered granitic rock that is moderately to well fractured or masked.

Soils: The dominant soil (65%--JEAA-2) on this landtype has a thin organic layer over a dark brown gravelly coarse loamy sandy, 20 to 60 inches deep with 60 percent coarse fragments. A minor soil (30%--JEAE-2), on higher ridges, is a brown gravelly loamy sand, less than 20 inches deep, with 70 to 80 percent coarse fragments. Rock outcrop is common to this soil.

Vegetation: The slopes of this landtype have scattered stands of timber and brush cover. Subalpine fir/elk sedge is the dominant habitat type. Forest crown density ranges from zero to 40 percent and brush crown density ranges from zero to 40 percent.

Hydrology: These headlands receive between 35 and 45 inches of precipitation of which most is in the form of snow. With a predominantly southern aspect, snowmelt occurs at moderate rates. An average of 15 to 25 inches of water is yielded annually. Overland flow occurs near ridges of rock outcrop and shallow soils. Percolation and downslope movement of subsurface water is rapid to very rapid. Subsurface water quickly finds its way to dissections, where it becomes streamflow. The total amount of water yielded by deep percolation into bedrock is probably low. The dissections within these lands rapidly collect both overland and subsurface flows and bring it together to concentrate at points of convergence, often on a lower bordering landtype. Response to high intensity summer storms is very rapid, especially while soils are wet from snowmelt. This landtype is one of the flashiest units on the District.

Management Qualities: The important features of this landtype for management are related to its watershed value, and esthetics. These are high hazard units because water movement becomes concentrated and disturbances to the landscape will cause disruption of a sensitive water handling system.

Roads. The units of this landtype are among the most hazardous for roads on the District. The dominant slope is steep and water movement is concentrated on or near the soil surface. Road cuts will be deep and interception of subsurface flow by such cuts will be the rule. The likelihood of losing both cuts and fills on these units, as well as the increased amount of sediment produced, combine to create many problems. Erosion hazards are also very high. Problems will be encountered shere roads cross drainages leaving these units. Culverts will be difficult to maintain.

Wood. Cryoplanated Headlands have very low to low productivity potentials. In addition, the high mass stability hazards present many limitations. Limitations to reforestation are severe to very severe and are related to climatic conditions, and low water-holding capacity of soils.

Water. The flashy debris-laden runoff in the many steep drainageways presents serious hazards to any structures crossing them. The hazard of serious acceleration of sedimentation is very high from any soil disturbance.

Forage. The potential production for this landtype is less than 100 to 400 pounds per acre per year of usable dry forage. Historic grazing use has reduced important vegetative cover and productive capacity. This has advanced the incident of surface creep, mass wasting, and sediment production.

Recreation. These lands are often an important part of the high value dispersed recreation areas associated with high elevations. They function as a scenic backdrop at the head of minor drainages and as vistas to the lower elevations. Many severe hazards exist to man-made facilities constructed on lower slopes or across the major drainages leaving these units. Flashy spring runoff is very common to these areas.

Management Evaluation:

Map Symbol 109n-1
Cryoplanated Basin Land
Moderately Deep and Deep Skeletal, Sandy and Loamy Soils

Location: This landtype is limited in extent but typical in Tranquil Basin and Mountain Meadow.

Landtype Characteristics: These are cryoplanated units that have been structurally altered to a basin-like topography by shifts in the earth's crust. These lands presently occupy a lower position in the landscape than they did prior to faulting. As a result of the change in base level, they have become somewhat dissected and have deep accumulations of alluvial and colluvial materials in the central portion of the basins. Such units are dominantly well timbered with forest crown densities ranging from 10 to 80 percent, with minor inclusions of open wet meadows. Slopes are dominantly convex and short with gradients ranging from 10 to 50 percent. The moderately deep and deep skeletal, sandy and loamy soils are over masked or well to extremely well fractured, weakly to moderately well weathered granite bedrock. A water table is close to the surface of the soil in the basin portions of this landtype.

Soils: The dominant soil (60%--JEAA-2), in the lower central portion of these basins, has a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly loamy sand, greater than 30 inches deep, with 40 percent coarse fragments dominated by fine gravels. A generally well timbered soil (40%--JEAA-5), on steeper sideslopes, has a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, greater than 30 inches deep, with 50 percent moderately well graded coarse fragments. Minor inclusions of wet deeper soils do occur in association with the wet meadows.

Vegetation: These units are dominantly well timbered with forest crown densities generally in excess of 40 percent. A subalpine fir/elk sedge habitat type is dominant with minor inclusions of other subalpine fir habitat types containing Engelmann spruce and other water loving forms of vegetation. Brush crown density ranges from zero to 10 percent.

Hydrology: Mean annual precipitation is 35 to 40 inches and mean water yield is 20 to 30 inches. Snowpack is heavy and releases 25 to 40 inches of water during snowmelt which begins in late April and continues into June. Peak snowmelt rates are in May and June. Runoff is very heavy during this period and is by moderately deep subsurface flow and deep percolation. Small drainage channels through this landtype naturally intercept much of this subsurface flow and carry it

away as stream flow. Peak runoff is normally in June but runoff extends well into summer as the soil slowly drains. Low lying areas are saturated through spring and summer months.

Management Qualities: The soils in this unit are relatively stable under natural undisturbed conditions. Major problems will involve a high probability of intercepting subsurface flow and ground water in the lower portions of individual units. Surface erosion problems are expected to be moderate and trafficability will be poor to fair on some soils.

Roads. Major problems to construction will be the poor trafficability associated with wet soils and the effect of this on the bearing capacity of road prisms. The probable interception of subsurface water will also contribute to the signficance of this problem. A moderate hazard to mass failures of cutslopes does exist associated with the wet soil but the magnitude of this hazard may not be limiting. Adequate road drainage and a poor gradation of coarse fragments will be of major concern on this landtype.

Wood. The timber productivity potential for this landtype is dominantly rated very low to low for the subalpine fir/elk sedge habitat type. Some localized areas, especially the denser stands, may rate somewhat higher. Major limitations to reforestation are rated severe because of the vegetative competition associated with elk sedge understories and the severity of climatic conditions.

Water. This is a high producer of well regulated, high quality water. Water handling characteristics have a moderate to high hazard for disruption by activities or improvements that cut deeply into the soil mantle or seriously alter or obstruct drainage channels. High spring runoff in drainage channels will damage improvements that do not make generous allowances for it. High water tables in drainage bottoms and depressions further restrict use and activity.

Forage. The best grazing potential within this landtype is restricted to the meadow-like inclusions. The dominant situation, however, under the timbered portions of these basins is a very low to low productivity potential. Current productions figures are somewhat less than potentials because of excessive use in localized areas. Good response, however, can be expected from rehabilitation practices.

Recreation. These units are esthetically pleasing to the backcountry experience. Most trails and gradients are easily suited to access by foot or horseback. Hunting and hiking are probably

the major activities engaged in on this landtype. Trafficability of trails in the wet areas is expected to be poor to fair, however, and some trampling by horse traffic and rutting by motorcycles can be expected.

Management Evaluation:

Map Symbol 110x
Scoured Cirque Basin Land
Shallow Skeletal, Sandy and Loamy Soils

Location: This landtype is common to the head of major drainages like Fir Creek and Porter Creek.

Landtype Characteristics: These lands consist of both shallow and deep glacial scoured amphitheater-like basins. They are formed at the heads and on upper side walls of most glaciated valleys on the District. These units often have steep rocky headwalls (Landtype 113) with much exposed bedrock and talus. Glacial scouring and ice plucking of headwalls were the major formative processes. Perched water tables over impermeable bedrock results in numerous alpine lakes. Forest crown cover is dominantly scattered or patchy with forest crown densities ranging from zero to 40 percent. Slopes are generally broken, short and have weakly developed dendritic drainage patterns. Slope gradients are variable and range from zero to 50 percent. The dominantly shallow skeletal, sandy and loamy soils occur over weakly to well fractured, unweathered to very weakly weathered granite bedrock. The percent rock outcrop ranges from 10 to 30 percent.

Soils: The dominant soil (60%--IFBD-5), over the entire unit, has a highly pavemented surface over a very dark grayish brown to dark brown gravelly sandy loam, less than 20 inches deep, with 40 percent well graded coarse fragments. This soil is somewhat deeper in localized depressions, but this is not extensive. A very minor soil (less than 15%--IFBA-4), associated with cirque lakes and benches, has a zero to 4-inch organic layer over a very dark grayish brown loam to very fine sandy clay loam, 20 to 60 inches deep, with no coarse fragments. This soil is generally very wet. Rock outcrop is scattered and associated with the shallow soil.

Vegetation: This landtype is sparsely vegetated with open stands of timber; forest crown densities ranging from zero to 40 percent. Subalpine fir/grouse whortleberry, subalpine fir/whitebark pine, subalpine fir/juncus parryi, and subalpine fir/elk sedge habitat types occur in varying positions. A subalpine fir/marshmarigold habitat type is common to the wet benches and adjacent to cirque lakes. Brush crown densities range from zero to 40 percent.

Hydrology: Mean annual precipitation is between 40 and 60 inches. Most of this amount is received as snow. Approximately 25 to 40 inches of water is yielded annually. Overland flow, which occurs during spring snowmelt and high intensity summer storms, takes place over rock outcrop and near cirque lakes. Most water yield is accumulated in alpine lakes

and basins usually associated with this landtype. These basins then feed streams and bedrock aquifers supplying springs. The long duration of snowmelt and very slow to slow release of water make these landtypes one of the best sustained water yield producers on the District.

Management Qualities: These lands are major regulators of streamflow and as such serve a very important function on the District. Climates are quite severe with cold harsh winters and cool summers. An avalanche hazard does exist in association with the adjacent 113 landtype. Most hazards are rated low to moderate.

Roads. Construction characteristics of these lands are generally favorable to road construction. Bedrock is competent and soils are shallow. Construction cost, however, will be very high. Many units, however, are small and surrounded by landtypes less suited to construction activity. Also a moderate to high hazard to mass failures of road fills can be expected with the deeper wet soil. Trafficability in this area will also be very poor to poor. Sediment production associated with construction activities will be of major concern in these quality water producing areas.

Wood. This is basically a non-commercial timber producing landtype with overall productivity potential rated very low. Subalpine fir/juncus parryi is dominant with isolated areas of subalpine fir/elk sedge in pockets on lower slopes. Except for isolated patches, most forest crown densities are less than 20 percent. Snow and wind deformation are common. Limitations to reforestation are very severe because of the harsh severe climate and localized high water tables.

Water. These units are probably the highest water producers on the District. Overland flow and sediment are seldom problems under natural conditions. Snowpack from snowfall and avalanches remains well into the summer and may require considerable expense for spring or early summer access. The basin configuration presents construction problems in the lowest portions of the landtype where perched water tables occur. Although these lands have only a moderate hazard of disruption of hydrology, maintenance of their favorable water handling characteristics is a primary management consideration.

Forage. Production potential for forage is rated low with current production levels of 100 to 600 pounds per acre per year of usable dry forage. These levels are very close to potentials and subject to little change if left alone. In general, these lands may be better suited to game use than livestock use. Livestock use may also contribute to sedimentation and pollution of the quality water generated on these lands.

Recreation. Cirque Basin Lands are an important part of the high value dispersed recreation areas associated with glaciated lands. Because they are easily traversed on foot or horseback, they are fundamental access routes to adjacent areas. Because of the quality fishing in many of these units, they also become destination points for many recreationists throughout the mid and late summer. Trails should be quite stable and require limited maintenance. Trafficability is good for the dominant soil but very poor to poor for the wet soil associated with lakes and wet benches. Because of their rocky, steep, very impressive nature, these units are often scenic attractions.

Management Evaluation:

Map Symbol 111a
Weakly Dissected Glacial Trough Land
Moderately Deep and Deep Skeletal, Sandy and Loamy Soils

Location: These are smooth side slopes of glacial troughs. Typical units are located in the headwaters of the North Fork of the Boise River.

Landtype Characteristics: These lands occupy the sideslopes of U-shaped troughs typical of alpine glaciated mountains. Slopes have been over-steepened and the V-shaped alluvial canyons have been altered to U-shaped valleys by the ice action of glaciers. Drainages are typically shallow and parallel as compared to the dendritic pattern of the fluvial lands. Slopes are well timbered, long, and have gradients of 50 to 70 percent. The deep skeletal, sandy and loamy soils have developed over moderately to extremely well fractured, very weakly to moderately well weathered granite bedrock.

Soils: The dominant soil (80%--IECA-5) has a zero to 2-inch organic layer over a dark grayish brown gravelly sandy loam, 20 to 60 inches deep, with 40 percent moderately well graded coarse fragments. A minor soil (20%--JEAE-5), on steeper slopes and near seeps, has a thin organic layer over a dark brown gravelly sandy loam, less than 20 inches deep, with 50 percent moderately well graded coarse fragments.

Vegetation: This landtype is dominated by subalpine fir/elk sedge, subalpine fir/tall huckleberry, and subalpine fir/grouse whortleberry habitat types which have crown densities of 10 to 40 percent. Timber production potential for these habitat types is low. Brush crown densities are less than 30 percent.

Hydrology: Annual precipitation received on these slopes ranges between 40 and 50 inches. Most all of this amount occurs as snowfall. Snowpack remains well into spring and early summer. Deep seepage and subsurface flow are the dominant means of water yield, which is approximately 20 to 35 inches annually. Subsurface water moves down the long straight slopes in a uniform manner with highest accumulation found at the base of the slopes where soils are deepest and slope gradient moderate. The dissections of the parallel drainage pattern will naturally intercept subsurface flow and deliver it in an evenly distributed manner to the lower bordering landtype (usually 104). The slow regulation of water characteristic of these lands is due primarily to the long period of snowmelt, excellent transmission of water through the soil horizon, and good bedrock penetration. Water is also delivered from these slopes in the form of snow from avalanches.

Management Qualities: These lands are potential problem areas because of moderate to high hazards and a high probability of intercepting subsurface flow. Avalanche hazard is high.

Roads: Interception of subsurface flow is a major problem, especially on mid and lower slopes. Handling this water will be difficult and the hazards to cut and fill slope stability are high. Debris slides and slump hazards can also be accentuated under these conditions.

Wood. These lands are generally well timbered with subalpine fir, lodgepole pine and some Douglas-fir. Productivity potentials are generally low to moderate and snow and avalanche damage are common. The climate is quite severe. The timber cover is very important to maintaining slope and snowpack stability.

Water: Snowpack remains well into the summer months and may require considerable expense for spring access. Deep road cuts on the lower one-half of the slopes will alter the normal movement of subsurface flow by intercepting and returning it to the surface. The snow avalanche hazard is high from these slopes and may present a threat to roads or other structures, both within and below the landtype.

Forage. Production on these units is rated low with current levels of 100 pounds per acre per year of usable dry forage. Low production combined with high inherent erosion hazard and high slope creep hazard makes these poorly suited to livestock grazing. Grazing will continue to accelerate erosional processes and contribute significantly to sediment production.

Recreation. These lands are an important part of the high value dispersed recreation areas associated with Glaciated Lands. They function as a scenic backdrop to the glaciated landscape. Trail construction problems are hazards from avalanches and debris slides. Considerable maintenance would be required to remove rock, debris, and sediment. Trafficability is fair to good.

Management Evaluation:

Map Symbol 111a-1
Weakly Dissected Glacial Trough Land
Shallow and Moderately Deep Skeletal Sandy and Loamy Soils

Location: Common to the south slopes of the glaciated valleys on the east portion of the District.

Landtype Characteristics: These lands occupy the sideslopes of U-shaped troughs, typical of alpine glaciated valleys. Slopes have been oversteepened and the V-shaped fluvial canyons have been altered to U-shaped valleys by the ice action of glaciers. Drainages are typically shallow and parallel as compared to the dendritic pattern of the Fluvial Lands. Slopes are smooth and weakly dissected. The slopes of this landtype are long, southerly, mostly non-timbered or scattered trees with slope gradients of 40 to 60 percent. The shallow and moderately deep skeletal, sandy and loamy soils have developed over moderately weathered granite that is weakly well fractured.

Soils: The dominant soil (75%--IFBA-5) on mid and lower slopes, has a thin organic layer over a very dark grayish brown gravelly sandy loam, 20 to 60 inches deep, with 40 percent coarse fragments dominated by fine gravels. A minor soil (20%--JEAE-2), on upper slopes and ridges, is a brown gravelly loamy sand, less than 20 inches deep, with 50 percent well graded coarse fragments.

Vegetation: The slopes of this landtype are not heavily vegetated. Timber production is rated as very low with the following habitat types represented: subalpine fir/whitebark pine, subalpine fir/grouse whortleberry, and brush/grass communities not identified as to habitat type. The Douglas-fir/chokecherry type is very limited in extent. Forest crown density is less than 5 percent and brush crown density ranges from 10 to 50 percent.

Hydrology: Average annual precipitation received on these landtypes, which is predominantly in the form of snow, ranges between 35 and 50 inches. Approximately 20 to 35 inches of this amount is yielded annually. Overland flow is rare on undisturbed slopes. However, on those slopes heavily impacted by stock animals, overland flow and accelerated erosion is present. Deep seepage and subsurface flow are the prime modes of water yield from the slopes. Subsurface flow moves uniformly downslope to accumulate in greatest quantity within the lower, deeper soils. Natural interception of subsurface water by the parallel dissections occurs and is evenly distributed on the lower bordering landtype (usually 104). The moderate to rapid response to water input is due primarily to the moderate snow melt period and rapid transmission of moisture through the soil horizon.

Management Qualities: The high to very high surface erosion and debris slide hazards are major problems on this landtype.

Roads. Construction materials in these lands are slightly weathered and moderately well graded. Mass stability hazards, however, tend to offset this benefit. Surface erosion hazard for natural slopes as well as cut and fill slopes is high. Mass stability hazards for cut and fill slopes are moderate to high. These factors combined with the possibility of intercepting large quantities of runoff makes water and sediment handling definite management problems. Trafficability is good to very good.

Wood. Timber productivity potential is very low. Slopes are dominated with brush/grass and elk sedge communities. There are small scattered pockets of subalpine fir/elk sedge in semi-protected areas on sideslopes, and subalpine fir/whitebark pine on the higher more exposed positions. Limitations to reforestation are severe and are related to climate and water holding capacity.

Water. These slopes are very sensitive to soil disturbance and reduction in vegetal cover by excess grazing or other means. Even a small increase in overland flow will greatly accelerate erosion and sedimentation. The steep drainageways flush out regularly and this presents a hazard to road and trail crossings. Deep road cuts into the toes of these slopes will intercept a moderate volume of subsurface flow during spring snowmelt.

Forage. The potential production for this landtype is 100 to 1000 pounds per acre per year of usable dry forage. Present reduced yield levels are associated with historic overgrazing. The least productive areas are related to eroded shallow, coarse textured soils with low water holding capacities. The best areas are associated with deeper soils and a somewhat more moist micro-climate and a higher water-holding capacity. Recovery rates from adverse use will be very slow.

Recreation. These lands are an important part of the high value dispersed recreation areas associated with glaciated lands. They function as a scenic backdrop at the upper ends of glacial troughs. Trail construction will have problems similar to roads. Seasonal maintenance will be required to remove rocks, debris, and sediment. Trafficability will be good to very good.

Management Evaluation:

Map Symbol 111b
Moderately Dissected Glacial Trough Land
Moderately Deep and Deep Skeletal, Sandy and Loamy Soils

Location: These are moderately dissected sideslopes of glacial troughs typical of glaciated valleys along Canyon Creek and the North Fork of the Boise River.

Landtype Characteristics: These landtypes are generally formed as a sidewall on the inside curve of glaciated valleys. These areas were somewhat less scoured, leaving a higher percentage of well weathered granite bedrock on upper slopes compared to the 111b-1 landtype. This softer bedrock, combined with the high rate of water discharge during spring snowmelt, has resulted in many deeper dissections than the 111a landtype. Drainages are typically parallel as compared to the dendritic patterns on the Fluvial Lands. Slopes are timbered, long, and have gradients from 50 to 80 percent. The moderately deep and deep skeletal, sandy and loamy soils occur over extremely well fractured, weakly to moderately well weathered.

Soils: The dominant soil (40%--IFBA-5), on north slopes, has a zero to two inch organic layer over a dark grayish brown gravelly sandy loam, 20 to 60 inches deep, with 45 percent coarse fragments. Two other soils (30%--IFBD-5), 25%--JEAA-5), are similar but differ in depth and percent coarse fragments. The shallow soil (IFBD-5) is confined to oversteepened slopes and contains 45 percent coarse fragments. The moderately deep soil (JEAA-5) is on westerly aspects and contains 70 percent coarse fragments.

Vegetation: The dominant habitat types on this landtype are subalpine fir/elk sedge, subalpine fir/pinegrass, subalpine fir/tall huckleberry, and Douglas-fir/elk sedge. The subalpine fir habitat types are found in all positions while the Douglas-fir types are very limited in extent. Forest crown densities range from zero to 70 percent while brush crown densities range from zero to 60 percent.

Hydrology: Mean annual precipitation is 35 to 45 inches and mean water yield is 15 to 30 inches. Snowpacks are heavy and persist well into June. Rapid snowmelt occurs in May and June and peak runoff occurs in June. Overland flow is rare. Major runoff is by moderately deep subsurface flow and deep percolation. Parallel first order streams intercept much of this subsurface flow and drain it rapidly from the slopes. Ground water drains more slowly and provides late season flow. These slopes are extremely wet into July.

Management Qualities: These lands are among the more hazardous on the District. Erosion and mass stability hazards are generally high to

very high. Avalanche hazard is high. Trafficability is good. Subsurface flows are very close to the surface on lower slopes.

Roads. Bedrock characteristics on lower and mid slopes are well suited as construction materials while upper slopes are moderately well weathered granite. The probability of intercepting subsurface flow with road cuts is very high on mid and lower slopes. Handling this water will be difficult, and the hazards to cut and fill slope stability are high. A moderate to high debris slide hazard can also be expected under these conditions.

Wood. These landtypes are well timbered with subalpine fir, Douglas-fir, and some lodgepole pine. Productive potentials are generally low to moderate and snow and avalanche damage is common. The climate is quite severe. Timber cover is very important in maintaining slope and snowpack stability.

Water. These lands yield large quantities of high quality, well regulated water. Cuts into the mantle and/or alteration or obstruction of drainageways will seriously degrade the quality and regulation of this water. Activities and improvements will be severely tested by the heavy spring runoff in drainageways and through saturated slopes. Cost of installing major improvements on these slopes, while adequately protecting their water handling characteristics, will be high.

Forage. Production on these units is rated low to moderate. Low production combined with high inherent erosion hazard and high surface creep hazard makes these units poorly suited to livestock grazing.

Recreation. These lands are an important part of the high value dispersed recreation areas associated with glaciated lands. They function as a scenic backdrop to the glaciated landscape. Trail construction problems are similar to roads. Considerable maintenance will be required to remove rock, debris, and sediment. Trafficability is fair to good.

Management Evaluation:

Map Symbol 111b-1
Moderately Dissected Glacial Trough Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: This landtype is common within the boundaries of the Sawtooth N.R.A. and is also found along Ten Mile Creek and Goat Creek.

Landtype Characteristics: This landtype is the open or sparsely timbered sideslope of U-shaped glacial troughs typical of the alpine glaciated landscape. The aspect is dominantly south to southwest and forest crown density ranges from 0 to 20 percent. Slopes are generally long with a well developed parallel drainage system. Slope gradients range from 50 to 70 percent with the steeper portions restricted to dissections and upper slopes. The shallow and moderately deep skeletal, sandy and loamy soils occur over moderately to extremely well fractured, very weakly to weakly weathered granite bedrock. Patches of rock outcrop are common to upper slopes and spur ridges.

Soils: The dominant soil (60%--JEAE-2), on steep upper slopes and in dissections, has a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, less than 20 inches deep, with 80 to 90 percent well graded coarse fragments. This soil is commonly associated with rock outcrop. A less extensive soil (35%--JEAA-2), on mid and upper slopes, has a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly loamy sand, 20 to 40 inches deep, with 60 to 70 percent well graded coarse fragments.

Vegetation: This landtype is dominated by brush/grass-elk sedge communities with scattered stands of subalpine fir/elk sedge and subalpine fir/stipa habitat types. Forest crown densities will range from zero to 20 percent, brush crown densities will range from 10 to 40 percent.

Hydrology: Mean annual precipitation is 35 to 45 inches and mean water yield is 20 to 30 inches. Snowpack is heavy and starts melting in late March and early April. Rapid snowmelt occurs in May and is generally over by early June. Overland flow occurs locally from rocky situations. Major runoff is by heavy subsurface flow at shallow to moderate depths. Deep percolation into bedrock is also significant. Parallel first order channels intercept much of the subsurface flow. Peak runoff is generally in May, one or two weeks before peak runoff from Landtype 111b.

Management Qualities: The moderate to high inherent erosion hazard of these lands is a definite problem. This hazard combined with a moderate to very high surface creep hazard and rapid runoff rates in the spring generate numerous debris slides, resulting in a moderate to high debris slide hazard. Avalanche hazard is also very high.

Roads. Construction materials in these lands are of good quality, well graded granite, especially on the upper slopes. Other hazards, however, tend to offset this benefit. The high inherent erosion hazard of cutslopes, debris slides, and the possibility of intercepting subsurface water at dissections makes water and sediment handling definite construction problems. The most stable position with the least expected impact from these hazards would be the upper one-third of slopes. Lower south slopes will prove extremely hazardous. Trafficability, however, is expected to be good to very good.

Wood. This is dominantly a non-commercial timber producing landtype with productivity rated as low and very low. Upper slopes are generally occupied by a subalpine fir/stipa habitat type and brush-grass-elk sedge communities. Subalpine fir/elk sedge is common as dense small stands on lower north slopes and drainages. Deep snow, avalanche and wind deformation are common. Limitations to reforestation are very severe with climate and the low water-holding capacity of the soils the limiting factors.

Water. The heavy spring runoff both through the soil mantle and in channels must be given major consideration in any management of this landtype. Cuts into the mantle and/or alteration or obstruction of the many water channels are the greatest hazard to the hydrology of this landtype. Avalanches may occur on these slopes in heavy snow years.

Forage. In general forage production on these units is low with some areas rated moderate on mid and lower slopes. Current production on many of these slopes is less than half of potential. This reduction can be related to the combined effects of excessive grazing and subsequent soil loss from the slopes. When these soils are disturbed by grazing or other activities, the fine soil materials erode sufficiently to severely damage the productive capacity of this landtype and yield high volumes of fine sediments. The resultant soils have been left with very rocky or gravelly pavemented surfaces which are basically unsuited to the re-establishment of certain vegetation. Recovery is expected to be slow even under good management practices.

Recreation. These lands are an important part of the high value dispersed recreation areas associated with glaciated lands. They function as a scenic backdrop at the upper ends of the glacial troughs. Trail construction would have problems similar to roads. Seasonal maintenance will be required to remove rocks, debris, and sediment. Trafficability will be very good.

Management Evaluation:

Map Symbol 111c
Strongly Dissected Glacial Trough Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: This landtype occupies the lower segments of glacial trough lands and is common to the upper Deadwood River and the North Fork of the Boise River.

Landtype Characteristics: This landtype is the strongly dissected sideslope of U-shaped glacial troughs occurring in the lower reaches of alpine glaciation. They differ from other trough lands in having long steep sideslopes entrenched by numerous deep parallel dissections. Aspects are dominantly south or west with forest crown densities highly variable, ranging from zero to 80 percent. Slope gradients range from 40 to 70 percent. The shallow and moderately deep skeletal, sandy and loamy soils occur over masked or slightly to extremely well fractured, moderately to well weathered granite bedrock. Rock outcrop is common on upper slopes and along dissections.

Soils: The dominant soil (55%--JEAE-5), on mid and upper slopes, has a trace of an organic layer over a dark brown to dark yellowish brown gravelly sandy loam, less than 20 inches deep, with 70 percent well graded coarse fragments. The rock outcrop is commonly associated with this soil. A somewhat less extensive soil (40%--IECA-5) on mid and lower slopes has a zero to 4-inch organic layer over a dark grayish brown to dark yellowish brown gravelly sandy loam to sandy clay loam, 20 to 60 inches deep, with 50 percent well graded coarse fragments.

Vegetation: This landtype has two contrasting vegetative situations; upper slopes are dominated by open grown stands of subalpine fir and/or brush-grass-elk sedge communities. Lower slopes are densely timbered with a subalpine fir/elk sedge habitat type with 50 to 80 percent forest crown density. Brush crown densities for the entire unit range from zero to 20 percent.

Hydrology: Mean annual precipitation is 30 to 50 inches and mean water yield is 20 to 35 inches. Snowpack is very heavy and avalanches are common. Snowmelt reaches a peak in May and extends into June. Overland flow occurs on the rockier portions from summer storms but is rare from snowmelt. The many parallel first order drainages intercept much of the heavy subsurface snowmelt runoff and drain it off as stream flow. Peak runoff is in May or June. Regulation of runoff is less than Landtypes 111a and 111b but better than 111x.

Management Qualities: These lands are relatively unstable as exhibited by their strongly dissected topography. The erosion and mass stability hazards are moderate to high with major problems associated with interception of subsurface water, basic inherent surface erosion, debris slides, surface creep, and mass stability of road fills on steeper sideslopes.

Roads. Major problems to construction involve handling water generated in road cuts by intercepted subsurface flow and water and debris encountered in dissections. Construction activities and subsequent erosion of cut and fill slopes and the road prisms will contribute significantly to sedimentation of adjacent streams. The high frequency of debris slides will also necessitate additional maintenance of culvert installations or installation of oversized structures to permit passage of debris. Revegetation of cut and fill slopes will be generally difficult. Trafficability will be good to very good.

Wood. The timber productivity of this landtype is dominantly low with areas of Douglas-fir/pinegrass and subalpine fir/pinegrass rated moderate on lower slopes. Limitations to reforestation will be severe to very severe with low water holding capacity the limiting factor on upper slopes and vegetative competition most limiting on lower slopes.

Water. The heavy and rapid snowmelt runoff from these steep slopes is the factor most limiting to management. Cuts, fills and drainageway alteration are the greatest hazards to the water handling characteristics of this landtype. It will be extremely difficult and costly to build improvements on this landtype that do not seriously alter the hydrology and are not subject to serious damage from runoff and avalanches.

Forage. This landtype is rated very low for forage production on the upper slopes with shallow soils and low to moderate on mid and lower slopes with deeper soils. Grazing impact has been somewhat severe in localized areas especially along the North Fork of the Boise River. Sediment production and surface creep have been significantly accelerated. The resultant soils have highly pavemented surfaces especially on mid and upper slopes and soils have eroded sufficiently to severely damage productive capacity. Recovery is expected to be very slow even under good management practices.

Recreation. These lands are an important part of the high value dispersed recreation areas associated with glaciated lands. They function as an introductory portion of the scenic backdrop at the lower ends of glacial troughs. Trails will have similar problems to roads and considerable seasonal maintenance will be required at drainage crossings. Trafficability will generally be good to very good.

Management Evaluation:

Map Symbol 111d-3
Steep Benchy Glacial Headland
Shallow and Moderately Deep Skeletal, Sandy and Loam Soils

Location: These units are common to the headland areas of many major and minor drainages on the District. Many units in the headwaters of Canyon Creek and Ten Mile Creek are typical of this landtype.

Landtype Characteristics: These units are steep, benchy, rocky ice plucked cirque headlands at the head of many minor drainages in the glacial trough lands. These lands give the impression of weakly developed cirques but fail to exhibit the typical cirque basin characteristics. Numerous drainages dissect the benchy slopes in a well developed dendritic pattern. Forest crown cover is variable and patchy with forest crown densities ranging from zero to 50 percent. Slope gradients are broken and benchy, ranging from 30 to 80 percent, with the steeper portions restricted to the upper weak headwalls of individual units. The shallow and moderately deep skeletal, sandy and loamy soils have developed over well to extremely well fractured, very weakly to moderately well weathered granite bedrock. Rock outcrop is common to the fringes and as rocky talus areas throughout individual units.

