Lolo National Forest

Land Systems Inventory

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June 1989

OBJECTIVES AND PROCEDURE

OBJECTIVES

The primary objective of this project was to produce a comprehesive inventory of soil and vegetation patterns/resources for resource managers on the Lolo National Forest. This survey is best used as a tool for identification of areas that require special management treatment, or, at the least, on-site evaluation.

A secondary objective was to produce a soil survey that coordinated with the overlapping and adjoining Soil Conservation Service soil surveys for Missoula and Sanders Counties.

PROCEDURE

This is an Order 2 to 3 soil resource inventory. It was completed under procedure outlined in Forest Service Handbook 2509.18, Soil Management Handbook.

HOW TO USE THIS INVENTORY

1) Locate the area of interest on the Quad Location Map, Appendix I, or on the appropriate Land System Inventory Quad Map.

2) Identify the Map Unit Symbol(s) that fall within the area of interest.

3) Become familiar with the meaning of the symbol—from information given in the Introduction under Landforms, Geology and Parent Materials, and Vegetation.

   Example: **10UA**

   10 – refers to the landform, in this case it is a stream bottom
   U – refers to the geology/parent material, in this case it is undifferentiated
   A – refers to the vegetation phase, in this case it is the warm, forested riparian community that occurs within the 10 series (stream bottom) map units—the A doesn't refer to open-grown forest

4) Go to the Map Unit Index on page 1-3 of Chapter II: Map Unit Descriptions, and find the page locations of the desired map unit description(s).

5) For additional interpretive information on engineering, timber, or watershed topics, go to the appropriate section(s) in Chapter III: Interpretations.

6) For additional soil information, see Chapter IV: Taxonomy.

TABLE OF CONTENTS

[1]**NOTE:** Each chapter is numbered separately.

LIST OF FIGURES

LIST OF TABLES

Chapter I: INTRODUCTION

PHYSIOGRAPHY

The Lolo National Forest is located in the northern Rocky Mountains in west-central Montana. The forest is approximately 120 miles long and 40 to 80 miles wide encompassing 2.1 million acres.

The southwestern boundary of the forest follows the Bitteroot Divide. The Coeur D'Alene, Rattlesnake, Swan, and south Mission Ranges are dominant features of the landscape. The Clark Fork River drainage is also a dominant feature and bisects the forest from east to west. The major tributaries of the Clark Fork are the Blackfoot, Bitterroot, Flathead, St. Regis, and Thompson Rivers (in order of confluence from east to west).

The Lolo National Forest includes major portions of Missoula, Mineral, and Sanders Counties. It also includes smaller portions of Powell, Granite, Lake, and Ravalli counties. The town of Missoula is centrally located in Missoula county and is the largest community within the forest with a population of about 40 thousand.

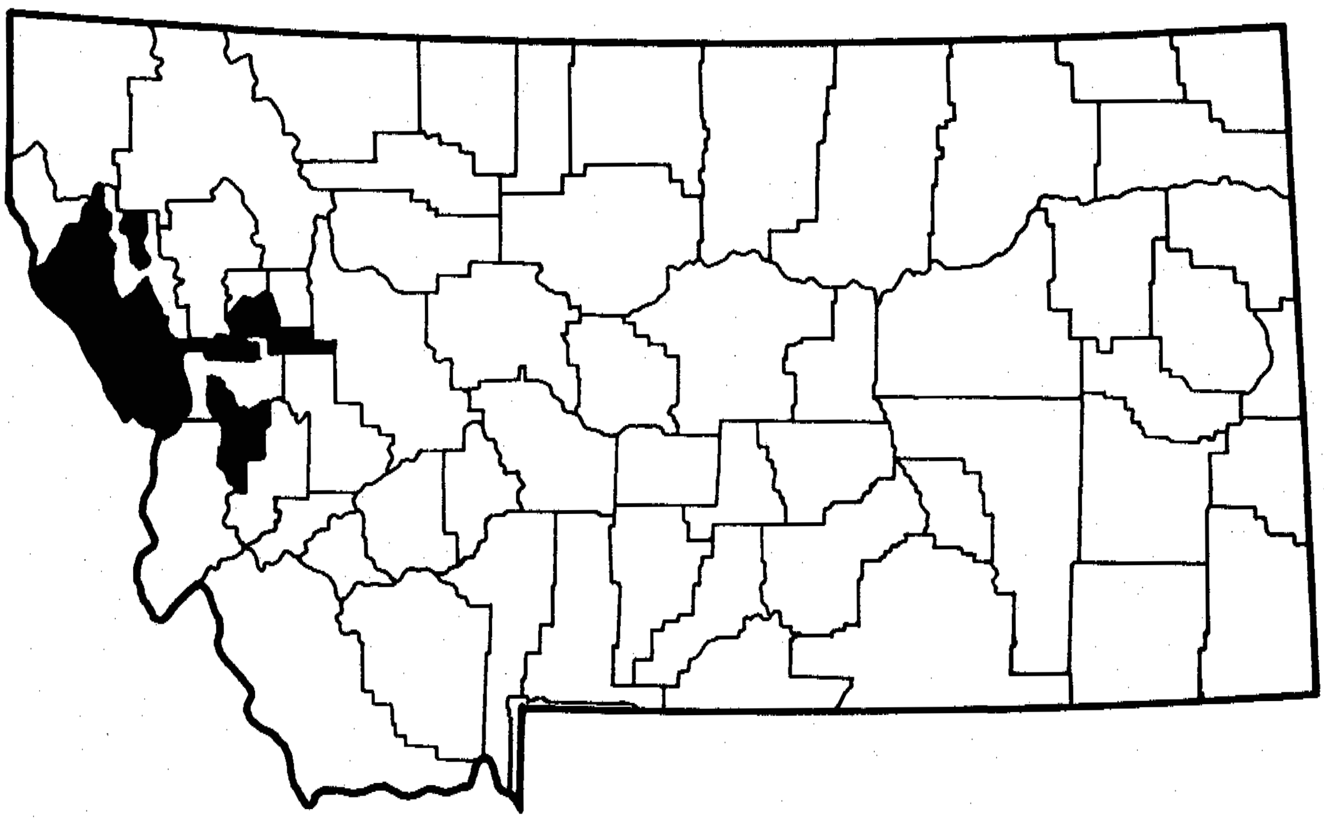


Figure I-1: LOCATION MAP FOR THE LOLO NATIONAL FOREST

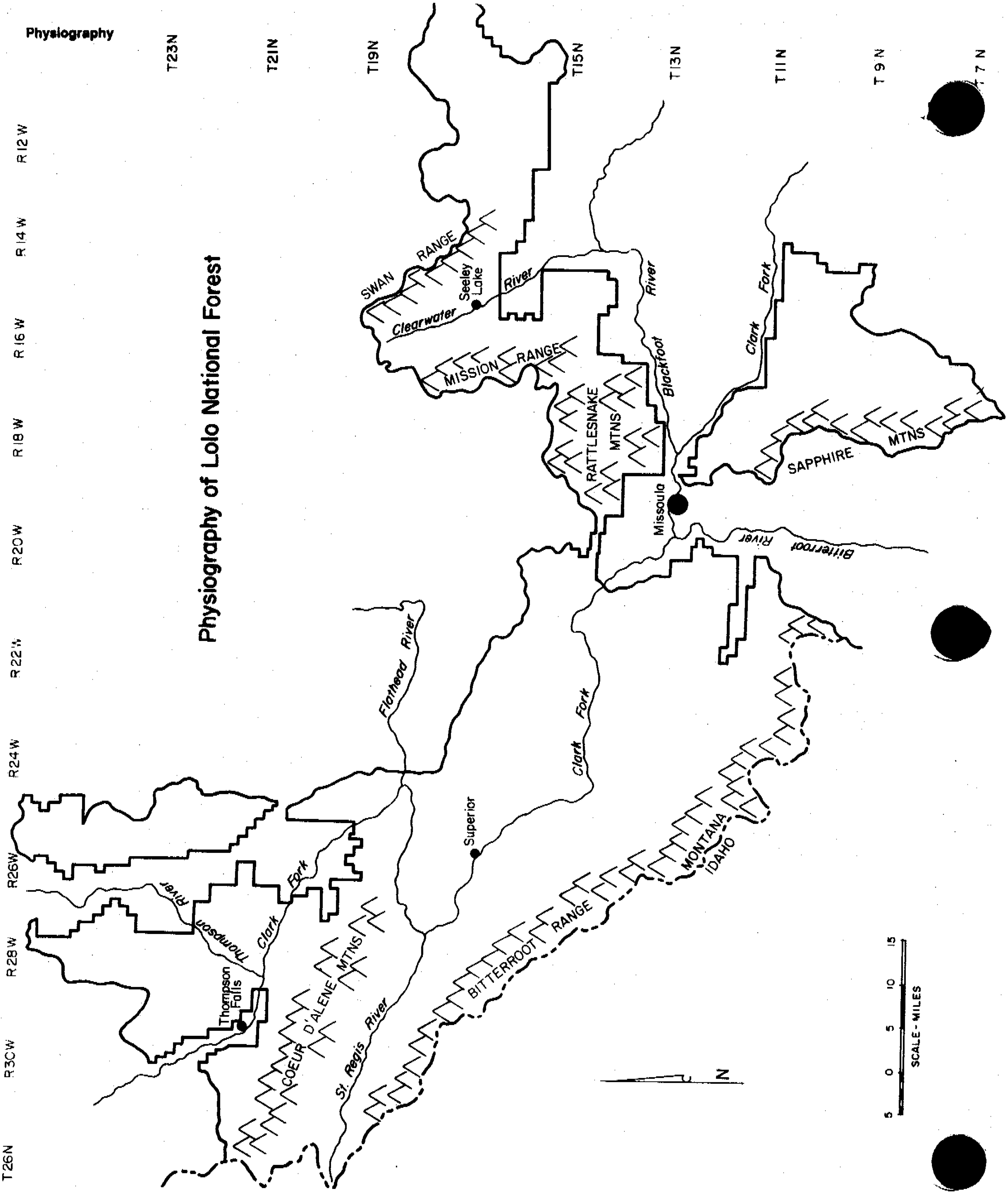


Figure I-2: PHSYIOGRAPHY MAP FOR THE LOLO NATIONAL FOREST

CULTURAL HISTORY

The earliest evidence of human occupation in Montana currently known is at Indian Creek near Townsend. Artifacts associated with extinct mammal bones dated to 11,500 years BP (before present) have been uncovered there.

In western Montana, Glacial Lake Missoula inundated much of the lands comprising the Lolo National Forest below the 4,200 foot level. This precluded human occupation until well after the lake drained which was approximately 13,000 years ago. The archeological record shows evidence of continuous occupation of the Lolo National Forest for the past 6,000 years and perhaps longer. Prehistoric sites and artifacts have been found on each District of the Lolo National Forest in a variety of habitat types and landform settings.

The early Native American groups who occupied western Montana employed a hunting and gathering lifestyle. This remained essentially unchanged until introduction of the horse from the south by the Shoshone in about 1750 AD. The coming of the horse, gun, and European trade goods brought tremendous economic and social change to the Native Americans in western Montana as well as the plains cultures to the east and the plateau cultures to the west.

The Native American groups who occupied the Lolo National Forest include the Salish (Flathead, Pend D'Oreille) and Kootenai. However, the Nez Perce from Idaho as well as the Shoshone and Blackfeet were known to have traveled through and utilized these lands at the time of Euro-American contact in 1805 with the Lewis and Clark expedition.

Several events in the history of development of western Montana are primary to understanding the pattern of settlement on the Lolo National Forest. The first Euro-American settlement in western Montana was established in 1809. It was a trading post called Salish House, established by David Thompson from the Northwest Company near Thompson Falls. Later, St. Mary's Mission was established near Stevensville in 1841 in the Bitterroot Valley. In 1850, Fort Owen was established in the same area and was the economic center for western Montana for over a decade. Mullan Road was constructed by US Army engineer, John Mullan in 1862. It tied the Missouri River System to that of the Columbia. The road, built for military purposes, provided a practical transportation route into western Montana for miners and eventually settlers. The gold strikes at Pierce, Idaho in 1861; Bannack, Montana in 1862; Cedar Creek (near Superior, Montana) in 1869; and Ninemile in 1874 brought large numbers of people into the territory. Many of them stayed establishing farms, ranches, and centers of commerce. The coming of the railroads in the 1880's provided a need for vast consumption of timber resources for railroad ties as well as lumber for towns that sprang up along the routes. By the 1890's much of the forested land along the railroad routes was extensively harvested, and it appeared the trend would continue.

In 1897 and 1898 much of western Montana and Idaho were incorporated into the Federal Forest Reserves. These reserves were later divided into the Bitterroot, Lolo, Missoula, and Cabinet National Forests between 1905 and 1907. Today, through several reorganizations, western Montana contains four National Forests: the Bitterroot, Lolo, Flathead, and Kootenai. The timber and mining industries remain as a primary basis of the economony on the Lolo National Forest and in western Montana. (For further information on the history of the area consult "The Prehistory of the Lolo and Bitterroot National Forests: An Overview by McLeod and Melton: 1986.")

CLIMATE

The Continental Divide creates a physical barrier which greatly affects the climate of Montana. Those areas west of the Divide are dominated by a maritime (north Pacific coast) climate and those east of the Divide are dominated by a continental climate. This pattern breaks down periodically under influence by the jet stream and/or erratic frontal systems. Being located west of the Divide, the Lolo National Forest is under a modified maritime climate. Winters and summers are milder, temperature extremes are less frequent, humidity is higher, and winds are lighter than those experienced east of the Continental Divide.

Temperatures in Missoula at elevation 3,150 feet can be used as representative for the forest. Average daily temperatures in Missoula from the years 1951 to 1978 ranged from 22° F in the month of January to 67° F in the month of July. Extreme temperatures for the same period were -26° to 101° F. The frost free period in Missoula is approximately 100 days becoming shorter with increase in elevation. The period of last frost on the forest is about May 30 to June 9. The period of first frost is about August 28 to September 10. These dates are representative of elevations from 2,400 to 4,100 feet.

The Lolo National Forest is predominantly mountainous forest land dissected by large valleys such as the Missoula, Swan, Bitteroot, and Potomac. A strong "orographic effect" is created due to this topography. Precipitation ranges from about 15 inches average annual in the Missoula Valley to 100+ inches on mountain peaks around 9,000 feet of elevation (see precipitation map in Figure I-3). Precipitation data from six weather stations throughout the forest are given graphically on figure I-4.

A pattern becomes apparent from this data. The western portion of the forest – from a line running north/south between St. Regis and Superior – and the northeastern portion of the forest receive the highest amounts of precipitation. The southeastern portion of the forest receives the lowest amount of precipitation. The same pattern holds for distribution of precipitation between amounts received as snow versus rain. The far west locations recieve a high proportion of annual precipitation in the form of snow whereas central locations such as Missoula receive a much higher proportion of annual precipitation in the form of rain.

Over two-thirds of the precipitation received falls as snow, which is the primary source for ground water recharge and streamflow. Nearly half of the average annual 42 inches of precipitation that falls on the Lolo National Forest's watersheds is released as streamflow. About 3.5 million acre-feet of water per year flow through almost 10,000 miles of stream channels to the Clark Fork River (data from the Lolo National Forest Plan). Figure I-5 illustrates representative stream flow distributions across the forest. Streams were selected primarily by availability of data; and, secondarily by representation of stream hydrographs for that area. It is evident that the stream flow curves across the forest are very similar. However, a slight pattern shows that streams on the western side of the forest peak slightly earlier than those on the eastern side.

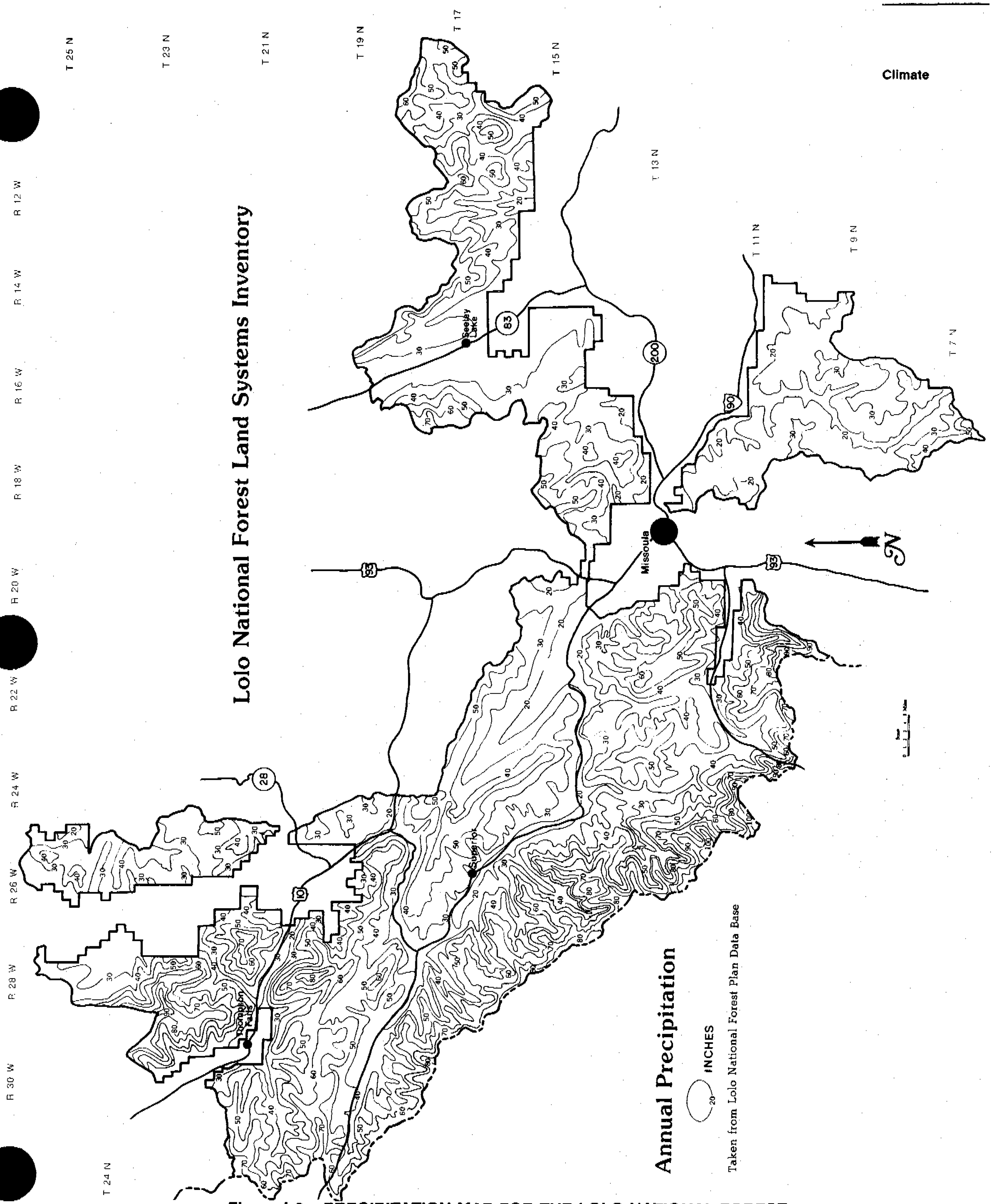


Figure I-3: PRECIPITATION MAP FOR THE LOLO NATIONAL FOREST

MONTHLY PRECIPITATION

1981 TO 1985 AVERAGES

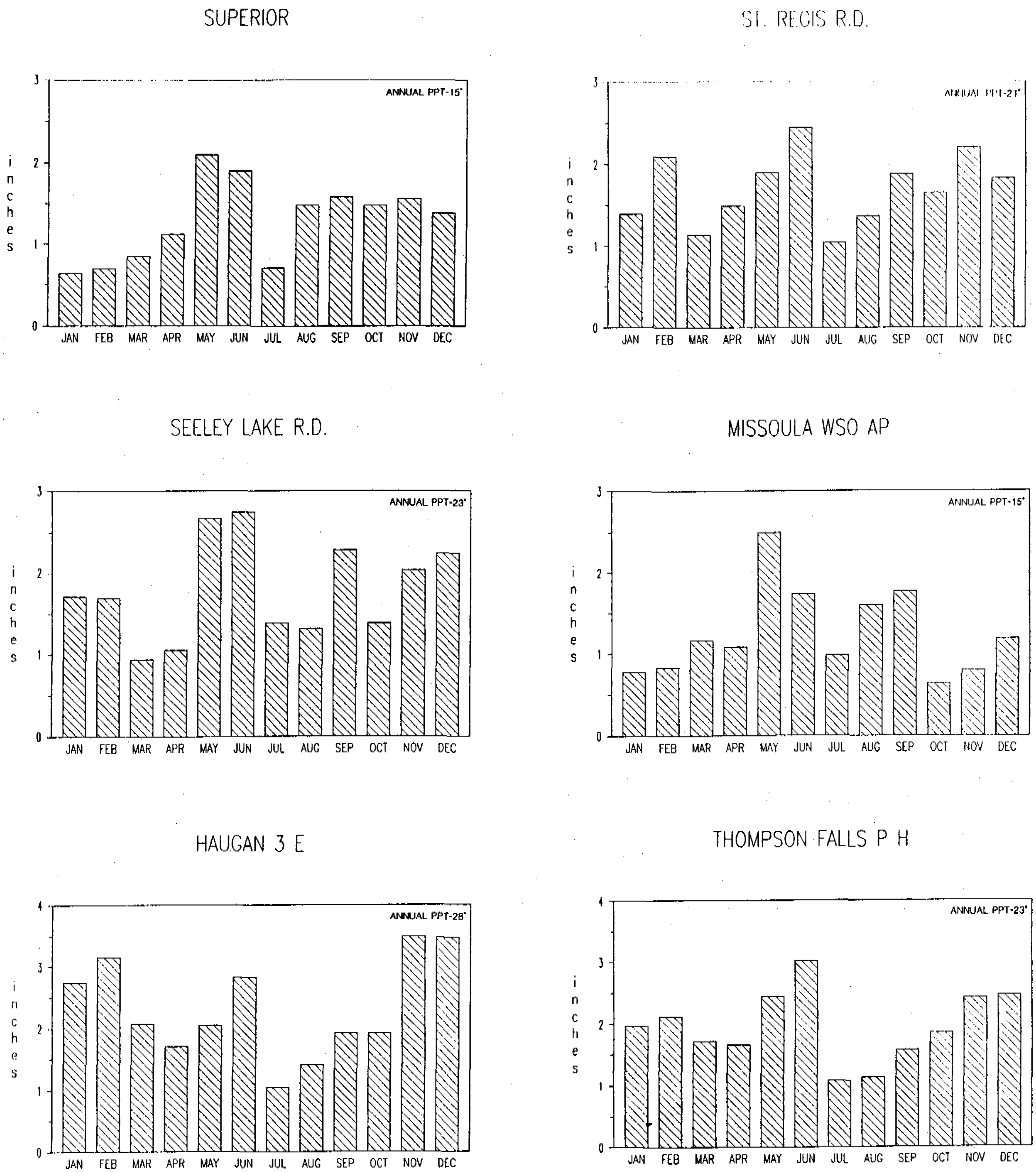


Figure I-4: REPRESENTATIVE MONTHLY PRECIPTITATION

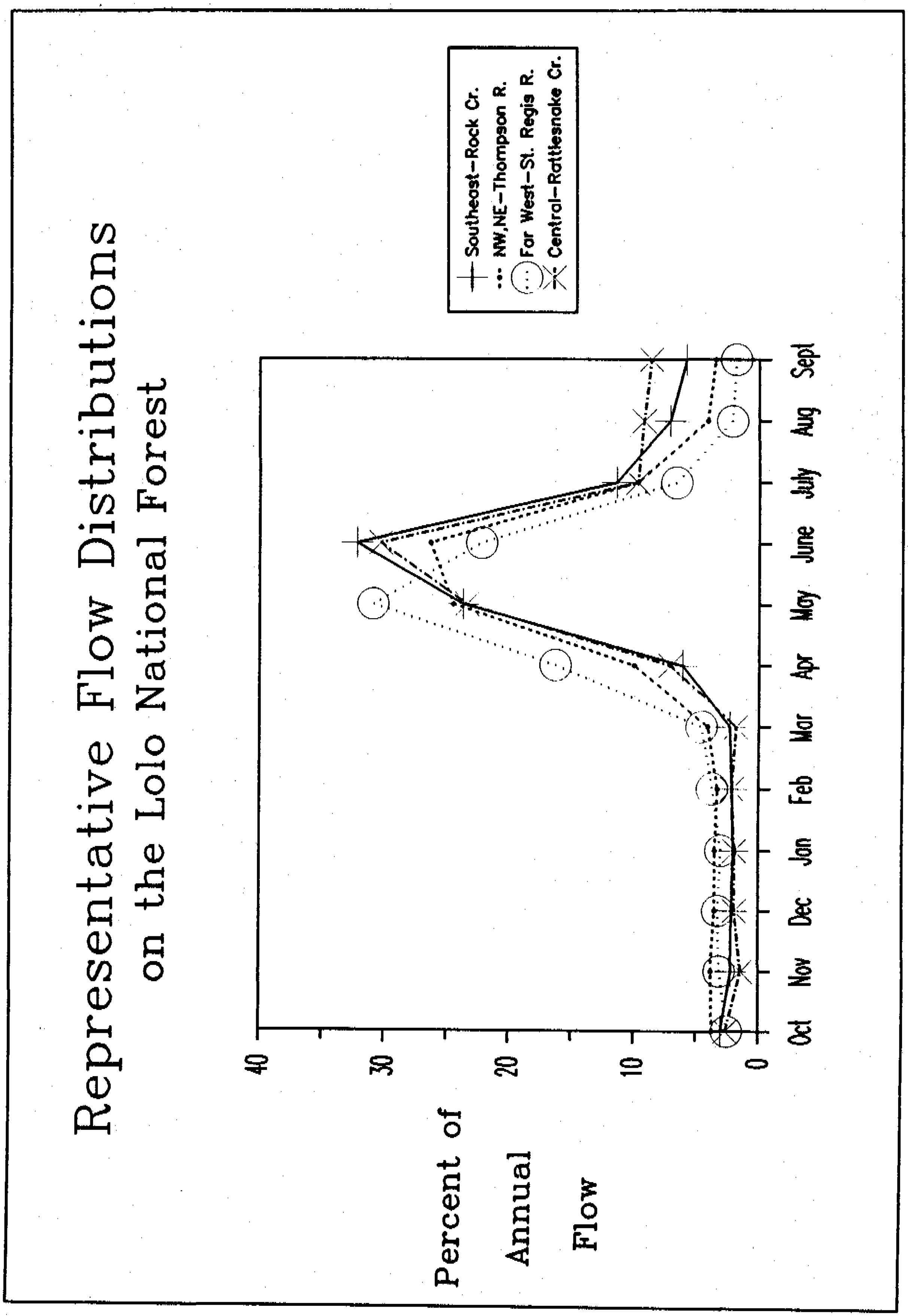


Figure I-5: REPRESENTATIVE FLOW DISTRIBUTIONS

LANDFORMS

Landform features are an integral part of the Land System Inventory. Key landforms have reoccurring characteristics that help identify and stratify landscapes for management interpretations. Landform properties such as slope steepness, slope shape, slope complexity, the pattern and density of low order streams and relief are used to define landforms. Other landscape characteristics important to land management can be inferred by landform, such as soil depth, rock outcrop percent, and to a certain extent parent material. For example, very steep slopes with perennial streams at the base tend to have more rock outcrop and soils are shallow to moderately deep. Landform properties and inferred landscape characteristics are used to interpret sediment delivery efficiency, slope stability, limitations to road construction, and limitations to timber harvest. Observable properties of landforms will help the users of this report to identify LSI map units in the field.