Soils: The dominant soils (40%--JEAA-5, 40%--JEAE-5) have a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam. The shallow soil (JEAE-5) contains 70 to 80 percent well graded coarse fragments. The moderately deep soil, on benchy areas and slopes less than 60 percent, contains 40 percent well graded coarse fragments. Rock outcrop is commonly associated with the shallow soil (JEAE-5).

Vegetation: This landtype contains patchy dense stands of subalpine fir/woodrush and subalpine fir/elk sedge habitat types on benches and on slopes less than 60 percent. Steeper slopes have more open stands of subalpine fir/whitebark pine and subalpine fir/juncus parryi. Forest crown densities range from zero to 50 percent and brush crown densities range from zero to 5 percent.

Hydrology: Mean annual precipitation is 40 to 55 inches and mean water yield is 25 to 40 inches. Snowpack is extremely heavy and persists into July. Snowmelt starts later and ends later on 111d-3 landtypes than on all but cirque basin lands. Peak runoff is in June but heavy runoff extends through July. Springs draining ground water from fractured bedrock flow well all year. The major spring runoff moves by subsurface flow to the first order streams where most of it is intercepted and drained away as stream flow. Overall outflow rate is moderate. Lower slopes are saturated into July.

Management Qualities: This landtype has moderate to high hazards with major limitations associated with a high inherent surface erosion hazard on natural and disturbed surfaces, and a high mass stability hazard associated with road cutslopes and fillslopes. Heavy snowpacks and other climatic factors associated with high elevations are the major limitations to activities within this unit.

Roads. Major problems to construction within this landtype involve a moderate to high surface erosion hazard of exposed surfaces and a low to high hazard for mass failures of cutslopes and fillslopes. Cutslope failures will not be the typical bow-shaped slumps but will be dominated by extensive areas of rock fall. A moderate surface creep hazard and a moderate debris slide hazard will create hazards from accumulations of sediment and other materials in drainages resulting in seasonal maintenance at culvert installations.

Wood. The productivity potential for this landtype is rated very low. The scattered stands of subalpine fir habitat types exhibit very slow growth and considerable deformation as a result of the climate. Limitations to reforestation are rated very severe because of climate and the low water-holding capacity of the very stony soils.

Water. These are some of the highest water yielding lands on the Forest. The dominant factors influencing management on these lands are the rapid, heavy runoff and the short snow-free season. Cuts into the mantle will intercept and concentrate some runoff and cause new channels to be formed. Fills and obstructions to drainageways will cause short term channel erosion and sedimentation. Structures and facilities on these areas will be severely tested by snowpacks and debris generated in runoff.

Forage. Potential forage production is rated very low with current levels near this potential. The plant communities and soils on these units at such elevations are very fragile and do not respond favorably to disturbance. The rate of recovery on disturbed areas is expected to be very slow.

Recreation. These steep benchy glacial headlands are a significant feature of the high value dispersed recreation areas associated with glaciated landtypes. Because of their steep rocky and impressive character, they are excellent compliments to the surrounding scenic attractions. Trails will be relatively stable on upper slopes, requiring only seasonal maintenance. Traffic-ability will be very good.

Management Evaluation:

Map Symbol 111x
Scoured Glacial Trough Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: This landtype is common to many of the glaciated valleys in the Sawtooth National Recreation Area and other strongly glaciated portions of the District.

Landtype Characteristics: These units are the steep rocky sidewalls of glaciated valleys. They have been ice plucked and scoured and lie adjacent to and below the larger scoured cirque basin lands. These units occur on all aspects with patchy forest crown densities ranging from zero to 30 percent. Slopes are long and steep with gradients ranging from 60 to 90 percent. Dissections are numerous, parallel and shallow. The dominantly shallow skeletal, sandy and loamy soils have developed over well to extremely well fractured, weakly to moderately weathered granite bedrock. Rock outcrop ranges from 30 to 70 percent of individual units.

Soils: The dominant soil (30% to 70%--JEAE-2) is restricted to mid and lower slopes, and is a dark brown gravelly loamy sand, less than 20 inches deep, with 80 percent well graded coarse fragments. Rock outcrop is the other major component of this landtype.

Vegetation: This is dominantly a sparsely timbered landtype with subalpine fir/whitebark pine the dominant habitat type. Forest crown densities are generally less than 10 percent with isolated patches approaching 30 percent. Brush crown densities are less than 10 percent.

Hydrology: The mean annual precipitation is 35 to 55 inches and mean water yield is 25 to 45 inches. Snowpacks are heavy and avalanching is severe. Northerly aspects retain deposits of snow until July but southerly aspects become bare in May. Much of the snow moves to valleys by avalanching. Surface runoff is dominant due to the rockiness, steepness and frequency of dissections. Summer storms create flashy runoff in small first and second order streams. Only small amounts of water are detained for later runoff.

Management Qualities: This landtype is one of the most impressive units of the glaciated landtypes. Hazard ratings are dominantly moderate to very high.

Roads. Most construction hazards within this landtype are rated high to very high. Sediment generated on natural slopes, on exposed surfaces resulting from construction, and from debris slides will be a continual problem requiring considerable maintenance. Rock fall from cutslopes will continue to close roads. Full benching will be the rule with extremely high construction costs. Trafficability will be very good.

Wood. This is not a timbered landtype. Individual units are dominated by very open stands of subalpine fir/whitebark pine with overall crown densities dominantly less than 10 percent. Lower slopes and protected cold pockets support isolated dense stands of subalpine fir/elk sedge. Productivity potential in all cases will be very low. Wind, snow, and avalanche deformation are very common.

Water. This landtype has severe hazards to management activities and improvements. The heavy and sometimes flashy runoff together with avalanching will damage most facilities or structures. The hazard of disruption of hydrology is low to moderate due to the extreme rockiness. Even minor soil disturbance causes much soil and rock material to enter steep drainageways to be flushed to lower streams.

Forage. Potential forage production is rated very low with current levels near this potential. Surface creep is a major problem and aggravated by grazing activity. Much of this poised material has a very high potential of reaching lower adjacent streams as sediment. The plant communities and soils on these units are very fragile when subjected to grazing disturbance. Rates of recovery following disturbance are expected to be very slow.

Recreation. Scoured glacial trough lands are a significant feature of the high value dispersed recreation areas associated with glaciated landtypes. Because of their steep, rocky, very impressive character, they are excellent compliments to the surrounding scenic attractions. Trails will be most stable on upper slopes and will require seasonal maintenance. Trails on lower slopes will be difficult to stabilize and maintain, especially at drainage crossings. Trafficability will be very good.

Management Evaluation:

Map Symbol 112-1
River Spur Land
Moderately Deep Fine Loamy and Sandy Skeletal Soils

Location: These units are restricted to the island-like areas along the South Fork of the Payette River.

Landtype Characteristics: These lands are the isolated ridge remnants adjacent to major streams. They have separated from the main mountain slopes by faulting and the subsequent forces of the river cutting down through fractures in the rock or other areas of less resistance. As a result, these lands appear as small islands separated from the main slopes by a drainage or old river channel. These units possess all aspects with forest crown densities ranging from 10 to 70 percent. Slopes are convexed, have gradients of 20 to 40 percent and usually are less than 600 feet long. The moderately deep and deep coarse loamy and sandy skeletal soils occur over extremely well fractured, weakly to moderately weathered granite bedrock. Remnants of river terraces and other stream deposited material are quite common.

Soils: Two soils dominant this landtype. The north slope soil (50%--IECA-3) has a zero to 2-inch organic layer over a dark yellowish brown to yellowish brown sandy loam to gravelly sandy clay loam, 40 to 60 inches deep, with 15% coarse fragments. The south slope soil (50%--JLAA-2) has a zero to 1-inch organic layer over a very dark grayish brown to yellowish brown gravelly loamy sand, 20 to 60 inches deep, with 50 to 60 percent coarse fragments dominated by rock greater than three inches in diameter. Deeper soil remnants associated with river terraces are common inclusions.

Vegetation: This landtype is dominantly well vegetated with Douglas-fir/pinegrass, Douglas-fir/Idaho fescue, and Douglas-fir/tall huckleberry on south slopes and Douglas-fir/mountain snowberry on north slopes. Forest crown densities are 10 to 30 percent for the south slope habitat types and 50 to 70 percent for the north slope habitat type. Brush crown density ranges from zero to 30 percent.

Hydrology: Mean annual precipitation is 25 to 30 inches and mean water yield is 5 to 10 inches. Snowpack on south aspects is light and short-lived. On north slopes, snowpacks are moderate and persist into May. Runoff from south slopes is intermittent through the winter and spring but runoff from the north slopes is dominantly in April and May. Runoff is by moderately deep subsurface flow and deep percolation. Streams and springs are rare.

Management Qualities: These lands are relatively stable under natural undisturbed conditions. Most hazards are rated very low to moderate. Major problems will be related to sediment production because of the proximity of these units to major live streams.

Roads. Major hazards to construction activity will be related to how the activity contributes to sediment production and subsequent pollution of adjacent streams. Most construction hazards will be low although suitable coarse fragments will be lacking in association with the north slope soils. Trafficability will be fair to very good. Stream encroachment of natural slopes and constructed facilities can be expected.

Wood. This landtype has a low to moderate timber productivity potential on south slopes and a moderate to high potential on north slopes. Ponderosa pine appears to be the most productive seral species in these dominantly Douglas-fir habitat types. Limitations to reforestation are moderate on north slopes and moderate to severe on south slopes. The major limiting factors are vegetative competition in all habitat types and the low water holding capacity of south slope soils.

Water. The steeper slopes immediately above streams have a high hazard for sedimentation from soil disturbance. The other areas have a moderate hazard for disruption of hydrology and this is related to interception of moderate amounts of subsurface flow. The hydrology poses low hazards to improvements.

Forage. Forage production is rated low to moderate for both domestic livestock and wildlife. These units, however, because of their proximity to the major drainage and a travel influence area, have been grazed little except by wildlife. However, concentrations of domestic grazing on these units is expected to contribute excessive amounts of sediment to the adjacent live streams.

Recreation. Except for depositional landtypes, these units are among the more highly sought after for recreational development. Their proximity to live streams and moderate relief make them ideally suited for summer home, administrative site, and campground development. The contrasting soils on this landtype have variable permeabilities, neither being well suited for sanitary landfills or leach fields. Trafficability of surfaces will be fair to very good.

Management Evaluation:

Map Symbol 113
Rocky Ridge Land
Shallow Skeletal Sandy and Loamy Soils

Location: These are the highest rocky ridges of the Glaciated Lands. A typical location is Goat Mountain near the head of Bear River.

Landtype Characteristics: These lands have been formed by the scouring action of glaciers and consist of the highest ridges, upper slopes, and extremely rocky spur ridges in the glaciated lands. These units are above 7,500 feet and are found on all aspects. Slopes are sparsely timbered to non-timbered, and have gradients of 70 to 90 percent. The shallow skeletal, sandy and loamy soils have developed over slightly to moderately fractured, unweathered to moderately weathered granite bedrock. Rock outcrop is greater than 50 percent.

Soils: The dominant soil (40%--JEAE-2) is shallow and has no organic layer. This soil is most common to lower slopes and is a brown gravelly loamy sand with 60 percent coarse fragments.

Vegetation: This landtype is dominated by brush/grass communities with some small areas of subalpine fir/elk sedge and subalpine fir/white bark pine. Forest crown densities are less than 10 percent while brush crown densities range from zero to 10 percent.

Hydrology: These landtypes receive between 45 to 65 inches of precipitation annually. Most of this amount is deposited as snow. Water yielded from the units averages 35 to 50 inches per year. Transpirational utilization of water is very low. As a result, losses from the landtypeis mostly by sublimation and evaporation. Considerable water leaves these ridgelands by blow-off of loose snow to lower more protected slopes and by snow avalanching. Major water yield is by surface runoff, but some subsurface flow and percolation through bedrock occurs. The slow period of snowmelt is the primary reason for the extended runoff into August. The response to high intensity summer storms is rapid.

Management Qualities: These lands are relatively stable. They are mostly rock and, because of their position, water related hazards are a hazard on lower slopes only.

> Roads. There are no units above Rocky Ridge Lands to accumulate water. Bedrock is competent. Construction through this landtype will be very difficult and expensive. Rock-fall from cut slopes will be a continual problem.

Wood. About 90% of this landtype is non-forested. The remaining 10 percent has a very low timber production potential. Due to severe climatic conditions and low water-holding capacity, reforestation site limitations are very severe.

Water. On north facing slopes the snowpack remains well into the summer months and will hinder access. The high snow avalanche hazard for these landtypes present threats to any winter and spring activities. Water production is an extremely significant function of these lands.

Forage. Due to the small percentage of soil on the landtype, the severe climatic conditions, and the low water-holding capacity of the soils, this unit has very low range productivity potential and is not well suited to grazing. Also, revegetation of grazed areas will be difficult.

Recreation. These lands are a part of the high value dispersed recreation areas associated with Glaciated Lands. There are excellent vantage points for scenic vistas. There are also opportunities for hunting and naturalist activities; i.e., hiking, bird watching, nature photography, etc. Trails will be difficult to construct.

Management Evaluation:

Map Symbol 114
Subalpine Rim Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy Soils

Location: These units are very limited in extent confined to some of the highest ridges in the glaciated landtypes. Typical locations are found along the District boundary above Grandjean and along the headwaters of Canyon Creek.

Landtype Characteristics: These lands are the smooth mountain shoulders or ridges that have not been strongly glaciated or dissected to any extent by fluvial action. These units lie adjacent to strongly glaciated landtypes and have been strongly influenced by localized scouring and strong cryoplanation. Aspects are dominantly south and west with scattered trees, mostly subalpine fir. Slopes are of short to moderate length, smooth and convex. Gradients range from 20 to 60 percent. The shallow and moderately deep skeletal, sandy and loamy soils have developed over well to extremely well fractured, very weakly to weakly weathered granite bedrock. Rock outcrop is restricted to ridges and is of limited extent.

Soils: The dominant soil (75%--JEAA-5), on upper slopes and benches, has a thin organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, 20 to 40 inches thick, with 50 percent well graded coarse fragments. A less extensive shallow soil (20%--JEAE-5), on steeper more eroded slopes and adjacent to rock outcrop, has a highly pavemented surface over a dark brown to dark yellowish brown gravelly sandy loam with 70 percent coarse fragments.

Vegetation: Subalpine fir/whitebark pine is the dominant habitat type identified on these lands. Forest crown densities are generally less than 10 percent and brush crown densities range from zero to 5 percent.

Hydrology: Mean annual precipitation is 40 to 50 inches and mean water yield is 25 to 35 inches. Snowpacks are variable and much snow is lost from these exposed areas by wind scour. The snow cover on a large portion of these areas is gone by June due to their exposure to sun and wind. Peak runoff is in May and mostly as rapid subsurface flow through the stony soil mantle. Appreciable ground water flow also occurs through the fractured bedrock. Overland flow from summer storms may occur on the rockier areas and natural channels have developed to handle runoff at these points. Outflow of water delivered to this landtype is rapid.

Management Qualities: These lands are relatively stable as illustrated by their smooth topography. Soil disturbance will cause a moderate to high surface erosion hazard and accelerate surface creep.

Roads. These lands are generally quite stable to road construction although often inaccessible because they are surrounded by much less stable landtypes. The only significant limitation is a moderate erosion hazard for road surfaces and fill slopes. Trafficability will be good.

Wood. This landtype is dominated by open grown stands of subalpine fir/whitebark pine with very low productivity potential. Limitations to reforestation are very severe because of climate and low water-holding capacity.

Water. Water handling characteristics provide moderate hazards to management activity. The hazards are related to the flashy runoff from summer storms. Management activities can affect the water handling characteristics by diverting surface and subsurface runoff from natural patterns and by causing redistribution of snowpack. The consequences of these alterations will not be as great on this landtype as on adjacent lower landtypes and channels.

Forage. This landtype is rated as having a very low to low productivity potential for forage plants suited to domestic livestock and wildlife grazing. These units may provide an important part of the mountain goat early winter range as well as spring and summer range for goat and bighorn sheep populations. The dominant forage plants may be best suited to these forms of wildlife. Because the soils are very rocky and surfaces are well pavemented, recovery from excessive grazing is expected to be very slow.

Recreation. Although limited in extent, Subalpine Rim Land is a significant feature of the high value dispersed recreation areas associated with glaciated landtypes. Because of their rounded topography and extreme high elevation, these units are excellent compliments to the surrounding scenic attractions. Their vantage point offers many scenic vistas and the ridge location often provides good access to other scenic areas. Trails will be very stable and have good trafficability.

Management Evaluation:

Map Symbol 120a-8
Weakly Dissected Mountain Slope Land
Moderately Deep Skeletal, Sandy and Loamy Xeric Soils

Location: These units are restricted to southerly aspects along the South Fork of the Payette River.

Landtype Characteristics: This landtype has been formed dominantly by fluvial action and subsequently modified by faulting associated with mountain building processes. The subsequent slopes have been slightly rejuvenated and the underlying bedrock has been tipped, with the dominant jointing plane parallel to the slopes. Forest crown cover is limited to drainages and lower slopes. Because of the slight rejuvenation, a weak dendritic drainage pattern is being superimposed over a weakly developed parallel drainage system. Slope gradients range from 40 to 60 percent with the steeper portions confined to mid slopes and dissections. The aspect is dominantly south. Moderately deep skeletal, sandy and loamy xeric soils have developed over masked or extremely well fractured, moderately to well weathered granite bedrock.

Soils: The dominant soil (60%--GDFQ-5), on open, dry mid and lower south slopes, is a dark brown to dark yellowish brown gravelly sandy loam, less than 20 inches deep, with 40 to 50 percent coarse fragments dominated by fine and medium gravels. The other major soil (40%--IFDA-5) on upper slopes and under timber, has a 0 to 2-inch organic layer over a very dark gray to brown gravelly sandy loam, 20 to 60 inches deep, with 40 percent coarse fragments dominated by fine gravel.

Vegetation: These units are south slopes dominated by brush, grass and elk sedge commmunities. Patches of timber dominated by a Douglas-fir/elk sedge habitat type are common. Forest crown densities within this habitat type will range from 20 to 60 percent. Brush crown densities will range from 10 to 30 percent for the entire landtype.

Hydrology: Mean annual precipitation is 25 to 30 inches and mean water yield is less than 10 inches. Snowpack is light and intermittent. Short periods of snowmelt occur throughout the winter and snow is gone in May. Runoff peaks can happen from December through April depending upon the occurrence of warm rainstorms. Runoff from warm rain on snow produces heavy subsurface flow for short periods. In some cases, stream channels cross this unit from rocky landtypes above and carry flashy runoff through the landtype. Outflow of water delivered to these slopes is moderate to rapid.

Management Qualities: This landtype is dominantly south-facing with a moderate inherent surface erosion hazard. Debris slide hazard is rated low to moderate. There are indications on aerial photographs that these units have some basic instability associated with the

underlying bedrock. This instability is not fully understood and may or may not be of significance to management. For this reason, a detailed investigation should be made for proposed individual projects. The problem is thought to be associated with the tilted underlying bedrock. This hazard is reflected in the tables with a slump hazard rating of high. This problem has not currently manifested itself in conjunction with construction activities but still needs further investigation.

Roads. Construction problems will mainly be associated with the instability of the underlying bedrock. This problem may manifest itself only where wide roads will expose 10 to 20 feet of the underlying bedrock. Surface erosion of the road prism will be high and trafficability will be moderate to high. Revegetation potential of cut and fill slopes will be fair to good.

Wood. This landtype is dominantly non-timbered, hot and dry. Inclusions of a Douglas-fir/elk sedge habitat type have a low to moderate timber productivity potential. Limitations to reforestation will be severe because of vegetative competition and the low water holding capacity of the soils.

Water. Flashy runoff in channels through this landtype from higher areas presents a hazard to improvements, especially roads. Subsurface flow is very subject to interception during heavy warm rain-on-snow runoff events which occur once in about five to 10 years. Therefore, hazards for serious alteration of water handling characteristics are high from deep road cuts and fills, but moderate for low cuts and fills.

Forage. This landtype is moderately suited for range use. Productivity potentials are rated low to moderate and current levels are very near this. Very few of these units have been grazed in recent years and little deterioration is evident. The dominant soil has a highly pavemented surface that may respond very slowly to treatments designed to rehabilitate disturbed areas.

Recreation. This landtype falls within the travel influence areas along the South Fork of the Payette River and acts as a backdrop to this travel route. Massive bedrock failures may be encountered where high standard roads expose 10 to 20 feet of the underlying bedrock adjacent landtypes. These failures may severely detract from the esthetic quality of the surrounding canyon.

Management Evaluation:

Map Symbol 120b-3
Moderately Dissected Mountain Slope Land
Shallow and Moderately Deep Skeletal, Sandy and Loamy, Xeric Soils

Location: This unit is typical of the dry south slopes along Clear Creek and Archie Creek.

Landtype Characteristics: These moderately dissected xeric south slopes have been weakly to moderately incised by running water. Dissections are weakly dendritic and widely spaced. These units are dominantly non-timbered with isolated stands of timber having less than 20 percent forest crown density. Slopes are generally long and steep with gradients ranging from 40 to 70 percent. The shallow and moderately deep skeletal, sandy and loamy, xeric soils have developed over masked or extremely well fractured, weakly to well weathered granite bedrock.

Soils: The dominant soil (45%--GDFQ-5), on south slopes and ridges, has 5 to 15 percent pavement over a dark brown to dark yellowish brown gravelly sandy loam over a gravelly sandy clay loam, less than 20 inches deep, with 60 percent well graded coarse fragments. Another major soil (30%--GDFS-5), on north slopes, toe slopes and along dissections, has a trace of an organic layer over a very dark grayish brown to brown gravelly sandy loam over a gravelly sandy clay loam, 20 to 60 inches deep, with 40 percent fine gravel. A minor soil (20%--GDFA-3), on south slopes, is a very dark grayish brown to dark yellowish brown gravelly sandy loam over a gravelly sandy clay loam, 20 to 40 inches deep, with 15 percent fine gravel. Rock outcrop is scattered but confined mostly to ridges.

Vegetation: These units are south slopes dominated by brush-grass communities. Douglas-fir/wheatgrass, subalpine fir/elk sedge and Douglas-fir/chokecherry habitat types are common inclusions on ridges, in dissections, and on lower slopes. Forest crown densities are dominantly less than 10 percent while brush crown densities range from 0 to 80 percent.

Hydrology: Mean annual precipitation is 20 to 35 inches and mean water yield is less than 10 inches. Snowpack is light and intermittent. Slopes are normally bare by mid-April. Runoff is predominantly as subsurface flow and occurs periodically throughout the winter. Rain-on-snow events produce the heaviest short-term runoff from these slopes. Water channels flow only during wet conditions. Water delivered to these slopes flows off at a moderate to rapid rate. Overland flow is uncommon on undisturbed areas but common from summer or spring thunder showers on grazed areas. Debris-laden peak flows occasionally originate on these slopes from thunderstorm and rain-on-snow events.

Management Qualities: These moderately dissected south-facing slopes are dominated by moderate to high hazards. Surface erosion, debris

slides and natural slumps will be common problems. Roads will require considerable maintenance to maintain passability and trafficability. Natural sedimentation and sedimentation related to construction will be major problems.

Roads. Major construction problems are related to sediment production associated with water generated during storms and intercepted subsurface flow. Dissections will present the major problem with moderate to high mass stability hazard for cutslopes. The dominant soils and bedrock contain a poor gradation of coarse fragments dominated by fine gravels.

Wood. This landtype occurs on warm, dry exposed slopes and is dominantly non-forested. Isolated stands of Douglas-fir/wheatgrass, Douglas-fir/chokecherry and subalpine fir/elk sedge habitat types have very low to moderate productivity potentials. Limitations to reforestation on these isolated areas will be severe to very severe because of high evapotranspiration losses and the low water holding capacity of the dominant soils.

Water. Drainageways on lower slopes present hazards from flashy debris-laden runoff during thunderstorms and rain-on-snow events. Cut and fill slopes at mid and lower slope positions and heavy grazing on all slopes will increase the frequency and severity of debris-laden runoff events.

Forage. This landtype is dominated by brush-grass communities with forage productivity potentials ranging from 400 to 1500 pounds of usable dry forage per acre per year. Present production is rated at two-thirds of potential. Major problems resulting from grazing are the aggravation of the moderate to high surface erosion hazards, debris slide hazards, and surface creep. For these reasons, these units may be suited to only limited grazing. Increased sedimentation can be expected from any activity that disturbs the soil surfaces.

Recreation. This landtype currently has little recreation appeal. Esthetics are questionable and water is limiting. Hunting is probably the major recreation potential associated with these units at the present time. It should be noted, however, that any disturbance on these units, because of their open, exposed southerly aspects, will be visible from many miles.

Management Evaluation:

Map Symbol 120b-4
Moderately Dissected Mountain Slope Land
Moderately Deep and Deep Coarse Loamy and Loamy Skeletal Soils

Location: This unit is common in the Clear Creek drainage.

Landtype Characteristics: The slope forming process on Moderately Dissected Mountain Slope Land is the action of running water. Slopes have been moderately incised by stream cutting and intermittent concentrations of overland flow. The slopes of this landtype are north facing, and heavily timbered with forest crown densities of 30 to 80 percent. Slopes are dominantly long, with gradients ranging from 40 to 70 percent. The moderately deep and deep coarse loamy and loamy skeletal soils have developed over moderately to extremely well fractured or masked, moderately to well weathered granite bedrock.

Soils: The dominant soil (80%--IFBA-5), on mid and lower slopes at higher elevations, has a 0 to 3-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly sandy clay loam, 20 to 60 inches deep, with 50 percent coarse fragments dominated by fine gravels. A minor soil (20%--IFBA-3), is restricted to upper slopes and most common at lower elevations. This soil is similar to the dominant one but contains less than 35 percent coarse fragments dominated by fine gravels.

Vegetation: The slopes of this landtype are heavily timbered, with the following habitat types dominant: Douglas-fir/ninebark, subalpine fir and tall huckleberry, Douglas-fir/mountain snowberry and Douglas-fir/chokecherry. Forest crown density ranges from 30 to 80 percent and brush crown density is similar.

Hydrology: Mean annual precipitation is 20 to 40 inches and mean water yield is 5 to 15 inches. Snowpacks are moderate and persist well into May. Major runoff is from snowmelt and occurs in a few weeks in April and May. Overland flow is extremely rare and runoff is about evenly divided between moderately deep subsurface flow above bedrock, and percolation through bedrock. Outflow rate of water delivered to the landtype is moderate to slow. Lower slopes and concave, incipient draws have greater quantities of subsurface flow than upper slopes and convex ridges.

Management Qualities: These Moderately Dissected Mountain Slope Lands are north facing and well vegetated. The moist micro-climate contributes to the high productivity of this landtype.

Roads. This landtype will not be as hazardous as many other lands for road locations. However, specific hazards do exist that must be considered. Where bedrock is well fractured, deep percolation of water will be the rule. The likelihood of cut slopes intercepting

subsurface flow is reduced, except on the steepest slopes. At the base of major draws where fracturing is masked and the bedrock is well weathered, deep percolation of water will be restricted and the degree of cut and fill failures will be increased. Well weathered bedrock is also a poorly graded source of fill material. The degree of hazard associated with a moist micro-climate and bedrock will be reduced by confining locations to upper slopes. Revegetation potential for cut slopes is moderate to high. Trafficability will be fair to good.

Wood. These units are among the most productive on the District, with moderate to high productivity potentials. Limitations to reforestation are severe to moderate and are related to the very brushy vegetative competition.

Water. A high hazard for serious alteration of the hydrology of landtype exists on the mid and lower slopes from cuts and fills. Subsurface flow is heavy and subject to interception during spring runoff. Fills and their sub-base, and some cuts, are subject to saturation and loss of strength. The hazard for serious increase in sedimentation is correspondingly high. Hazards to hydrology are moderate on upper slopes, convex slopes and ridges.

Forage. The potential production for this landtype is 200 to 1200 pounds per acre per year of usable dry forage, dominated by browse. The units are currently producing 100 to 1000 pounds per acre per year. Most of these units can be grazed more heavily than they are currently. Accelerated surface erosion will be the only limitation of significance.

Recreation. Recreation potential is mainly related to esthetics and providing a forested appearance. Relief precludes campground developments, but other forms of recreation such as interpretive trails, backpacking, hiking, and fishing can be managed for.

Management Evaluation:

Map Symbol 120b-6
Moderately Dissected Mountain Slope Land
Shallow and Moderately Deep Coarse Loamy and Loamy Skeletal Soils

Location: This landtype is common to areas around the Whitehawk Basin.

Landtype Characteristics: These moderately dissected fluvial lands have a southerly aspect with 30 to 60 percent forest crown density. Slopes are of moderate length with a weakly developed dendritic drainage pattern. Gradients range from 20 to 60 percent with the steeper portions restricted to dissections and the upper one-third of slopes. The shallow and moderately deep coarse loamy and loamy skeletal soils have developed over masked or extremely well fractured, moderately to well weathered granite bedrock.

Soils: The dominant soil (70%--JEFA-3), common to mid and upper slopes, has a 1-inch organic layer over a very dark grayish brown to dark yellowish brown gravelly sandy loam, 20 to 40 inches deep, with 20 to 30 percent fine gravel. A less extensive soil (30%--JEFA-5) common to mid and lower slopes, is similar but 20 to 60 inches deep, with 40 to 50 percent coarse fragments. Fine gravels still dominate.

Vegetation: This landtype is dominantly a timbered unit with 30 to 60 percent forest crown cover. Douglas-fir/chokecherry and Douglas-fir/mountain maple habitat types are most common on lower slopes. Douglas-fir/mountain snowberry becomes dominant on drier mid and upper slopes. Understories are very brushy, with 30 to 80 percent crown cover.

Hydrology: Average annual precipitation ranges between 20 and 30 inches. Snow melts throughout the winter months on these southerly facing slopes and is gone by early spring. The units are typically dry throughout the summer months except for periods of occasional storms. Annual water yield averages 5 to 10 inches. The major water yield is complete by early spring. Overland flow is uncommon from undisturbed areas. Disturbed areas exhibit overland flows during high intensity rainfall. Most all of the water is yielded by subsurface flow and deep seepage. The short slopes and moderate dissection create only moderate concentration of water on the landtype.

Management Qualities: These units are very brushy with moderate to high surface erosion and debris slide hazards. Timber productivity is moderate.

Roads. Major problems to construction are moderate to high erosion hazards for road surfaces and a moderate to high probability of intercepting subsurface water. This interception is often expressed as piping and results in a moderate to high

Map Symbol 120c
Strongly Dissected Mountain Slope Lands
Shallow & Moderately Deep Sandy & Sandy Skeletal Soils Over Soft Bedrock

Location: This unit is common along Lick Creek and around the Deadwood Reservoir.

Landtype Characteristics: These lands are steep southerly slopes that have been deeply incised by stream cutting. Side slopes have numerous dendritic dissections 30 to over 50 feet deep and less than 500 feet apart. In areas where dissections are more widely spaced, entrenchment is deeper. Slope gradients range from 40 to 70 percent. Ridges are relatively sharp with little exposed bedrock. The slopes are moderately well timbered, with forest crown densities ranging from 10 to 60 percent. The shallow and moderately deep sandy and sandy skeletal soils are underlain by moderately to well weathered granite that is extremely well fractured or masked.

Soils: The dominant soil (80%--JEFA-1), on most mid and lower slopes, has a 0 to 1-inch organic layer over a brown gravelly sand, 20 to 60 inches deep, with 20 percent fine gravels. A minor soil (20%--JEFA-2) is a shallow phase of the dominant soil and contains 40 percent coarse fragments dominated by fine gravels.

Vegetation: The slopes of this landtype are moderately timbered with the following habitat types represented: Douglas-fir/spirea, Douglas-fir/wheatgrass, Douglas-fir/pinegrass, Douglas-fir/ninebark, and ponderosa pine/bitterbrush. Forest crown density is 10 to 60 percent and brush crown density is 40 to 70 percent.