Twenty-three landform groups have been identified in the survey area. The numeric portion of the map unit symbol identifies the landform group for easy reference. For example the map unit 10UA has a landform characteristic of stream bottoms. This is indicated in the symbol by the number 10.

Stream bottoms (10) are nearly level, long and narrow units traversed by streams. These landforms are occupied by floodplains and low terraces with vertical relief of less than 50 feet. Substratum materials are often porous and gravelly although previously ponded areas or backwater areas can have deep deposits of silts. Water tables are often near the surface. Stream channels change frequently and contribute a natural source of sediment. Management activities usually occur near streams in this landform which increases the risk of adding sediment to stream systems. Nearly level slopes reduce potential of transporting sediment except immediately adjacent to streams.

Terraces (13) are nearly level, flat to slightly concave step-like alluvial benches with short steep descending slopes called risers along one side. Vertical relief of risers range from 50 to 200 feet. Stream bottoms are often inclusions in narrow map units or are adjacent to these terraces. Substratum materials are often porous and gravelly. Some terraces located near mouths of streams or along the Clark Fork River have deep silty surface layers. Nearly level benches are often desirable areas for road construction and have a low potential of transporting sediment to streams. Terrace risers are steep and often are adjacent to streams. They can present roadcut stability problems to roads and can be major sources of sedimentation through erosion and landslides.

Low relief, dissected foothills and benches (14) are rolling or undulating foothills and benches of low relief. They are located along the Clark Fork River and some major river valleys. Steep escarpments are included in some units where streams have dissected these landforms. Substratum materials are derived from Glacial Lake Missoula lacustrine sediments and are silty or clayey and have a moderately slow permeability. Distinct lacustrine varves can be observed in most deposits. Drainage systems are dendritic and are usually ephemeral. This landform delivers sediment inefficiently except where steep escarpments can deliver sediment readily to nearby streams. Silty substratum is highly erosive and ruts easily.

Toeslopes and Alluvial fans (15) are gently to moderately sloping, somewhat fan-shaped or bench-like features which form a part of mountain valley floors and adjoin adjacent steep mountain slopes. These landforms are rarely above 4200 feet. Major order perennial streams or poorly-drained drainage stringers are often 1000 to 5000 feet apart. Substratum materials in alluvial fans are comprised of valley fill. These materials are very stony, rocks are subrounded to round, and fine matrix can be silty or clayey. Substratum materials in toeslopes are comprised of colluvium or alluvium with many angular or rounded rock and a loamy matrix. Sediment delivery efficiency of these landforms is moderate because of presence of many large order streams. Potential for sediment delivery is lower on gentle slopes with significant distance to streams.

Rolling alluvial terraces (16) are rounded low hills and moderately sloped benches generally perched in mouths of tributary drainages of the Clark Fork River. Some of these terraces are on the lower slopes of stream breaklands. Occasionally, some have a nearly flat bench but most are rounded or moderately steep. When landforms occupy narrow stream valleys sideslopes or risers can be quite steep. Substratum is stratified silts, sands, and gravels with occasional large boulders. Sediment delivery efficiency is high because of moderately steep slopes and close proximity to streams. Road construction exposes highly uncohesive soils on steep landforms which creates cutbank ravelling, slope stability, and erosion hazards.

Flood scoured footslopes (22) contain a series of moderately sloping benches and moderately steep, smooth slopes within and just above the valley floor. These landforms are associated with the scouring action of Glacial Lake Missoula. Soils are a complex of a thin veneer of shoreline deposits and colluvium overlying bedrock. Landform is defined by the bedrock structure. These landforms rarely have perennial streams and sediment delivery efficiency is low. Shallow soils present some limitations to excavation.

Dissected footslopes (24) are rounded hills and benches with relief of 200 to 500 feet high. Slopes are convex with gradients of 20 to 40 percent and are highly dissected and complex. Upper drainageways are gently concave and short pitches of 55 percent occur in lower incised drainageways. Sediment delivery from this landform is inefficient except where the steeper incised drainageways feed live streams. Soil mantles are relatively thick and retain and transport high amounts of ground water. Combinations of tractor and cable yarding are often needed to harvest timber because of complex slope characteristics.

Moderate relief mountain slopes (30) are nearly straight to slightly convex slopes with gradients from 30 to 55 percent. The drainage pattern is locally parallel and recessive with some branching in metasedimentary parent materials. Granitic parent materials have a dendritic pattern. Drainages are most commonly first or second order streams with distances between drainages of about 1000 to 2500 feet. Moderate relief mountain slopes deliver sediment to streams efficiently because of moderately steep straight slopes and frequency of stream channels.

Broadly convex ridges (32 and 33) are broadly rounded landforms about 500 to 1500 feet high. Slopes are convex with gradients of 0 to 35 percent. Drainageways are poorly defined and widely spaced. Generally, springs and first order streams originate at the lower elevation boundary of this landform. Substratum materials are extremely rocky and bedrock is highly fractured due to cold, high elevation climate. Ground water moves easily through this highly fractured substratum. Broadly convex ridges at the highest elevations (33) exhibit evidence of overland flow when sparsely vegetated. Recharge from deep percolation is maximized in the higher precipitation areas. Fully recharged soils in the spring can create overland flow events during high intensity summer rainstorms which increases erosion hazard on this landform. Broadly convex ridges deliver sediment to streams inefficiently because of the gentle, broad convex slopes which disperse sediment and lack of stream channels for transportation.

Undulating uplands (38) are gently undulating with convex hills and broad concave drainageways positioned in upland basins. The drainage pattern is irregular and spacing of first order drainageways is about 300 to 1000 feet. Substratum materials in lower landscape position are often glacial till. The upper portions of convex hills are underlain by material derived from local bedrock similar to material on broadly convex ridges. These landforms receive high amounts of precipitation and groundwater drainage from deep soil mantles is slow. Springs and poorly-drained areas are common. Undulating uplands deliver sediment to streams inefficiently because of low gradient convex slopes and the irregular drainage pattern. Streams are relatively close together and sediment does not have to travel far to reach the drainage system. The gently concave drainagways tend to trap and hold moving sediment.

Glacial cirque headwalls and alpine ridges (40) are steep, concave, wall-like cliffs in the back of a cirque basin and steep jagged alpine ridges associated with glaciation. These landforms are greater than 60 percent and have high amounts of rock outcrop. Avalanches and natural landslides are inherent to these landforms. Sediment is delivered to cirque basins efficiently because of steep concave slopes. Cirque lakes and basins tend to trap sediment from moving downstream.

Steep subalpine ridges and headwalls (41) are very steep straight to concave mountain slopes. These landforms have rock outcrop, shallow soils, and receive high amounts of precipitation. Shallow soils have limited capacity for hydrologic storage and spring runoff is rapid. Drainage spacings are about 200 to 500 feet apart and are comprised of first and second order drainages. These slopes deliver sediment very efficiently because of very steep slopes and high density of stream channels.

Glacial cirque bottoms (42) are concave alpine basins which can have gentle slopes to a series of stair-step levels. Small cirque lakes are common. The soil and substratum are often relatively thin and water moves rapidly out of this landform during the snowmelt period.

Basins (43) are concave features set into the upper slopes of steep mountain slopes and glaciated mountain slopes. First and second order streams converge to an apex at the lower end of this landform forming the origin of second or third order streams. Slope gradients average 45 percent but range from 25 to 55 percent. Drainage densities are high with spacing about 100 to 300 feet. These basins are a lesser expression of cirque basins (42) and grade into stronger expression with increasing elevation. It is thought that these basins are remnants of periglacial activity related to snow cornicing or nivation associated with previous glacial periods. Basins deliver sediment to streams efficiently because of moderately steep concave slopes and high stream density. Concave slopes tend to concentrate runoff.

Avalanche chutes (45) are steep, concave chutes on glaciated mountain slopes and troughwalls, streambreaklands, and steep mountain slopes. Only the larger chutes are delineated. Smaller chutes are inclusions in cirque headwalls, steep subalpine ridges and headwalls, and glaciated mountain slopes and troughwalls. They are formed by a large mass of snow often accompanied by other debris moving rapidly downslope. Avalanche paths often have fans of debris at the base and leave a deforested scar on the mountain slope. Avalanche paths can deliver sediment to streams efficiently because of steep slopes and proximity of higher order streams at the base. Substratum material is permeable and most water moves downslope below the soil surface. Landslides can occur in these landforms.

Glacial valley trains (46 and 47) are long, narrow gently sloping bottoms of U-shaped or other glaciated valleys. These landforms contain major order streams and are pocketed with springs. Slope gradients in landform 46 are 10 to 35 percent. Slope gradients in landform 47 are 35 to 45 percent and major order streams can be quite incised. Substratum materials is composed of glacial till, glacial outwash, stream alluvium and debris from adjacent valley walls. The material has many large rock fragments. The gentle gradient of landform 46 delivers sediment inefficiently except immediately adjacent to streams. The moderate gradient of landform 47 delivers sediment more efficiently. Stream densities are often high and management activities tend to be near streams which increases potential for sediment to enter stream systems.

Glaciated mountain slopes and troughwalls (48) are steep concave to straight mountain slopes with gradients of 55 to 75 percent. The drainage pattern is parallel. Drainage spacing is usually more than 1500 feet. A change in straight slope to somewhat convex along the lower third of the slope generally signifies deposition of glacial till. Soils are a complex of glacial till and residual soils. Glacial till deposits can be quite deep. High amounts of ground water move through the soil mantle in this landform and springs are common along the slope where glacial till occurs. Sediment is delivered efficiently because of steep slopes. Deeper soils on lower slopes help to slow snowmelt runoff from upper slopes.

Stream breaklands (26 and 60) are very steep, straight to concave slopes up to 3000 feet in relief. These slopes have been formed by fluvial erosion, faulting, or both. Slopes are greater than than 65 percent and rock outcrop can occupy a significant portion of the landform. The drainage pattern is parallel and first order streams are most common with spacing of more than 1500 feet. Sediment is delivered efficiently because of steep slopes.

Dissected stream breaklands (61) are very steep straight to concave slopes up to 3000 feet in relief. Slopes are greater than 65 percent and rock outcrop can be a significant portion of the landform. Drainages comprise more than 25 percent of the surface area. Sediment is delivered very efficiently because of steep slopes and there is potential for landslides.

Steep mountain slopes (64) are steep, complex slopes up to 2500 feet in relief. Slopes are greater than 55 percent. Drainage patterns are trellis. Drainageways are somewhat broad and complex slopes create fewer steep stream gradients than on stream breaklands. Drainage spacings are from 1000 to 2500 feet and drainages are first and second order. Sediment delivery efficiency is moderate because complex slope shape enhances slope storage over transport.

Glacial moraine (72) are gently rolling hills that occupy valley floor. Slope gradients are from 0 to 35 percent. Topography varies from a knoll and pothole topography typical to glacial moraine to nearly flat plains of ablation till or ground moraine. Stream patterns are irregular or deranged. Pothole lakes and poorly-drained areas are common. Till is inherently high in silt which is highly transportable by erosion. Sediment delivery is inefficient because of low slope gradients.

Glacial outwash plain (73) are flat plains formed from large masses of continental or piedmont glaciers outwash sediments. Substratum is porous and gravelly. Major order streams cross these landforms but first order streams are less common. Stream spacing is very wide. These plains are very inefficient at delivering sediment.

Glacially scoured mountain slopes (74) are moderately steep, complex slopes with slope gradients from 25 to 55 percent. Ice scouring in stream channels has left very steep slope inclusions. Soils and substratum are a complex of glacial till in drainageways, shallow soils from glacial scouring on ridgecrests, and residual soils on upper slopes. These landforms differ from landform 48 by receiving less precipitation, having less groundwater movement through the soil mantle, and having tills with higher silt content. Drainages are deranged and parallel and are rarely perennial. Sediment delivery is moderately efficient although complex slopes enhance slope storage and wide stream spacing limits transport potential.

Table I-1: LANDFORM INDEX

MAP UNIT SYMBOL NUMBER	LANDFORM
10	Floodplains and low stream terraces
13	High and old alluvial terraces
14	Low relief, dissected lacustrine foothills and benches
15	Toeslopes in valley fill and alluvial fans
16	Rolling alluvial terraces – sandy alluvium, old deltas and lakeshores remnant from Glacial Lake Missoula
22	Flood scoured footslopes
24	Dissected footslopes – associated with Osburn Fault
26	Rocky stream breaklands and rocklands
30	Moderate relief mountain slopes – 30-55%
32	Broadly convex ridges
33	Broadly convex ridges strongly frost churned
38	Undulating uplands – old ice cap features
40	Glacial cirque headwalls and alpine ridges
41	Steep subalpine ridges, headwalls, and mountain slopes
42	Glacial cirque bottoms
43	Weakly expressed glacial cirques and nivational basins
45	Avalanche chutes
46	Glacial valley trains – 10-35% slopes
47	Glacial valley trains – >35% slopes
48	Glaciated sideslopes and troughwalls – 55 to 75% slopes
60	Stream breaklands – >65% slopes
61	Dissected stream breaklands – >65% slopes
64	Steep mountain slopes – >55% slopes
72	Continental glacial moraine, rolling hills on valley floors
73	Glacial outwash plains
74	Glacially scoured mountain slopes – 25 to 55% slopes

GEOLOGY AND PARENT MATERIAL

General Geology of the Survey Area

Rock Types

The most predominant bedrock in the survey area are the partially metamorphosed, ancient sedimentary rocks of the Belt Basin Supergroup; known as Belt metasedimentary rocks. During Precambrian time, sediments composed of silt, clay, sand, and carbonate materials were deposited into an expansive shallow sea. This sea covering western Montana and northern Idaho was known as the Belt Basin. The sediments were compressed and cemented into sedimentary rocks, sandstones, siltstones, shales, and limestones. These sedimentary rocks became more indurated over time becoming partially metamorphosed by heat and pressure. Sandstones became quartzite, siltstone became siltite, shale became argillite, and limestones retained some of their carbonatic character. Evidence of the depositional environment of these rocks can be observed today by the occurrence of mudcracks, ripple marks, crossbedding, and fossil algal mats.

Some local formation names of these rocks are Pritchard, Burke, Revette, St. Regis, McNamara, and Bonner. Weakly carbonatic rocks are Wallace or Helena. Some bedrocks are not specifically identified by name and are grouped into the Ravalli group and Missoula group. Pritchard is the oldest bedrock and can be observed near Quinn's Hot Springs. The bedrocks of the Missoula Group are the youngest, one of which can be observed where the Clark Fork River has cut and exposed pink argillites along Interstate 90 just east of the mouth of Fish Creek.

Sedimentary rocks younger than the Belt series are exposed in the Fishtrap area. These rocks are of the Cambrian period and are composed of Woolsey shales and limestones and dolomites of the Silver Hill, Hasmark, and Meagher formations.

The sedimentary and metasedimentary rocks of the area have been episodically intruded by igneous sills, usually of gabbroic composition and granitic stocks. Small areas of **volcanic** bedrock are exposed within the survey area. Gabbro and basalt are exposed in the Tyler Creek area and at the survey boundary in the McCabe Creek Area. A granitic stock is exposed on the divide between Tank Creek and Albert Creek. The upper Lolo Creek drainage is composed of **granites** from the Idaho batholith. These granites vary in composition and texture. Some granites are highly decomposed and referred to as gruss.
Gruss produces uncohesive very gravelly sandy loam and loamy sand substratum materials. Other less decomposed, **well weathered granites** produce more cohesive sandy loam substrata. Associated gneiss and **micaceous schist** are in transition areas at the contact between the Idaho batholith and the Belt Series Ravalli group in the Cooper Creek-Dick Creek area.

Structural Setting

The Rocky Mountains were uplifted by intense folding and faulting of many layers of sedimentary and metasedimentary bedrocks, as much as 25 miles thick. Blocks of bedrock were uplifted, folded, and sheared along fault zones creating a complex occurrence of bedrocks. Older rocks occur alongside younger rocks with portions of the geologic column missing from the stratigraphy. Much of the more recent sedimentary strata has been eroded away leaving only isolated areas of younger rocks exposed of which the Belt Supergroup rocks form a majority.

Great folds and contrasting angles of bedrock are observed in bedrocks exposed throughout the area. Major fault lines play an important role in determining major river drainages in western Montana. Two large faults, the Osborn Fault west of St. Regis and the O'Brien Fault in the O'Brien Creek drainage south of Missoula, have significantly altered the Belt rocks. Bedrocks are crushed and highly weathered in these areas. Smaller faults occur throughout the survey area which have apparently contributed to areas of deformed and highly weathered bedrocks.

Glacial History and Surficial Geology

Intense geologic activity including movement, uplift, volcanic activity, and subsequent erosion occurred during the interval between the formation of the Rocky Mountains and the ice age. About 40 million years ago, during the Tertiary period, the Northern Rocky Mountain region apparently had a desert climate as dry as that of the modern southwestern states. Sparse vegetation and drywash drainage systems contributed to massive filling of valleys with sediment. Remnants of these **Tertiary valley fills** exist in the Missoula valley, the Ninemile Valley, north of Savenac, and in the Lolo Creek drainage. Some of these valley fills have been uplifted and are in high mountain basins north of Plains.

The Tertiary Period ended about 3 million years ago with the beginning of the Pleistocene. A sequence of wet/cool periods corresponding to ice advances and drier interglacial periods were characteristic of the Pleistocene. These sequences have contributed significantly to present day landforms and surficial materials in the survey area. The headwaters of major drainages often contain **glacial deposits** and scoured residual landscapes which suggest a glacial history.

Continental glaciation and large piedmont glacial lobes extended from the north into the Fisthrap/Bend area and into the Seeley/Swan area. Alpine glaciation was also active in the heads of many mountain drainages. Some of these alpine glaciers formed high on divides and extended into valleys, coalescing to produce large valley glaciers, such as in the Seeley valley. Alpine glaciers were local in extent, originating along northeasterly trending divides. Ice fields may have occurred along the lower elevation divides.

Glacial lakes are associated with the more extensive glaciers in Western Montana. Glacial Lake Missoula was created by a glacial ice dam on Clark Fork River near Lake Pend Orielle. Within the survey area, this large glacial lake flooded the Clark Fork River drainage below about 4200 feet. **Lacustrine** deposits are located on high benches along the Clark Fork River and in mouths of some tributary drainages. Deltas were created at the mouths of tributaries to the Clark Fork River. Remnants of these deltas and old shorelines can be seen on many mountain-sides in western Montana. Release of the lake by retreat of the ice dam scoured the valley floor and mountain sides along the Clark Fork River. Filling of the lake and release of the water appears to have occurred a number of times.

Many of our soil surfaces have been influenced by volcanic activity originating in the Cascade Range. **Volcanic ash** produced by eruptions of Mount Mazama, Glacier Peak, and Mount St. Helens have been transported by wind as loess and redistributed on the mountains of western Montana. The thickest deposits resulted from the Mount Mazama eruption about 6700 years ago. Other thin ash deposits have come from Glacier Peak about 12,000 years ago and several deposits from Mount St. Helens dating from 3400 years to the recent 1980 eruption. Soil surfaces containing volcanic ash vary from 7 inches to 20 inches thick in the survey area.

Parent Material – Geology Groups

Soil parent materials are in part determined by bedrock and surficial geology. The objectives of this soil survey have led to the deliniation of parent materials that exhibit similar interpretive soil characteristics. Geology has been grouped when no unique interpretive characteristic has been identified. Following is a list of the geology groups used in the survey. These groups are identified in the map unit symbol by the first letter after the landform number. For example in 10UA, "10" denotes the landform as alluvial and "U" denotes the geology group as undifferentiated.

Sedimentary Rocks (geology group B) contain parent materials derived from interbedded shales, limestones, and dolomites. Formations in this group are from the Cambrian Period. Residual and colluvial soils are on moderate relief and steep mountain slopes. Till soils are on rolling moraine in broad mountain valleys. Parent materials derived from shales and soft limestones have silt loam to clay loam textures. Soils are erosive and are prone to rotational slumping. Native road surfaces rut when wet. Parent materials derived from other limestones and dolomites have sandy loam to silt loam textures. Soils are less plastic, are moderately erosive, and provide good road surfaces. Because of the interbedded nature of this bedrock these soils occur in complex distribution.

Granitics and associated rocks contain parent materials derived from granitic bedrock of the Idaho Batholith and other minor granitic intrusions. The rock fragment content and hardness of rock fragments are variable depending upon the types of minerals and degree of weathering of the rock. These materials are on moderate relief and steep mountain slopes, stream breaklands, undulating uplands, and all glacial landforms. Parent materials are divided into groups according to the amount and hardness of rock fragments and the character of the fine fraction. These properties affect erodibility and bearing strength of subsoils and substrata.

Well weathered granitics (geology group G) contain parent materials derived from granitic bedrock that has smaller mineral size or more mafic minerals that tend to weather into fine sandy loam or sandy loam textures. Along drainages and lower slopes, soils have few rock fragments and clay lenses in the subsoil can be observed. Soils are very erosive. Native road surfaces tend to rut when wet and rock fragment content is low.

Moderately well weathered (grus) granitics (geology group K) contain parent materials derived from weakly consolidated, weathered granitic rock. Coarse sandy loam and loamy sand soils contain large amounts of fine gravel sized particles of weakly consolidated rock. Many of these particles can be crushed with the fingers. The lower substrata is formed in weathered granitic rock and is relatively impermeable to roots and water. It has observable rock structure. It rapidly breaks into a mixture of pea sized gravel and sand when exposed by excavation. Soils are very erodible and disturbed areas, such as roads and landings are difficult to revegetate.

Lacustrine and valley fill deposits (geology group J) contain parent materials derived from Glacial Lake Missoula silt and clay deposits or Tertiary valley fill deposits. Soils have a high silt content and are silt loams, silty clay loams, and clay loams. Soils derived from lacustrine parent material have very few rock fragments and are associated with low relief, dissected foothills and benches along the Clark Fork River and Ninemile Creek drainage (Landform group 14). Rock fragments vary in valley fill deposits from few to many and rock fragment size ranges from cobbles to stones. Valley fill deposits are associated with alluvial fans at the base of mountain slopes e.g. Ninemile valley, Savenac area, and Missoula valley. Soils are very erodible. Native road surfaces rut when wet.

Metasedimentary Rocks contain parent materials derived from Belt Supergroup quartzite, argillite, and siltite. The rock fragment content and hardness are variable depending upon the degree of weathering of the rock. Degree of weathering is dependent on associated faults, preponderance of argillites, and calcium carbonate content. These parent materials are on mountain slopes, stream breaklands, broad convex ridges, and rolling uplands. Parent materials derived from this group are divided into two groups according to the amount and hardness of rock fragments and calcium carbonate content. These properties affect erodibility and productivity of soils formed in these parent materials.

Highly weathered metasedimentary rocks (geology group J) contain parent materials derived from Belt Supergroup argillites and siltites. They are common along the Osborn Fault which trends east/west from Superior through St. Regis along Mullan Gulch and north of Deborgia.(landform group 24) Soils formed in this bedrock are silty and substratum contains many shaly rock fragments that have low durability.

Moderately weathered metasedimentary rocks (geology group M) contain parent materials derived from Belt Supergroup Formations with a preponderance of argillite, calcareous argillite, and some siltite. Formations are the Wallace, Helena, Empire, and Libby Formations. Soils are slightly plastic loams and silt loams. Rock fragments have a low durability index and are less than 55 percent by volume of the soil. Subsoil and substrata calcium carbonate accumulations are associated with soils formed in parent materials derived from calcareous argillite. Soils have a moderately low erodibility and a high water holding capacity. When used as native road surface, they tend to rut when wet and rock fragment content is low.

Weakly weathered metasedimentary rocks (geology group Q) contain parent materials derived from Belt Supergroup quartzites, siltites, and argillites other than the Formations listed above. Soils are non-plastic sandy loams and fine sandy loams and contain many hard rock fragments. Soils formed in these parent materials have subsoils and substrata resistant to erosion.

Glacial till (geology group O) contains glacial till, drift and reworked till derived from Belt Supergroup Formations. Soils are sandy loams to loams and contain many subrounded to rounded rock fragments. Rock fragments tend to be poorly sorted with occasional stones or boulders. These materials are on lower slopes of glacial troughwalls, in rolling glacial valleys, and in cirque basins. The underlying bedrock is mostly hard and weakly weathered. Glacial till deposits ravel on steep road cutbanks and slump on roadcuts that intercept springs. Valley and troughwall glacial till soils tend to be some of the most productive in the survey area.

Volcanics (geology group P) contains parent materials derived from shallow igneous intrusives and extrusives generally of gabbro or basalt rock type. Soils are slightly plastic loams and clay loams and contain few rock fragments. These materials are on moderate relief mountain slopes. Soils are somewhat shallow to moderately deep and underlying bedrock is mostly hard. These soils are erosive, and when used as native road surface, they tend to rut when rock fragment content is low.

Mica schist and associated rocks (geology group S) contains parent materials derived from mica schist, micaceous sandstones, phyllites, and associated gneiss. Soils are uncohesive sandy loams and silt loams containing a high amount of mica. They are on moderate relief and steep mountain slopes and some glacial landforms. Materials containing mica are unstable on certain steep slopes. Soils are very erosive and road cutbanks and fill slopes tend to slough. When used as native road surface, they tend to rut when rock fragment content is low.

Sandy lacustrine (geology group X) contains parent materials derived from reworked sands and silts from Glacial Lake Missoula lacustrine deposits and the Clark Fork River alluvium. Soils are uncohesive sandy loams, fine sandy loams, and silt loams. They are on low relief, dissected lacustrine foothills and benches. Soils are very erosive, steep road cutbanks tend to slough, and native road surfaces rut when wet.

Undifferentiated (geology group U) contains parent materials derived from Belt Supergroup metasedimentary rocks or weakly weathered granitic rocks. These materials include alluvium on terraces and floodplains; shallow soils on flood scoured footslopes and stream breaklands; strongly frost churned broadly convex ridges; and glacial outwash on plains. Soils are sandy loams and loamy sands containing many hard rock fragments. Soils on alluvial terraces have many rounded rocks which contribute to road cutbank ravel. Hard bedrock can pose limitations to excavation for roads in shallow soils. Sandy and extremely rocky soils can reduce native road surface quality on road constructed in all these materials.