Hydrology: Mean annual precipitation is 20 to 35 inches and mean water yield is 5 to 15 inches. Snowpacks are low to moderate and snowmelt can occur on and off in late winter on southerly aspects. Runoff is usually spread over a 3-4 month period ending in mid to late May. Runoff from normal snowmelt conditions is shallow to moderately deep subsurface flow and deep percolation through the soft bedrock. These areas receive 8 to 15 inches of water input from heavy rainstorms and rain-on-snow events on an average of about once in ten years. Under these conditions, heavy runoff occurs in a few days dominantly as shallow subsurface flow which accumulates in concave incipient draws and moves down these draws until forced to the surface. These slopes release the water delivered to them at a moderate to rapid rate and dry rapidly after snowmelt. Water held in weathered bedrock provide much of the summer moisture for deep rooted vegetation.

Management Qualities: Construction hazards are rated dominantly high on this landtype. Interception of subsurface flow, spalling bedrock and sedimentation are the most important considerations.

Roads. The characteristics of this landtype are generally poor for road location except on upper slopes and ridges. Poorly graded, incompetent, spalling bedrock, combined with the probable interception of subsurface flow on lower slopes, will result in unstable cuts and fills. These factors will increase the probability that sediment will reach adjacent drainages. Accelerated surface erosion will be a major problem from disturbed soil surfaces and construction.

Wood. These units are some of the more productive on the District. The timber productivity rating is dominantly moderate with ponderosa pine the most productive seral species of the Douglas-fir habitat types. Limitations to reforestation are severe and are related to water holding capacity and high evapotranspiration losses.

Water. Interception of subsurface flow is a moderate hazard in normal runoff years because runoff is spread over a number of months. However, during the abnormally heavy rains and rain-on-snow events, which can occur in fall, winter or spring, subsurface flow interception and concentration is a very serious hazard because of the large amount of runoff during a short period. The hazard for serious erosion and sedimentation from concentration of intercepted subsurface flow during these periods is very high. A combination of moderately deep cuts and disturbed soil near drainage channels will increase the hazard for serious sedimentation. Road crossings of the deeply entrenched second and third order streams have a high sedimentation hazard. The convex upper slopes are less hazardous due to the lack of deeply entrenched drainage channels and less accumulated subsurface runoff water.

Forage. The potential production for this landtype is 400 to 900 pounds per acre per year of usable dry forage. The lower yield is associated with the exposed upper ridge positions and the shallow coarse textured soils. On these areas water holding capacity is low. The higher yields are related to the more moist micro-climate on protected lower slopes and drainages. The vegetation is dominated by browse species. Grasses and forbs are limited. Grazing, however, will greatly accelerate the erosional process by removing the protective vegetation and litter. Surface creep hazard will also be accentuated.

Recreation. The potential for recreation on these units are related to aesthetics and providing a "Forest Experience." The landtype provides a timbered scenic backdrop for vistas but is generally unstable for most recreational developments and roads. Big game hunting is a major fall activity on these units. Trails will be highly erosive but have fair to good trafficability.

Management Evaluation:

Management Evaluation:

Map Symbol 120c-1
Strongly Dissected Mountain Lands
Moderately Deep and Deep Sandy Skeletal and Coarse Loamy Soils

Location: These are the steep, strongly dissected north slopes along the South Fork of the Payette River.

Landtype Characteristics: These landtypes occupy the steep, strongly dissected north slopes along major drainages. Dissections are predominantly deep and parallel. Slopes are well timbered, long, and have gradients from 50 to 90 percent. Soils are moderately deep and deep sandy and sandy skeletal over well to extremely well fractured or masked, weakly to well weathered granite bedrock.

Soils: The dominant soils (30%--JEAA-2, 30%--JEAE-2) on this landtype are moderately deep and shallow and have thin organic layer over brown gravelly loamy sand with 60 to 70 percent coarse fragments. Another soil (40%--IECA-1) has a 2-inch organic layer over a dark brown gravelly loamy sand, 40 to 60 inches deep, with 20 percent coarse fragments dominated by fine gravels.

Vegetation: These units are some of the most densely timbered units on the District. Forest crown densities range from 10 to 80 percent for the dominant habitat types. Understories are somewhat brushy with crown densities ranging from 30 to 80 percent. Common habitat types include Douglas-fir/ninebark, Douglas-fir/elk sedge, Douglas-fir/pinegrass and subalpine fir/tall huckleberry.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 10 to 20 inches. Snow pack is moderate on lower portions and heavy on upper portions of the landtype. Snowmelt begins on lower areas by early April and ends on upper areas in early June. Runoff is about evenly divided between moderately deep subsurface flow above bedrock and percolation through bedrock. The subsurface flow moves to incipient drainages where heavy flows accumulate as it moves downslope. When it reaches well entrenched channels it is forced to the surface to become stream flow. About 80 percent of the annual runoff leaves these slopes in a two month period. Some channels through this landtype show signs of having "flushed out" in the past from runoff originating on headland landtypes above. Rate of outflow of water delivered to these slopes is moderate.

Management Qualities: Erosion and mass stability hazards are ranked moderate to very high. Subsurface flow and steep slopes are the most severe problems.

Roads. The construction problems of this landtype are severe for road construction. Very poorly graded, non-competent, spalling

bedrock combined with probable interception of subsurface flow will result in very unstable cuts and fills, and an increased probability that sediment will reach adjacent drainages. If roads must be made, impacts will be least if confined to upper slopes as low standard work roads. Some seasonal maintenance will still be required.

Wood. This landtype is one of the better commercial timber producing units on the District. The timber productivity potential for the dominant habitat types is moderate to high. Reforestation site limitations are moderate to severe with vegetative competition the most limiting factor.

Water. Roads across this landtype will have high hazard of mass failure and drainage failure at crossings of steep drainages originating on higher headlands. Hazard of subsurface flow interception and concentration is also high for cuts across these slopes. Hazard to hydrology from partial timber removal without roads is low.

Forage. Production potential for usable dry forage on this landtype is rated moderate with current levels very near these potentials. This vegetation is dominated by browse species. Grasses and forbs are limited in extent. Grazing, however, will greatly accelerate the erosional processes by removing the protective vegetation and litter. Slope creep will also be accelerated.

Recreation. This landtype is responsible for much of the timbered appearance of north slopes along the South Fork of the Payette River. As such, these lands provide a timbered scenic backdrop for many vistas looking from the north end of the District to the south. Trails cannot be expected to hold up without considerable maintenance. Trafficability will be fair to very good.

Management Evaluation:

Map Symbol 120c-2
Strongly Dissected Mountain Slope Lands
Moderately Deep and Deep Skeletal Sandy and Loamy Xeric Soils

Location: Warm dry south slopes along the South Fork of the Payette River.

Landtype Characteristics: These lands are steep scuth slopes which have been deeply dissected by stream cutting. Side slopes are long, steep and have numerous dendritic dissections 50 to over 100 feet deep. The spacing side dissection is less than 500 feet apart. In areas where dissections are more widely spaced, entrenchment is deeper. Ridges are sharp with a trace of bedrock exposed. The slopes are poorly vegetated, (brush/grass), convex to straight and have a 40 to 70 percent slope gradient. The moderately deep and deep skeletal, sandy and loamy, xeric soils have developed over extremely well fractured or masked, moderately to well weathered granite bedrock.

Soils: The dominant soil (60%--JECA-2), on mid and upper slopes, has a trace of an organic layer over a dark grayish brown gravelly loamy coarse sand, 20 to 40 inches deep, with 45 percent moderately well graded coarse fragments. A similar soil (40%--GDFA-2), on mid and lower timbered slopes, has a 0 to 2-inch organic layer over a very dark grayish brown gravelly loamy coarse sand, 20 to 50 inches deep, with 40 percent coarse fragments.

Vegetation: This landtype is dominated by brush/grass communities with scattered stands of Douglas-fir/pinegrass and Douglas-fir/wheatgrass habitat types. Forest and brush crown densities are variable, both ranging from 0 to 30 percent.

Hydrology: Mean annual precipitation is 20 to 30 inches and mean water yield is less than 5 inches. Snowpack is light and seldom persists through the winter. Runoff in winter and spring is sporadic in response to warm spells and rain storms. Overland flow from winter and spring runoff is uncommon but summer thunderstorms often produce overland flow and erosion. Greatest runoff comes from rain-on-snow events with about a one in ten year average occurrence. Draws are often flushed of accumulated debris by thunderstorm runoff and rain-on-snow runoff. Rate of outflow of water delivered to these slopes is rapid.

Management Qualities: Construction hazards are moderate to high on this landtype. These factors, in addition to spalling bedrock and a high inherent erosion hazard are most important considerations.

Roads. The engineering characteristics of this landtype are generally poor for road locations. Poorly graded, incompetent, spalling bedrock, combined with steep, sparsely vegetated slopes,

will result in unstable cuts and fills. These factors will increase the probability that sediment will reach adjacent drainages. The jointing plane of the bedrock is also parallel to slopes in localized areas contributing to massive bedrock failures where cuts exceed four to six feet.

Wood. This is a sparsely forested landtype with scattered stands of Douglas-fir habitat types. Timber productivity potential is rated very low to moderate. Limitations to reforestation are very severe.

Water. Debris-laden peak flows in the major draws are a serious hazard to road fills and drainage facilities. Major rain-on-snow events and heavy thunderstorms create conditions of runoff that can be seriously aggravated by roads, heavy grazing, or other disturbances that either generate accelerated runoff or concentrate it. This will increase the frequency and severity of the flushing of sediment and debris from drainageways. Sedimentation hazard increases at a corresponding rate.

Forage. The potential production for this landtype is 100 to 1000 pounds per acre per year of usable dry forage. Current levels are far below potentials because of deterioration resulting from historic grazing practices. Recovery is expected to be very slow.

Recreation: These lands are located adjacent to a travel and water influence area and serve as a scenic backdrop.

Management Evaluation:

Map Symbol 120c-3
Strongly Dissected Mountain Slope Land
Shallow and Moderately Deep Skeletal, Sandy and Loam Soils

Location: This landtype is common to the central portion of the District and is adjacent to major drainages.

Landtype Characteristics: These lands are the steep southerly slopes that have been deeply incised by fluvial action. These units are dominated by open stands of timber with forest crown densities ranging from 10 to 30 percent. North slope inclusions have forest crown densities of 40 to 60 percent. Sideslopes are long with numerous dissections. Slope gradients range from 50 to 70 percent. Ridges are sharp and often rocky; dissections are V-shaped and have steep gradients. The erosional processes associated with fluvial action are very active on this landtype. The shallow and moderately deep skeletal, sandy and loamy soils have developed over masked or well to extremely well fractured, very weakly to very well weathered granitic bedrock.

Soils: The dominant soil (40%--JECA-2), on most steep southerly slopes, has a trace of an organic layer over a very dark grayish brown to brown coarse sandy loam to gravelly loamy coarse sand, 20 to 40 inches deep, with 40 percent fine gravels. A similar soil (20%--JECB-2), in similar positions, is less than 20 inches deep and contains 70 percent well graded coarse fragments. A lower slope soil (20%--JEFA-5) has a thin organic layer over a dark brown to yellowish brown gravelly sandy loam, 20 to 40 inches deep, with 45 percent fine gravels. A similar soil (15%--IFBA-5), under the more heavily timbered north slope inclusions, has a 0 to 2-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly sandy clay loam, 20 to 30 inches deep, with 40 percent fine gravels. Rock outcrop is generally restricted to ridges and eroded faces.

Vegetation: The vegetative associations on this landtype are extremely variable and quite complex. The dominant habitat types are Douglas-fir/wheatgrass, Douglas-fir/chokecherry, Douglas-fir/mountain snowberry, ponderosa pine/wheatgrass, and ponderosa pine/bitterbrush on south slopes, and Douglas-fir/elk sedge, Douglas-fir/mountain maple, and subalpine fir/elk sedge on the more heavily timbered north slopes. Forest crown densities are dominantly 0 to 30 percent on southerly and westerly aspects and 40 to 60 percent on north slopes. Brush crown density ranges from 0 to 50 percent.

Hydrology: Mean annual precipitation is 20 to 35 inches and mean water yield is 5 to 15 inches. Snowpacks are light on lower portions and moderate on upper slopes. Snowmelt on exposed areas is sporadic through winter and spring and is over by May. Less winter snowmelt takes place on sheltered areas and snow remains well into May. Runoff on upper

slopes above major dissection is by shallow to moderately deep subsurface flow, deep percolation, and localized surface runoff from rock outcrops. On mid and lower slopes, where dissection is well expressed, much subsurface flow is intercepted and concentrated as stream flow. Runoff peaks can occur in winter or spring depending on the occurrence of rain-on-snow events. Small streams originating on this landtype have a cycle of sediment and debris buildup and periodic flushing during major runoff events. Outflow rate of water delivered to this type is moderate to rapid. Summer storms can cause periodic flashy runoff of sediment-laden overland flow.

Management Qualities: This landtype is among the most hazardous on the District. Most hazards are rated high to very high and major problems will occur from erosion, mass stability, and sediment production. Extreme caution is urged when planning management activities on these units.

Roads. Bedrock conditions are extremely variable on this landtype. Many areas of well weathered, spalling granite will create many problems in the stability of backslopes and sediment production. The shallow subsurface flow and the numerous dissections will present water handling problems at drainage crossings. Most construction hazards are rated high to very high and many slopes are too steep to support stable fillslopes. Some of the road locations through more competent granite will have fewer stability problems but surface erosion and subsequent sediment production will be major hazards. In many areas avalanche hazards will be very high, and a high frequency of debris slides will plug culverts and contribute to road damage. Trafficability, however, is expected to be good over most areas.

Wood. Like the vegetation, this landtype is extremely variable as to productivity potential for commercial timber species. Southerly aspects with more open grown stands of Douglas-fir and ponderosa pine have very low to low productivity potentials. Although individual trees may grow quite well, the stand density is very low. North slopes in Douglas-fir and subalpine fir habitat types have a low to moderate productivity potential. Limitations to reforestation are rated very severe on southerly aspects because of the low water holding capacity and high evapotranspiration losses of these positions. Northerly aspects and lower more moist slopes are rated severe for similar reasons plus vegetative competition.

Water. The water quality of major streams is greatly affected by the sediment produced on this landtype. Natural sediment is a constant problem during periods of peak flow when channels in minor drainages are cleansed of accumulated debris. Activity on these slopes can greatly accelerate the problem through disturbance

and acceleration of surface erosion and surface creep. The characteristic most controlling to land use on this landtype is the periodic rapid debris-laden runoff in the stream channels. It will be extremely difficult to construct crossings at these channels that will not be destroyed by the heavy debris-laden flows which occur on the average of once in 10 years. Any grazing, road construction, or major vegetation manipulation will increase the amount of sediment accumulating in the channels and decrease the interval between flushing events.

Forage. This landtype is currently producing 200 to 700 pounds per acre per year of useable dry forage. This level is about half of potentials that are rated as 200 to 1000 pounds per acre per year. This reduction in potential appears most related to accelerated erosion from impacts associated with historic grazing practices. The high inherent erosion hazard coupled with the moderate surface creep hazard makes these units respond poorly to grazing activity. The vegetation present is necessary to reduce the amount of sediment leaving the landtype and entering the drainage system from natural erosion processes.

Recreation. The open, expansive character of these units makes them likely candidates as scenic areas. Lack of contrast is a possible problem. Trail construction is best on upper slopes although hazards will be similar to those encountered with road construction. Trafficability will generally be good.

Management Evaluation:

Map Symbol 120c-11
Strongly Dissected Mountain Slope Land
Moderately Deep and Deep Skeletal, Sandy and Loamy Soils

Location: This landtype is common to those heavily timbered steep slopes south of the Lowman Ranger Station.

Landtype Characteristics: These fluvial lands are the steep north slopes that have been deeply incised by stream cutting, intermittent concentrations of overland flow and the rapid concentration of shallow and moderately deep subsurface flow. Sideslopes are of moderate length and steep with numerous parallel dissections. Ridges are relatively sharp with little exposed bedrock. Slope gradients range from 50 to 70 percent. The moderately deep and deep skeletal, sandy and loamy soils have developed over masked or extremely well fractured, moderately to very well weathered granite bedrock.

Soils: The dominant soil (60%--IFBA-5) has a 0 to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly sandy clay loam, 40 to 60 inches deep, with 50 percent coarse fragments dominated by fine gravels. This soil is most common on mid and upper slopes. A less extensive soil (40%--IFBA-3), on more exposed upper east and west slopes and areas of highly weathered granite on north slopes, has a 0 to 3-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam, 40 to 60 inches deep, with 25 to 30 percent fine gravels.

Vegetation: This landtype is one of the better timber producing units on the District with forest crown densities ranging from 30 to 80 percent. The dominant habitat types are ponderosa pine/wheatgrass, Douglas-fir/chokecherry, Douglas-fir/spiraea, and Douglas-fir/ninebark. Brush crown densities range from 30 to 80 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 10 to 20 inches. Snowpack is moderate to heavy and persists into June on the highest areas and into May on the lower areas. Major runoff is in April and May when heavy discharge of subsurface flow occurs. Overland flow runoff from summer storms is rare on undisturbed areas. Runoff is about evenly divided between moderately deep subsurface flow above bedrock and percolation through the weathered and fractured bedrock. The accumulation of this runoff increases going downslope and moving from convex to concave shaped slopes. Greatest concentration of subsurface flow is in the incipient drainageways on the lower two-thirds of the slope. Ground water is most concentrated and nearest the surface on deep soiled slopes and deposits adjacent to the more deeply entrenched streams. Debris-laden flash flows seldom occur in drainageways in this landtype. Outflow rate of water delivered to these slopes is slow to moderate.

Management Qualities: Most hazards for this landtype are rated moderate to very high. High surface erosion hazards and mass stability problems associated with interception of subsurface flow will be major limitations. Bedrock spalling will be common in most exposed road cuts. This landtype, however, is one of the most productive for commercial timber species.

Roads. The qualities of this landtype present many hazards to road construction. Very poorly graded, soft spalling bedrock combined with probable interception of subsurface flow will result in very unstable road cuts and fills. These problems combine with a high surface erosion hazard greatly increasing the probability that sediment will reach adjacent drainages. The least impact has been observed where roads have been restricted to the upper one-quarter of slopes, although surface erosion and interception of subsurface water are still problems in selected areas. Areas of very well weathered granitic bedrock, clay pockets, are of limited extent but very significant because of the problems they create in construction. These heavy textured soils are restricted to the more moist northerly aspects that are heavily vegetated. Where possible, these areas should be avoided.

Wood. This landtype is one of the better commercial timber producing units on the District. Timber productivity ratings range dominantly from moderate to high for the major habitat types, Douglas-fir/spirea and Douglas-fir/ninebark. Reforestation site limitations are moderate to severe with high evapotranspiration losses on south slopes and vegetative competition on all slopes the major limiting factors.

Water. Hazard of intercepting large quantities of subsurface flow is high at concave swales and incipient draws. Hazard of ground water interception is high on steep slopes adjacent to streams. Sedimentation hazard is high to very high for roads crossing the deeply entrenched streams on the lower one-half of these slopes and moderate to high on the upper one-half. The combination of hazards presents an overall hazard to hydrologic characteristics of high to very high on lower slopes and moderate to high on upper slopes.

Forage. Forage production potential on this landtype is rated low to high with the vegetation dominated by browse species. Grasses and forbs are limited, most common under the ponderosa pine habitat types on southerly aspects. Grazing, however, will greatly accelerate the erosional processes by removing the protective vegetation and litter. Surface creep will also be accelerated increasing the frequency of debris slides.

Recreation. This landtype is responsible for much of the timbered appearance of some north slopes on this District. As such, these lands provide a timbered scenic backdrop for many vistas looking from the north end of the District to the south. Trails are not expected to hold up without considerable maintenance because of the highly erosive nature of these soils. Trafficability will be fair to good.

Management Evaluation:

Map Symbol 120d-3
Steep Headlands
Moderately Deep Skeletal Sandy and Loamy Soils

Location: Head of Archie Creek and the north slope headlands above Clear Creek.

Landtype Characteristics: This landtype comprises the headlands of minor drainages in the fluvial lands. The formative processes have been the rapid concentration of surface and shallow subsurface flow. These concentrations, acting on well weathered bedrock, resulted in the development of over-steepened, fan-shaped headlands. The dendritic drainage patterns concentrate water very rapidly to a focal point at the base of the unit. This focal point is a major area of sediment accumulation and sediment discharge. The slopes are north facing, well timbered with 60 to 70 percent gradients. The soils have very dark brown surfaces, with moderately deep sandy skeletal and loamy skeletal soils over very weakly to moderately well weathered granite that is extremely well fractured or masked.

Soils: The dominant soil (75%--IECA-5), on northerly aspects, has a 0 to 4-inch organic layer over a dark grayish brown gravelly sandy loam, 20 to 60 inches deep, with 40 percent coarse fragments. A minor soil (20%--JECB-2), on dry exposed south and west slopes, is a dark brown gravelly loamy coarse sand, less than 20 inches deep, with 50 percent coarse fragments.

Vegetation: The slopes of this landtype are well vegetated by timber and brush. Timbered habitat types represented are as follows: Douglas-fir/ninebark, Douglas-fir/pinegrass, Douglas-fir/spirea and subalpine fir/tall huckleberry. The non-timbered portion of the units has a brush/grass cover not identified as to habitat types. Forest crown density ranges from 0 to 60 percent and brush crown density is 10 to 40 percent.

Hydrology: These landtypes receive an average of 35 to 45 inches of precipitation annually. Major release of water in snow packs occurs in a few weeks in May and June. Annual water yield is between 15 and 25 inches. Overland flow is rare. Most surface water readily infiltrates into the soil horizon. Total water yielded by deep seepage is low due to the low-moderate bedrock penetration potential and rapid transmission of subsurface water down the steep slopes. The numerous dissections within these headlands intercept subsurface flow for yield as streamflow. Subsurface water accumulates in draws. The converging drainageways of these landtypes tends to heavily concentrate surface runoff during spring snowmelt at downslope focal point(s). These units release water at a moderate to rapid rate.

Management Qualities: This landtype has high to very high erosion and mass stability hazards. Subsurface flow and rapid concentration of surface flow will be major considerations.

Roads. The bedrock is dominantly non-competent and poorly graded as fill material. Cut slopes will not be stable because of the likelihood of intercepting subsurface flow. Mass wasting and slumps associated with cuts will not be uncommon. Special structures will be necessary to handle intercepted subsurface flow and water concentrated in draws to prevent weakening of fills. Roads located in the bottoms of drainages, near the focal point of water concentration, will be washed out regularly.

Wood. These units are well timbered with low to high productivity ratings for most areas. Limitations to reforestation are moderate to severe and related to vegetative competition.

Water. Special consideration will be necessary for access routes crossing major drainages as these dissections handle large volumes of water and debris during the snowmelt period. The probability of intercepting subsurface flow on lower slopes during the spring by road cuts is high.

Forage. The potential production for this landtype is 100 to 1000 pounds per acre per year of usable dry forage. Forage is dominated by browse species with current production levels near potentials. Grazing will accelerate the surface erosion on these slopes.

Recreation. These units offer excellent vistas to the landscapes below. They are, however, too unstable for developments. Trails will require considerable maintenance, especially on lower slopes. Trafficability will be good.

Management Evaluation:

Map Symbol 120e
Maturely Dissected Mountain Slope Lands
Moderately Deep Sandy and Coarse Loamy Soils

Location: Common to areas around the Deadwood Reservoir.

Landtype Characteristics: The landtype has a finely meshed low relief dendritic drainage pattern with rounded ridges and broadly concave drainage bottoms. Such a pattern indicates a more maturely developed topography than the typically sharp ridges and V-shaped valleys of Fluvial Lands. Surface erosion has been active in reducing these areas of well weathered bedrock, to low relief, undulating ridge systems. The slopes have all aspects, are moderately timbered and have 5 to 40 percent slope gradients. The moderately deep sandy and coarse loamy soils have developed over masked or extremely well fractured, moderately well weathered granite bedrock.

Soils: The dominant soil (70%--JEFA-1) on mid and upper slopes, has a 0 to 1-inch organic layer over a brown gravelly sand loam to gravelly sand, 20 to 40 inches deep, with 20 percent coarse fragments. A minor soil (30%--IFBA-3), on lower slopes and in drainages, has a 0 to 3-inch organic layer over a very dark grayish brown gravelly sandy loam, greater than 60 inches deep, with 20 percent fine gravels.

Vegetation: The slopes of this landtype are timbered. The habitat types represented are as follows: subalpine fir/tall huckleberry, Douglas-fir/elk sedge, and Douglas-fir/pinegrass. Forest crown density ranges from 30 to 60 percent and brush crown density is 0 to 20 percent.

Hydrology: Mean annual precipitation is 25 to 35 inches and mean water yield is 10 to 20 inches. Snowpack is moderate and lasts well into May on most sites. Runoff is about evenly divided between moderately deep subsurface flow above bedrock, and percolation through the weathered bedrock. Overland flow is uncommon on undisturbed areas. Outflow rate of water delivered to this area is moderate to slow.

Management Qualities: Landtype erosion, stability and construction hazards are rated low to moderate. The major area of consideration is the amount of sediment generated from these short, low relief slopes.

> Roads. Due to the high degree of bedrock weathering, road construction problems will be related to poorly graded material and the potential for large amounts of sediment to reach streams. Massive failures, either natural or from cuts and fills, should not be a major contributor to sediment production. Sediment generated by snowmelt or high intensity storms may be very significant.

Wood. These lands appear to be very productive. Aspect and a moist micro-climate are reflected in the low to high timber production potentials. The roots are able to penetrate the soft bedrock, a source of water during the normally dry growing season. Limitations to reforestation are severe to moderate, with vegetative competition and low water holding capacity major limiting factors.

Water. The hazard to roads or other improvements from runoff is moderate. The greatest hazard to the area's hydrologic characteristics is that of artifically intercepting subsurface flow, concentrating runoff or diverting channeled runoff water and depositing it on the very erodible soils. Very frequent water outlets and dispersion will be needed in road, parking lot or other drainage systems to keep gullies from forming at each outlet.

Forage. The potential production for this landtype is about 400 pounds per acre per year of usable dry forage. Many areas have been severely damaged by trailing, subsequently reducing productive potential by accelerating the erosional processes. Recovery will be slow.

Recreation. Because of the gentle topography, these units have many areas well suited to recreational developments. Soils, however, are very unstable and not suited to use as leach fields. Trafficability will be fair.

Management Evaluation:

Map Symbol 120e-1
Maturely Dissected Mountain Slope Land, High Relief
Shallow and Moderately Deep Sandy and Coarse Loamy Soils

Location: These units are confined to the area around the Deadwood Reservoir.

Landtype Characteristics: This landtype has a high relief dendritic drainage pattern with rounded ridge tops and narrowly concave drainage bottoms. Such a pattern indicates a more maturely developed topography than the typically sharp ridges and V-shaped drainages of the Fluvial Lands. These units are located at mid elevations on all aspects. Slopes are timbered and moderately long with gradients of 10 to 50 percent. The shallow and moderately deep sandy and coarse loamy soils have developed over masked or extremely well fractured, well weathered granite bedrock.

Soils: One soil (100%--JEFA-1) dominates this landtype. This soil has a 0 to 1-inch organic layer over a brown gravelly loamy sand, 20 to 40 inches deep, with 25 percent fine gravels. A shallow phase of this soil is common to ridges and eroded slopes.

Vegetation: This forested landtype has Douglas-fir/pinegrass and Douglas-fir/elk sedge habitat types on drier sites, and a subalpine fir/grouse whortleberry habitat type on cooler moist sites. Forest crown density ranges from 10 to 50 percent and brush crown density ranges from 10 to 80 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 10 to 20 inches. Snowpack is moderate and normally persists into May. Runoff is about equally divided between moderately deep subsurface flow above the weathered bedrock and percolation through the fractured and weathered portion of the bedrock. Soils become nearly saturated about once each year during snowmelt in May. Subsurface flow is at its peak at these times and is especially heavy in concave draws. Lower slopes have small entrenched drainageways that carry surface water during these heavy runoff periods. Overland flow is uncommon even during summer storms. Outflow rate of water delivered to these slopes is moderate.

Management Qualities: The relatively steep slopes underlain by well weathered bedrock promote shallow subsurface flow. Most of the problems on this landtype are related to intercepting subsurface flow and moderate to very high erosion hazards.

> Roads. Surface erosion will be a problem. The probability of exposing well weathered bedrock is high. When exposed, this material spalls and sloughs, and is a constant source of sediment.

This material will plug drainage ditches and culverts, reduce trafficability and increase maintenance cost.

Wood. This landtype has a moderate timber production potential. Limitations to reforestation are severe, because of vegetative competition and the low water holding capacity of the soils.

Water. The hydrology of these slopes provides a low to moderate hazard to improvements or activities. Roads or other continuous cuts into the soil mantle on lower slopes are very likely to intercept subsurface flow, concentrate it and deposit it onto erodible slopes. Overland flow generated on road surfaces adds to the water concentration and erosion problem. The soils are especially vulnerable to concentrated runoff water and activities need to be designed to avoid this if sedimentation rates are to be kept down.

Forage. Forage production potential for this landtype is low. Over-grazing will significantly accelerate erosion and produce sediment. Recovery from adverse use will be moderately low.

Recreation. The landtype lacks qualities suited to campground development, but many qualities are suitable for other outdoor activities such as hunting, hiking, bird watching, etc. Trails will be highly erosive requiring seasonal maintenance.

Management Evaluation:

Map Symbol 121e
Maturely Dissected Basin Land
Deep Sandy and Coarse Loamy Soils

Location: These units are confined to the areas within and around Whitehawk Basin.

Landtype Characteristics: This unit consists of land that has been modified or displaced from its original position by faulting activities and presently occupies a lower position than it did at one time. These units because of their low position following faulting have subsequently been modified by fluvial processes. The resultant unit is a moderately to well timbered basin containing a mature topography of low relief, rolling hills. The drainage pattern is lateritic to dendritic with slope gradients ranging from 10 to 40 percent. The deep sandy and coarse loamy soils have developed over masked, moderately well to well weathered granite bedrock. Deep colluvial and alluvial soils have developed in drainages and broader lower gradient portions of these basins.

Soils: One soil (100%--IECA-3) dominates this entire unit, although shallow highly eroded phases and meadow land inclusions do exist. This dominant soil has a 0 to 2-inch organic layer over a very dark yellowish brown to yellowish brown gravelly sandy loam, dominantly less than 60 inches deep, with 15 percent fine gravels. Minor inclusions of similar shallow soils occur on ridges and upper slopes while deeper soils with a high water table occur in drainages and some basin segments of individual delineations.

Vegetation: This landtype is moderately to well timbered and dominated by subalpine fir/grouse whortleberry, subalpine fir/pinegrass and Douglas-fir/pinegrass habitat types. More moist meadow land type inclusions are common to some dissections and flatter basin-like areas. Forest crown densities range from 20 to 60 percent while brush crown densities range from 10 to 20 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 10 to 20 inches. Snowpack is moderate and persists well into May. In addition to precipitation, this landtype receives and accumulates water by surface, subsurface and ground water flow from higher surrounding slopes. As a result, this terrain handles large quanities of water during April, May and June. Overall outflow rate of water delivered to the unit is slow to moderate. Overland flow from undisturbed areas is rare. Predominant manner of runoff is as moderately deep subsurface flow and deep percolation. Water table is near the surface on low lying toe slopes and narrow stream bottoms during spring and recedes to moderately deep in summer, fall and winter.

Management Qualities: Most hazards on this landtype are rated low to moderate. Major limitations will be a moderate to high erosion hazard

both for natural surfaces and on construction areas. Some limitations will be encountered with the wet soils that have developed in drainages and meadow-like areas.

Roads. These units contain poorly graded materials both in the bedrock and the soils. Surface erosion on disturbed areas as well as on road surfaces, cutslopes and fillslopes, will be a major problem. The probability that sediment will reach live streams will vary from location to location within the landtype.