Table I-2: GEOLOGY GROUPS

Code	*Parent Material*	*Source Formations*
B	Soft sedimentary	Hasmark, Silverhill, Meagher, Woolsey, and some soft metasedimentay
G	Hard granites	Idaho Batholith granites (soils have more fines)
J	Lacustrine, valley fill	Glacial Lake Missoula silts or Tertiary valley fill
K	Decomposed granites	Idaho Batholith grussic granites
M	Calcareous argillites and moderately weathered argillites/siltites	Wallace, Helena, and Libby
O	Glacial till and drift	Undifferentiated; excludes tills derived from soft sedimentary
P	Volcanics	Gabbro, Basalt
Q	Hard Belt metasedimentary	All Belt Series except for those listed above under "M"
S	Micaceous schists	Micaceous schists, phyllites, micaceous sandstones
X	Lacustrine, sandy alluvium	Glacial Lake Missoula fine sands and sandy alluvium
U	Undifferentiated	Includes alluvium, Belt Series, and Granites

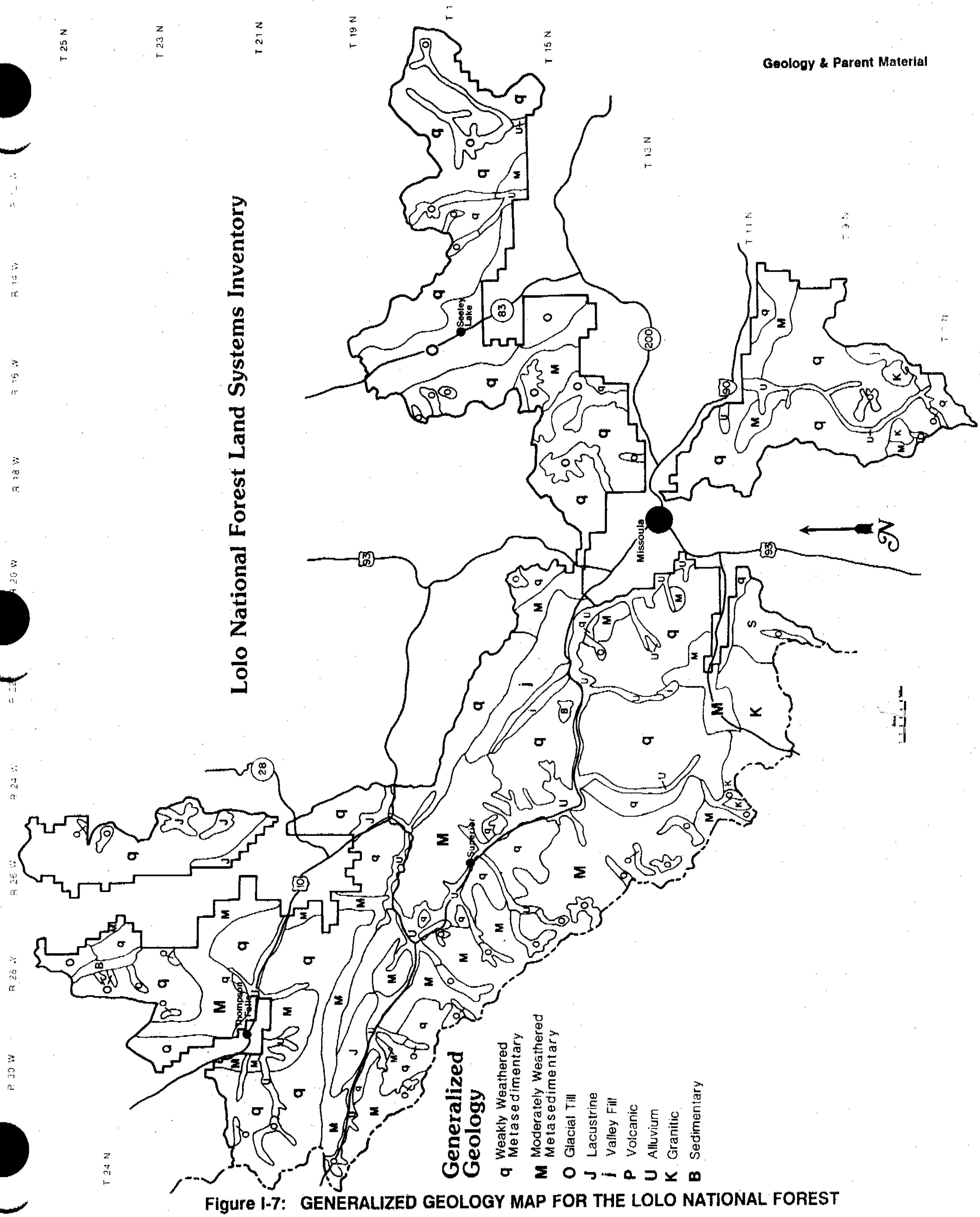


Figure I-7: GENERALIZED GEOLOGY MAP FOR THE LOLO NATIONAL FOREST

VEGETATION

The survey area is predominantly forested or potential forest. Ponderosa pine, Douglas-fir, grand fir, western larch, Engelman spruce, lodgepole pine, subalpine fir, mountain hemlock, western redcedar, and western white pine are all important coniferous species in the survey area.

Forest vegetation characteristics vary spatially and geographically in this survey area. Spatial vegetation patterns result from variation in aspect, slope percent, and elevation over short distances which is typical of mountainous country. Repetitive patterns are reflected by landforms identified in the Land Systems Inventory. Gradual trends are observed geographically from west to east which appear to be the result of the change from maritime to continental climate. A broad boundary drawn north to south through Superior and Plains is a useful approximation of where this change begins to occur. West of Superior/Plains, vegetation indicates more effective moisture and warmer climates. Species which occur on east, north, and west aspects west of Superior/Plains will occur only on north aspects east of Superior/Plains. Western hemlock, western white pine, mountain hemlock, and western redcedar are more common in the western portion of the survey area and only occur on more moist microsites in the eastern portion of the survey area

Other areas demonstrate local climatic influences that cause vegetation patterns to stand out as different from the rest of the survey area. The preponderance of Engelmann spruce in the Lolo Creek drainage on northerly aspects seems to reflect a cooler, more moist environment similar to high elevation continental climates. Cold air drainage may be the factor responsible for the presence of subalpine fir on valley bottoms in the Seeley Lake area (Hackley, 1980). This species is otherwise absent in the mixed coniferous forests on side slopes below approximately 5,400 feet.

Periodic wildfires have burned parts of the survey area. Large fires occurred in 1910 and again in 1929 and 1934. Fire frequencies average about 30-100 years. Evidence from fires scars on old growth trees on south aspects indicate fires in some areas can be as frequent as every 8 to 13 years. Open-grown stands of Douglas-fir and ponderosa pine have been maintained through frequent occurrence of fire in the understory. Large areas of fire related even aged lodgepole pine stands are on many upper slopes and ridgetops. Mid and lower slopes have mixed stands of Douglas-fir and western larch. Stand age varies on these sites by fire occurrence and frequency. Brush fields with scattered trees are on slopes that burned repeatedly and where re-establishment periods are long because of shallow, rocky soils.

Small openings dominated by alder, bracken fern, western coneflower, sedge meadows and sparse clumpy stands of subalpine fir are at the high elevations in the far western portion of the survey area near the Idaho border. These openings have deep, dark soils that are seasonally saturated by well aerated water from upper slopes. At higher elevations generally on southerly aspects, grasses, forbs, and scattered Douglas-fir are in openings on wind swept, well-drained ridges. These openings occur in association with north slopes dominated by subalpine fir forests. Brush and forb vegetation is maintained in avalanche chutes in the higher elevations.

Habitat Types

Habitat types provide a permanent and ecologically-based system of land stratification. Distribution of habitat types over the land is used to evaluate *potential* land use. Each habitat type is recognized by distinctive combinations of overstory and understory plant species at climax. They are named for the dominant or characteristic vegetation of the climax community. Habitat types are useful in soil surveys for assessing the combined effects of aspect, slope, elevation, and soil properties on potential plant growth. Habitat types were used in this survey to evaluate potential timber productivity and limitations to forest regeneration. Other interpretations based on habitat types include fire and wildlife habitat potential. Certain habitat types have been further subdivided into phases to provide additional definition for timber and wildlife interpretations. This survey used the habitat type system developed for Montana by Pfister et al. (1977) for forested communities. Non-forested and riparian communities are described through a community group classification.

Habitat Type Groups

Different habitat types often have similar interpretive implications. Habitat types with similar implications for soil survey objectives are grouped in this inventory. These groups are based on similarities in seral vegetation as well as the expected climax community. The groups are named and described below. For a complete list of habitat types that occur in each group consult Table I-3.

Open-grown forest occupies steep south slopes and low elevation benches (below 3500 feet). Douglas-fir/Idaho fescue, Douglas-fir/pinegrass-bluebunch wheatgrass, Douglas-fir/bluebunch wheatgrass, and Douglas-fir/rough fescue are important habitat types in this group. Climatic conditions limit tree species to ponderosa pine and Douglas-fir. Existing vegetation is generally represented by low density stands with a grass understory and a few scattered shrubs. Shrub species are chokecherry, serviceberry, snowberry, and ninebark. Regeneration is limited by low effective moisture and high solar insolation. Existing vegetation often provides important elk and deer winter range. Potential timber productivity is low.

Dry Douglas-fir forest occupies warm and somewhat dry aspects, and is characterized by moderately stocked stands of Douglas-fir and ponderosa pine with patchy, dense young stands of Douglas-fir. The understory is composed of a mosaic of shrubs and grasses. This forest group occupies the climatic zone between the open-grown forest and dry, mixed coniferous forest. Western larch is incidental in most stands but can occur in moist draws. Douglas-fir/ninebark-pinegrass phase, Douglas-fir/pinegrass, and Douglas-fir/snowberry-pinegrass phase are important habitat types. Stands of timber are slow to regenerate after "regeneration" harvests because of competition for moisture by grasses and shrubs. Important big game forage shrubs such as serviceberry and chokecherry are common. Existing vegetation often provides important elk and deer winter thermal cover. Potential timber productiviity is moderately low to low.

Dry, mixed coniferous forest occupies low elevation north aspects and mid-elevation east and west aspects Douglas-fir/ninebark (moist phase) and grand fir/beargrass are two important habitat types in this group. Seral species include western larch, ponderosa pine, and some lodgepole pine. Some stands are very dense Douglas-fir and western larch with a dense ninebark understory. Inclusions of moister habitat types from the "moist, mixed coniferous forest" group are found in drainages and northerly midslopes. Regeneration is rarely limited by site conditions. These stands are often important thermal cover for elk and deer. Potential timber productivity is moderate.

Moist, mixed coniferous forest occupies northerly aspects, moist toeslopes, moist benches, moist terraces, and east and west aspects in the far western portion of the survey area. This group characterizes a favorable climate for tree growth with above-average moisture conditions and moderate temperatures. Grand fir/queencup beadlily, grand fir/twinflower, and western redcedar/queencup beadlily are common habitat types. Seral species include western larch, Douglas-fir, lodgepole pine, western white pine, and ponderosa pine. Inclusions of subalpine fir can occur along some drainages. Regeneration is not limited by site condiitons. Timber harvest can often increase big game forage. Potential timber productivity is high.

Cool, somewhat dry Douglas-fir forest occupies the zone just below the subalpine forest zone. This group occurs at elevations between 4800 and 5500 feet, but can be higher on southerly aspects. An important habitat type is Douglas-fir/blue huckleberry, often with Douglas-fir/pinegrass (pinegrass phase) inclusions. Grand fir/beargrass replaces Douglas-fir/blue huckleberry in similar landscape positions on the far western portion of the survey area. Seral communities are dominated by lodgepole pine, western larch, beargrass, blue huckleberry, and pinegrass. Regeneration can be limited on southerly aspects by insolation and on ridgetops by wind dessication. Shrubs decrease after harvest or severe fire. Potential timber productivity is moderate.

Subalpine forest occupies cold, moist sites above 5500 feet. It can occupy northerly aspects as low as 4800 feet in the western portion of the survey area. Important habitat types are subalpine fir/fool's huckleberry on northerly aspects and in moist basins, and subalpine fir/beargrass on other aspects of well-drained slopes. Mountain hemlock/beargrass and mountain hemlock/fool's huckleberry are in similar locations west of St.Regis and Plains. Seral species can include lodgepole pine, Douglas-fir, western larch, grand fir and western white pine. Potential timber productivity is moderately high to high.

Upper elevation subalpine forest occupies upper ridgetops and cirque basins above 6000 feet and extends to 8000 feet. Important habitat types are subalpine fir/woodrush and subalpine fir/beargrass on ridgetops, and subalpine fir/fool's huckleberry (woodrush phase) in cirque basins. Mountain hemlock habitat type counterparts exist west of St. Regis and Plains. Whitebark pine and stunted lodgepole pine are characteristic forest components along with subalpine fir and Engelmann spruce. Trees are more open-grown and stunted with increasing elevation. Rubblefields are common and increase in area with increasing elevation. Re-establishment periods for timber can take as long as 50 years on these sites because of insolation, short growing period, heavy snow accumulation, and stress due to frost and high winds. Potential timber productivity is low and decreases to very low at the highest elevations.

COMMUNITY TYPE GROUPS

There is no habitat type classification system for forest openings. Also, the habitat type classification system does not adequately describe the diversity of the riparian areas in the survey area. The following groups of vegetative community types are used to describe vegetation in these areas.

Moist forest openings occur at high elevation near the Idaho border within the subalpine forest group. These sites have seasonal water tables and late snowmelt causing moist conditions to persist late into the growing season. A wide variety of community types occur in these openings, frequently in complex patterns. Communities dominated by alder, bracken fern, western coneflower, or sedges are common.

Riparian areas are along stream channels. Fluctuating water tables and changing character of stream systems from reach to reach cause vegetation diversity within small areas. The complex distribution and large variety of species create unique vegetation communities. Riparian areas are important in the survey area although they are of small extent in comparison to other vegetation groups. These sites are very productive and provide unique diversity important to wildlife. They also offer dynamic stability to the watershed. Riparian communities are separated into three subgroups in this soil survey.

> **Warm forested riparian** communities occupy the lower elevation range (below 4800 feet) of major stream courses. It includes Douglas-fir, grand fir (in the western portion of the survey area), cottonwood, grasses, and many of the major local shrub species. Some habitat types observed in this subgroup are Douglas-fir/twinflower, spruce/sweetscented bedstraw, spruce/horsetail, and grand fir/queencup beadlily.
>
> **Cool forested riparian** communities occupy the mid to upper elevation range (above 4800 feet) of major drainages. Vegetation includes subalpine fir, Engelmann spruce, beargrass, twinflower, sometimes queencup beadlily, and many of the major local moist shrub species. Some habitat types observed in this subgroup are subalpine fir/bluejoint, subalpine fir/queencup beadlily, subalpine fir/sweetscented bedstraw, western redcedar/devil's club, and western redcedar/queencup beadlily.
>
> **Non-forested riparian** communities occupy those portions of drainages where stream courses meander and soils are too poorly-drained for conifers to exist. Dominant vegetation include willows and sedges.

Grassy balds are on high elevation ridges exposed to strong winds and high insolation. These communities are surrounded by a tension zone where climatic and soil conditions can support trees but tree establishment is difficult and long term. Effective moisture is lower than surrounding areas because of redistribution of snow and soils are shallow. Beargrass, Idaho fescue, bluebunch wheatgrass, sedges, and a wide variety of forbs dominate these communities. Scattered "wolfy" Douglas-fir occupy many of these communities.

Avalanche paths are openings maintained by frequent avalanches. Plant communities are variable. Communities dominated by alder and other shrubs are common.

Table I-3: HABITAT TYPE/HABITAT GROUP INDEX

Habitat Group	Habitat type	Abbreviation
OPEN-GROWN FOREST **(A)**[1]	ponderosa pine/bluebunch wheatgrass ponderosa pine/snowberry Douglas-fir/bluebunch wheatgrass Douglas-fir/Idaho fescue Douglas-fir/rough fescue Douglas-fir/snowberry-bluebunch wheatgrass Douglas-fir/pinegrass-bluebunch wheatgrass	PIPO/AGSP PIPO/SYAL PSME/AGSP PSME/FEID PSME/FESC PSME/SYAL-AGSP PSME/CARU-AGSP
DRY DOUGLAS-FIR FOREST **(B)**[1]	Douglas-fir/ninebark-pinegrass Douglas-fir/snowberry-pinegrass Douglas-fir/pinegrass-kinnikinnick Douglas-fir/pinegrass-ponderosa pine Douglas-fir/pinegrass-pinegrass Douglas-fir/elk sedge	PSME/PHMA-CARU PSME/SYAL-CARU PSME/CARU-ARUV PSME/CARU-PIPO PSME/CARU-CARU PSME/CAGE
DRY, MIXED CONIFEROUS FOREST **(C)**[1]	Douglas-fir/dwarf huckleberry Douglas-fir/dwarf huckleberry Douglas-fir/blue huckleberry-blue huckleberry Douglas-fir/ninebark-ninebark Douglas-fir/twinflower grand fir/beargrass	PSME/VACA PSME/VACA PSME/VAGL-VAGL PSME/PHMA-PHMA PSME/LIBO ABGR/XETE
MOIST, MIXED CONIFEROUS FOREST **(D)**[1]	grand fir/queencup beadlily grand fir/twinflower western redcedar/queencup beadlily western hemlock/queencup beadlily	ABGR/CLUN ABGR/LIBO THPL/CLUN TSHE/CLUN
COOL, SOMEWHAT DRY DOUGLAS-FIR FOREST **(G)**[1]	Douglas-fir/blue huckleberry-beargrass Douglas-fir/pinegrass-pinegrass Douglas-fir/elk sedge	PSME/VAGL-XETE PSME/CARU-CARU PSME/CAGE
SUBALPINE FOREST **(E)**[1]	subalpine fir/queencup beadlily subalpine fir/twinflower subalpine fir/menziesia mountain hemlock/menziesia subalpine fir/alder subalpine fir/dwarf huckleberry subalpine fir/beargrass subalpine fir/beargrass-blue huckleberry mountain hemlock/beargrass	ABLA/CLUN ABLA/LIBO ABLA/MEFE TSME/MEFE ABLA/ALSI ABLA/VACA ABLA/XETE ABLA/XETE-VAGL TSME/XETE
UPPER SUBALPINE FOREST	subalpine fir/beargrass-grouse huckleberry subalpine fir/woodrush mountain hemlock/woodrush subalpine fir(whitebark pine)/grouse whortleberry whitebark pine-subalpine fir	ABLA/XETE-VASC ABLA/LUHI TSME/LUHI ABLA(PIAL)/VASC PIAL-ABLA

[1]**CAUTION:** The designated letter for the habitat groups only apply to landforms 30 and 64. For example, the letter "A" does not correspond to Open-grown forest in all map units.

General vegetation zones of the Clark Fork - St. Regis Area, Montana.

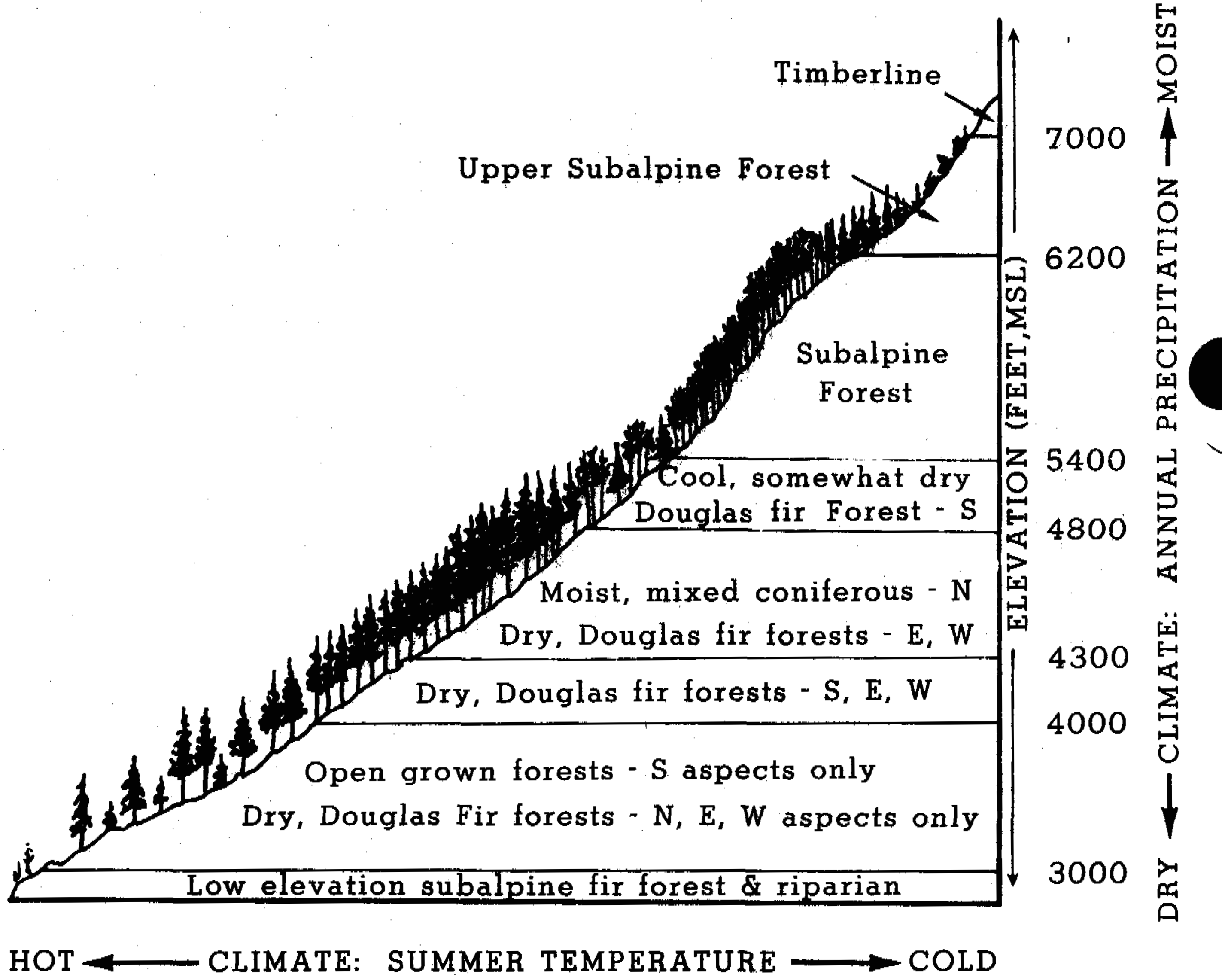


Figure I-8: GENERAL VEGETATION ZONES *(Clark Fork – St. Regis area, Montana)*

MAP UNIT CHARACTERISTICS SUMMARY

The following table summarizes the general features of each map unit. Detailed descriptions of the map units are given in Chapter II. The descriptors used in the landform, parent material, and vegetation columns in Table I-4 are explained in preceding sections of this chapter.

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
10UA	Stream bottoms	1-10	Alluvium	Warm forested riparian	Variable	2800-4400	0-5
10UB	Stream bottoms	1-10	Alluvium	Non-forested riparian	Variable	2800-4400	0
10UC	Stream bottoms	1-10	Alluvium	Cool forested riparian	Variable	3400-5400	0
13JA	Terraces	1-35	Lacustrine over alluvium	Dry Douglas-fir and moist, mixed coniferous forest	Variable	2800-4400	0-5
13UA	Terraces	1-45	Alluvium	Dry, mixed coniferous forest	Variable	2800-4400	0-5
13UB	Terraces	1-45	Alluvium	Moist, mixed coniferous forest and Subalpine forest	Variable	3300-4900	0-5
14JA	Low relief, dissected foothills and benches	5-30	Lacustrine	Dry Douglas-fir forest	Variable	2800-4400	0
14JB	Low relief, dissected foothills and benches	5-30	Lacustrine	Moist, mixed coniferous forest	Northerly	3500-4000	0
14XA	Low relief, dissected foothills and benches	5-20	Sandy lacustrine	Dry Douglas-fir forest	Variable	2800-4400	0
15JA	Toeslopes and alluvial fans	5-35	Valley fill deposits	Dry Douglas-fir, and dry, mixed coniferous forest	Variable	3000-4400	0
15JB	Toeslopes and alluvial fans	5-35	Valley fill deposits	Moist, mixed coniferous and subalpine forest	Variable	3000-4400	0
15UA	Toeslopes and alluvial fans	5-35	Undifferentiated -toeslope deposits	Dry Douglas-fir and dry, mixed coniferous forest	Variable	3000-4400	0
15UB	Toeslopes and alluvial fans	5-35	Undifferentiated -toeslope deposits	Moist, mixed coniferous forest	Northerly	3000-4600	0

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
16UA	Rolling foothills and terraces	5-45	Alluvium	Open grown, dry Douglas-fir and dry, mixed coniferous forest	Variable	2800-4400	0
22MA	Flood scoured footslopes	20-45	Moderately weathered metasedimentary rocks	Dry, mixed and moist, mixed coniferous forest	Variable	3200-4500	0
22UA	Flood scoured footslopes	20-45	Weakly weathered metasedimentary rocks	Dry, Douglas-fir and dry, mixed coniferous forest	Variable	3200-4500	5
24JA	Dissected foot-slopes	5-45	Highly weathered metasedimentary rocks	Dry Douglas-fir forest	S,E,W	3600-4000	0
24JB	Dissected foot-slopes	5-45	Highly weathered metasedimentary rocks	Moist, mixed coniferous forest	N,E,W	3600-4000	0
26UA	Stream breaklands	55-100	Undifferentiated -metasedimentary rocks	Dry Douglas-fir forest	Variable	3800-6800	>50
30BB	Moderate relief mountain slopes	30-50	Sedimentary rocks	cool, somewhat dry Douglas-fir;and moist, mixed coniferous forest	Variable	3800-4800	0-5
30GA	Moderate relief mountain slopes	30-55	Well weathered granitics	Cool, somewhat dry Douglas-fir	Variable	4000-5000	0
30GB	Moderate relief mountain slopes	30-55	Well weathered granitics	Subalpine forest	Variable	5000-6800	0
30KA	Moderate relief mountain slopes	30-55	Moderately well weathered granitics	Cool, somewhat dry Douglas-fir	Variable	4000-5000	0
30KA*b*	Moderate relief mountain slopes	30-55	Moderately well weathered granitics -bouldery phase	Cool, somewhat dry Douglas-fir	Variable	4000-5000	15-25
30KB	Moderate relief mountain slopes	30-55	Moderately well weathered granitics	Subalpine forest	Variable	5000-6800	0
30KB*b*	Moderate relief mountain slopes	30-55	Moderately well weathered granitics -bouldery phase	Subalpine forest	Variable	5000-6800	15-25
30MA	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Open grown forest	Southerly	3000-4400	0-5
30MB	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Dry Douglas-fir forest	S,E,W,	3000-5000	0-5