Wood. Timber productivity potential for this landtype is rated low to moderate with limitations to reforestation rated moderate to severe. Vegetative competition and the low water holding capacity of the soils are the major limiting factors.

Water. Low lying portions have saturated soils during spring and this will restrict improvements to the better drained areas. Deep cuts will intercept large quantities of subsurface flow or ground water that can easily be concentrated to erodible quantities. Numerous streams are present and roads will require numerous bridges or large culverts and fills.

Forage. Forage production potential in this landtype is rated low with current levels very low in many areas. Historic overgrazing has severely reduced the productivity potential of many upper slopes and ridges. Many low lying areas, especially along wet meadows, have a moderate to high productivity potential and are currently producing at about one-half to one-third of this level. A good ground cover of vegetation and litter appears very important to the maintenance of soils on slopes with gradients greater than 30 percent. The basin-like areas with deep soils and less gradient will withstand the impact to a much greater degree. Sedimentation to the adjacent live streams will be the most significant problem associated with grazing.

Recreation. These units have many features highly suited to recreational and administrative site developments. Many areas have slope gradients less than 10 percent, a forested cover, and proximity to live streams. The soils, however, will suffer from excessive disturbance and understory vegetation will be difficult to maintain with disturbance. Trails will be highly erosive and trafficability will be fair.

Management Evaluation:

Map Symbol 121e-1
Maturely Dissected Basin Land
Moderately Deep and Deep Coarse Loamy and Loamy Skeletal Soils

Location: This landtype is commonly associated with faulting activity on the west side of the Deadwood Reservoir.

Landtype Characteristics: These units consist of lands that have been modified or displaced from their original position by faulting activities and presently occupy a lower position than they did at one time. Because of their lower position, these units have accumulated materials generated on higher adjacent landtypes. These accumulations combined with fluvial erosional processes have resulted in a somewhat basin-like mature topography. Individual units are generally small and well timbered. Dissection is variable being both parallel and dendritic. Slope gradients range from 10 to 30 percent. The moderately deep and deep coarse loamy and loamy skeletal soils have developed over a variably fractured and variably weathered granite bedrock.

Soils: The dominant soil (60%--IFBA-5), on the more open dissected slopes and ridges, has a 0 to 4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly sandy clay loam, greater than 60 inches deep, with 50 percent moderately well graded coarse fragments dominated by rock. Another major soil (40%--IFDA-5), on lower sideslopes and in basins, has a 0 to 2-inch organic layer over a very dark gray to brown gravelly sandy loam, greater than 60 inches deep, with 60 percent coarse fragments dominated by rock and a water table at 1 to 2 feet below the surface.

Vegetation: This landtype is dominated by brush/grass and aspen communities on open dissected slopes and ridges and by subalpine fir/grouse whortleberry in the wetter basin portions and on lower sideslopes. In the timbered areas forest crown densities range from 40 to 80 percent while brush crown densities range from 10 to 30 percent. On open slopes, brush crown densities range from 30 to 60 percent.

Hydrology: Annual precipitation and water yield average 35 to 40 inches and 10 to 20 inches, respectively. Overland flow is minimal due to gentle relief. Subsurface flow is the primary means of water delivery both to and from the landtype. These units act as a trap basin for subsurface water yielded from above. The slow release to water inputs makes these lands good regulators of flow.

Management Qualities: Most hazards on this landtype are rated very low to moderate. The major limitations are a high to very high possibility of intercepting subsurface water in shallow road cuts, a moderate erosion hazard and poor trafficability for the wetter soils.

Roads. Construction materials in this landtype are moderately well graded and dominated by large rocks and boulders. In many areas, a water table is within one foot of the surface, greatly increasing the probability of intercepting ground water and significantly reducing trafficability.

Wood. The timber producing portion of this landtype has a low to moderate productivity potential. The severe limitations to reforestation are dominantly related to climate and vegetative competition.

Water. There is a moderate to high hazard of accelerated erosion from concentration of water. During the spring melt period, the probability of intercepting subsurface flow by road cuts is high. High water table in spring will limit activities.

Forage. Forage production on this landtype is dominantly low to moderate with the lowest areas under the heavy timber stands and the best areas on the more open sideslopes of dissections. Some areas have received moderate impacts and some accelerated erosion from sheep trailing and grazing. Recovery rates, however, are expected to be moderately rapid.

Recreation. These lands have many qualities suited to recreational developments. The topography is gentle, most of these areas are well timbered, and live streams are relatively close. The presence of a seasonal high water table and slow permeability rates are not conducive to treatment of sewage within the soil mantle. Some compaction is likely during the wet season and dust will be a moderate problem during the drier seasons of the year.

Management Evaluation:

Map Symbol 122
Oversteepened Canyon Land
Shallow Sandy and Sandy Skeletal Soils

Location: This landtype is located along most major drainages on the District, especially Warm Springs Creek and Ten Mile Creek.

Landtype Characteristics: These oversteepened canyon lands are steep to extremely steep, weakly to moderately dissected, sparsely timbered south slopes immediately adjacent to many major drainages. The dissections in these units are dominantly parallel and of first order and are generally in contact with main drainages of third to fourth order. Overall slope gradients range from 50 to 80 percent. The shallow sandy and sandy skeletal soils have developed over moderately to extremely well fractured or masked, very weakly to well weathered granite bedrock. Rock outcrop is limited to spur ridges.

Soils: The dominant soil (45%--JECB-2), on slopes over 65 percent, is a very dark grayish brown to dark yellowish brown gravelly loamy coarse sand, less than 20 inches deep, with 45 percent moderately well graded coarse fragments. A similar soil (30%--JEFA-2), on slopes less than 65 percent, is a very dark grayish brown to brown gravelly loamy sand, 20 to 40 inches deep, with 50 to 60 percent well graded coarse fragments. A minor soil (20%--JEAA-2), occurring as a north slope inclusion, has a thin organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly loamy sand, 20 to 40 inches deep, with 40 percent coarse fragments dominated by fine gravels.

Vegetation: This landtype is sparsely timbered on most slopes with forest crown densities ranging from 10 to 30 percent. These areas are dominated by Douglas-fir/wheatgrass and Douglas-fir/elk sedge habitat types. North slope inclusions are more heavily timbered with forest crown densities ranging from 30 to 50 percent. These areas are dominated by Douglas-fir/spirea, Douglas-fir/ninebark and subalpine fir/elk sedge habitat types. Brush crown densities are variable and range from 10 to 50 percent.

Hydrology: Mean annual precipitation is 20 to 35 inches and mean water yield is 5 to 15 inches. Snowpack is light to moderate and persists through winter only on the higher and more sheltered portions. Snowmelt and runoff can occur at any time during winter that warm temperatures and/or warm rainstorms occur. Rain-on-snow events have caused heavy natural runoff erosion and sedimentation at approximately a one in ten year frequency. At such times, 8 to 12 inches of water have been delivered to the soil in a few days, and the stress on the steeply sloping non-cohesive soils causes many debris slides to stream channels. Runoff is dominantly as shallow to moderately deep subsurface flow above bedrock. Outflow rate of water delivered to these slopes is rapid. Overland flow runoff from high intensity summer storms is common causing flash flows in small drainage channels.

Management Qualities: Many of the hazards on this landtype are rated moderate to very high with the major limitations associated with surface erosion, debris slides, surface creep, and numerous mass stability hazards. Any activity that disturbs natural soil surfaces will greatly accelerate the erosional processes and significantly increase sedimentation to the adjacent drainages.

Roads. Although much of the bedrock in this landtype is of moderate competence, the many high to very high hazard ratings make construction difficult if not impractical. A high erosion hazard and high surface creep hazard combine to produce high debris slide hazards that will result in considerable deterioration of culvert installation. Many sideslopes are too steep to maintain stable fills and road cuts will expose excessive amounts of spalling bedrock material. In these sandy soils over soft bedrock, subsurface water will be intercepted during high intensity storms.

Wood. This landtype is dominated by open grown stands of Douglas-fir/wheatgrass and Douglas-fir/elk sedge habitat types, composed chiefly of ponderosa pine with very low to moderate timber productivity potentials. North slope inclusions of Douglas-fir and subalpine fir habitat types have a low to high productivity potential. Limitations to reforestation are very severe for the more open stands because of the high evapotranspiration losses and low water holding capacity of the sandy soils. North slope inclusions have moderate to severe limitations because of vegetative competition and the low water holding capacity.

Water. The flashy summer runoff, the periodic debris slides and debris-laden peak flows make these areas very hazardous to any major improvements. Livestock use, road construction and concentrated wildlife use results in serious increase in erosion and sedimentation from this landtype.

Forage. Forage production potentials on this landtype are rated very low to low with current levels near or somewhat below this potential. Historic grazing practices have significantly accelerated surface erosion on these units leaving a highly pavemented surface and subsequently reducing the productivity potential. Recovery rates are expected to be very slow. Any grazing activity will significantly accelerate the natural erosional processes on these very loose sandy slopes.

Recreation. These units lie adjacent to some of the roads along major drainages and access routes on the District. These units, therefore, may be significant as backdrops and do provide the canyon-like appearance of the Deadwood drainage. Mass wasting resulting in debris slides will be a significant hazard to activities or development constructed adjacent to this landtype.

Management Evaluation:

Map Symbol 122-4
Oversteepened Canyon Lands
Moderately Deep Skeletal, Sandy and Loamy Soils

Location: North slopes along the South Fork of the Fayette River.

Landtype Characteristics: The units of this landtype are very steep canyon lands generally associated with major streams. Side slope dissections are steep, shallow to moderately deep, parallel, and dominantly second or third order where they contact the main drainage. A gap of two to four orders exists between the drainages on the slope and the main stream. Erosional processes are extremely active; undercutting at the base of the units by the major streams and faulting are primary reasons for the oversteepened slopes. The slopes are north facing and heavily timbered, with slope gradients of 60 to 80 percent. The moderately deep skeletal, sandy and loamy soils have developed over extremely well fractured, very weakly to well weathered granite bedrock.

Soils: The dominant soil (40%--IECA-2), on mid and upper slopes, has a 0 to 2-inch organic layer over a yellowish brown gravelly loamy coarse sand, 20 to 40 inches deep, with 55 percent coarse fragments. The other major soils (20%--IFBA-5, 20%--IFBD-5), have a 0 to 2-inch organic layer over a gravelly sandy loam to gravelly sandy clay loam. The deep soil (IFBA-5), on north slope wet drainages, contains 50 percent coarse fragments dominated by gravels. The shallow soil (IFBD-5), on oversteepened slopes and spur ridges, contains 60 to 70 percent well graded coarse fragments. Rock outcrop is common to spur ridges.

Vegetation: The slopes of this landtype are well vegetated. Timbered habitat types include subalpine fir/tall huckleberry, subalpine fir/grouse whortleberry, Douglas-fir/ninebark, and Douglas-fir/pinegrass. Forest crown density ranges from 0 to 60 percent and brush crown density is 0 to 50 percent.

Hydrology: Annual precipitation and water yield average 25 to 35 and five to 15 inches, respectively. Snowmelt occurs in a relatively short time due to the northerly aspects of the landtypes. Overland flow and subsurface flow are the prime means of water conveyance within and from the unit. During the spring snowmelt period, which releases a majority of the annual yield, most of the water leaves as subsurface flow. This water tends to move evenly downslope and accumulate within lower slopes. Overland flow is limited to rocky and shallow soil areas during high intensity summer storms. These landtypes respond rapidly to water inputs (snowmelt, rain, etc.). However, due to the parallel drainage pattern, runoff and subsurface water is not concentrated.

Management Qualities: This landtype is among the most hazardous on the District. Erosion hazards are high to very high when surface litter and

vegetation are disturbed. Surface creep will be accelerated with disturbances. Mass stability hazards are moderate to very high.

Roads. Construction problems will mainly involve stability of cuts and fills, acceleration of surface erosion and handling intercepted subsurface flow. Bedrock is competent and extremely well fractured in most areas. The magnitude of hazards will be reduced slightly on upper slopes and ridges.

Wood. This landtype is one of the better timber sites on the District with moderate to high productivity potentials. Limitations to reforestation are severe to moderate and are related to vegetative competition.

Water. These steep units are highly susceptible to accelerated erosion from artificial concentration of water. Road cuts will intercept subsurface flow during snowmelt. Erosion rates of road prisms will be very high to extreme. Due to the proximity of these landtypes to perennial streams, nearly all eroded material will enter streams.

Forage. The potential production for this landtype is 100 to 1000 pounds per acre per year of usable dry forage. However, trampling of these steep unstable slopes by grazing animals will greatly accentuate creep terracettes, making more material for release into adjacent streams as sediment. Recover from disturbance will be moderately rapid.

Recreation. These units are the prime scenic portion of many travel routes on the District. Some hiking and hunting does occur here. Trails pass through or originate at the base of these units, providing access to some of the back country. Trail construction and maintenance are generally difficult because of rock and erosion hazards. Trafficability is expected to be good.

Management Evaluation:

Map Symbol 123-1
Faulted Bench Land
Moderately Deep Skeletal, Sandy and Loamy Soils

Location: This landtype is limited in extent and somewhat variable. Typical units occur at the north end of the Deadwood Reservoir and along the South Fork of the Payette River.

Landtype Characteristics: These units are generally small remnants of block faulting activity that have not been dissected by the fluvial processes. All aspects are included and forest crown densities range from 10 to 70 percent. A drainage pattern is very weakly developed, shallow and somewhat dendritic to irregular. Slopes are very short and gentle, with gradients dominantly less than 20 percent. Unlike dissected fluvial landtypes, the overall relief has a very uniform base level. The moderately deep skeletal, sandy and loamy soils have developed over variably fractured and weathered granite bedrock.

Soils: A pair of soils (HBDA-4, HBDA-5) dominate this landtype. These soils are very similar with a 0 to 3-inch organic layer over a dark grayish brown to brown loam to gravelly sandy clay loam, greater than 60 inches deep. The finer textured soil (HBDA-4) is confined to lower gradients and depressions with a high water table and contain only a trace of coarse fragments. The other soil (HBDA-5) is common to the more sloping units and contains 50 percent well graded coarse fragments. Most of the soils in this landtype have developed in depositional materials that have been deposited on the previously formed bench. A high water table is common to the unit on the north end of the Deadwood Reservoir.

Vegetation: This landtype is well timbered with forest crown densities ranging from 10 to 70 percent. Wet meadow communities and a Douglas-fir/pinegrass habitat type dominate the lower wet areas while Douglas-fir/elk sedge and Douglas-fir/Idaho fescue habitat types are common to the more sloping portions of the units. Brush crown densities will range from 0 to 30 percent.

Hydrology: Mean annual precipitation is 30 to 40 inches and mean water yield is 15 to 20 inches. Snowpack is moderate to deep and persists through May. Runoff is dominantly as ground water. This area receives much water from higher and adjacent slopes and the water table is at or near the surface during the spring. Depressions stay wet well into the summer from ground water recharge generated on higher adjacent units. The deep soils store and slowly release this water to streams running through or adjacent to them. The units near the Warm Springs airport have been somewhat elevated and lack water tables that persist through the summer.

Management Qualities: Most hazards on this landtype are rated very low to low. The major limitations will be a high probability of intercepting subsurface water or ground water tables, locally poor trafficability and a moderate to high erosion hazard for extensive excavations.

Roads. Major limitation in localized areas will be a high water table that will reduce the bearing capacity of the road prisms. Trafficability in these areas will be poor. Surface erosion of cut and fill slopes will be a moderate problem where cuts exceed 5 to 6 feet in length; however, because of the low gradients this may not be a significant problem. Revegetation potentials for cut and fill slopes will be good to very good.

Wood. Timber productivity potential for this landtype is dominantly moderate with limitations to reforestation rated moderate to severe. The major limiting factors are vegetative competition and a seasonal high water table.

Water. The high water table in localized areas is a main hydrologic hazard to improvements and activities. Continuous cuts or ditches are the major hazard to the hydrology. These are likely to drain the area and reduce the regulation of water flow through the soil deposits. Soil erosion and sedimentation may accompany this artificial drainage. Streams through the landtype can easily be diverted from their natural channels at road crossings unless special care is taken.

Forage. Forage production on this landtype is rated low to moderate with some localized areas around wet meadows being rated high. Although current levels are close to potentials, most units are in areas closed to grazing or because of their heavy timber cover and windthrow, evidence little grazing impact. The exception is the unit on the north end of the Deadwood Reservoir where the wet meadows receive considerable grazing impact and some deterioration and subsequent sedimentation has resulted. Most areas, however, are expected to recover rapidly under good management practices.

Recreation. These units have many qualities similar to depositional landtypes and are basically well suited for a variety of recreational activities. Because of the gentle relief and availability of water, these units may be well suited for recreational development or administrative sites. Localized areas associated with wet meadows or high water tables may not be as well suited and may provide problems associated with poor trafficability and compactability of soils. Dust will be a moderate problem during the drier seasons of the year. Most soils, however, are poorly suited to development of leach fields or other facilities requiring purification of affluent within the soil profile.

Management Evaluation:

Map Symbol 123c
Strongly Dissected Faulted Bench Land
Shallow and Moderately Deep Loamy Skeletal Soils

Location: This landtype is common to the west side of the Deadwood Reservoir.

Landtype Characteristics: This landtype is the Strongly Dissected Fluvial remnant of extensive areas of major faulting activities. The resultant topography is a system of long, broad ridges separated by deep dissections with steep sideslopes. These units contain all aspects with forest crown density ranging from zero to 60 percent on south and west slopes and 50 to 70 percent on north slopes. The sideslopes of the major deep parallel dissections have gradients ranging from 40 to 70 percent. The slopes on broad ridges are somewhat less. The shallow and moderately deep loamy skeletal soils have developed over masked or extremely well fractured, weakly to very well weathered granite bedrock.

Soils: The dominant soil (60%--JEFA-5) over most south, east, and west slopes has a 0-to-2-inch organic layer over a dark brown to yellowish brown gravelly sandy loam 20 to 60 inches deep, with 40 percent fine gravel. A less extensive soil (25%--IFBA-5), on steeper, north slopes, has a 0-to-4-inch organic layer over a very dark grayish brown to yellowish brown gravelly sandy loam to gravelly sandy clay loam, 20 to 40 inches deep, with 40 percent coarse fragments dominated by fine gravels. A minor shallow soil (15%--JECB-2), on oversteepened sideslopes and spur ridges, is a very dark grayish brown to dark yellowish brown gravelly loamy coarse sand with 45 percent moderately well graded coarse fragments.

Vegetation: This landtype is dominantly well timbered except for oversteepened south slopes. Forest crown densities range dominantly between 30 and 70 percent. These denser timbered stands are dominated by subalpine fir/elk sedge, subalpine fir/spirea, Douglas-fir/elk sedge and Douglas-fir/spirea habitat types. Areas where forest crown densities range from zero to 10 percent are dominated by a Douglas-fir/bitterbrush habitat type. Understories are dominantly brushy with brush crown densities ranging from 10 to 70 percent.

Hydrology: These lands receive an average of 30 to 40 inches of precipitation annually. Snowpack melts at moderate to rapid rates in May. Approximately 10 to 20 inches of water is yielded annually. Unlike other faulted bench lands this landtype has distinct V-shaped dissections suggesting that streamflow from higher slopes and from this landtype is significant. The strongly dissected characteristic of these units is derived, in part, from the high water yielded from upslope cryoplanated landtypes. Overland flow is uncommon and restricted to periods of high

intensity summer storms. The dominant means of water movement is by subsurface flow and deep seepage. This landtype is moderate to rapid in response to water input.

Management Qualities: These units have a moderate to very high surface erosion and debris slide hazard. Surface creep also ranks moderate to very high. Excessive disturbance combined with these high hazards will rapidly make surface erosion and subsequent sediment production a major problem associated with this landtype.

Roads. Construction problems will mainly involve poorly graded materials, spalling bedrock, high and very high erosion hazards, and some mass stability hazards for cut and fill slopes. The least impact has been observed when roads are held to the upper one-fourth of the long, parallel ridges. As these roads are moved downslope or increased in width, the impacts associated with these hazards become more significant. Another major problem involves connecting ridges and crossing the major drainages which separate them. The size of such drainages and the magnitude of water and material that passes through these drainages will create major problems at crossings. Culverts are generally inadequate and bridging is usually required. Trafficability, however, will be good to very good. Because of the unique character of the parallel ridge system and the suitability of these ridge locations for roads, these units often provide opportunities for skyline logging systems.

Wood. This landtype is among the better timber producing landtypes on the District. The moisture, temperature, and soil mix appear to provide an ideal climate for ponderosa pine, especially on the lower slopes and in drainages. The Douglas-fir/spirea and the Douglas-fir/elk sedge habitat types have a moderate to high timber productivity potential with severe limitations to reforestation generated by high evapotranspiration losses and vegetative competition. The cooler, north slope habitat types, subalpine fir/elk sedge and subalpine fir/spirea, have a low to moderate timber productivity potential with severe limitations to reforestation dominated by vegetative competition. The drier, more open stands of Douglas-fir/bitterbrush are rated very low with very severe limitations to reforestation. Low water holding capacity and high evapotranspiration losses on these dry south slopes are the major limiting factors.

Water. Erosion and sedimentation hazard varies from moderately low on ridge tops to high on steep slopes adjacent to streams. The numerous dissections make much of the area fall in the high sedimentation hazard. As construction or other activities move downslope, hazard of sedimentation increases. The deeply entrenched channels will require deep cuts and fills for road crossings. Roads on upper slopes and ridges that require no crossings of deeply entrenched streams will be significantly less problem.

Forage: Current and potential production estimates for this landtype are very close and are rated low to moderate. Brush species are a major component of the understories with crown densities dominantly 30 to 70 percent. The high surface erosion hazards, debris slide hazard, and surface creep hazard will be significantly accelerated by excessive grazing. Recovery rates, however, will be moderately rapid except for steeper south slopes.

Recreation. These areas appear to be well suited for a variety of recreational activities that do not involve much soil disturbance. The numerous parallel ridges separated by deep dissections provide interesting vistas and ideal hunting country. Trails will be relatively stable, although water bars and seasonal maintenance will be necessary. Surface erosion will be the major problem. Trafficability will be good to very good.

Management Evaluation:

Valley Types

Valley types include valley bottoms and the lower 200 to 500 feet of their immediately adjacent sideslopes. Valley types have similar geomorphic and morphometric characteristics. They are natural portions of the valley landscape resulting from the interaction of climate, available relief, rock type (lithology), geologic structure, and stream dynamics. Valley types have predictable hydrologic, engineering, and environmental characteristics. Valley types can be a basic part of an interdisciplinary reconnaissance of streams and valleys from which many useful management interpretations can be made and kept in context of the land systems inventory.

Landtype descriptions provide good information for mountain slopes, depositional lands, and other land areas large enough to be mapped at the reconnaissance level. However, stream valleys are often too narrow to be delineated as separate landtypes, yet their characteristics are often significantly different from the adjacent landtypes. This is due to the additional influence of the occupying streams.

Stream valleys are strategic areas from the standpoint of recreation and access planning and maintenance of desired stream conditions. Knowledge of characteristics of the major stream valleys is very useful in broad land use planning. Streamflow, quantity, quality, and timing are not direct considerations of this stratification of stream valleys.

The approach used to stratify and describe valley types is very similar to that approach used with landtypes. In a sense, valley types are special landtypes, too narrow to be delineated. The natural population of fourth order and larger stream valleys was studied to determine the most logical system for stratification. Upstream watershed size and complexity, physiographic subsections, valley forming processes, local modifying influences appear to be useful considerations in stratifying valleys for inventory.

Valley types contain the following information:

1. Designative Information
    a. Name
    b. Number
    c. Map Symbol
2. Illustrative Photograph
3. Geomorphic Characteristics - The Significant Geologic, Morphologic, and Stream Energy Characteristics
    a. Valley Forming Process or Evolution
    b. Shape or Configuration
    c. Stream Energies or Dynamics
    d. Parent Material or Rock Type
    e. Other Distinguishing Features

4. Morphometric Characteristics - The Dominant Range of Dimensions of Significant Physical or Tangible Properties

   a. Valley Bottom Width
   b. Sideslope Gradient
   c. Channel Gradient
   d. Channel Materials
   e. Other Physical Properties

5. Management Qualities - The Relationships Between Valley Type Characteristics and Management Activities Expressed as Hazards or Potentials (Management Qualities Criteria for Valley Types may be noted in Appendix A)

   a. Channel Overflow Flooding Hazard
   b. Sediment Buffering Quality
   c. Sedimentation Hazard from a Valley Bottom Road
   d. Stream Shade Reduction Hazard
   e. Channel Erosion Hazard with Channel Alteration

APPENDIX A - INTERPRETIVE TABLES AND CRITERIA

Explanation of Table No. 1
Landtype Erosion and Stability Hazards

General Characteristics

Map Symbol - Mapping symbol representing each landtype.

Soil Unit - Lists the number assigned to individual soils and percentage of each in the landtype.

Dominant Slope Range - Gives the dominant slope range for each mapping unit. When individual soils slope gradients vary from dominant range, these are listed separately after the individual unit.

Bedrock Characteristics - The following key was used to describe the granitic bedrock characteristics:

Class No.	Fracturing	Distance Between Fractures
1	Massive	6' or more
2	Slightly Fractured	4' to 6'
3	Moderately Fractured	1.5' to 4'
4	Well Fractured	0.5' to 1.5'
5	Extremely Well Fractured	0.5'

Class	Weathering
1	Unweathered Rock - Unweathered rock will ring from a hammer blow; cannot be dug by the point of a rock hammer; joint sets are the only visible fractures; no iron stains emanate from biotites; joint sets are distinct and angular; biotites are black and compact; feldspars appear to be clear and fresh.
2	Very Weakly Weathered Rock - Very weakly weathered rock is similar to Class 1, except for visible iron stains that emanate from biotites; biotites may also appear "expanded" when viewed through a hand lens; feldspars may show some opacity; joint sets are distinct and angular.
3	Weakly Weathered Rock - Weakly weathered rock gives a dull ring from a hammer blow; can be broken into "hand-sized" rocks with moderate difficulty using a hammer; feldspars are opaque and milky; no root penetration; joint sets are subangular.

4 Moderately Weathered Rock - Moderately weathered rock may be weakly spalling. Except for the spall rind, if present, rock cannot be broken by hand; no ring or dull ring from hammer blow; feldspars are opaque and milky; biotites usually have a golden yellow sheen; joint sets indistinct and rounded to subangular.

5 Moderately Well Weathered Rock - Moderately well weathered rock will break into small fragments or sheets under moderate pressure from bare hands; usually spalling; root penetration limited to fractures, unlike Class 6 rock where roots penetrate through the rock matrix; joint sets are weakly visible and rounded; feldspars are powdery; biotites have a light golden sheen.

6 Well Weathered Rock - Well weathered rock can be broken by hand into sand-sized particles (grus); usually so weathered that it is difficult to determine if rock is spalling, roots can penetrate between grains; only major joints are preserved and filled with grus; feldspars are powdery; biotites may appear silver or white in thin flakes.

7 Very Well Weathered Rock - Very well weathered rock has feldspars that have weathered to clay minerals and rock is plastic when wet, no resistance to roots.

Surface Erosion Hazards

Inherent Erosion Hazard. Rated for bare soil conditions according to five qualitative classes. These classes are based on the ability of the soils to take in water, resistance of the soil surface to dispersion under the impact of rainfall and surface water movement, effect of coarse fragments that reduce surface detachment, and effect of topography. Climate was considered a constant.

5 - Very High - Unprotected bare soil will erode sufficiently to severely and permanently damage the productive capacity of the soil or will yield excessively high volumes of sediment.

4 - High - Unprotected bare soil will erode sufficiently to severely damage productive capacity or will yield high volumes of sediment.

3 - Moderate - Sufficiently resistant to erosion to permit limited and temporary exposure of bare soil during development or use.

2 - Low - Sufficiently resistant to erosion to permit exposure of bare soil under minimal precautionary restrictions.

1 - Very Low - No appreciable hazard of erosion.

The following method was used to determine the above classes:

Inherent Erosion Hazard Classes.

$$\text{Inherent Erosion Hazard Class} = \frac{\text{Soil Erodibility} + \text{Topographic Hazard}}{2}$$

Soil erodibility was taken as an average of soil erodibility adjusted for protective coarse fragments of the dominant soils in each land type. Five class values were used for soil erodibility and topographic hazard. They are:

Soil Erodibility Index

Permeability X Detachability each on a 0 - 10 Scale	Class Rating
0 - 6	1
7 - 20	2
21 - 40	3
41 - 70	4
71 - 100	5

The topographic hazard estimate was based on slope gradient only. Slope class values to be added to soil erodibility are shown below.

Slope Classes

Slope Gradient	Class Rating
0 - 66	1
7 - 20	2
21 - 45	3
46 - 65	4
66+	5

Mass Stability Hazards

These erosion hazards are related to mass movement of soil and materials. The movement may happen within a short period or take place over a relatively long period of time.

Debris Slides. This column gives the relative hazards for the failure of accumulations of materials in (draws) confined drainages. Three numerical qualitative ratings are given based on soil and slope characteristics, surface erosion and surface creep activity combined with the estimated period of frequency of climatic conditions which cause such slides to occur. Amounts of debris considered to be significant will vary with the resource affected. The classes are:

5 Very High - Combinations of the above factors result in frequent movement of large amounts of material as debris slides.

3 Moderate - Combinations of the above factors result in conditions that vary from frequent movement of small amounts of material to infrequent movement of large amounts of material.

1 Very Low - Combinations of the above factors result in small amounts of materials being moved at infrequent intervals of time.

Slump. This column gives the relative hazard for lineal of bow-shaped failures of slopes to occur in any given year under natural conditions. The area as a whole has a relatively low hazard for these kinds of failures. Most of them will occur on finer-textured soils that are in seeps, low spots or at the toes of slopes. A few have occurred as a structural failure in weathered bedrock or slippage along joining planes in the bedrock.

Five qualitative classes were used. They are 5 - very high, 4 - high, 3 - moderate, 2 - low, and 1 - very low. The very high and high classes are probably the only classes which would be a significant hazard to land management.

Surface Creep. This column gives three numerical qualitative rating classes for surface creep. Surface creep is considered to be the downslope movement of the surface soil which eventually accumulates in draws. This material thus accumulated in draws is subject to movement as debris slides. The materials move primarily in mass through the gravitational force which may be accelerated by the effect of water, wind, freezing and thawing. Surface creep includes individual soil or rock particles that move only a short distance at one time. The three classes are 5 - very high, 3 - moderate, and 1 - very low. Moderate ratings are considered to be for lands where creep averages about 25 cubic yards per square mile per year.