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
30MC	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Dry, mixed coniferous forest	N,E,W	3800-5200	0-5
30MD	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Moist, mixed coniferous forest	Northerly	3700-5400	0-5
30ME	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Supalpine forest	Northerly	4800-6600	0-5
30MG	Moderate relief mountain slopes	35-55	Moderately weathered metasedimentary rocks	Cool, somewhat dry Douglas-fir forest	Southerly	5000-6500	0-5
30PA	Moderate relief mountain slopes	35-55	Volcanics	Dry Douglas-fir and dry, mixed coniferous forest	Southerly	3500-5500	0-5
30PE	Moderate relief mountain slopes	35-55	Volcanics	Subalpine forest	Northerly	5000-6500	0-5
30QA	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Open grown forest	Southerly	3000-4800	0-5
30QB	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Dry Douglas-fir	S,E,W,	3000-5800	0-5
30QC	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Dry, mixed coniferous forest	N,E,W,	3800-5200	0-5
30QD	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Moist, mixed coniferous forest	Northerly	4000-5200	0-5
30QE	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Subalpine forest	Northerly	4600-6600	0-5
30QG	Moderate relief mountain slopes	35-55	Weakly weathered metasedimentary rocks	Cool, somewhat dry Douglas-fir	Southerly	4600-6000	0-5
30SA	Moderate relief mountain slopes	35-55	Mica schist and associated rocks	Dry, mixed coniferous and cool, dry somewhat Douglas-fir	Northerly	3800-5000	0-5
30SB	Moderate relief mountain slopes	35-55	Mica schist and associated rocks	Subalpine forest	Northerly	5000-6800	0-5
32KA	Broadly convex ridges	10-35	Moderately well-weathered granitics	Subalpine forest	Variable	5500-6800	0
32MA	Broadly convex ridges	10-35	Moderately weathered metasedimentary rocks	Subalpine forest	Variable	5000-6800	0
32QA	Broadly convex ridges	10-35	Weakly weathered metasedimentary rocks	Subalpine forest	Variable	5000-6800	0-5

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
32QC	Broadly convex ridges	10-35	Weakly weathered metasedimentary rocks	Cool, somewhat dry Douglas-fir forest	Variable	4500-5600	0-5
32QD	Broadly convex ridges	25-45	Metasedimentary rocks	Grassy balds	Southerly	5800-7000	0
33UA	Broadly convex ridges	10-40	Undifferentiated -metasedimentary and granitics	Upper subalpine forest	Variable	6200-8000	0
38KA	Undulating uplands	10-35	Granitics and associated rocks	Subalpine forest and moist forest openings	Northerly	5800-6800	0
38QA	Undulating uplands	10-35	Metasedimentary rocks	Subalpine forest and moist forest openings	Northerly	5000-6800	0
40KA	Glacial cirque headwalls and alpine ridges	55-85	Granitics and associated rocks	Upper subalpine forest	Northerly	6000-8000	35-50
40QA	Glacial cirque headwalls and alpine ridges	55-85	Metasedimentary rocks	Upper subalpine forest	Northerly	6000-8000	20-40
41KA	Steep subalpine ridges and head-walls	55-100	Granitics and associated rocks	Subalpine forest	Northerly	5500-6800	20-40
41QA	Steep subalpine ridges and head-walls	50-100	metasedimentary rocks	Subalpine forest	Northerly	4400-6600	20-40
41SA	Steep subalpine ridges and head-walls	55-100	Mica schist	Subalpine forest	Northerly	5500-6800	20-40
42KA	Glacial cirque bottoms	10-35	Granitics and associated rocks	Subalpine forest	Northerly	5800-7800	5-15
42QA	Glacial cirque bottoms	10-30	Metasedimentary rocks	Subalpine forest	Northerly	5400-6700	5-15
43QA	Basins	20-45	metasedimenatry rocks	Subalpine forest	Northerly	4800-6000	0
43QB	Basins	20-45	Moderately weathered Metasedimentary rocks	Moist forest openings	Northerly	4800-6000	0
43SA	Basins	20-45	Mica schist	Subalpine forest	Northerly	4800-6000	0
45UA	Avalanche paths	40-80	Undifferentiated-metasedimentary rocks	Moist forest openings	Variable	4800-8000	10-20
46KA	Glacial valley train	10-35	Glacial till- derived from granitics	Subalpine forest	Variable	5400-6600	0

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
46OA	Glacial valley train	10-35	Glacial till	Subalpine forest	Variable	5400-6600	0
47KA	Glacial valley train	35-45	Glacial till- derived from granitics	Subalpine forest	Variable	5400-6500	5
47OA	Glacial valley train	35-45	Glacial till	Subalpine forest	Variable	5400-6500	5
48KA	Glaciated mountain slopes	55-75	Granitics and associated rocks	Subalpine forest;	Variable	5500-7500	20-40
48QA	Glaciated mountain slopes	55-75	Metasedimentary	Subalpine and; moist, mixed coniferous forest	Variable	4500-6500	10-25
60KA	Stream breaklands	65-100	Granitics and associated rocks	Cool, somewhat dry Douglas-fir forest	Variable	4200-5500	15-30
60KB	Stream breaklands	65-100	Granitics and associated rocks	Subalpine forest	Variable	5000-6000	15-30
60MA	Stream breaklands	65-100	Moderately weathered metasedimentary	Open grown forest	Southerly	3400-4800	25
60MB	Stream breaklands	65-100	Moderately weathered metasedimentary	Dry Douglas-fir forest	Variable	3400-4800	25
60MC	Stream breaklands	65-100	Moderately weathered metasedimentary	Dry, mixed coniferous forest and cool, somewhat dry Douglas-fir forest	Variable	3400-4800	25
60MD	Stream breaklands	65-100	Moderately weathered metasedimentary	Moist, mixed coniferous forest	Northerly	4000-5500	25
60QA	Stream breaklands	65-100	Weakly weathered metasedimentary	Open grown forest	Southerly	3400-4800	20-40
60QB	Stream breaklands	65-100	Weakly weathered metasedimentary	Dry Douglas-fir forest	Variable	3400-4800	20-40
60QC	Stream breaklands	65-100	Weakly weathered metasedimentary	Dry, mixed coniferous and cool somewhat dry Douglas-fir forest	N,E,W	3600-4800	20-40
60QD	Stream breaklands	65-100	Weakly weathered metasedimentary	Moist, mixed coniferous forest	Northerly	3600-5000	20-40
61MC	Dissected stream breaklands	65-100	Moderately weathered metasedimentary	Open grown and; dry, mixed coniferous forest	Southerly	3600-5800	15-30
61MD	Dissected stream breaklands	65-100	Moderately weathered metasedimentary	Moist, mixed coniferous forest	Northerly	3600-5800	15-30

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
61QC	Dissected stream breaklands	65-100	Weakly weathered metasedimentary	Dry, mixed coniferous forest	E,W	3600-5800	15-40
61QD	Dissected stream breaklands	65-100	Weakly weathered metasedimentary	Moist, mixed coniferous and Subalpine forest	Northerly	3600-5800	15-40
61SA	Dissected stream breaklands	65-100	Mica schist	Cool, somewhat dry Douglas-fir and subalpine forest	Variable	4000-5500	15-30
64KA	Steep mountain slopes	50-75	Moderately weathered granitics	Cool, somewhat dry Douglas-fir forest	Variable	4000-5000	5
64KA*b*	Steep mountain slopes	50-75	Moderately weathered granitics-bouldery phase	Cool, somewhat dry Douglas-fir forest	Variable	4000-5000	15-25
64KB	Steep mountain slopes	50-75	Moderately weathered granitics	Subalpine forest	Variable	5000-6800	0-15
64KB*b*	Steep mountain slopes	50-75	Moderately weathered granitics-bouldery phase	Subalpine forest	Variable	5000-6800	15-25
64MA	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Open grown forest	Southerly	3200-5000	5-15
64MB	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Dry Douglas-fir forest	S,E,W	3200-5000	5-15
64MC	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Dry, mixed coniferous forest	N,E,W	3200-5500	5-15
64MD	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Moist, mixed coniferous forest	Northerly	3400-5800	5-15
64ME	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Subalpine forest	Variable	5000-6500	5-15
64MG	Steep mountain slopes	55-75	Moderately weathered metasedimentary	Cool, somewhat dry Douglas-fir forest	Southerly	4200-5600	5-15
64QA	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Open grown forest	Southerly	3000-4800	5-15
64QB	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Dry Douglas-fir forest	S,E,W	4000-5500	5-15
64QC	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Dry, mixed coniferous forest	Variable	3400-5500	5-15
64QD	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Moist, mixed coniferous forest	Northerly	3400-5500	5-15

Table I-4: MAP UNIT CHARACTERISTICS SUMMARY (continued)

Map Unit	Landform	Slope %	Parent Material	Vegetation	Aspect	Elevation	Rock Outcrop %
64QE	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Subalpine forest	Northerly	5000-6600	5-15
64QG	Steep mountain slopes	55-75	Weakly weathered metasedimentary	Cool, somewhat dry Douglas-fir forest	Southerly	4200-5600	5-15
64SB	Steep mountain slopes	55-75	Mica schist	Cool, somewhat dry Douglas-fir, dry, mixed coniferous, and Subalpine forest	Variable	3200-5600	5-15
72BA	Glacial moraine	1-35	Glacial till	Moist, mixed coniferous and subalpine forest	Variable	3600-4600	0
72OA	Glacial moraine	1-35	Glacial till	Moist, mixed coniferous and subalpine forest	Variable	3600-4600	0
73UA	Glacial outwash plain	1-20	Glacial outwash	Dry,mixed coniferous forest	Variable	3200-4800	0
73UB	Glacial outwash plain	1-10	Alluvium over glacial outwash	Cool and non-forested riparian	Variable	3200-4600	0
74BA	Glacially scoured mountain slopes	25-55	Sedimentary rocks and glacial till	Cool, somewhat dry Douglas-fir, moist, mixed coniferous, and Subalpine forest	Variable	3200-5400	0-5
74UA	Glacially scoured mountain slopes	25-55	Undifferentiated	Cool, somewhat dry Douglas-fir, moist, mixed coniferous, and Subalpine forest	Variable	3200-5400	0-5

Chapter II: MAP UNIT DESCRIPTIONS

This chapter gives detailed descriptions for each of the map units listed below.

Table II-1: MAP UNIT DESCRIPTION INDEX

Table II-1: MAP UNIT DESCRIPTION INDEX (continued)

Table II-1: MAP UNIT DESCRIPTION INDEX (continued)

10UA

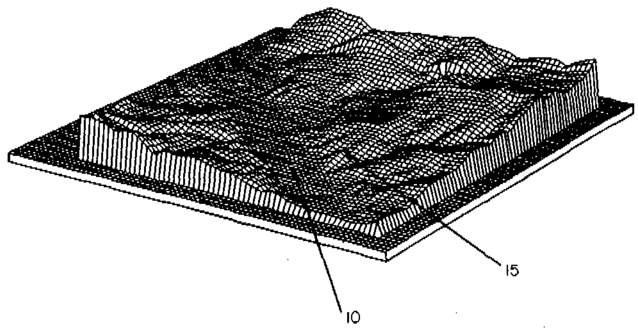
Orthents and Aquepts, stream bottoms

SUMMARY

The map unit occurs in stream bottoms. Vegetation is a warm forested riparian community type. Soils form in a complex of well-drained and poorly-drained alluvial deposits.

LANDFORM

The landform consists of recent floodplains, perennial streams, and low stream terraces 2 to 10 feet above the existing stream channel. Braided stream channels that change course frequently are common. Floodplains and terraces have fluctuating water tables and are subject to flooding.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-10	Variable	2800-4400	20-30	0-5

VEGETATION

Existing: Vegetation is a mixed forest of ponderosa pine and Douglas-fir on the well-drained stream terraces and a moist meadow community in mosaic with spruce and cottonwood on the poorly-drained soils. Grand fir and western larch are included in some stands west of Superior. The forest understory on well-drained sites is composed of kinnikinnick, pinegrass, snowberry, and Idaho fescue. Poorly-drained sites can have bluejoint, sedges, false hellebore, queencup beadlily, sweetscented bedstraw, willow, elderberry, and rocky mountain maple.

Habitat Type (HT) Composition: The map unit contains a mosaic of habitat types and vegetation communities that is determined by a complex pattern of well-drained and poorly-drained soils. Douglas-fir series HTs and grassy meadows are on well-drained sites. They occupy about 60 percent of the map unit. The poorly-drained and frequently flooded soils are occupied by wet sedge meadows, spruce/ queencup beadlily (PICEA/CLUN), and stands of cottonwood. They occupy about 35 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN), subalpine fir/common horsetail (ABLA/EQAR), and western redcedar/ queencup beadlily (THPL/CLUN) can occur in the upper elevation bounds of this unit. These sites are colder and receive more precipitation.

10UA

GEOLOGY

The unit is underlain by alluvial deposits. The alluvium consists of stratified sands, rounded rocks, and silts. These alluvial deposits can be very thick and textures are quite variable. The alluvial gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

SOILS

Map Unit Summary: Soil properties vary with proximity to streams and to water tables. Soils on terraces and away from streamside are well-drained with medium to moderately coarse textures. Soils near streams and in low swales are poorly-drained. Soils have 10 to 65 percent rounded rock fragments.

Composition:
Orthents are located near streams and on low terraces, can have seasonal water tables, and are flooded periodically. Spruce, cotton- wood, shrubs and scattered Douglas-fir and ponderosa pine are supported by these soils. Similar soils are Fluvents, Xerolls, and Ochrepts. Fluvents support graminoid or brush vegetation and have thinner surface layers and stratified textural layers due to frequent removal or deposition by flooding. Xerolls support graminoids or scattered tree vegetation and have a darker surface layer. Ochrepts support Douglas-fir and ponderosa pine forests and have a weakly expressed subsoil above the substrata. Xerolls and Ochrepts are flooded infrequently. These soils occupy about 60 percent of the map unit.