TABLE 1

LANDTYPE EROSION AND STABILITY HAZARDS — LOWMAN District

Map Symbol	Soil Unit No.	Soil Unit %	Dominant Slope Range Percent	Bedrock Characteristics: Fracturing Class	Bedrock Characteristics: Weathering Class	Inherent Surface Erosion Hazard	Mass Stability Hazards: Debris Slides	Mass Stability Hazards: Slump	Mass Stability Hazards: Surface Creep
101	GDFA-2	70	0-5	-	-	2	-	-	-
	JADA-2	30	0-5	-	-	5(flooding)	-	-	-
101-3	IADA-2	70	0-5	-	-	2	-	-	-
	IECA-2	30	0-15	-	-	3	-	-	-
102	GDEA-5	<15	0-5	-	-	1	-	-	-
	JECA-2	35	0-5	-	-	1	-	-	-
	JEFA-5	50	0-5	-	-	1	-	-	-
103	HBDA-5	30	0-5	-	-	3	-	-	-
	IECA-2	50	0-5	-	-	3	-	-	-
	JEAA-2	20	0-2	-	-	2	-	-	-
103-1	IADA-2	30	0-5	-	-	2	-	-	-
	IECA-5	50	0-15	-	-	3	-	-	-
	JEAA-2	20	0-2		-	2	-	-	-
104	IFBA-4	<15	0-5	-	-	2	-	-	-
	IFBA-5	85	0-20	-	-	2	-	-	-
105	IECA-2	80	0-10	-	-	1-3	-	-	-
	IFBA-5	20	10-20	-	-	4	-	-	-
106	IECA-2	80	0-15	-	-	2	-	-	-
	IECA-3	20	0-30	-	-	3-4	-	-	-
106-2	IECA-5	80	0-25	-	-	3	-	-	-
	JEAA-5	20	10-30	-	-	3	-	-	-
108	JEAA-5	100	30-60	-	-	3-4	1	3	1

TABLE 1

LANDTYPE EROSION AND STABILITY HAZARDS

Lowman District

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109-2	IFBA-5	80	10-60	4-5/M	2-6	4	1	1	1-3
	IFBD-5	20	30-50	5	2-3	3-4	1	1	1
109-9	IFBA-3	40	10-30	M	5-6	3	1	2	1
	IFBA-5	60	10-40	M	5-6	3	1	1	1
109a-1	IFBA-5	85	20-50	5/M	2-6	3	1	1	1-3
	IFBD-5	15	20-50	5/M	4-5	3-4	2	1	3
	R. O.	T							
109b	IECA-2	30	40-60	5/M	3-6	3-4	1-2	2-3	1-3
	IECA-5	70	20-60	4-5/M	4-6	3-4	1	3	1
109c	IECA-2	70	20-60	4-5/M	4-6	3-4	3	2-3	1-3
	JEAA-2	30	20-60	4-5/M	4-6	4	3	2-3	3-5
109d-1	JEAA-2	65	60-70	3-5/M	2-5	5	4	2	3-5
	JEAE-2	30	40-60	3-5	2-4	3	3-4	2	3-5
	R. O.	5							
109n-1	JEAA-2	60	10-30	4-5/M	3-5	3	1	1	1-3
	JEAA-5	40	30-50	4-5/M	3-4	3	1	1	3
110x	IFBA-4	≤15	0-10	3	2	2	1	1	1
	IFBD-5	≥60	10-50	2-4	1-2	2-3	1	1	1
	R. O.	10-30							
111a	IECA-5	80	50-70	3-5	3-5	4	2	1	1-3
	JEAE-5	20	60-70	3-5	2-3	4	2-3	1	3
111a-1	IFBA-5	75	40-60	2-4	4	4	3-4	1	3
	JEAE-2	20	40-60	2-4	4	4-5	3-4	1	3
	R. O.	5							

TABLE 1

LANDTYPE EROSION AND STABILITY HAZARDS — Lowman District

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111b	IFBA-5	40	50-80	5	3-5	4	3	1	1
	IFBD-5	30	60-80	5	3-5	4	3	1	1
	JEAA-5	25	60-80	5	2-4	4	4	1	3-5
	R. O.	5							
111b-1	JEAA-2	35	50-60	3-5	2-3	3-4	3-4	1	3
	JEAE-2	60	50-70	3-4	2	4	4	1	3-5
	R. O.	5							
111c	IECA-5	40	40-60	2-5/M	4-6	4	3	1	1
	JEAE-5	55	40-70	2-5	2-4	4-5	4	1	3-5
	R. O.	5							
111d-3	JEAA-5	40	30-60	4-5	2-5	3-4	2	1	1-3
	JEAE-5	40	50-80	5	2-3	4	3	1	3
	R. O.	20							
111x	JEAE-2	30-70	60-90	4-5	2-4	4-5	3	1	3-5
	R. O.	30-70							
112-1	JEAA-2	50	20-40	5	3-4	3	1	2	1-3
	IECA-3	50	20-40	5	3-4	2	1	2	1-3
113	JEAE-2	40	70-90	2-3	1-2	4	2	1	1-3
	R. O.	60							
114	JEAA-5	75	20-40	4-5	2-3	2-3	1	1	1
	JEAE-5	20	30-60	4-5	2-3	3-4	1	1	1-3
	R. O.	5							
120a-8	IFDA-5	40	40-50	5/M	4-6	3	1	4*	1
	GDFQ-5	60	50-60	5	3-4	3	2-3	2-4*	3

TABLE 1

LANDTYPE EROSION AND STABILITY HAZARDS

Lowman District

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120b-3	GDFA-3	20	40-60	5/M	3-5	3-4	1	1-2	1-3
	GDFQ-5	45	60-70	5/M	3-5	3	3-4	2	3
	GDFS-5	30	40-60	5/M	4-6	3-4	2	3-4	1
	R. O.	5							
120b-4	IFBA-3	20	40-70	3-5/M	4-6	3-4	2-3	1-2	1-3
	IFBA-5	80	40-70	3-5/M	4-6	4	2-3	1-3	1-3
120b-6	JEFA-3	70	40-60	5/M	4-6	4	3	3	1-3
	JEFA-5	30	40-60	5/M	4-6	4	3	2	1
120c	JEFA-1	80	40-60	5/M	4-6	4	3	1	3
	JEFA-2	20	40-70	5/M	5-6	4	1-2	1	1-3
120c-1	IECA-1	40	50-70	4-5	3-6	4-5	4	4	1-3
	JEAA-2	30	60-80	5	3-6	3-4	4	1-2	1-3
	JEAE-2	30	70-90	4-5	3-4	4-5	4	1-2	1-3
120c-2	GDFA-2	40	40-60	5/M	5-6	3-4	3	3-4*	3-5
	JECA-2	60	50-70	5/M	4-6	4	4	3-4*	5
120c-3	IFBA-5	15	50-70	5/M	3-6	4	3-4	1	1
	JECA-2	40	50-70	5	2-3	4	4-5	1	3
	JECB-2	20	50-70	4-5/M	3-6	3-4	4-5	1	1-3
	JEFA-5	20	50-60	5/M	2-6	4	4	3	1-3
	R. O.	5							
120c-11	IFBA-3	40	50-70	M	5-6	4	3-4	1	3
	IFBA-5	60	50-70	4-5/M	4-6	4	2-4	3	1-3
120d-3	IECA-5	75	60-70	5	3-5	4	4	3	3
	JECB-2	20	60-70	5	2-4	4	4	2	3
	R. O.	5							

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LANDTYPE EROSION AND STABILITY HAZARDS — Lowman District

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120e	IFBA-3	30	5-20	5/M	4-5	3	1	2	1
	JEFA-1	70	20-40	5/M	4-5	3	1-2	2	1-3
120e-1	JEFA-1	100	10-50	5/M	5-6	3-4	2-3	1-3	3
121e	IECA-3	100	10-40	M	5-6	3-4	1-2	1	1-3
121e-1	IFBA-5	60	10-30	-	-	2-3	2	1	1
	IFDA-5	40	10-30	-	-	2-3	2-3	1	1
122	JEAA-2	20	60-80	5/M	4-6	4	4	1-3	1-3
	JECB-2	45	60-80	3-5/M	2-4	4-5	4	1	5
	JEFA-2	30	50-65	3-5/M	4-5	4	3-4	1	3
	R. O.	5							
122-4	IECA-2	50	60-80	5	2-3	4	3	1	1-3
	IFBA-5	20	60-80	5	4-6	4-5	3	3-4*	1
	IFBD-5	20	60-80	5	2	4	3	1-4*	1-3
	R. O.	<10							
123-1	HBDA-4	50	0-10	-	-	2	1	1	1
	HBDA-5	50	5-20	-	-	2-3	1	1	1
123c	IFBA-5	25	50-70	5/M	5-7	3-4	3-4	2-3	1
	JECB-2	15	50-70	5	2-4	4-5	4	1	3-5
	JEFA-5	60	40-60	5/M	3-6	4	3	1	1-3

Explanation of Table No. 2
Construction Hazards

This table lists the soil characteristics and interpretations that are important primarily to road construction. Characteristics and interpretations given in Table No. 1 should also be considered in an evaluation of each landtype with regard to construction hazard.

Map Symbol. Mapping symbol representing each landtype.

Soil Unit. Lists the number assigned to individual soils and percentage of each in the landtype.

Dominant Slope. Gives the dominant slope range for each soil unit.

Percent of Rock Outcrop. Gives the percentage of rock outcrop (attached bedrock) in each soil unit.

Coarse Fragments. This column gives an estimate of the percentage of coarse fragments in three size ranges which correspond to fine gravel (2 mm to ¼"), medium and coarse gravel (¼ to 3"), cobble or stones (> 3"). Estimates are made from sieved samples using a 2 mm screen.

Surface Erosion

Cut and Fill Slopes. This column gives five numerical qualitative classes for erosion hazard of cut and fill slopes. Ratings are based on exposed materials according to the same criteria as inherent erosion (Table No. 1). Ratings are based on (a) cut ratios of 3/4:1 on roads 24 feet wide on the dominant slope gradient for the landtype and (b) uncompacted fills with ratios and heights infered from 24 foot wide roads and dominant slope gradient with balance cut and fill design; bare of vegetal cover, bermed and with an outslope grade. The classes are:

5 - Very High - Unprotected cuts and fills yield excessively high volumes of sediment.

4 - High - Unprotected cuts and fills will yield excessively high volumes of sediment during periods of flashy or long duration runoff.

3 - Moderate - Sufficiently resistant to erosion to permit temporary exposure of bare soil after construction.

2 - Low - Sufficiently resistant to erosion to permit exposure of bare soil under minimal precautionary restrictions.

1 - Very Low - No appreciable erosion hazard.

Road Surface. Three numerical qualitative class ratings are made for the erodibility of the road surface. Ratings are based on road surfaces with tread ruts, compacted by traffic, without wearing or base coarse, having a 6% grade sustained for 500 feet, with minimal lateral sloping or crowning. Only erosion from water generated on the road surface is considered. Composition of roadbed materials are based on depth and texture of soil, amount and size of coarse fragments and kind of fracturing and weathering of underlying bedrock. Classes are:

5 - Very High - Roadbed will yield high amounts of sediment and require constant or extensive repair for maintenance of trafficability.

3 - Moderate - Sufficiently resistant to erosion to require only intermittent or seasonal repair for maintenance of trafficability.

1 - Very Low - Little or no appreciable erosion hazard.

Mass Stability

Cut Slope. This column gives five numerical qualitative classes for mass failure of cut slopes. The hazards are dependent essentially on the same factors as natural slope stability. Generally speaking, a road cut will be less stable than a natural slope. The chief variable is the height and angle of cut. Landtypes with the highest cut slope failure hazards generally have an accumulation of fine-textured homogenous materials, steep slopes, unstable bedrock conditions or a subsurface moisture source. The classes are based on probability of failure and relative volumes of materials that could be expected from mass failures of the cut slopes. The classes are:

5 - Very High - Mass failures of cut slopes yield excessively high volumes of material and constant removal is required to keep sediment from reaching streams and in some cases to maintain trafficability.

4 - High - Mass failures of cut slopes yield high volumes of materials that require removal of materials from the roadbed several times each year.

3 - Moderate - Cut slopes fail each year but yield only such volumes of material that require removal of material on a seasonal basis.

2 - Low - Cut slopes may not fail each year and when they do, only occasional removal of material is required.

1 - Very Low - Cut slopes seldom fail or produce very low amounts of material.

Fill Slopes. This column gives five numerical qualitative classes for mass failure of fill slopes. The classes are rated on probability of failure and the strength properties of the materials used in the construction of fills. The mass failures of fills is highest when materials are poorly graded, fine-textured, and subject to saturation at the base. The classes are:

5 - Very High - The probability of failure is high and failure of fill slopes will yield excessively high volumes of sediment to stream channels and/or roadbed will require frequent extensive repair to maintain trafficability.

4 - High - The probability of failure is high even with intensive prevention treatment. Failure of fill slopes will yield moderate to high amounts of sediment to stream channels and/or the roadbed will require frequent repair to maintain trafficability.

3 - Moderate - The probability of failure is high unless intensive prevention treatments are used. Failure of fill slopes will yield moderate to high amounts of sediment to stream channels and/or the roadbed will require repair to maintain trafficability.

2 - Low - Some failures can be expected with normal precautionary measures. Failures of fill slopes will yield moderate to high amounts of sediment to stream channels and/or the roadbed will require repair to maintain trafficability.

1 - Very Low - Probability of mass failure is small or sediment yields are low and/or roads require only occasional repair.

Revegetation Potential

Cut and Fill Slopes. This column gives five numerical qualitative classes for potential of revegetation of cut and fill slopes to establish a protective cover. Criteria used to arrive at the classes are soil texture, water holding capacity, depth of soil, and climatic limitations. This rating does not consider possibility of specialized revegetation practices such as hydro-seeding or use of mats. The classes are:

5 - Very High - Excellent response to revegetation can be expected the first year with normal accepted practices.

4 - High - Good response to revegetation can be expected the first year with normal accepted practices.

3 - Moderate - Fair response to revegetation can be expected the first year with normal practices. More than one year may be necessary to establish a protective vegetated cover. Limitations are soil profiles with limited water-holding capacity or somewhat adverse climatic conditions.

2 - Low - Poor response can be expected by using normal revegetation practices. Limitations are coarse textured or shallow soils with low water-holding capacity, low fertility level or adverse climatic conditions.

1 - Very Low - Little or no response can be expected by using normal revegetation practices. Limitations are very coarse-textured or shallow soils with very low water-holding capacity and low fertility level or adverse climatic conditions.

Trafficability. The trafficability interpretation is composed of several factors. Bearing strength as reflected by soil texture of the surface horizons and control section combined with the amount of rutting and the traction problems associated with fine textured soils are the main factors. A "weighted" soil texture is used depending on the expected depth of cut. Surfaces of roads on gentle slopes generally contain more surface material than do those road surfaces constructed on steep slopes where considerable amounts of the control section material, and possibly bedrock, are used. This interpretation rates road surfaces that have no surfacing such as work roads and other low standard roads. Classes are:

5 - Very Good - Fragmental and loamy skeletal families with coarse fragments 3/4" diameter and larger and roads built in hard, well fractured bedrock. Road surfaces are resistant to erosion, and there are few rutting and traction problems. Intermittent maintenance is needed.

4 - Good - Coarse loamy, coarse silty, and loamy skeletal families with coarse fragments less than 3/4" diameter. Road surfaces need only seasonal maintenance to insure trafficability. Ruts are not usually formed in wet weather and there are few traction problems.

3 - Fair - Fine loamy, fine silty, sandy, and clayey skeletal families. Road surfaces need maintenance several times during a season to reduce ruts. Some traction problems exist when clayey surfaces are wet and with sandy surfaces.

2 - Poor - Fine clayey, very fine clayey families, and surfaces from organic soils. Road surfaces need constant maintenance during wet weather. Rutting is severe and traction problems indicate the use of 4-wheel drive which is not always successful.

1 - Very Poor - Permanently wet soils with a water table at or near the surface. Soils are for the most part impossible to traffic.

TABLE 2

CONSTRUCTION HAZARDS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
101	GDFA-2	70	0-5	0	10	10	30	-	-	5	-	-	2	3	4
	JADA-2	30	0-5	0	10	10	25	-	-	5	-	-	1	2	2-3
101-3	IADA-2	70	0-5	0	40	0	0	1	1	5	1	1	3	4	1
	IECA-2	30	0-15	0	25	10	5	2	2	5	2	2	2	3	3-4
102	GDEA-5	<15	0-5	0	15	15	20	-	-	3	-	-	1	2	3
	JECA-2	35	0-5	0	10	30	5	-	-	5	-	-	1	2	3-4
	JEFA-5	50	0-5	0	10	10	25	-	-	3	-	-	3	4	4
103	HBDA-5	30	0-5	0	20	10	30	2	3	3	1	1	1	3	3
	IECA-2	50	0-5	0	25	5	10	2	3	5	1	1	1	3	3
	JEAA-2	20	0-2	0	20	20	20	1	2	5	2	1	1	2	3
103-1	IADA-2	30	0-5	0	40	0	0	1	1	5	1	1	3	4	1-2
	IECA-5	50	0-15	0	25	10	5	1	2	3	2	2	2	3	3-4
	JEAA-2	20	0-2	0	20	20	20	1	2	5	2	1	1	2	4
104	IFBA-4	<15	0-5	0	0	0	0	-	-	3	3	3	3	3-4	1-2
	IFBA-5	85	0-20	0	15	5	25	-	-	3	2-3	1	2	3	4
105	IECA-2	80	0-10	0	10	10	20	2	3	5	3	1-2	2	4	4
	IFBA-5	20	10-20	0	10	15	30	3	3	3	2	2	2	3-4	4-5
106	IECA-2	80	0-15	0	20	20	25	2	2-3	5	2	1	1	2-3	5
	IECA-3	20	0-30	0	5	5	10	3	3	3	2-3	1-2	2	3	4
106-2	IECA-5	80	0-25	0	25	20	10	2	2	3	1	1	2	3-4	4
	JEAA-5	20	10-30	0	15	20	15	2	2	3	1	1	2	3-4	5
108	JEAA-5	100	30-60	0	10	10	30	1-2	3	3	3-5	2-3	2-3	3-5	3-4

TABLE 2

Page 2

CONSTRUCTION HAZARDS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
109-2	IFBA-5	80	10-60	T	15	10	10	2-3	3	3	2-3	1-3	2	3	4
	IFBD-5	20	30-50	0-10	20	20	20	1	2	3	1-2	1	1-2	2	4
109-9	IFBA-3	40	10-30	T	20	T	10	3-4	3-4	3	3	3	3	4	3
	IFBA-5	60	10-40	T	40	T	10	3	3-4	3	3	3	2	3	3-4
109a-1	IFBA-5	85	20-50	0	25	10	10	2	3	3	3	1-2	1-2	3	4
	IFBD-5	15	20-50	T	20	5	10	1	1	3	1	1-2	1	2	4
	R. O.	T													
109b	IECA-2	30	40-60	0	25	10	20	3	3-4	5	3	2-3	1	2	4
	IECA-5	70	20-60	0	30	0	30	2	3	3	4	3-4	3	4	4
109c	IECA-2	70	20-60	T	20	15	5	3-4	3-4	5	4	3	1	3	4
	JEAA-2	30	20-60	T	30	10	5	3	3	5	3	3	1	3	4-5
109d-1	JEAA-2	65	60-70	5-10	25	15	20	3	4-5	5	2-5	3-5	1-2	3	4-5
	JEAE-2	30	40-60	0	25	20	30	1-2	1-2	5	2	3-4	1-2	2	5
	R. O.	5													
109n-1	JEAA-2	60	10-30	0	35	0	5	2	2	5	3	1-2	2	4	2-3
	JEAA-5	40	30-50	0	25	10	15	3	3	3	2	1-3	2	3-4	3
110x	IFBA-4	<15	0-10	0	0	0	0	1-2	3	3	3	3-4	2	3	1-2
	IFBD-5	>60	10-50	10-30	15	5	20	1-2	3	1-3	3	2	2	2	4-5
	R. O.	10-30													
111a	IECA-5	80	50-70	T	15	0	25	2-3	4-5	3	3	3-5	2	3	3-4
	JEAE-5	20	60-70	T	20	0	30	3-4	5	1-3	3-4	4-5	1	2	4

TABLE 2

CONSTRUCTION HAZARDS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
	IFBA-5	75	40-60	T	25	0	15	4	4-5	3	3-4	2-3	1	2	4
111a-1	JEAE-2	20	40-60	5	30	5	15	1-2	3	3-5	2	2-3	1	2	4-5
	R. O.	5													
	IFBA-5	40	50-80	T	25	10	10	3	4-5	3	4	3-5	2	4	4
111b	IFBD-5	30	60-80	T	25	10	10	2	3-5	3	3	4-5	2	3-4	4
	JEAA-5	25	60-80	5	30	20	20	3-4	4-5	3	3-4	4-5	1	3	4
	R. O.	5													
	JEAA-2	35	50-60	T	25	10	30	3	3-4	3-5	2-3	3-4	1	3	4-5
111b-1	JEAE-2	60	50-70	5	35	15	35	3-4	3-5	3-5	2-3	3-5	1	2	5
	R. O.	5													
	IECA-5	40	40-60	0	15	15	20	3	3	3	3	3-4	2	3	4
111c	JEAE-5	55	40-70	5	20	20	30	3	3-5	3-5	2-3	3-5	1-2	2-3	4-5
	R. O.	5													
	JEAA-5	40	30-60	5	10	10	20	2	3-4	3	3-4	2-3	1	2-3	4-5
111d-3	JEAE-5	40	50-80	15	20	20	40	1	3-5	3-5	2-4	3-5	1	2	5
	R. O.	20													
111x	JEAE-2	30-70	60-90	30-70	20	20	40	1-2	3-5	3-5	2-4	4-5	1	2	5
	R. O.	30-70													
112-1	JEAA-2	50	20-40	0	10	10	40	1-2	3	5	2	2	2-3	3-4	4-5
	IECA-3	50	20-40	0	10	T	5	3	4	3-5	2	2	3	4	3-4
113	JEAE-2	40	70-90	60	20	10	30	1-2	3-5	3-5	3-4	5	1-2	2	5
	R. O.	60													

TABLE 2

CONSTRUCTION HAZARDS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
114	JEAA-5	75	20-40	0	15	15	20	1	2	3	2	1	1	2-3	4
	JEAE-5	20	30-60	5	20	20	30	1	2-3	3	2	1	2-3	2	4
	R. O.	5													
120a-8	IFDA-5	40	40-50	0	30	10	T	2	2-3	3	3	2	3	4	3-4
	GDFQ-5	60	50-60	T	25	15	5	1-2	2-3	3	2-3	2	3-4	3	4
120b-3	GDFA-3	20	40-60	0	15	0	0	3	3-4	3	2-3	1-2	2-3	4	3
	GDFQ-5	45	60-70	5	20	20	20	3	4-5	1-3	3	1-2	4-5	2	4-5
	GDFS-5	30	40-60	0	40	0	0	2	3	3	3-4	2-3	3	3	3-4
	R. O.	5													
120b-4	IFBA-3	20	40-70	0	20	0	0	2-3	4-5	3	3	3-4	3	4	3-4
	IFBA-5	80	40-70	0	45	0	5	2-3	4-5	3	3-4	3-4	3	4	3-4
120b-6	JEFA-3	70	40-60	0	25	0	0	3-4	4	3	4	3-4	3	4	3-4
	JEFA-5	30	40-60	0	35	10	5	2	3	3	3	3	2	3-4	3-4
120c	JEFA-1	80	40-60	T	20	0	0	4	4-5	5	3-4	3-4	2	3-4	3-4
	JEFA-2	20	40-70	T	30	5	5	3-4	4-5	5	3	3-5	2	3-4	4
120c-1	IECA-1	60	50-70	0	20	0	0	4	4-5	5	5	3-5	2	4	3
	JEAA-2	20	60-80	T	25	15	15	3-4	4-5	3-5	3-4	4-5	2-3	3-4	4-5
	JEAE-2	20	70-90	T	25	15	20	3	4-5	3-5	3-4	5	2-3	3-4	4-5
120c-2	GDFA-2	40	40-60	0	15	15	10	3	3-4	5	3	3-4	2	3	4
	JECA-2	60	50-70	T	25	10	10	3-4	4-5	5	3-4	3-5	1	2-3	4

TABLE 2

CONSTRUCTION HAZARDS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
120c-3	IFBA-5	15	50-70	0	40	0	0	2-3	4-5	3	3	3-5	2	3	4
	JECA-2	40	50-70	0	40	0	0	3-4	4-5	5	4-5	3-5	1	2	4
	JECB-2	20	50-70	5	30	20	20	3	3-5	5	2-3	3-5	1	2	4
	JEFA-5	20	50-60	0	45	0	0	2-3	4	3	4	3-4	3	4	3-4
	R. O.	5													
120c-11	IFBA-3	40	50-70	0	25	5	0	4	4-5	3	3-4	3-5	2	4	3-4
	IFBA-5	60	50-70	0	35	10	5	3	4-5	3	3-5	3-5	3	3-4	4
120d-3	IECA-5	75	60-70	T	25	5	10	3	4-5	3	4-5	4-5	1-2	3-4	4
	JECB-2	20	60-70	5	25	10	15	3-4	4-5	5	2-3	4-5	1-2	2	4
	R. O.	5													
120e	IFBA-3	30	5-20	0	20	T	T	3	3	3-5	3	2	2	4	3
	JEFA-1	70	20-40	0	10	5	5	3	3	5	2	2	2	4	3
120e-1	JEFA-1	100	10-50	0	25	0	0	3	4	5	1-3	1-2	1	3-4	3
121e	IECA-3	100	10-40	T	15	0	0	2	4	3-5	1-3	1-2	1	3	3
121e-1	IFBA-5	60	10-30	0	10	5	35	2	3	3	2-3	1-2	2	3	4
	IFDA-5	40	10-30	0	10	10	40	2	3	3	2-3	1	1-2	3	2
122	JEAA-2	20	60-80	0	30	5	5	4	4-5	5	4-5	4-5	2	3-4	4
	JECB-2	45	60-80	5	20	10	15	4	5	5	2	4-5	1	2	4
	JEFA-2	30	50-65	T	20	15	20	4	4-5	3-5	2-3	3-4	1	3	4
	R.O.	5													

TABLE 2

CONSTRUCTION HAZARDS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	% Dominant Slope	Rock Outcrop %	% Coarse Fragment 2mm-1/2"	% Coarse Fragment 1/2--3"	% Coarse Fragment > 3"	Surface Erosion Slope Cut	Surface Erosion Slope Fill	Surface Erosion Road surface	Mass Stability Slope Cut	Mass Stability Slope Fill	Revegetation Potential Slope Cut	Revegetation Potential Slope Fill	Trafficability
122-4	IECA-2	50	60-80	T	25	20	10	3-4	4-5	5	4	4-5	2	3-4	4
	IFBA-5	20	60-80	0	30	20	T	3	4-5	3	4-5	4-5	2-3	3-4	4
	IFBD-5	20	60-80	<10	20	15	30	3	3-5	3	2-3	4-5	1	2-3	4-5
	R. O.	<10													
123-1	HBDA-4	50	0-10	0	T	0	0	2	4	1	1	1	3	5	2
	HBDA-5	50	5-20	0	20	10	20	1-2	3	1	2-3	2	2	4	4
123c	IFBA-5	25	50-70	0	30	5	5	3-4	3-5	3	3-4	3-5	2	3	4
	JECB-2	15	50-70	T	20	10	15	4	4-5	5	2-4	3-5	1	2-3	4-5
	JEFA-5	60	40-60	0	40	0	0	2-3	4	3	3	2-4	2	3	4

Explanation of Table No. 3
Soil Hydrologic Characteristics

This table lists the soil characteristics and related interpretations that are important in determining soil hydrologic functions. Where soils occur in more than one landtype, the interpretations or vegetative cover may differ.

Map Symbol. Mapping Symbol representing each landtype.

Soil Unit. Lists the number assigned to individual soils and percentage of each in the landtype.

Depth to Bedrock. This column gives the dominant range in depth to the underlying bedrock.

Infiltration. Infiltration is the rate at which water enters the soil. The infiltration rate of a soil is controlled by the structure, porosity and texture of the surface layers. Five qualitative classes are used and they have the following quantitative ranges expressed in inches of water per hour.

Class	Rate (Inches/hr.)
Very Slow	Less than 0.20
Slow	0.20 - 0.63
Moderate	0.63 - 2.0
Rapid	2.0 - 6.3
Very Rapid	More than 6.3

Permeability. Permeability is the rate at which water moves through the soil. The permeability of a soil is determined primarily by structure and texture of the soil profile below the surface layers. The same five classes are used for permeability as were used for infiltration.

Available Water-holding Capacity. This column gives the water retention capacity of the soil profile and is expressed in inches of water. Available water, as used in this report, is the water in the soil profile that is available to plant roots. The figures in this column are net figures because hydroscopic and gravitational water have been subtracted. These figures are based on the mineral portion of the soil profile. The retention figures were calculated by using

average water-holding capacities of specified soil textures. These figures were obtained from the FSH 2509.15 (Handbook on Soils), Figure 6.5 in Chapter 6. Contrasting textures in a soil profile were calculated separately and totaled to arrive at the retention capacity of the profile and reductions were made when significant amounts of gravel and/or rock occurred in the profile.

The amount of water which a soil can hold depends primarily upon its texture. The amount of organic matter in the soil also is an important factor in determining the water-holding capacity of the soil. In soils, water is held in soil pores. Forces holding the water are primarily those of surface tension or surface attraction. Large pore spaces in sandy soils will not hold water very tightly and hence much of the water is lost through gravity and carried away as deep soil drainage. Smaller pores found in finer-textured soils hold the water much more tightly. A larger portion of the soil water is retained by these soils and this accounts for the finer textured soils retaining more water which represents the available and hydroscopic (unavailable) water in the soil.

Bedrock Penetration. This column gives three qualitative classes for penetration of the bedrock by moisture. There are no quantitative figures available and little is actually known concerning the degree and rate of penetration of the bedrock by moisture. These classes are purely relative and are based on characteristics of the bedrock such as fracturing and weathering. The three classes are as follows:

High - The bedrock is well to extremely well fractured weakly weathered to hard unweathered.

Moderate - The bedrock is moderately fractured, moderately hard to moderately weathered.

Low - The bedrock is massive, hard and unweathered, or soft moderately well to very well weathered with masked fracturing.

The definitions for the degrees of fracturing and weathering are the same as found under Bedrock Characteristics, Table 1.

Channel Armoring Quality. Road drainage systems, water diversion ditches and trails often divert water from natural drainageways or concentrate water and deposit it onto slopes. This interpretation gives a numerical qualitative rating of the relative ability of a soil to develop a stable channel for the artificially concentrated or diverted water. These ratings assume similar conditions of all external variables such as slope gradient, water concentration, etc. Ratings are based primarily on size and amounts of coarse fragments greater than ½" in diameter on subsurface horizons. The three ratings are as follows:

5 Good - All soil horizons below 8" of the surface contain over 35 percent by volume competent coarse fragments over ½ inch diameter of which at least 1/3 exceeds 3" diameter.

3 Fair - All soil horizons below 8" of the surface contain 20 to 35 percent by volume competent coarse fragments over ½ inch diameter of which at least 1/10 exceeds 3" diameter.

1 Poor - All soil horizons below 8" of the surface contain less than 20 percent by volumn of competent coarse fragments over ½" in size.

Vegetation Plus Litter. This column gives the percentage of ground cover which includes the basal area of the plants plus litter older than one year.

Surface Rock - > 3/4 Inch Diameter. This column gives the percentage of the surface covered by rock fragments that are larger than 3/4 inch in diameter.

Forest Crown Cover. This column gives the range in percent forest crown cover for tree species greater than 10 feet tall.

Brush Crown Density. This column gives the range in percent for the understory crown cover which includes brush, shrubs, and trees less than 10 feet tall.

TABLE 3

SOIL HYDROLOGIC CHARACTERISTICS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Depth to Bedrock (Inches)	Infiltration	Permeability	Available Water Capacity (Inches)	Bedrock Penetration	Channel Amoring Quality	% Vegetation Plus Litter	% Surface Rock >3/4"	% Forest Crown Density	% Brush Crown Density
101	GDFA-2	70	60+	4	4	3.3	-	1	50-70	0-15	10-30	10-50
	JADA-2	30	60+	5	4	W.T.*	-	1	50-70	0-15	0-20	0-40
101-3	IADA-2	70	60+	2-3	1-3	W.T.	-	1	90-100	0	0	0-60
	IECA-2	30	60+	4	4	5.1	-	1	70-100	0	0-10	0-10
102	GDEA-5	<15	60+	4	2	6.7	-	3	20-50	0-5	0	20-60
	JECA-2	35	60+	4	4	7.0	-	1	10-40	0	0	10-50
	JEFA-5	50	60+	4	4	6.6	-	1	10-50	0-5	20-40	10-50
103	HBDA-5	30	60+	3-4	2	7.1	-	3	60-80	0	50-70	0-10
	IECA-2	50	60+	3-4	2-3	5.0	-	1	60-80	0	50-70	0-10
	JEAA-2	20	60+	4	4	3.4	-	3-5	60-80	0	0-30	0-20
103-1	IADA-2	30	60+	2-3	1-3	W.T.	-	1	90-100	0	0	0-60
	IECA-5	50	60+	4	4	5.1	-	1	70-100	0	0-10	0-10
	JEAA-2	20	60+	4	4	3.4	-	3-5	60-80	0	0-30	0-20
104	IFBA-4	<15	60+	3	1	W.T.	-	1	40-60	0	20-60	0-30
	IFBA-5	85	60+	4	3	5.5	-	1	40-60	0-10	0-40	0-20
105	IECA-2	80	60+	3	3	5.3	-	1-3	70-100	0-20	40-80	10-20
	IFBA-5	20	60+	4	4	3.8	-	3-5	50-70	0-20	10-20	10-20
106	IECA-2	80	60+	4	4	3.2	-	3-5	60-80	0-10	10-20	10-20
	IECA-3	20	60+	3	3	5.6	-	1	60-80	0-10	0-10	10-30
106-2	IECA-5	80	60+	4	3	4.5	-	3	30-60	0-10	20-60	0-10
	JEAA-5	20	60+	3	3	4.4	-	3	40-60	0-10	0-20	0-20
108	JEAA-5	100	60+	4	4	4.3	-	3	80-100	0-10	60-80	10-30

TABLE 3

SOIL HYDROLOGIC CHARACTERISTICS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Depth to Bedrock (Inches)	Infiltration	Permeability	Available Water Capacity (Inches)	Bedrock Penetration	Channel Amoring Quality	% Vegetation Plus Litter	% Surface Rock >3/4"	% Forest Crown Density	% Brush Crown Density
109-2	IFBA-5	80	20-60	4	4	4.3	1-3	1	30-100	0-5	0-70	0-30
	IFBD-5	20	< 20	4	4	0.7	3	5	20-50	5-25	0	10-30
109-9	IFBA-3	40	60+	3	3	5.3	1	1	80-100	0	50-70	10-30
	IFBA-5	60	40-60	4	4	4.7	1	1	60-100	T	0-70	10-30
109a-1	IFBA-5	85	20-40	4	4	3.3	1-3	1	20-80	0-10	0-40	0-20
	IFBD-5	15	< 20	4	3	2.0	1-3	1	10-30	10-30	0-10	0-20
	R. O.	T										
109b	IECA-2	30	20-40	4	4	2.1	1-3	3	80-100	0	60-80	60-80
	IECA-5	70	40-60	4	4	3.7	1-3	1	80-100	0	40-80	60-80
109c	IECA-2	70	20-60	4	4	5.1	1	1	60-100	0	30-60	20-40
	JEAA-2	30	20-60	5	5	2.5	1-3	1-3	10-50	10-20	10-40	10-40
109d-1	JEAA-2	65	20-60	5	5	3.4	3-5	1-3	20-80	10-30	0-40	20-40
	JEAE-2	30	< 20	5	5	0.6	3-5	3	10-40	20-60	0-10	0-20
	R. O.	5										
109n-1	JEAA-2	60	30-60	4	4	4.1	3	1	40-60	0-10	10-60	0-10
	JEAA-5	40	30-60	4	4	3.0	3	1	70-90	T	60-80	0-10
110x	IFBA-4	< 15	20-60	3	2	W.T.	1	1	80-100	0	0-40	0-20
	IFBD-5	> 60	10-25	4	4	1.8	3	3	40-70	10-30	0-30	10-40
	R. O.	10-30										
111a	IECA-5	80	20-60	4	4	3.5	3	3	40-80	0-10	20-40	5-25
	JEAE-5	20	< 20	5	4	0.8	3	3	20-40	10-30	10-30	10-30
111a-1	IFBA-5	75	20-60	4	4	3.8	3	1	20-40	0-10	T	30-50
	JEAE-2	20	< 20	5	5	0.7	3	1-3	20-40	0-20	0	10-20
	R. O.	5										

TABLE 3

SOIL HYDROLOGIC CHARACTERISTICS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Depth to Bedrock (Inches)	Infiltration	Permeability	Available Water Capacity (Inches)	Bedrock Penetration	Channel Amoring Quality	% Vegetation Plus Litter	% Surface Rock >3/4"	% Forest Crown Density	% Brush Crown Density
111b	IFBA-5	40	20-60	3	2	5.4	3	1	60-80	T	50-70	40-60
	IFBD-5	30	<20	3	2	1.4	3	1	30-50	T	10-30	10-30
	JEAA-5	25	20-40	4	4	2.7	3	1-3	10-30	0-10	0-10	0-10
	R. O.	5										
111c	IECA-5	40	20-60	4	2-3	3.8	1-3	3	80-100	T	50-80	0-10
	JEAE-5	55	<20	4	4	0.7	3	3-5	30-50	5-20	0-20	0-20
	R. O.	5										
111d-3	JEAA-5	40	20-40	4	4	2.8	5	3	60-80	5-15	30-50	0-5
	JEAE-5	40	<20	4	4	0.6	5	5	20-50	20-50	0-20	0-5
	R. O.	20										
111x	JEAE-2	30-70	<20	5	5	0.5	3-5	5	30-60	20-40	0-30	0-10
	R. O.	30-70										
112-1	JEAA-2	50	60+	5	5	3.4	3-5	3	70-90	0-5	10-30	0-10
	IECA-3	50	60+	4	2	8.0	3-5	1	70-90	T	50-70	10-30
113	JEAE-2	40	<20	4	4	0.7	1	3	20-60	10-20	0-10	0-10
	R. O.	60										
114	JEAA-5	75	20-40	4	4	2.6	5	3	30-50	0-20	0-10	0-5
	JEAE-5	20	<20	4	4	0.9	5	5	10-30	10-30	T	0-5
	R. O.	5										
120a-8	IFDA-5	40	20-60	4	4	4.2	1-3	1	80-100	T	50-80	20-30
	GDFQ-5	60	<20	4	4	1.0	3	1-3	30-50	5-25	0	10-20
102b-3	GDFA-3	20	20-40	4	3	3.6	3	1	20-60	T	0-10	40-60
	GDFQ-5	45	<20	4	3	0.9	3	3	20-40	5-15	0	0-20
	GDFS-5	30	20-60	4	3	4.0	1-3	1	60-100	T	0-20	40-80
	R. O.	5										

TABLE 3

SOIL HYDROLOGIC CHARACTERISTICS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Depth to Bedrock (Inches)	Infiltration	Permeability	Available Water Capacity (Inches)	Bedrock Penetration	Channel Amoring Quality	% Vegetation Plus Litter	% Surface Rock >3/4"	% Forest Crown Density	% Brush Crown Density
120b-4	IFBA-3	20	20-40	4	2-3	4.2	1-3	1	50-100	0-5	30-80	30-70
	IFBA-5	80	20-60	4	2-3	4.5	1-3	1	50-100	0-5	50-80	50-80
120b-6	JEFA-3	70	20-40	4	4	4.7	1-3	1	60-80	0	50-80	50-80
	JEFA-5	30	20-60	4	4	3.9	1-3	1	60-80	0-10	30-70	30-70
120c	JEFA-1	80	20-60	5	5	3.8	1-3	1	30-60	T	30-60	40-70
	JEFA-2	20	10-30	4	4	1.7	1-3	1	30-60	T	10-40	40-70
120c-1	IECA-1	40	40-60	4	4	3.8	3	1	80-100	0-5	60-80	60-80
	JEAA-2	30	20-40	4	4	2.2	3	1-3	40-70	0-10	30-50	30-50
	JEAE-2	30	< 20	4	4	0.7	3	3	30-50	0-10	10-30	30-50
120c-2	GDFA-2	40	20-50	5	5	2.8	1-3	1	40-60	0-5	20-30	10-30
	JECA-2	60	20-40	5	5	2.0	1-3	1	40-60	0-10	0-5	0-5
120c-3	IFBA-5	15	20-40	4	4	3.2	1-3	1	80-100	0	40-60	30-50
	JECA-2	40	20-40	5	5	2.6	5	1	10-50	0-10	0-30	0-20
	JECB-2	20	< 20	5	5	0.7	1-3	3	10-40	0-10	0-10	0-20
	JEFA-5	20	20-40	4	4	3.4	1-3	1	20-40	0-15	10-30	10-40
	R. O.	5										
120c-11	IFBA-3	40	40-60	4-5	2-3	6.3	1	1	50-80	T	30-80	30-60
	IFBA-5	60	40-60	4	3-4	5.3	1-3	1	70-100	T	50-80	30-80
120d-3	IECA-5	75	20-60	4	4	4.2	1-3	1	80-100	T	40-60	10-40
	JECB-2	20	< 20	4	4	0.6	3-5	3	10-30	10-40	0-10	20-40
	R. O.	5										
120e	IFBA-3	30	60+	4	4	4.7	1	1	40-70	0-5	30-60	10-20
	JEFA-1	70	20-40	4	4	2.8	1-3	1	70-90	0-5	40-60	0-10
120e-1	JEFA-1	100	10-40	4	3-4	2.8	1	1	60-100	T	10-50	10-80

TABLE 3

SOIL HYDROLOGIC CHARACTERISTICS — Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Depth to Bedrock (Inches)	Infiltration	Permeability	Available Water Capacity (Inches)	Bedrock Penetration	Channel Amoring Quality	% Vegetation Plus Litter	% Surface Rock >3/4"	% Forest Crown Density	% Brush Crown Density
121e	IECA-3	100	20-60	3	3	6.2	1	1	30-90	0	20-60	10-20
121e-1	IFBA-5	60	60+	3	2-3	3.8	-	-	40-60	10-30	T	30-60
	IFDA-5	40	60+	3-4	3-4	W.T.	-	-	70-100	0-10	40-80	10-30
122	JEAA-2	20	20-40	5	5	2.3	1	1	60-80	T	30-50	10-50
	JECB-2	45	< 20	5	5	0.8	1-3	1	10-30	10-20	0-10	20-40
	JEFA-2	30	20-40	5	5	1.8	1	3	30-50	10-20	10-30	20-40
	R. O.	5										
122-4	IECA-2	50	20-40	4	4	2.9	5	3	60-80	0-10	30-60	20-50
	IFBA-5	20	20-60	4	3-4	4.0	1-3	1	70-100	0-10	60-80	10-30
	IFBD-5	20	< 20	4	4	0.7	5	5	40-70	10-20	0-20	0-20
	R. O.	<10										
123-1	HBDA-4	50	60+	2	2	W.T.	-	1	70-90	0	10-60	0-20
	HBDA-5	50	60+	2	2	6.3	-	1-3	50-80	0-10	40-70	10-30
123c	IFBA-5	25	20-40	3	2-3	3.6	1	1	70-90	0-10	50-70	30-50
	JECB-2	15	<20	5	5	0.8	3	3	10-30	20-40	10-30	10-30
	JEFA-5	60	20-60	4	4	4.2	1-3	1	50-70	T	30-60	40-70

Explanation of Table No. 4
Soil Vegetative Relationships and
Productivity Potentials

Map Symbol. Mapping Symbol representing each landtype.

Soil Unit. Lists the number assigned to individual soils and the precentage of each in the landtype.

Position on Landscape. Location of each soil on the landtype.

Habitat Type. Although similar landtypes have developed under similar climatic conditions, micro-climates vary considerably within the landtype boundaries. These variations are most often related to variations with aspect and position on the slope. Soil classification to the family level does not always reflect these variations; therefore, to refine productivity interpretations and to give a better picture of how soils and vegetation are related over the landtype, the recognized habitat types which occur on each soil on each landtype have been identified.

Habitat type identification was based on guides developed by R. Daubenmire in Forest Vegetation of Eastern Washington and Northern Idaho (December 1968) 1/, and further refined by R. Pfister and R. Kyker of the Intermountain Forest and Range Experiment Station. Further refinements will still be made over the next few years; consequently, this column should be reviewed and kept current.

At present most of the research on the Boise National Forest has been restricted to timber producing habitat types. For this reason non-timber producing types are referred to by plant community names. Primarily the non-timbered types are located at high elevations, on dry south slopes, at low elevations or in wet areas.

Productivity Potential

Range Productivity Potential. Each landtype has been rated for range productivity potential. Five qualitative classes were used based on inherent erosion characteristics, soil properties, vegetative type and limited range analysis data. The productivity classes are as follows:

Very High - More than 1,500 pounds per acre of usable forage.

High - 1,000 to 1,500 pounds per acre of usable forage.

1/Note: For additional information on habitat types see Forest Vegetation of Eastern Washington and Northern Idaho, Daubenmire, R. and Jean B., Wash. Ag. Exp. Sta. Tech. Bull. 60.

Moderate - 400 to 1,000 pounds per acre of usable forage.

Low - 100 to 400 pounds per acre of usable forage.

Very Low - Less than 100 pounds per acre of usable forage.

Landtypes were placed into one of these five classes by the use of available range analysis data. Where data was lacking, the ratings were projected from similar kinds of land. Classes were adjusted where vegetative type, inherent erosion, or other soil features were significant. The above ratings were based on the potential of the range for sheep grazing only.

Timber Productivity Potential. This column places the soil unit into five qualitative class ratings for timber productive potential. These classes correlate with the site classes developed from the Forest Timber Inventory Plots. The site classes are rated on productivity and use as a basis, cubic foot increment per acre per year. Of the seven site classes established, only five were found on the Boise National Forest. These have been given the following qualitative class names.

Very High	- Class 5	120 to 160 Cu.F./acre/year
High	- Class 4	85 to 120 Cu.F./acre/year
Moderate	- Class 3	50 to 85 Cu.F./acre/year
Low	- Class 2	20 to 50 Cu.F./acre/year
Very Low	- Class 1	Non-commercial

The soil units were placed into these classes with limited timber inventory data and projected to adjacent or similar landtypes. Few of the soil units were placed in Class 5.

Limitations for Reforestation. Four qualitative classes were developed for limitations to reforestation. Criteria considered in the development of these classes were vegetative competition, climate, water-holding capacity of the soil and evapotranspiration loss. The four classes are slight, moderate, severe, and very severe. The degree and/or a number of limiting factors were considered in making the class ratings.

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
101	GDFA-2	70	More well-drained, higher portions of units	Variable; ponderosa pine, sagebrush, cottonwood, and aspen communities	4	1-2	Moderate to very severe; hot, dry surfaces, low water-holding capacity, high evapotranspiration rates
	JADA-2	30	Adjacent to streams and seasonal flooding; dominant in narrow canyon units	Dense willow, alder, sedge, juncus, or subalpine fir - Engelmann spruce communities	1-4	1-3	Severe; vegetative competition, cold, air drainages, low water-holding capacity, flooding
101-3	IADA-2	70	Central portion of wet meadows with a perpetually high water table	Riparian communities associated with mid elevations	4-5	N/A	
	IECA-2	30	Outer sloping portions of units, more well-drained	Subalpine fir/Elk sedge	2	7	Very severe; climate, low water-holding capacity, climate
102	GDEA-5	<15	Open areas, third terrace positions	Brush/Grass	4	N/A	
	JECA-2	35	Well-drained, warm, dry sites	Ponderosa pine/Bitterbrush Ponderosa pine/Idaho fescue	3	2-3	Severe; hot, dry, high evapotranspiration losses
	JEFA-5	50	Cooler, protected areas	Douglas-fir/Pinegrass, Douglas-fir/Ninebark	4	3-4	Moderate; vegetative competition, high evapotranspiration losses
103	HBDA-5	30	Lower, more moist, cool sites - depressions	Subalpine fir/Elk sedge; Subalpine fir/Dwarf blueberry	1-2	1-2	Severe; climate, vegetative competition
	IECA-2	50	Elevated, moderately well-drained benches and knobs	Subalpine fir/Dwarf blueberry	1-2	1-2	Severe; climate, vegetative competition low water-holding capacity of surface soils
	JEAA-2	20	Meadow-like areas, very flat but well-drained	Mid elevation meadow land grass communities and some subalpine fir/ Idaho fescue	3	1	Very severe; low water-holding capacity, climate
103-1	IADA-2	30	Wet meadows with a seasonally high water table, poorly drained	Riparian communities associated with mid elevations	4	N/A	
	IECA-5	50	Sloping portions of units, well-drained	Subalpine fir-Elk sedge	2	1	Very severe; low water-holding capacity, climate
	JEAA-2	20	Meadow-like areas; very flat but well-drained	Mid elevation meadow land grass communities and some subalpine fir, Idaho fescue	3	1	Very severe; low water-holding capacity, climate

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
104	IFBA-4	<15	Wet areas, high water table	Subalpine fir/Bluejoint reedgrass	3-4	3	Severe; high water table, very cold
	IFBA-5	85	Higher, more well-drained portions of units	Subalpine fir/Elk sedge; Subalpine fir/Pinegrass; Subalpine fir/Grouse whortleberry	1-2	1-2	Moderate; well drained, seasonally dry, cold
105	IECA-2	80	Dominant over entire unit, moist environment	Douglas-fir/Pinegrass, Subalpine fir/Pinegrass	2	3	Severe; vegetative competition
	IFBA-5	20	Outer fringe of units more well-drained, drier	Douglas-fir/Chokecherry	2-3	2-3	Moderate; vegetative competition
106	IECA-2	80	Dominant on gentle rolling topography	Subalpine fir/Grouse whortleberry	2	2	Moderate; vegetative competition; climate
	IECA-3	20	Most common on steeper sloping portions of units	Brush/Grass	3	N/A	
106-2	IECA-2	80	Low relief, gentle slopes	Subalpine fir/Pinegrass	2	2-3	Severe; vegetative competition, climate
	JEAA-5	20	Elongated ridges, steeper slopes	Subalpine fir/Elk sedge, Brush/grass	1-2	2	Severe; low water-holding capacity, climate, vegetative competition
108	JEAA-5	100	Dominant over entire unit; deeper and wetter on lower slopes	Subalpine fir/Grouse whortleberry	1-3	2	Moderate; vegetative competition, climate
109-2	IFBA-5	80	All deeper soil slopes	Subalpine fir/Whitebark pine, Brush/Grass	1-2	1	Very severe to severe; vegetative competition, high evapotranspiration losses
	IFBD-5	20	Upper slopes and spur ridges	Brush/Grass	2-4	N/A	
109-9	IFBA-3	40	Depressions, lower side slopes, drainages and associated with minor soils in seeps	Subalpine fir/Pinegrass	2	2-3	Severe; vegetative competition, climate
	IFBA-5	60	Upper and mid slopes, and ridges	Subalpine fir/Grouse whortleberry, Douglas-fir/Elk sedge, Subalpine fir/Elk sedge	1-2	1-2	Severe to very severe; vegetative competition, climate

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
109a-1	IFDA-5	85	Timbered and open slopes	Subalpine fir/Elk sedge, Subalpine fir/Pinegrass, Brush/Grass	1-3	1-2	Severe; vegetative competition, climate
	IFBD-5	15	Upper south slopes and spur ridges	Subalpine fir/Stipa sp. Brush/Grass	1-2	1	Very severe; low water-holding capacity, climate
	R. O.	T	Spur ridges and eroded slopes				
109b	IECA-2	30	Upper slopes and spur ridges	Subalpine fir/Grouse whortleberry, Subalpine fir/Elk sedge	2-3	2-3	Severe; climate, vegetative competition
	IECA-5	70	Most side slopes	Subalpine fir/Elk sedge, Subalpine fir/Dwarf blueberry, Subalpine fir/Grouse whortleberry	2	1-2	Severe; climate, vegetative competition
109c	IECA-2	70	Timbered north slopes	Subalpine fir/Grouse whortleberry, Subalpine fir/Elk sedge	1-2	1-2	Very severe; cold climate, heavy snow-pack, low water-holding capacity
	JEAA-2	30	South slopes and ridges	Douglas-fir/Elk sedge; Subalpine fir/Pinegrass; Subalpine fir/Elk sedge, Subalpine fir/Idaho fescue, Subalpine fir/Whitebark pine	2	1-2	Severe; climate, water-holding capacity, vegetative competition
109d-1	JEAA-2	65	Domanant on all slopes	Subalpine fir/Elk sedge	1-2	1-2	Severe; climate, low water-holding capacity
	JEAE-2	30	High ridges	Brush/Elk sedge	1-2	1	Very severe; climate
	R. O.	5	Upper slopes and ridges				
109n-1	JEAA-2	60	Lower slopes and basins	Subalpine fir/Elk sedge	1-2	1-2	Severe; vegetative competition, climate
	JEAA-5	40	Steeper side slopes, generally well timbered	Subalpine fir/Elk sedge	1-2	1-2	Severe; vegetative competition, climate
110x	IFBA-4	<15	Benches and around lakes	Subalpine fir/Marshmarigold	2	1-2	Very severe; high water table, harsh climate
	IFBD-5	>60	Common over entire unit	Subalpine fir/Grouse whortleberry Subalpine fir/Whitebark pine, Subalpine fir/Juncus parryi Subalpine fir/Elk sedge	2	1	Very severe; climate
	R. O.	10-30	Scattered through unit				

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
111a	IECA-5	80	Mid and lower slopes and benches	Subalpine fir/Tall huckleberry Subalpine fir/Grouse whortleberry	1-2	1	Very severe; climate
	JEAE-5	20	Upper and lower slopes often associated with seeps	Subalpine fir/Elk sedge	1-2	1	Very severe; climate, low water-holding capacity
111a-1	IFBA-5	75	Mid and lower slopes	Brush/Grass, Subalpine fir/ Grouse whortleberry	3-4	1-2	Severe; climate
	JEAE-2	20	Upper slopes and ridges	Douglas-fir/Chokecherry, Brush/Elk Sedge Subalpine fir/Whitebark pine	2	1	Very severe; climate, low water-holding capacity
	R. O.	5	Upper slopes				
111b	IFBA-5	40	Dominant over entire slope under timber	Subalpine fir/Tall huckleberry, Subalpine fir/Pinegrass	2-3	3	Moderate; vegetative competition, climate
	IFBD-5	30	Associated with over-steepened slopes and spur ridges	Subalpine fir/Elk sedge	1-2	1-2	Very severe; vegetative competition, climate
	JEAA-5	25	More exposed, westerly slopes	Douglas-fir/Elk sedge, Douglas-fir/Idaho fescue	3	1-3	Severe to very severe; low water-holding capacity, vegetative competition
	R. O.	5	Spur ridges				
111b-1	JEAA-2	35	Mid and lower slopes	Subalpine fir/Elk sedge	3	1-2	Very severe; climate, low water-holding capacity
	JEAE-2	60	Steep upper slopes and dissections	Subalpine fir/Stipa sp., Brush/Grass	1-2	1	Very severe; climate, low water-holding capacity
	R. O.	5	Upper slopes and spur ridges				
111c	IECA-5	40	Mid and lower slopes	Douglas-fir/Pinegrass, Subalpine fir/Pinegrass, Subalpine fir-Elk sedge	2-3	3	Severe; vegetative competion
	JEAE-5	55	Mid and upper slopes	Douglas-fir/Idaho fescue, Subalpine fir/Idaho fescue	1	1	Very severe; low water-holding capacity
	R. O.	5					

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
111d-3	JEAA-5	40	Benched areas and slopes less than 60 percent	Subalpine fir/Woodrush, Subalpine fir/Elk sedge	1	1	Very severe; climate, low water-holding capacity
	JEAE-5	40	Steep slopes and dissections	Subalpine fir/Whitebark pine, Subalpine fir/Juncus parryi	1	1	Very severe; climate, low water-holding capacity
	R. O.	20	Mostly on steeper slopes & ridges				
111x	JEAE-2	30-70	Restricted to mid and lower slopes	Subalpine fir/Whitebark pine, Subalpine fir/Juncus parryi	1	1	Very severe; low water-holding capacity, climate
	R. O.	30-70					
112-1	JEAA-2	50	South slopes	Douglas-fir/Pinegrass, Douglas-fir/Idaho fescue, Douglas-fir/Tall Huckleberry	2	2-3	Moderate to severe; vegetative competition, low water-holding capacity
	IECA-3	50	North slopes	Douglas-fir/Mountain Snowberry	1-2	3-4	Moderate; vegetative competition
113	JEAE-2	40	Scattered but dominant on lower slopes	Subalpine fir/Whitebark pine, Subalpine fir/Elk sedge	2	1	Very severe; low water-holding capacity, severe climate
	R. O.	60	Ridges				
114	JEAA-5	75	Most upper slopes and benches	Subalpine fir/Whitebark pine	1-2	1	Very severe; climate, low water-holding capacity
	JEAE-5	20	Steeper, more eroded steep slopes and ridges	Elk sedge	1	N/A	
	R. O.	5	Restricted to ridges				
120a-8	IFDA-5	40	Upper slopes, timbered patches	Douglas-fir/Elk sedge	2-3	3	Severe; vegetative competition, low water-holding capacity
	GDFQ-5	60	Open, dry mid and lower south slopes	Brush/Grass	3	N/A	
120b-3	GDFA-3	20	Mid south slopes	Douglas-fir/Wheatgrass, Brush/Grass	4	1	Very severe; high evapotranspiration losses, low water-holding capacity
	GDFO-5	45	South slopes and ridges	Brush/Grass	3-4	N/A	
	GDFS-5	30	North slopes, toe slopes & drainages	Subalpine fir/Elk sedge, Douglas fir/Elk sedge	2-4	2-3	Severe; high evapotranspiration rates, low water-holding capacity
	R. O.	5	Ridges				

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS — LOWMAN District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
120b-4	IFBA-3	20	Common to mid and upper slopes at lower elevations, west & northwest aspects	Douglas-fir/Mountain snowberry Douglas-fir/Chokecherry	3-4	3-4	Moderate to severe; vegetative competition
	IFBA-5	80	Becomes more dominant with increasing elevations, cold air drainages on north slopes	Douglas-fir/Ninebark, Subalpine fir/Tall huckleberry	2-4	3-4	Severe; vegetative competition
120b-6	JEFA-3	70	Most side slopes and draws	Douglas-fir/Mountain maple, Douglas-fir/Chokecherry, Douglas-fir/Mountain snowberry	2-3	3	Moderate; climate, vegetative competition, high evapotranspiration losses
	JEFA-5	30	Lower slopes	Douglas-fir/Mountain snowberry Douglas-fir/Mountain maple	2-3	3	Moderate; vegetative competition, high evapotranspiration losses
120c	JEFA-1	80	Most mid and lower slopes and drainages	Douglas-fir/Spirea, Douglas-fir/Pinegrass, Douglas-fir/Ninebark	3	3	Severe; low water-holding capacity; high evapotranspiration losses
	JEFA-2	20	Upper slopes and over-steepened lower slopes	Douglas-fir/Spirea; Douglas-fir/Wheatgrass; Ponderosa pine/Bitterbrush	2-3	1-2	Severe; low water-holding capacity, high evapotranspiration losses
120c-1	IECA-1	40	North and east aspects	Subalpine fir/Tall huckleberry Douglas-fir/Pinegrass	3-4	3-4	Severe; vegetative competion
	JEAA-2	30	Westerly aspects	Douglas-fir/Ninebark	3	3-4	Moderate to severe; vegetative completion
	JEAE-2	30	Lower oversteepened slopes	Douglas-fir/Ninebark, Douglas-fir/Elk sedge	3	1-3	Severe; vegetative competition
120c-2	GDFA-2	40	Mid and lower timbered slopes	Douglas-fir/Pinegrass Douglas-fir/Wheatgrass	2-3	1-3	Very severe to severe; vegetative competition, low water-holding capacity, high evapotranspiration losses
	JECA-2	60	Upper and mid slopes, very dry	Douglas-fir/Wheatgrass, Brush/Grass	2-3	1-2	Very severe; low water-holding capacity, high evapotranspiration losses

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
120c-3	IFBA-5	15	North slopes and drainages	Subalpine fir/Tall huckleberry Douglas-fir/Pinegrass	2	2-3	Moderate; vegetative competition
	JECA-2	40	Most steep south slopes	Subalpine fir/Elk sedge, Subalpine fir/Idaho fescue	2	2-3	Severe; low water-holding capacity, vegetative competition
	JECB-2	20	Dry shallow south slopes	Douglas-fir/Wheatgrass	2	1-2	Very severe; low water-holding capacity, high evapotranspiration losses
	JEFA-5	20	Mid and lower, south and west slopes	Douglas-fir/Spirea, Douglas-fir/Wheatgrass	1-2	1-3	Very severe; low water-holding capacity
	R. O.	5	Knobs, spur ridges, steep south slopes				
120c-11	IFBA-3	40	More exposed, upper east and west slopes and areas of highly weathered granite on north slopes	Douglas-fir/Snowberry, Douglas-fir/Ninebark, Douglas-fir/Pinegrass	2-3	2-4	Severe; vegetative competition, high evapotranspiration losses
	IFBA-5	60	Most mid and lower slopes	Douglas-fir/Elk sedge, Douglas-fir/Spirea Douglas-fir/Ninebark	2-3	4	Moderate to severe; vegetative competition
120d-3	IECA-5	75	Dominant on north slopes	Douglas-fir/Pinegrass, Subalpine fir/Tall huckleberry	2-3	2-4	Moderate to severe; vegetative competition
	JECB-2	20	Exposed south and west slopes	Douglas-fir/Spirea Brush/Grass	2-3	1-2	Severe; low water-holding capacity
	R. O.	5	Spur ridges				
120e	IFBA-3	30	Lower slopes and drainages	Subalpine fir/Tall huckleberry	2	2-3	Moderate; vegetative competition, low water-holding capacity
	JEFA-1	70	Mid and upper slopes	Douglas fir/Pinegrass Douglas-fir/Elk sedge	2	3-4	Severe; vegetative competition, low water-holding capacity
120e-1	JEFA-1	100	Dominant, but a shallow phase common to ridges	Subalpine fir/Grouse whortleberry, Douglas-fir/Pinegrass, Douglas-fir/Elk sedge	2	2-3	Severe; vegetative competition, low water-holding capacity
121e	IECA-3	100	Common to entire unit, although shallow highly eroded phases and meadowland inclusions do exist	Subalpine fir/Grouse whortleberry, Subalpine fir/Pinegrass Douglas-fir/Pinegrass	2	2-3	Moderate to severe; vegetative competition, low water-holding capacity

TABLE 4

SOIL-VEGETATIVE RELATIONSHIPS AND PRODUCTIVE POTENTIALS

Lowman District

Map Symbol	Soil Unit No.	Soil Unit %	Position on Landscape	Habitat Type	Productivity Potential Range	Productivity Potential Timber	Limitations for Reforestation
121e-1	IFBA-5	60	Open dissected slopes and ridges	Brush/Grass and aspen communities	2	N/A	
	IFDA-5	40	Basin portion of unit and lower side slopes	Subalpine fir/Grouse whortleberry Douglas-fir/Pinegrass	2	2-3	Severe; climate, vegetative competition
122	JEAA-2	20	North slopes of dissections	Douglas-fir/Spirea, Douglas-fir/ Ninebark, Subalpine fir/Elk sedge	2	2-4	Moderate to severe; vegetative competition, low water-holding capacity
	JECB-2	45	Slopes over 65 percent	Douglas-fir/Wheatgrass	2	1	Very severe; low water-holding capacity, high evapotranspiration losses
	JEFA-2	30	Slopes less than 65 percent	Douglas-fir/Elk sedge	1-2	2	Severe; vegetative competition, low water-holding capacity
	R. O.	5	Spur ridges and steep side slopes				
122-4	IECA-2	50	Mid and upper slopes	Douglas-fir/Ninebark	2	3-4	Moderate to severe; vegetative competition
	IFBA-5	20	North slope wet drainages	Subalpine fir/Tall huckleberry Subalpine fir/Grouse whortleberry	2	3	Severe; climate, vegetative competition
	IFBD-5	20	Oversteepened slopes & spur ridges	Douglas-fir/pinegrass	2	2-3	Severe; low water-holding capacity, high evapotranspiration losses
	R. O.	<10	Spur ridges				
123-1	HBDA-4	50	Lower gradients and depressions with a high water table	Wet Meadow, Douglas-fir/Pinegrass	2-3	3	Moderate to severe; vegetative competition, high water table
	HBDA-5	50	Slopes	Douglas-fir/Elk sedge, Douglas-fir/Idaho fescue	2	2-3	Severe; vegetative competition
123c	IFBA-5	25	Steep north slopes	Douglas-fir/Snowberry Subalpine fir/Elk sedge	1-2	2-3	Severe; climate, vegetative competition
	JECB-2	15	Oversteepened side slopes and lower slopes	Douglas-fir/Pinegrass Douglas-fir/Idaho fescue	1-2	2-3	Very severe; low water-holding capacity, high evapotranspiration losses
	JEFA-5	60	Dominant over most south, east, and west slopes and ridges	Douglas-fir/Elk sedge	3	2-4	Severe; high evapotranspiration losses, vegetative competition

Explanation of Table No. 5
Soil Profile Characteristics

Soil Number. This column lists the soil identification symbol in alphabetical and numerical order. The 4-letter portion of this symbol corresponds to the alphabetical outline for classification of soils in Soils Taxonomy of the National Cooperative Soil Survey (December 1970). The fifth element of this symbol is a number ranging from 1 to 7. These numbers correlate to the following soil family textural names:

Number	Name
- 1	Sandy
- 2	Sandy skeletal
- 3	Coarse loamy
- 4	Fine loamy
- 5	Loamy skeletal
- 6	Clayey
- 7	Shallow sandy skeletal

Soil Classification. This column gives the classification of the soil unit to the family level according to Soils Taxonomy of the National Cooperative Soil Survey, U.S.D.A.

Landtypes. This column lists all the landtypes in which the soil unit is an important component.

Depth to Bedrock. This column gives the average depth to the underlying bedrock in inches.

Surface Layer. In this column the textures, coarse fragment percentage, thickness, moist colors, structure, color, reaction and organic horizons of the surface layers are described.

Subsoil Layers. This column describes the textures, thickness, coarse fragment percentage, moist colors, structure, and reaction of the subsoil layers.

Bedrock Characteristics. This column describes the characteristics of the bedrock which is generally associated with the individual soils. Definition of these terms are listed in the explanation of Table No. 1.

TABLE 5
SOIL PROFILE CHARACTERISTICS

Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
GDEA-5	Typic Argixerolls, loamy skeletal mixed frigid	102	60"+	Trace of organic layer over a very dark brown, weak moderate subangular blocky gravelly loam, 10 to 15 inches thick; mildly alkaline; 20 percent gravel; 10 percent rock	Dark yellowish brown, moderate medium and coarse subangular blocky gravelly sandy clay loam, > 50 inches thick; neutral to mildly alkaline; 10 to 20 percent gravel; 40 to 60 percent rock	Variable
GDFA-2	Typic Haploxerolls, sandy skeletal mixed frigid	101 120c-2	20"+	0 to 2 inches of organic layer over a very dark grayish brown, moderate fine granular gravelly sandy loam, 10 to 20 inches thick; neutral; 20 to 40 percent fine gravel; 0-10 percent rock	Dark brown, single-grained gravelly loamy coarse sand, > 40 inches thick; neutral; 30 to 40 percent gravel; 10 to 60 percent rock	Variable; dominantly granitics
GDFA-3	Typic Haploxerolls, coarse loamy mixed frigid	120b-3	20-60"	Very dark grayish brown, moderate medium granular gravelly sandy loam 10 to 20 inches thick; slightly acid; 10 to 20 percent fine gravel	Dark yellowish brown, moderate medium granular gravelly sandy loam to gravelly sandy clay loam, 10 to 60 inches thick; slightly acid; 20 to 30 percent fine gravel	Well to extremely well fractured or masked, transitional to well weathered granite. Some extremely well fractured rhyolite in 120b-3's.
GDFQ-5	Lithic Haploxerolls, loamy skeletal mixed frigid	120a-3 120b-3	<20"	Dark brown, weak fine and medium granular gravelly sandy loam, 4 to 10 inches thick; neutral; 20 to 40 percent fine and medium gravel; 10 to 30 percent rock	Dark yellowish brown, weak medium granular to massive gravelly sandy loam or gravelly sandy clay loam, 5 to 10 inches thick	Extremely well fractured; moderately to transitionally weathered granite (some extremely well fractured rhyolite in 120b-3 units)
GDFS-5	Pachic Haploxerolls, loamy skeletal mixed frigid	120b-3	30"+	Trace of organic layer, over a very dark grayish brown, weak fine granular gravelly sandy loam, 15 to 30 inches thick; slightly acid; 15 to 20 percent medium gravel, 0 to 20 percent rock	Brown, moderate coarse granular to single grain gravelly sandy loam or gravelly sandy clay loam, 10 to 60 inches thick; slightly acid; 30 to 60 percent fine and medium gravel, 0 to 30 percent rock	Masked or extremely well fractured, transitional to well weathered granite. (some extremely well fractured rhyolite in 120b-3 units. Bedrock variable in alluvial or colluvial positions)

TABLE 5
SOIL PROFILE CHARACTERISTICS

Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
HBDA-4	Typic Cryoboralfs, fine loamy mixed	123-1	60"+	0 to 3 inches of organic layer over a dark grayish brown, moderate medium subangular blocky very fine sandy loam, 4 to 12 inches thick; strongly acid; 0 to 20 percent fine gravel	Brown, strong coarse subangular or blocky gravelly clay loam to clay loam; greater than 40 inches thick; strongly acid; 0 to 30 percent fine gravel	Deep alluvial and colluvial soils often over river-washed cobbles and/or highly variable granite
HBDA-5	Typic Cryoboralfs, loamy skeletal mixed	103,123-1	60"+	0 to 2 inches of organic layer over a dark brown, moderate fine granular gravelly loam to loam, 5 to 15 inches thick; neutral to strongly acid; 0 to 20 percent medium and coarse gravel	Brown, single grain to massive gravelly or cobbly sandy loam to gravelly sandy clay loam, greater than 50 inches thick; strongly acid; 30 to 40 percent medium and coarse gravel; 20 to 50 percent rock	Deep alluvial and colluvial soils often over river-washed cobbles and/or highly variable granite
IADA-2	Typic Cryaguepts, sandy skeletal mixed	101-3 103-1	60"+	0 to 2 inch organic layer over a brown to black, moderate medium subangular blocky or fine granular loam or clay loam, 4 to 10 inches thick; slightly to medium acid; 0 to 20 percent gravel.	Alternating layers, very dark gray to yellowish brown, strong medium subangular blocky to single grain, gravelly sand to gravelly clay loam, greater than 60 inches thick; medium acid; 0 to 60 percent gravel; 0 to 50 percent rock	Deep alluvium over varying granite
IECA-1	Typic Cryochrepts, sandy mixed	120c-1	40-60"	2 inch organic layer over a dark brown weak fine granular sandy loam, 4 to 10 inches thick; medium acid; 0 to 15 percent fine gravel	Yellowish brown, single grain gravelly loamy sand 20 to 60 inches thick; medium acid; 10 to 30 percent fine gravel	Well to extremely well fractured, moderate to deeply well weathered granite
IECA-2	Typic Cryochrepts, sandy skeletal mixed	101-3,103, 105,106, 109b,109c, 122-4	20-60"+	0 to 2 inch organic layer over a dark yellowish brown, weak fine granular coarse sandy loam to sandy clay loam, 5 to 20 inches thick; slightly acid; 0 to 15 percent fine and medium gravel; 5 to 10 percent rock	Light yellowish brown, single grain gravelly coarse sand, greater than 20 inches thick; medium acid; 20 to 30 percent gravel; 10 to 30 percent rock	Masked or extremely well fractured, transitional to well weathered granite. Bedrock highly variable under depositional landtypes

TABLE 5
SOIL PROFILE CHARACTERISTICS

Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
IECA-3	Typic Cryochrepts, coarse loamy mixed	106, 112-1, 121e	60"+	0 to 2 inch organic layer over a dark yellowish brown, moderate fine granular sandy loam to loam, 5 to 10 inches thick; slightly acid; 0 to 15 percent fine gravel	Yellowish brown, single grain gravelly sandy loam to gravelly sandy clay loam, greater than 50 inches thick; medium acid; 10 to 30 percent fine gravel	Masked to extremely well fractured, transitional to well weathered granite; bedrock more variable beneath alluvial landtypes
IECA-5	Typic Cryochrepts, loamy skeletal mixed	103-1 106-2 109a-1 109b 111a 111c 111d-3	20"+	0 to 4 inch organic layer over a dark grayish brown weak fine granular gravelly sandy loam 5 to 10 inches thick; strongly acid; 20 to 40 percent fine and medium gravel	Dark yellowish brown, massive gravelly sandy loam, 5 to 10 inches thick; strongly acid; 40 to 60 percent gravel; 10 to 40 percent rock	Masked to extremely well fractured, weakly to well weathered granite
IFBA-3	Typic Cryumbrepts, coarse loamy mixed	109-9 120b-4 120c-11 120e	20"+	0 to 3 inch organic layer over a very dark grayish brown, weak medium and coarse granular sandy loam, 8 to 20 inches thick; slightly acid; 5 to 15 percent fine gravel	Yellowish brown, single grain gravelly sandy loam, 20 to 60 inches thick; slightly acid; 15 to 30 percent fine gravel	Masked to extremely well fractured, transitional to well weathered granite
IFBA-4	Typic Cryumbrepts, fine loamy mixed	104 110x	40"+	0 to 2 inch organic layer over a very dark gray, moderate medium granular loam; 5 to 10 inches thick; strongly acid to neutral; 0 to 15 percent fine gravel	Yellowish brown, massive gravelly clay loam, greater than 30 inches thick; slightly acid to neutral;10 to 20 percent fine gravel; 0 to 10 percent rock	Variable
IFBA-5	Typic Cryumbrepts, loamy skeletal mixed	104,105, 109-2,109-9, 109a-1, 111a-1,111b, 120b-4, 120c-3, 120c-11, 121e-1, 122-4, 123c	20"+	0 to 4 inch organic layer over a very dark grayish brown,weak fine granular gravelly sandy loam,10 to 30 inches thick; strongly acid to neutral; 15 to 40 percent fine gravel	Yellowish brown, single grain or massive gravelly sandy loam to gravelly sandy clay loam, 10 to 60 inches thick; strongly acid to neutral; 20 to 60 percent gravel; 0 to 40 percent rock	Variable

TABLE 5
SOIL PROFILE CHARACTERISTICS — Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
IFBD-5	Lithic Cryumbrepts, loamy skeletal mixed	109-2, 109a-1, 110x, 111b, 122-4	<20"	Trace of organic layer over a very dark grayish brown, weak fine granular gravelly sandy loam, 6 to 10 inches thick; strongly acid; 15 to 50 percent gravel; 0 to 50 percent rock	Dark brown, moderate medium granular gravelly sandy loam, 6 to 10 inches thick; strongly acid; 20 to 40 percent gravel; 0 to 50 percent rock	Well to extremely well fractured, moderately weathered granite
IFDA-5	Typic Haplumbrepts, loamy skeletal mixed frigid	120a-8 121e-1	20"+	0 to 2 inch organic layer over a very dark gray moderate medium granular gravelly sandy loam, 5 to 15 inches thick; medium acid; 15 to 30 percent fine gravel	Brown, weak fine granular gravelly sandy loam, 20 to 60 inches thick; medium acid; 30 to 50 percent fine and medium gravel, 10 to 30 percent rock	Extremely well fractured, transitional to well weathered granite
JADA-2	Typic Fluvaquents, sandy skeletal mixed frigid	101	60"+	Trace of organic layer over a very dark grayish brown, weak fine granular sandy loam, 2 to 10 inches thick; neutral; 0 to 15 percent gravel	Alternating layers of dark and light sandy and loamy soil; 20 to 60 inches thick; slightly acid to neutral; 0 to 60 percent gravel; 0 to 40 percent rock	Variable; deep alluvial and/or colluvial soils over both granite and volcanics
JEAA-2	Typic Cryorthents, sandy skeletal mixed	103, 103-1, 109c, 109d-1, 109n-1, 111b-1, 112-1, 120c-1, 122	20"+	0 to 1 inch organic layer over a very dark grayish brown to dark brown, moderate to fine granular, gravelly sandy loam, 6 to 8 inches thick; medium to slightly acid; 20 to 30 percent fine gravel	Brown to yellowish brown, weak fine granular to single grain, gravelly loamy sand to gravelly sandy loam, 14 to 60 inches thick; strongly to slightly acid; 25 to 45 percent gravel and 0 to 10 percent rock	Variable
JEAA-5	Typic Cryorthents, loamy skeletal non-acid, non-cal mixed	106-2, 108, 109n-1, 111b, 111b-1, 111d-3, 114	20-40"	0 to 1 inch organic layer over a very dark grayish brown to dark brown, weak fine and coarse granular, gravelly sandy loam, 6 to 14 inches thick; strongly acid; 20 percent gravel; 15 percent rock	Yellowish brown, massive, gravelly sandy loam, 14 to 25 inches thick; strongly acid, 35 to 40 percent gravel, 30 percent rock	Moderate to extremely well fractured, slightly to well weathered granite

TABLE 5
SOIL PROFILE CHARACTERISTICS

Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
JEAE-2	Lithic Cryorthents, sandy skeletal mixed	109d-1, 111a-1, 111x, 113, 120c-1	<20"	Dark brown to brown, weak fine granular, gravelly sandy loam, 2 to 6 inches thick; very slightly acid; 40 to 50 percent gravel; 0 to 10 percent rock	Brown massive, gravelly loamy sand, 4 to 14 inches thick; very slightly acid; 40 to 50 percent gravel; 20 to 25 percent rock	Massive to well fractured, hard unweathered to moderately weathered granite
JEAE-5	Lithic Cryorthents, loamy skeletal non-acid, non-cal mixed	111a, 111c, 111d-3, 114	< 20"	Trace of organic layer over a dark brown, weak fine granular, gravelly sandy loam, 2-6 inches thick; very strongly acid; 30-40 percent gravel; 30-35 percent rock	Dark yellowish brown, single grain, gravelly sandy loam, 6-14 inches thick; strongly acid; 40 percent gravel; 40-50 percent rock.	Well fractured, slightly to well weathered granite
JECA-2	Typic Xerorthents, sandy skeletal mixed	102, 120c-2, 120c-3	20-40"	0 - 1 inch organic layer over a very dark grayish brown, weak fine granular coarse sandy loam 4 to 6 inches thick; neutral; 0 to 5 percent fine gravel	Dark grayish brown to brown single grain gravelly loamy coarse sand, 16 to 40 inches thick; neutral; 30 to 35 percent fine and medium gravel; 15 to 20 percent rock	Extremely well fractured, well weathered granite
JECB-2	Lithic Xerorthents, sandy skeletal mixed	120c-3, 120d-3, 122, 123c	< 20"	Very dark grayish brown, weak fine granular gravelly loamy coarse sand, 2 to 4 inches thick; medium acid; 30 to 35 percent gravel	Dark brown to dark yellowish brown, weak and moderate medium subangular blocky, gravelly loamy coarse sand, 15 to 25 inches thick; very slightly acid; 35 percent gravel; 25 percent rock	Variable
JEFA-1	Typic Udorthents, sandy mixed	120c, 120e, 120e-1	20-60"	0 to 1 inch organic layer over a dark brown, weak fine granular and weak medium subangular blocky, gravelly sandy loam, 8-12 inches thick; very slightly acid; 20 percent fine gravel.	Brown to pale brown, massive and single grain gravelly sand, 10 to 40 inches thick; 25 to 30 percent fine gravel	Masked to well fractured transitional to well

TABLE 5
SOIL PROFILE CHARACTERISTICS

Lowman District

Soil No.	Soil Classification	Land Types	Depth to Bedrock	Surface Layer	Subsoil Layer	Bedrock Characteristics
JEFA-2	Typic Udorthents, sandy skeletal mixed	120c,122	20-40"	Very dark grayish brown, single grain gravelly loamy sand, 4 to 8 inches thick; very slightly acid; 25 percent fine gravel; 10 percent rocks	Brown, single grain, gravelly loamy sand, 16 to 40 inches thick; very slightly acid; 40 percent fine gravel, 20 percent rock	Moderately to extremely well fractured, transitional to well weathered granite
JEFA-3	Typic Udorthents, coarse loamy non-acid, non-cal mixed frigid	120b-6	40"+	Very dark grayish brown, single grain gravelly loamy sand, 4 to 8 inches thick; very slightly acid; 25 percent fine gravel; 10 percent rock	Brown, single grain, gravelly loamy sand, 16 to 40 inches thick; very slightly acid; 40 percent fine gravel, 20 percent rock	Moderately to extremely well fractured, transitional to well weathered granite
JEFA-5	Typic Udorthents, loamy skeletal non-acid, non-cal mixed frigid	102,120b-6, 120c-3, 123c	30"+	0 to 2 inch organic layer over a dark brown, weak medium granular gravelly sandy loam, 5 to 10 inches thick; slightly acid; 20 to 40 percent fine gravel	Yellowish brown, weak medium granular gravelly sandy loam, 4 to 8 inches thick; medium acid; 30 to 50 percent fine and medium gravel, 5 to 25 percent rock	Extremely well fractured or masked, moderately to highly weathered granite

MANAGEMENT QUALITIES CRITERIA FOR VALLEY TYPES

CHANNEL OVERFLOW FLOODING HAZARD: This is a qualitative rating of the hazard of water overflowing the defined stream channel and inundating the adjacent terrain. Major considerations of the rating are: (1) entrenchment of channel into valley bottom; (2) extent of valley bottom subject to overflow; and (3) evidence of past overflows.

RATING	CRITERIA
High	Streamside area subject to inundation averages over 100 feet wide. Much evidence of past inundation is present.
Moderately High	Streamside area subject to inundation averages 50 to 100 feet wide. Evidence of past inundation is present.
Moderate	Streamside area subject to inundation averages 25 to 50 feet wide. Evidence of past inundation is present.
Moderately Low	Streamside area subject to inundation averages 15 to 25 feet wide. Evidence of past inundation is present.
Low	Streamside area subject to inundation averages less than 15 feet wide.

NOTE: Area is considered subject to inundation if it is less than 3 vertical feet above the distinguishable high water line for the adjacent stream channel.

If the area subject to inundation includes over 75 percent of the valley bottom area, raise rating one class.

SEDIMENT BUFFER QUALITY: This is a qualitative rating of the capacity of the valley area for stopping and storing soil material eroded from sources above the valley bottom.

RATING	SEDIMENT FLOW REDUCTION CLASS*	BUFFER ZONE WIDTH** (FEET)
Excellent	High	50 - 150
	Medium to High	> 150
Good	High	25 - 50
	Medium	50 - 150
	Low	> 150
Fair	High	10 - 25
	Medium	25 - 50
	Low	50 - 150
Poor	High	< 10
	Medium	10 - 25
	Low	25 - 50
Very Poor	Low to Medium	< 10
	Low	10 - 25

* Sediment Flow Reduction Classes are categorized as follows:

CLASS	CHARACTERISTICS
High	This class has frequent large obstructions to water and sediment flow such as depressions, mounds, logs, rocks (greater than 10 inches in diameter), trees, and stumps. Obstructions are spaced 5 feet or closer.
Medium	This class has a few large obstructions or many small obstructions to water and sediment flow such as brush, slash, herbaceous plants, and cobble size rocks (3 to 10 inches in diameter). Obstructions are spaced 5 feet or closer.
Low	This class has few to no obstructions to water and sediment flow. Obstructions are spaced greater than 5 feet.

** Buffer Zone Width is that distance between the edge of the stream and the valley sideslope.

SEDIMENTATION HAZARD FROM A VALLEY BOTTOM ROAD: This is a qualitative rating of the hazard for sedimentation of water courses from the creation of or presence of a road generally located as far from the stream as valley bottom width allows while maintaining a valley bottom gradient. Actual rate of sedimentation is greatest during and immediately after construction. The rating is based on a SL-12 standard road (19 feet wide including ditch and shoulder) with routine past construction practices for timber operator built roads. Modal situation is with weathered (weathering classes 4 and 5) granitic sideslope materials.

RATING	SEDIMENT BUFFER QUALITY RATING*	DOMINANT SIDESLOPE GRADIENT (PERCENT)
High	Poor to Very Poor	Any Slope
Moderately High	Fair	Greater Than 55
Moderate	Fair	Less Than 55
	Good	Greater Than 55
Moderately Low	Good	Less Than 55
Low	Excellent	Any Slope

* Definitions of Sediment Buffer Quality Rating classes can be noted from the preceeding Valley Type Criteria.

NOTE: The above are modal conditions and the ratings can be modified as indicated below when conditions are significantly different from the above. The modifying conditions are:

Increase the hazard rating one class for each of the following that apply ---

1. Sideslopes undercut by the road are very wet during snowmelt and runoff conditions.
2. Sideslopes undercut by the road have bedrock sliding planes parallel with the slope.
3. Widest part of the valley bottom alternates from one side of the stream to the other.
4. Flashy debris-laden runoff is common from tributary drainages crossed by the road.
5. Sideslopes undercut by the road are dominantly (50 percent) well weathered to highly weathered (weathering classes 6 and 7) bedrock.

Decrease the hazard rating one class for each of the following that apply ---

1. Sideslopes undercut by the road are dominantly (50 percent) hard unweathered to moderately weathered (weathering classes 1, 2, and 3) bedrock.
2. Sideslopes undercut by the road include over 40 percent competent, angular, rock fragments.

STREAM SHADE REDUCTION HAZARD: This is a rating of the hazard of reducing stream surface shading by vegetation due to valley bottom road construction. The main factor considered is the degree of encroachment on and elimination of streamside vegetation required in valley bottom road locations.

RATING	CRITERIA
High	Less than 50 percent of the valley length has over 25 feet of gentle valley bottom terrain between streams and steep sideslopes.
Moderately High	Between 50 and 70 percent of the valley length has over 25 feet of gentle valley bottom terrain between streams and steep sideslopes.
Moderate	Between 70 and 85 percent of the valley length has over 25 feet of gentle valley bottom terrain between streams and steep sideslopes.
Moderately Low	Between 85 and 95 percent of the valley length has over 25 feet of gentle valley bottom terrain between streams and steep sideslopes.
Low	More than 95 percent of the valley length has over 25 feet of gentle valley bottom terrain between streams and steep sideslopes.

CHANNEL EROSION HAZARD WITH CHANNEL ALTERATION: This is a qualitative rating of the hazard for erosion of the stream channel as a result of channel constriction, encroachment, or other alterations of the channel materials or dimensions that control flow direction or velocities. The rating is based primarily on erodibility of channel materials without the aid of vegetation.

RATING	CRITERIA
High	Channel materials are predominantly sands and gravels and will seriously erode with any channel alteration.
Moderately High	Channel materials are predominantly sands, gravels, and cobbles and will erode moderately with moderate channel alteration and seriously with major alteration.
Moderate	Channel materials are predominantly gravels, cobbles, and stones and will erode moderately with major alteration.
Moderately Low	Channel materials are predominantly cobbles, stones, and boulders and will erode only slightly with major alteration.
Low	Channel materials are predominantly boulders and bedrock and will not erode significantly even with major alteration.

MODIFYING NOMENCLATURE FOR VALLEY TYPE NAMES

SIDESLOPE GRADIENT: The dominant gradient of the sideslopes. Consideration is based on the lower 200 to 500 feet of the sideslopes.

MODIFIER	SLOPE CLASS (PERCENT)
Gentle-Sided	< 30
Moderately Steep-Sided	30 - 50
Steep-Sided	50 - 65
Very Steep-Sided	65 - 80
Precipitous-Sided	> 80

VALLEY BOTTOM WIDTH: The dominant width of valley bottom terrain exclusive of the width of the occupying stream channel.

MODIFIER	WIDTH CLASS (FEET)
Very Narrow	< 15
Narrow	15 - 50
Moderately Narrow	50 -100
Moderately Wide	100 -300
Wide	>300

VALLEY GRADIENT: The dominant longitudinal gradient of the valley bottom. It is typically the gradient of the occupying stream.

MODIFIER	GRADIENT CLASS (PERCENT)
Low	< 2
Moderate	2 - 4
Moderately Steep	4 - 8
Steep	8 -12
Very Steep	>12

STREAM CHANNEL CONDITION CLASSIFICATION

INTRODUCTION

Stream channel condition is essentially a qualitative rating of a stream channel's reaction in terms of stability to the peak flows it has experienced in the recent past (20 to 40 years). It is controlled by a complex interaction of factors, the most important of which are (1) the stability of channel materials, (2) the magnitude of peak flows, and (3) stream sediment loads.

The channel condition does not necessarily indicate the hydrologic condition of the upstream watershed. A channel may be in good or excellent condition solely because of very stable channel materials - not because of well regulated streamflow. On the other hand, a channel may be in poor condition primarily because of highly unstable materials and/or change in base level rather than high peak flows from a poor condition watershed. Channel condition information is supplemental to, rather than a substitute for watershed condition information.

RECONNAISSANCE APPROACH AND PROCEDURES

The major streams, generally fourth order and larger, were subdivided into "reaches" of similar conditions of materials, valley shape, vegetation, and apparent stability condition by aerial photo interpretation. The streams were then traveled in the field, reach corrections made, and channels rated as to condition. Field records and photographs are available in the Boise National Forest Supervisor's Office. The stream channel condition criteria used are presented on the following page.

DEFINITION OF TERMS

Channel - That cross section containing the stream which is obviously distinct from the surrounding area due to breaks in the general slope of the land.

Channel sides, stream banks, and stream bottom defined below are all referenced to the water surface of the stream at other than flood stage conditions.

Channel Side - The portion of the channel cross section from the break in the general slope of the surrounding land to the water surface.

Stream Bank - The submerged portion of the sides of the channel cross section from the water surface to the point which is 45^{o} from the vertical.

Stream Bottom - The submerged portions of the channel cross section other than the banks.

Guides for Stream Channel Condition Classification
(From Megahan)

1. Channel sides well vegetated. (2)	1. Channel sides partially vegetated. (4)	1. Very little vegetation on channel sides. (6)
2. No slumping of channel sides. (2)	2. Slumping of channel sides at constrictions and bends. (4)	2. Slumping of channel sides common. (6)
3. Very little or no cutting or deposition of channel bottom. (2)	3. Some cutting of channel bottom at constrictions, bends, and steep grades and deposition in areas where the water velocity is less. (4)	3. Cutting and deposition of channel bottom obviously in a state of flux. (6)
4. Aquatic vegetation on channel sides and bottom. (1)	4. Aquatic vegetation scattered mostly in areas where stream velocities are low. (2)	4. No aquatic vegetation. (3)
5. Algae on rocks. (1)	5. Algae on rocks in places where the bottom is stable. (2)	5. No algae on rocks. (3)
6. Very little or no recent cutting or deposition along channel sides. (2)	6. Some cutting of stream banks at constricted areas or at outside of bends; deposition at the inside of bends and at the confluence with other streams. (4)	6. Large-scale cutting of stream banks common. (6)

CLASSIFICATION	RATING*	INDEX	MAP COLOR CODE
Excellent	10 - 13	1	Blue
Good	14 - 17	2	Green
Fair	18 - 22	3	Yellow
Poor	23 - 26	4	Orange
Very Poor	27 - 30	5	Red

* Stream condition rating equals the summation of the above 6 guides.

7. Channels in Rock - In some instances, the channel cross-section may be carved in rock. Regardless of the above rating, to classify the condition of such channels on the basis of channel stability, they must be considered to be in the Good condition class or better.

SEDIMENTATION PROBLEM AREAS MAP EXPLANATION

DEFINITIONS OF BASIC TERMINOLOGY

Accelerated sediment source areas are those areas from which sedimentation rates have been increased over natural rates by man-controlled activities.

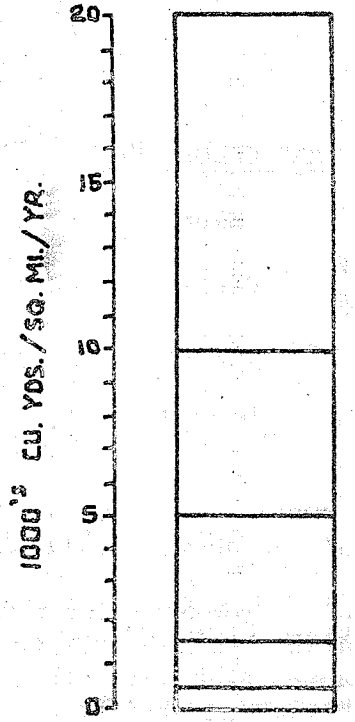
Sediment is the solid material transported to and deposited in a water body or water course. Soil and rock material eroded from the slopes of a watershed becomes sediment only if and when it is delivered to a water body or water course. Therefore, erosion is not the same as sedimentation.

Natural erosion is occurring on, and natural sedimentation is occurring from all lands. This is erosion and sedimentation which occurs when soils, climate, landform, and vegetation have not been altered directly or indirectly by man. Accelerated sedimentation is that additional sedimentation that results from alteration of natural conditions by man.

RECONNAISSANCE APPROACH AND PROCEDURES

The approach taken in this reconnaissance was to separate the accelerated sediment source areas into five qualitative classes - low, medium, high, very high, and extreme - by field observation, aerial photograph interpretation, and review of past survey information. Next, the quantitative limits of each class were estimated, based on benchmark data from quantitative studies. No quantitative measurements of sedimentation were taken during this reconnaissance.

The classes and their estimated quantitative limits are:



CLASS	COLOR CODE	CUBIC YARDS PER SQUARE MILE PER YEAR
Extreme	Red	10,000 - 20,000
Very High	Orange	5,000 - 10,000
High	Yellow	1,500 - 5,000
Medium	Blue	500 - 1,500
Low	Green	50 - 500

The rates above apply to specific areas from which sediment originates. Examples are disturbed areas of the road prism, sheep driveways and placer mined slopes. The rates do not apply to watershed-size areas. Rates for watersheds would be the weighted mean of all areas within the watershed and would normally be much lower than the rates above.

Procedures followed during the reconnaissance are outlined below:

1. System and a few non-system roads were travelled and minimum segments of 0.1 mile were rated into extreme, very high, high medium, or low accelerated sedimentation rates. This was done by observing: (a) erosion evidence on and adjacent to the road, and (b) buffer conditions and other evidence of eroded material delivery to water courses. Sedimentation ratings were recorded by color on a 2 inch per mile map.

2. When available, erosion, sedimentation, and watershed condition studies and reports for areas within the District were reviewed. Those areas delineated by the studies and reports which showed actual or potential accelerated erosion or sedimentation rates were transferred to a 2 inch per mile map.

3. Range condition information from allotment management folders was reviewed.

4. Resource-scale, color aerial photographs were systematically reviewed. During this review, watershed condition information from Step 2 was interpreted as to sediment delivery conditions and accelerated sedimentation classes were assigned. Other accelerated sediment source areas, such as mining disturbance, were located and rated. Information was recorded on a 2 inch per mile map.

The minimum area delineated was approximately 0.1 mile for roads and 30 acres for land areas. Whenever large mass failures due to disturbance were observed, they were delineated; however, this is an incomplete inventory of such failures. Sedimentation from stream channel erosion is not included in this mapping. Stream channel condition maps indicate channel erosion.

ANALYSIS OF INVENTORY INFORMATION

The inventory information is for one point in time, 1972, and will change with time. Proper evaluation of this information requires recognition of some basic relationships between sedimentation, erosion, and other factors.

Sedimentation and Erosion. Eroded material is the source of sediment. the sedimentation rate for a given area is not necessarily the same as the erosion rate. Much of the material eroded is dropped when the runoff water carrying it slows down or enters the soil, or when a

soil mass, moved by gravity, comes to rest before entering a water course. The percent of the total eroded material that enters a water course and becomes sediment is called the sediment-delivery percent. The sediment-delivery percent varies greatly from one location to another and from one time to another. Slope shape, steepness, roughness, vegetation, length, as well as amount and timing of rainfall and snowmelt all influence sediment-delivery percent.

The term buffer zone refers to the characteristics of the land between as erosion source and the most accessible water course. A good buffer zone keeps the sediment-delivery percent very low.

A good buffer zone has frequent large obstructions such as depressions, mounds, logs, rocks, trees, and stumps. It is wide enough to catch and store large quantities of eroded material. A poor buffer zone lacks these characteristics.

The buffer zone also has a sediment storage function much like a reservoir. A delay occurs between the time of material inflow to the buffer zone and the time of outflow of material to water courses. The length of delay depends on the storage capacity of the buffer zone and the rate of inflow of eroded material. A good buffer zone has surplus storage capacity and can delay outflow of sediment to water courses indefinitely as long as erosion rates are not extreme for a long period. Once the storage capacity of a buffer zone is exhausted, the sediment-delivery percent jumps and remains high until erosion is reduced. Sedimentation rate often remains high for a time after the erosion rate drops until in-transit material, surplus to the storage capacity, passes through the buffer zone.

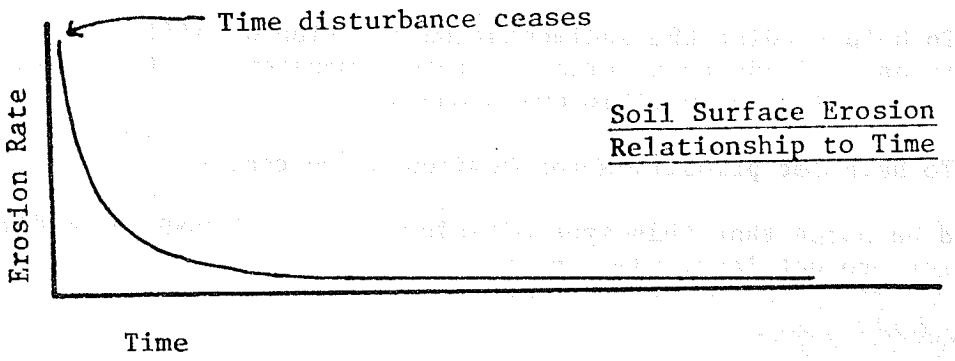
The storage capacity and efficiency of a buffer zone can often be improved or damaged by man.

Erosion Rate to Time Relationship. For this discussion, erosion will be separated into (1) soil surface erosion by running water, and (2) soil erosion by mass movement (primarily by the force of gravity).

Soil surface erosion by running water has been shown by many studies to reduce with time after a disturbance such as denudation, soil disturbance, water rechanneling, etc. The reduction in erosion rate is greatest during the first three to five years after the disturbance ceases. Then the erosion rate reduces more gradually until it reaches a more sustained, long-term rate. The quantitative scale varies with the type of disturbance but the general shape of the surface erosion rate curve with time is similar to the curve presented on the opposite page.

The difference in the time and erosion rate scale from site to site is mostly controlled by the time required for the site to regain good ground cover and infiltration conditions and for new water channels

to become armoured with stable materials. (Soils derived from well weathered granitic bedrock require many years to develop stable new water channels.)



Soil erosion by mass movement (primarily by the force of gravity) is less related to time than soil surface erosion by running water. After a major soil disturbance or major reduction in deep rooted plants, the mass movement hazard is likely to be at its highest. However, after this initial period, the hazard of mass movement erosion stays about the same and has no clear relationship with time.

Relationship of Erosion to Climatic Events. Soil surface erosion by running water is related to climatic events in that rainfall and snowmelt provide the main energy for detachment and transport of soil. Consequently, as the magnitude of the climatic event increases, so does the rate or quantity of erosion increase. However, the same climatic event does not always cause the same amount of erosion. The erosion rate is also dependent on the time of the storm occurrence after a given soil disturbance. That is, the same rainstorm will cause more erosion if it occurs in an area one year after denudation by fire than if it occurs three years after the fire.

The relation of soil erosion by mass movement to time after disturbance and climatic events is not as well understood as that of soil surface erosion. There is strong evidence that soil erosion by mass movement, primarily by the force of gravity, is more closely related to climatic events than to time. For example, in the Idaho Batholith there are indications that the same storm event will cause about the same amount of soil erosion by mass movement whether it occurs two years or seven years after road construction or timber harvest on a given area.

USES FOR ACCELERATED SEDIMENTATION INVENTORY INFORMATION

After the information is placed in perspective, it may be useful for the following purposes:

1. To get a general picture of the 1972 accelerated sedimenta-

tion situation for the District or Planning Unit.

2. To get a general indication of the effect of past man-controlled activities on sedimentation on different types of land.

3. To help predict the sedimentation reaction of different types of lands to alternative future managemnt activities. This fits into multiple use planning.

4. To help set priorities for sedimentation control efforts.

(It should be noted that this type of information is broad and is not suitable for project level planning purposes.)

APPENDIX B - ADDITIONAL INFORMATION

Guide to Textural Classification

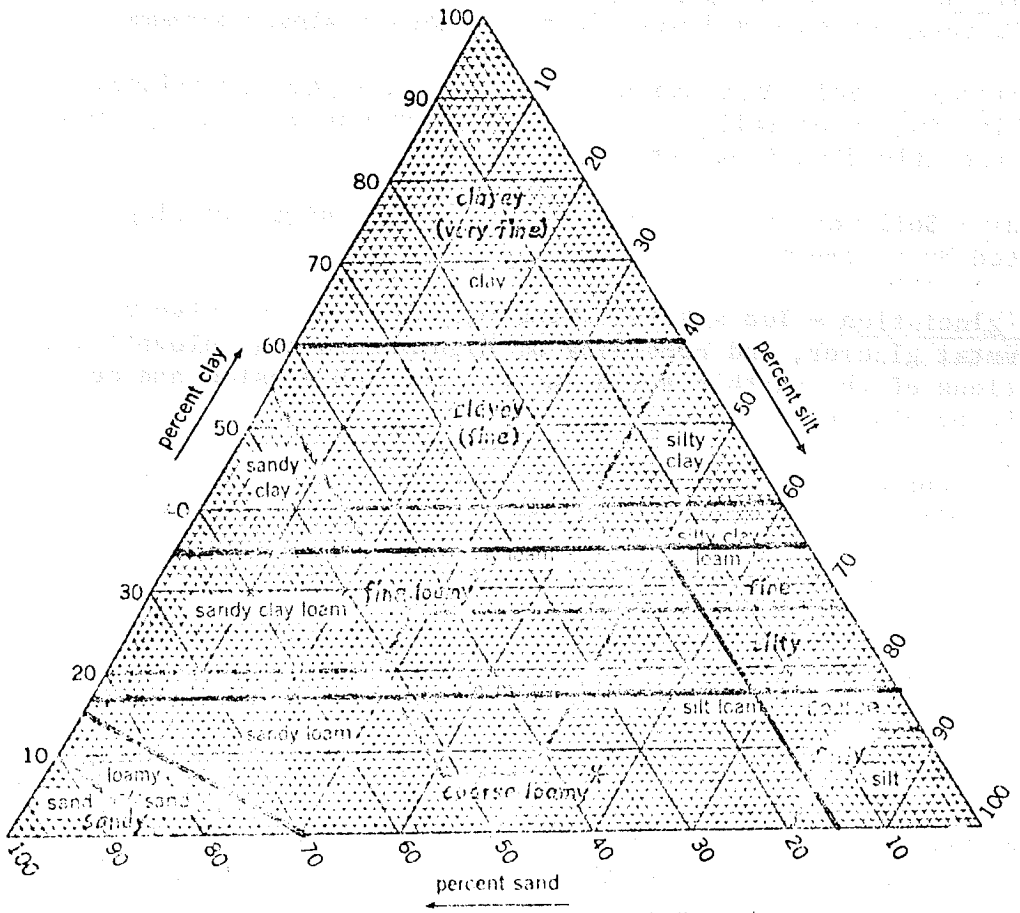
Glossary

References

Maps

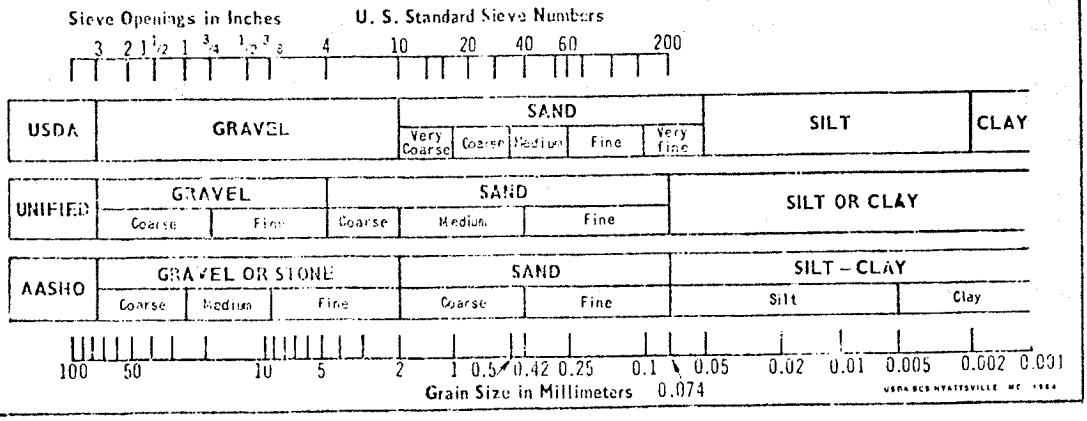
- Landtype-Soil Association and Valley Types
- Sedimentation Problem Areas
- Stream Channel Stability Condition

GUIDE FOR TEXTURAL CLASSIFICATION IN SOIL FAMILIES



* Very fine sand (0.05 – 0.1) is treated as silt for family groupings; coarse fragments are considered the equivalent of coarse sand in the boundary between the silty and loamy classes.

COMPARISON OF PARTICLE SIZE SCALES



GLOSSARY

Aeolian - Wind deposited soil materials, generally called loess.

Alluvial fan - A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain or meets a slower stream.

Alluvial soil - Soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

Alluvium - Soil materials such as gravel, sand, silt, or clay, deposited by a stream.

Alpine glaciation - Ice sheets moving only locally relative to a continental glacier, and producing at high mountainous elevations, alterations of the earth's solid surface through erosion and deposition by glacier ice.

Angle of repose - The maximum slope or angle at which a material such as soil or loose rock remains stable.

Available water holding capacity - The portion of water in a soil that can be readily absorbed by plant roots. Considered to be that water held in the soil against a pressure of up to approximately 15 bars.

Block fault - A body of rock bounded by one or more faults. It may be elevated or depressed relative to the adjoining region.

Blocky structure - Soil aggregates that are shaped like blocks. They may have flat or rounded surfaces that join at sharp angles.

Boulders - Rock fragments greater than 24 inches in diameter.

Clay - This term has two meanings: (1) soil consisting of inorganic materials, the grains of which have diameters smaller than .002 millimeters, (2) crystalline fragments of various minerals.

Cobbles - Rounded or partially rounded rock fragments ranging from 3 to 10 inches in diameter.

Colluvial - Gravity is the work force involved. Rock fragments and soil materials accumulating at the base of steep slopes.

Concave slope - A hollow, curved inclined surface of a hill, ridge or mountain.

Consistence - A combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Such terms as loose, friable, firm, soft and sticky describe soil consistence.

Convex slope - Opposite of concave slope. A slope arched or curved outwardly.

CRB - Columbia River Basalt. Includes all flows and interstratified volcanic materials in Idaho that are associated with the Columbia River Basalt formation.

Crumb structure - Soil aggregates that are generally soft, small, porous, and irregular, tending toward a spherical shape.

Cryoplanated - Reduction of land surfaces mainly due to processes associated with frost action. The smooth slopes that characterize the surfaces are believed to be formed by frost accelerated erosion on altiplanation, induced by past and, in places, present alpine climatic regimes. These landscapes are often near other landscapes which have clearly been glaciated. Altiplanation and Cryoplanation are considered by some to be synonymous.

Deep percolation - Synonymous with deep seepage. That part of precipitation which enters the soil and percolates downward to the ground-water table or into pores, fractures, or joints of bedrock.

Deep seepage - See deep percolation.

Dendritic drainage pattern - Characterized by irregular branching in all directions with the tributaries joining the main stream at all angles.

Differential erosion - The more rapid erosion of one portion of the earth's surface as compared with another.

Dip slope - A slope of the land surface which conforms approximately to the angle at which a stratum of rock is inclined from the horizontal.

Elevated displacement - The higher of the two sides of a fault measured in the vertical.

Erosion - This includes processes of weathering, solution, corrosion, and transportation of earth and rock materials. Forces involved may be water, ice, wind, and gravity.

Escarpment - A more or less continuous line of cliffs or steep slopes facing in one general direction and due to erosion or faulting.

Extrusive - Those igneous rocks cooling above the earth's surface.

Faulting - The movement which produces relative displacement of adjacent rock masses along a fracture.

Fluvial - Produced by or pertaining to rivers and streams.

Geomorphology - The branch of physical geography which deals with the interpretative description of the relief features of the earth.

Glacial outwash - Boulders, till, gravel, sand or clay deposited by melt-water streams below active glaciers.

Granitic - Pertaining to relatively coarse-grained, light-colored rocks, composed chiefly of varying amounts of quartz and feldspar with relatively low amounts of dark colored minerals.

Granular structure - Aggregates are roughly spherical and small. They may be either hard or soft, but are generally more firm and less porous than crumb structure and are without the distinct faces of blocky structure.

Gravel - Rounded or angular rock fragments, not prominently flattened from 2 mm, to 3 inches in size. Fragments over 2 inches diameter - coarse gravelly; under ½ inch in diameter - fine gravelly.

Ground-water runoff - (In the context of a watershed.) That part of runoff that reaches surface streams of either perennial or intermittent form as flow beneath the soil surface. This includes, but is not limited to, subsurface flow and deep percolation.

Grus - An accumulation of fragmental products derived locally from the decomposition of granite.

Habitat type - See Habitat Type, Explanation of Table 4, Appendix A.

Igneous - Formed from a molten or partially molten material.

Infiltration - The passage of water through the soil surface into the soil.

Inherent erosion - See Inherent Erosion Hazard, Explanation of Table 1, Appendix A.

Intrusive - Molten material forming rocks before reaching the earth's surface. Cooling slowly.

Landtype - A portion of the landscape resulting from geomorphic and climatic processes with defined characteristics having predictable soil, hydrologic, engineering, productivity and other behavior patterns.

Landtype association - Represents the broadest level in the land stratification system at which the manifest (obvious) elements of soils, landform and vegetation become controlling.

Lithology - The physical character of a rock.

Massive structure - Characterized by large uniform masses of cohesive soil, sometimes with poorly defined and irregular breakage.

Mass stability - The susceptibility of soil masses to stress. Gravitational stresses, on slopes, changes of state (solution) and soil particle cohesion are the main factors involved.

Mass-wasting - The slow downslope movement of rock or soil debris. A general term for a vareity of processes by which large masses of earth materials are moved by gravity either slowly or quickly from one place to another.

Moderately dissected - Dissections or drainageways are spaced 500 to 1500 feet apart if shallow or moderately deep or if deep, more than 1500 feet apart.

Moraine - Soil materials, rocks, and gravel deposited chiefly by direct glacial action.

Nivation - Frost action and mass-wasting beneath a snowbank.

Overland flow - The part of precipitation that flows over the land surface toward water channels.

Parallel drainage pattern - Streams flowing nearly parallel to one another due to parallel topographic features.

Parent material - The unconsolidated mass of material from which the soil profile develops.

Percolation - The movement of water within the soil.

Plasticity - The property of a soil that enables it to undergo permanent deformation without appreciable volume change or rupture.

Relief - Difference in elevation between the high and low points of a land surface.

Low	-	100 feet
Moderate	-	100-500 feet
High	-	500 feet

Response, Hydrologic - The relative time interval from water input (rainfall, snowmelt, etc.) to water outflow (water yield, runoff, etc.).

Lithology - The physical character of a rock.

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Parent material - The unconsolidated mass of material from which the soil profile develops.

Percolation - The movement of water within the soil.

Plasticity - The property of a soil that enables it to undergo permanent deformation without appreciable volume change or rupture.

Relief - Difference in elevation between the high and low points of a land surface.

Low	-	<100 feet
Moderate	-	100-500 feet
High	-	>500 feet

Response, Hydrologic - The relative time interval from water input (rainfall, snowmelt, etc.) to water outflow (water yield, runoff, etc.).

RO - Rock outcrop. Surface exposures of bedrock.

RO - Rock outcrop. Surface exposures of bedrock.

Runoff - (In the context of a landtype) Synonymous with landtype water yield. That part of precipitation received on a landtype that is yielded as free water to a lower bordering landtype or stream. The source of runoff (water yield) may be overland flow, subsurface flow, or deep percolation.

Runoff - (In the context of a watershed) That part of precipitation which appears in surface streams of either perennial or intermittent form. The source of runoff may be surface runoff or ground-water runoff.

RW - River-wash. A miscellaneous unit consisting of sandbars, gravel, cobbles, stones, boulders, wet areas, sands, and silting areas. Generally little vegetation is found on this soil.

Scarp slopes - Escarpment or steep slopes associated with faulting activity, usually opposite a dip slope.

Sediment - The solid material transported to and deposited in a water body or water course.

Sedimentary - Rocks composed of particles precipitated or deposited from suspension or solution in water.

Sedimentation - The process whereby sediment is transported to and deposited in a water body or water course.

Silt - Small mineral soil grains that range between 0.05 and 0.002 millimeters in diameter.

Single grain structure - No observable soil aggregates with the soil grains noncoherent.

Skeletal - A soil containing 35 percent or more rock fragments greater than 2.0 millimeters in diameter.

Slope hydrology - The manner in which a mountain slope disposes of the water it receives.

Slope length - Length of the incline surface of any part of the land.

Short	-	< 500 feet
Moderate	-	500 to 1500 feet
Long	-	< 1500 feet

Slump - The downward slipping of a mass of soil or rock material, moving as a unit.

Soil - A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms.

Soil aggregate - A single mass or cluster consisting of many primary soil particles held together in a form such as a clod, crumb, or granule.

Soil color - (Munsell color system). A color designation system that specifies the relative degrees of the three simple variables of color: hue, value, and chroma. For example: light yellowish brown, 10YR 6/4 is a color (of soil) with a hue = 10YR, value = 6, and chroma = 4.

Soil development - The formation of a soil (genesis) from its parent material; five major factors largely control the kind of soil that develops:

1. Climate (particularly temperature and precipitation)
2. Living organisms (especially the native vegetation)
3. Nature of parent material
4. Topography of area
5. Time that parent materials are subjected to soil formation

Soil horizon - A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes.

Soil mottling - Contrasting color patches that vary in number and size.

Soil particle - An individual grain of soil, within a definite size group, as a clay, silt, or sand particle.

Soil profile - A vertical section of the soil through all its horizons and extending into the parent material.

Soil reaction - Sometimes referred to as pH. It is the common logarithm of the reciprocal of the hydrogen ion concentration of the soil solution. pH7 indicates a neutral soil; above 7, alkaline; below 7, acid.

Soil structure - The arrangement of the primary soil particles into lumps, granules, or other aggregates.

Soil texture - The relative amounts of the various size classes of soil particles, such as sand, silt, and clay. (See Chart, Appendix B.)

Stones. Rock fragments between 10 and 24 inches in diameter if rounded, and longer than 15 inches along the longer axis, if flat.

Strike - The direction or bearing of a horizontal line in the plane of an inclined stratum of rock. It is perpendicular to the direction of the dip.

Strongly Dissected - Dissections or drainageways are spaced less than 500 feet apart if shallow or moderately deep, or 500 to 1000 feet apart if deep.

Structural control - Topographic features pertaining to, part of, or consequent upon the geologic structure.

Subsoil - That part of the soil profile commonly below the surface horizon and above the parent material.

Subsurface flow - Synonymous with subsurface runoff, interflow, and subsurface storm flow. That part of precipitation which infiltrates the surface soil and moves laterally through the soil horizon toward streams as ephemeral, shallow, perched ground-water above the main ground-water level.

Surface layer - That part of the soil profile that includes the surface and first (A) horizon (generally 4 to 10 inches).

Surface runoff - (In the context of a watershed) That part of runoff that reaches surface streams of either perennial or intermittent form as overland flow.

Tectonic lands - Land raised by deformation of the earth's crust. Uplift, warping, fracture, faulting are some forms of tectonism. This is in contrast with land formed by volcanism or sedimentary deposition.

Terrace - The level or gently undulating land lying along a stream valley, intermediate in elevation between the flood plain and the upland. Terraces are remnants of an earlier flood plain of the stream.

Transported soils - Those soils not formed in place but moved by wind, water, or gravity.

Truncate - Terminate abruptly; truncated spur; the widening of a valley by a glacier results in the truncation of the ridges entering the sides of the valley.

Uplift - Elevation of any extensive part of the earth's surface relative to some other parts.

Vesicular - Filled with tiny air pockets and resembling a sponge or honeycomb in appearance.

Water table - The upper surface of the ground water.

Water yield, Landtype - See Runoff (in the context of a Landtype).

Weakly Dissected - Dissections or drainageways are generally 500 to 1500 feet apart if shallow, and more than 1500 feet apart if deep.

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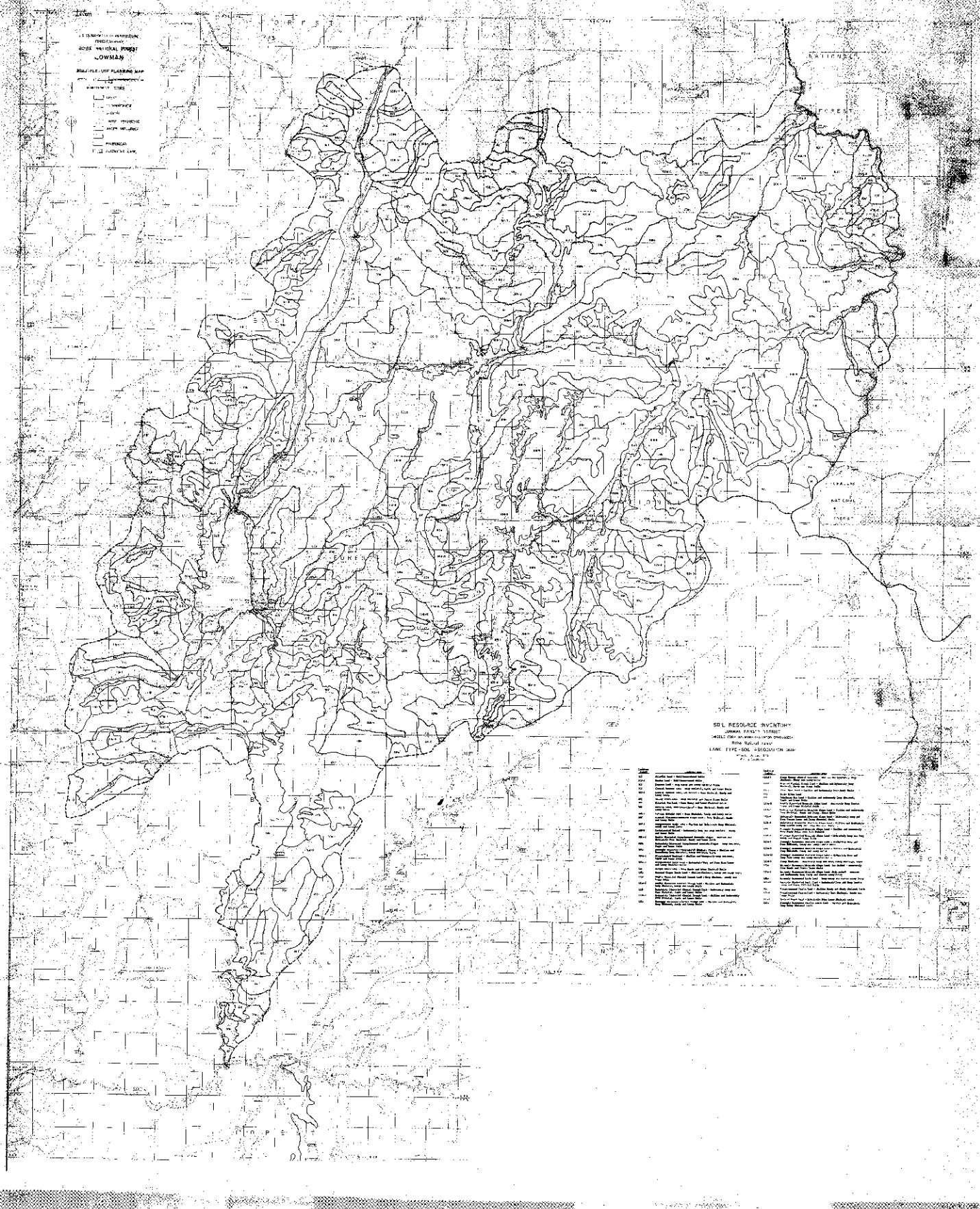
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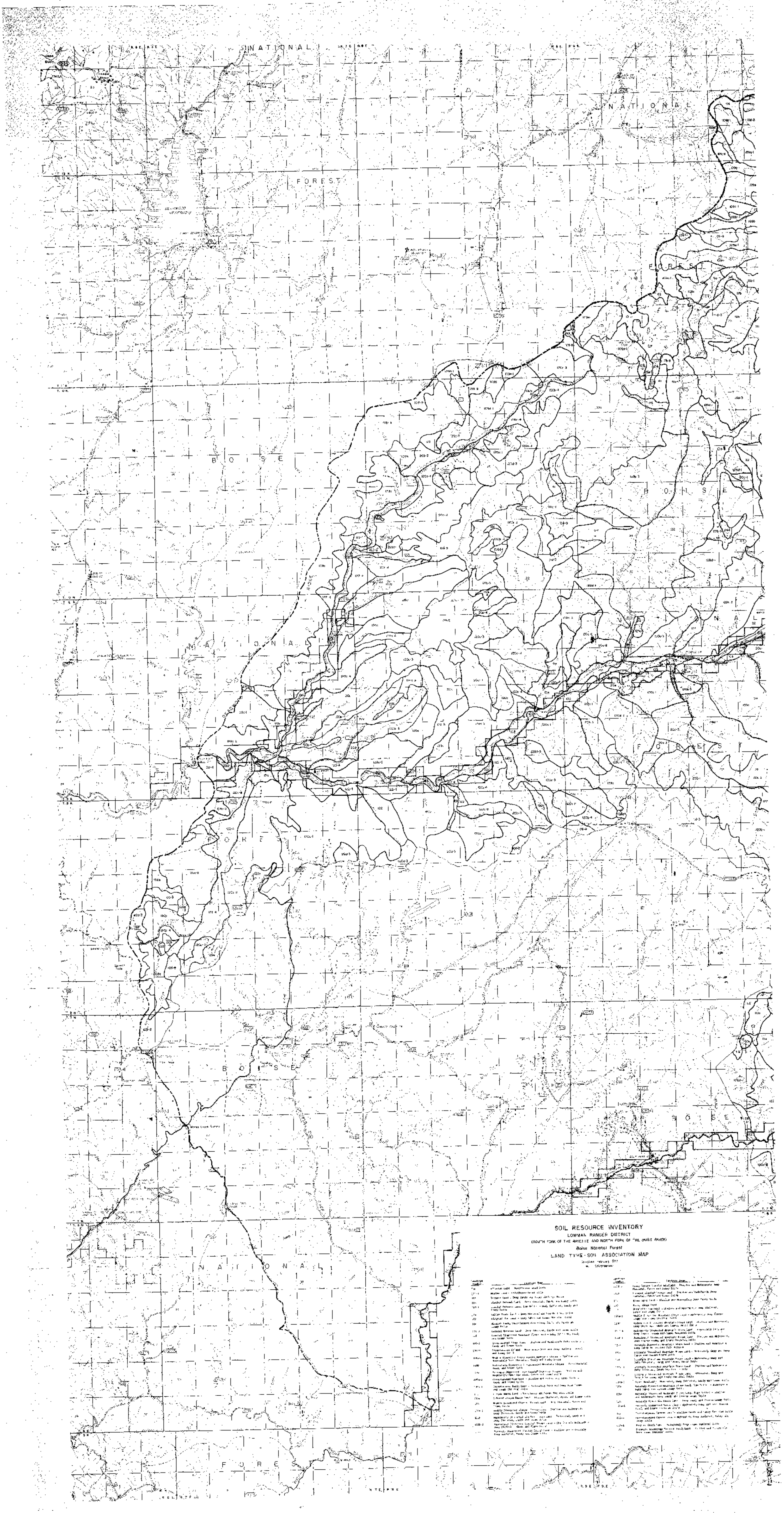
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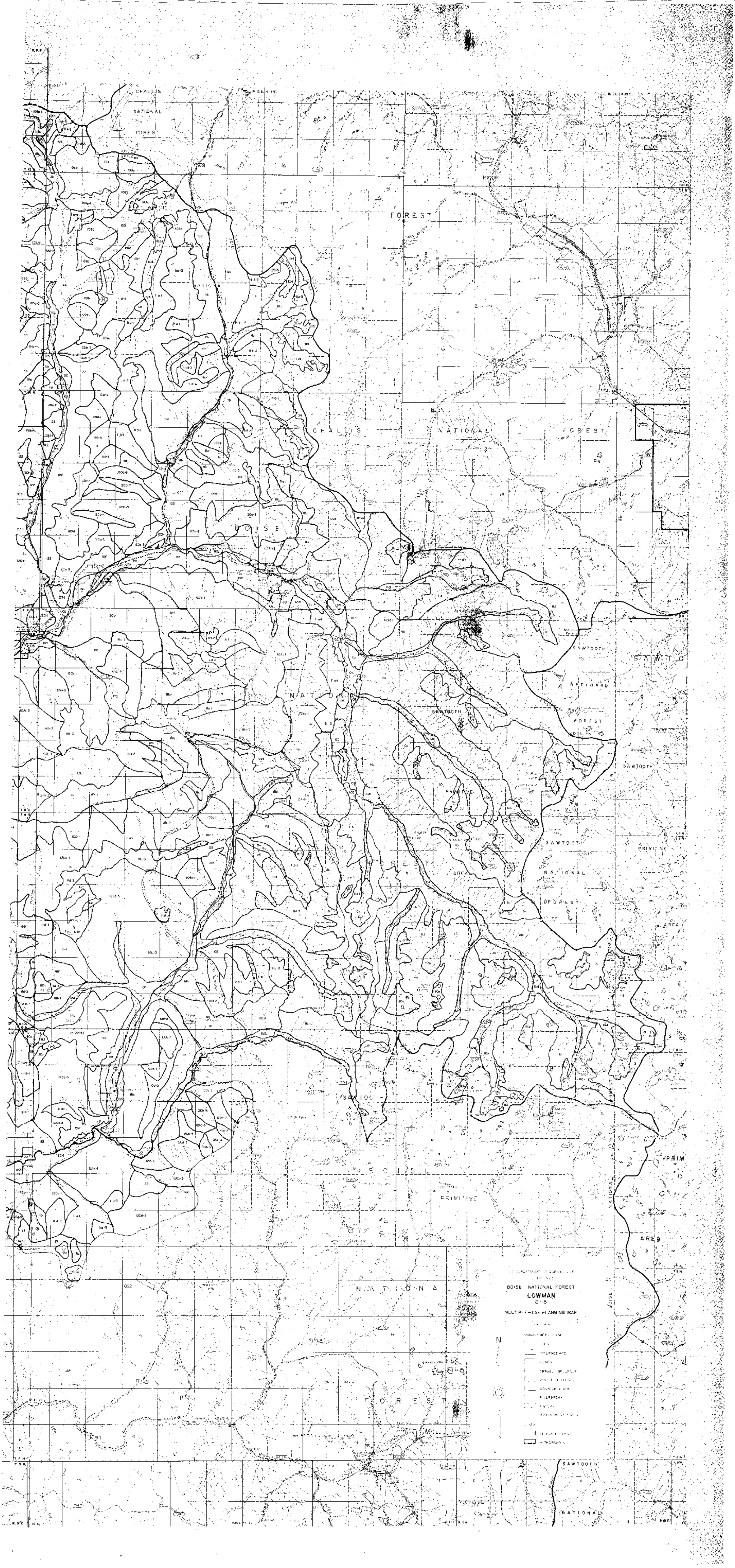
LOWMAN RANGER DISTRICT
Boise National Forest
LAND TYPE - SOIL ASSOCIATION MAP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