Aquepts occur at streamside and in bogs where water tables are high year-round. These soils support bluejoint, willow, sweetscented bedstraw, sedge, spruce, and cottonwood. Similar soils are Aquents. They have no subsoil development. These soils occupy about 30 percent of the map unit. Included is up to 10 percent riverwash and stream channels along large streams.

Representative Profiles:
Orthents have dark yellowish brown sandy loam surface layers about 10 inches thick. Substrata are dark brown extremely cobbly sandy loams and loamy sands to a depth of 60 inches or more. Strong brown mottles are often present below 15 inches.

Aquepts have dark brown to grayish brown silt loam surface layers about 2 inches thick. Subsoils are dark yellowish brown silt loams about 25 inches thick. Substrata are olive to dark gray silt loams to depths of 60 inches or more. Mottles are common to many and distinct throughout.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Productivity is dependent on the finer textured soil surface layers as the extremely cobbly moderately coarse alluvial soils can be quite infertile. Harvest activity should be directed away from stream course to protect streambanks and to reduce risk of sedimentation. The terrain is well suited to tractor operation. Tractor operation near streams, moist draws, and depressions can rut, compact, or puddle the soil and reduce soil productivity.

Roads: Shallow ground water and seasonal flooding can limit construction and increase maintenance. Turnpiking can be used to overcome problems with wet subgrades. Flooding and stream channel changes can damage bridges or culverts. Areas with deep silty alluvium have low bearing strength and will rut. Rocky subsoils and substrata produce rough road surfaces. Surfacing improves the quality of the road.

Range: This map unit is moderately suited to range management. Potential forage production is high. Steep sideslopes in adjacent map units cause livestock to stay in these stream bottoms which creates problems with overgrazing sensitive riparian vegetation and compaction of wet soils. Livestock traffic and grazing along streambanks can decrease stability of streambanks which deliver sediment to the stream system. Low stocking levels and fencing can reduce potential for impacts.

10UA

Wildlife: Young to mature stands of ponderosa pine and Douglas-fir provide excellent yearlong whitetail deer range, particularly where associated with wet meadows and/or seral black cottonwood. Forage is available from grasses and forbs in timbered understories, shrubs within poorly-drained inclusions, and foliose lichens from timbered overstories. Mature and old growth forests provide excellent habitat for a host of cavity-nesters and raptors. Due to the dynamic nature of this unit caused by periodic flooding and channel changes, habitat manipulation is often of little value and must be carefully weighed against needs for additional diversity to the habitat.

Fisheries: High amounts of channel gravel combined with low channel gradients provide good spawning environments in this map unit. Large woody debris is responsible for most pool habitat. These reaches are warmer, frequently larger, and typically receive heavy fishing use.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is high because all soil disturbance is relatively close to stream channels. The major watershed management concern is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

10UB

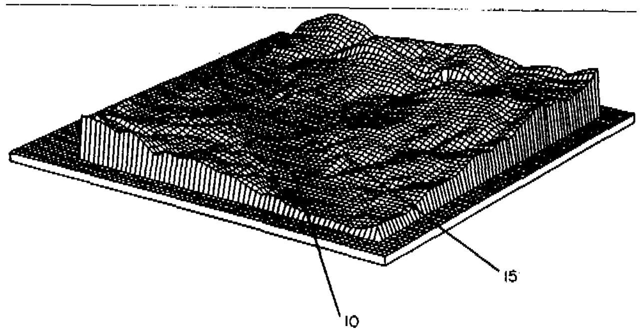
Aquepts, stream bottoms

SUMMARY

The map unit occurs in stream bottoms. Beaver ponds are common. Vegetation is a non-forested riparian community type. Soils form in poorly-drained silty alluvial deposits.

LANDFORM

The landform consists of recent floodplains, perennial streams, and ponded water. Braided stream channels are common and stream courses change frequently. Beaver activity creates an elevated water table.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-10	Variable	2800-4400	20-40	0

VEGETATION

Existing: Vegetation is mostly a shrub community of willow, alder, and elderberry, with some sedge and graminoid openings along pond and stream perimeters. Low terraces adjacent to streamside support subalpine fir, spruce, and lodgepole pine. The forest understory has bluejoint, queencup beadlily, elderberry, common horsetail, and starry Solomon's seal.

Habitat Type (HT) Composition: The map unit consists of brushfields dominated by willow with openings of sedges and graminoids. Brushfields and water occupy about 70 percent of the map unit. Perimeters where water tables are less elevated support subalpine fir/bluejoint (ABLA/CACA) and spruce/common horsetail (PICEA/EQAR). Forested areas occupy about 20 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) can occur on more well-drained rises. This inclusion is moderately well-drained and there are less limitations to timber harvest and regeneration.

GEOLOGY

The unit is underlain by silty alluvial deposits that can overlie gravelly alluvial deposits. The alluvium consists of sands, some gravels, and silts. These alluvial deposits can be very thick and textures are quite variable.

10UB

SOILS

Map Unit Summary: Soils are poorly-drained and subsoils are continually saturated. Soils have medium to moderately coarse textures and 10 to 45 percent rounded rock fragments.

Composition:
Aquepts have light colored surface layers and a weakly expressed subsoil. They support both brushfield and forested vegetation. Similar soils are Aquolls and Aquents. Aquolls have dark surface layers and support graminoids and sedges. Aquents have light colored surface layers and have no subsoil development and support mostly brushfield vegetation. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Ochrepts are on moderately well-drained terraces. These are more productive timber sites and present fewer limitations to timber harvest and regeneration.

Representative Profile:
Aquepts have dark brown to grayish brown silt loam surface layers about 2 inches thick. Subsoils are dark yellowish brown silt loams about 25 inches thick. Substrata are olive to pinkish gray silt loams to depths of 60 inches or more. Mottles are common to many and distinct throughout.

MANAGEMENT CONSIDERATIONS

Timber: This map unit contains only scattered trees among ponds and braided stream channels and is poorly suited to timber management. Inclusions of forested areas along perimeters have a high potential annual production and are suited to timber management. On inclusions, removal of trees will elevate water tables and will increase re-establish- ment time. Soils are highly susceptible to compaction, rutting, and soil displacement. High water tables severely limit access.

Roads: High water tables and flooding severely limit construction. Beaver activity, constant stream channel changes, and flooding increase maintenance costs. Wet silty alluvium has low bearing strength and will rut. Protection of stream system from sediment produced during and after construction is difficult.

Range: Wet soils, flooding, and low forage value limit grazing in this map unit.

Wildlife: Shrub communities provide excellent habitat for whitetail deer and moose. Beaver populations thrive in this unit and are the primary natural factor in influencing the physical characteristics of the floodplain. Songbird populations are generally high particularly where associated with beaver activity. Vegetative manipulation is not generally desirable for wildlife.

Fisheries: Very low gradient reaches created by beaver dams are common. These reaches provide excellent overwintering habitat and can provide for enlarged surface waters which improve fishing opportunities. Frequency of channel changes threaten longevity of stream habitat structures. Pools are created by bank scour and can be adversely affected by improper grazing practices.

Watershed: Erosion hazards and sediment delivery efficiency is high. The major watershed management concern is the difficulty in controlling sediment delivered to streams from roads and recreation because of close proximity to water courses throughout this unit. Stream channel changes can produce large amounts of sediment. Beaver dams can serve as sediment traps.

10UC

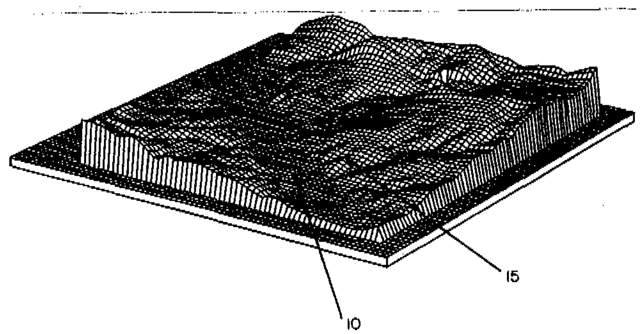
Cryochrepts and Aquepts, stream bottoms

SUMMARY

The map unit occurs in cool stream bottoms. Vegetation is a cool forested riparian community type. Soils form in a complex of moderately well drained and poorly-drained alluvial deposits.

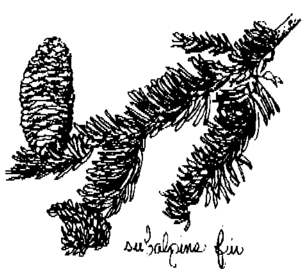
LANDFORM

The landform consists of recent floodplains, perennial streams, and low stream terraces 2 to 10 feet above the existing stream channel. Braided stream channels that change course frequently are common. Floodplains and terraces have fluctuating water tables. The lowest portions of these floodplains flood annually. Other terraces may flood at approximately 25 year intervals.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-10	Variable	3400-5400	30-40	0

VEGETATION



Existing: Vegetation is a mixed forest of spruce, western redcedar, grand fir, larch, lodgepole pine, and subalpine fir. The understory is dominated by blue huckleberry, beargrass, queencup beadlily, thimbleberry, mountain alder, serviceberry, and mountain maple.

Habitat Type (HT) Composition: Subalpine fir/queencup beadlily (ABLA/CLUN), subalpine fir/ menziesia (ABLA/MEFE) are on moderately well-drained soils. Western redcedar/queencup beadlily (THPL/CLUN) occurs at the lower elevation limits of this map unit on moderately well-drained soils west of Missoula. These HTs occupy about 60 percent of the map unit. Subalpine fir/bluejoint (ABLA/CACA) and spruce/common horsetail (PICEA/EQAR) are on poorly-drained soils near streamsides and in depressions. These HTs occupy about 15 percent of the map unit. Shrubfield openings occupy less than 10 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) is on more well-drained terraces. This HT is a less productive timber site.

GEOLOGY

The unit is underlain by alluvial deposits. The alluvium consists of stratified sands, rounded rocks, and silts. These alluvial deposits can be very thick and textures are quite variable. The alluvial gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

10UC

SOILS

Map Unit Summary: Soils on low terraces and away from streamside are moderately well-drained. Soils near streams and in depressions are poorly-drained. Soils have a silty surface derived from volcanic ash influenced loess. Subsoils are moderately coarse or coarse textured and have 30 to 65 percent rounded rock fragments.

Composition:
Cryochrepts are cold, moderately well-drained soils. Silty loess surface layers less than 14 inches thick are common. They are located on low terraces and away from streamside, have seasonal water tables, and can be flooded periodically. Similar soils support THPL/CLUN. They are Eutrochrepts. These soils occupy about 60 percent of the map unit.

Aquepts are near streamside and in bogs where water tables are high year-round. These soils support ABLA/CACA, PICEA/EQAR, and shrubfields. Similar soils are Aquents and Fluvents. They have no subsoil development. These soils occupy about 25 percent of the map unit.

Included are up to 15 percent dissimilar soils. Ochrepts on well-drained terraces that are rarely flooded and have seasonal water tables are rare. They support subalpine forest and generally, ABLA/XETE HT.

Representative Profiles:
Cryochrepts have dark yellowish brown very gravelly silt loam surface layers about 9 inches thick. Substrata are brown very gravelly sandy loams and very cobbly sandy loams to a depth of 60 inches or more. Strong brown mottles are often present below 15 inches.

These Aquepts have dark brown loam surface layers about 8 inches thick. Subsoils are dark grayish brown silt loams about 14 inches thick. Substrata are gray gravelly loamy sands to a depth of 60 inches or more. Mottles are prominent below 9 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is very high. Productivity is dependent on the finer textured soil surface layers as the extremely cobbly soils can be quite infertile. Harvest activity should be directed away from streamcourses to protect streambanks and to reduce risk of sedimentation. Tractor operation near streams, moist draws, and depressions can rut, compact or puddle the soil and reduce soil productivity. Designated skid trails that avoid wet areas or logging on deep snow will reduce potential for soil impacts. Summer frost can limit regeneration of some species.

Roads: Shallow ground water and seasonal flooding can limit construction and increase maintenance. Turnpiking can be used to overcome problems with wet subgrades. Flooding and stream channel changes can damage bridges or culverts. Silty surface layers have low bearing strength and will rut. Rocky subsoils and substrata produce rough road surfaces. Surfacing improves the quality of the road.

Range: Forage is limited and generally, unpalatable to livestock. Steep sideslopes in adjacent map units cause livestock to stay in these stream bottoms which creates problems with overgrazing sensitive riparian vegetation and compaction of wet soils. Livestock traffic and grazing along streambanks can decrease stability of streambanks which deliver sediment to the stream system. Low stocking levels and fencing can reduce potential for impacts.

Wildlife: This unit provides excellent spring, summer, and fall habitat for deer and moose. It also provides excellent winter range in the St. Regis drainage and in the Seeley Lake area for whitetail deer. Shrub understories provide excellent big game forage and can be enhanced by regeneration timber harvest. Within occupied grizzly bear habitat, understory forbs and berry-producing shrubs provide very important bear foods. Timber stands provide important grizzly bear day bed sites and migration routes.

10UC

Fisheries: Low gradient streams that occur in this map unit offer reasonable opportunity for good fisheries habitat. The cooler temperatures which occur in this map unit can limit fisheries production. Tree canopy removal can encourage beaver occupancy. Large woody debris is responsible for most pool habitat.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is high because all soil disturbance is relatively close to stream channels. The major watershed management concern is protection of stream channels and banks. Bridges and culverts should be carefully planned to maintain channel stability. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

13JA

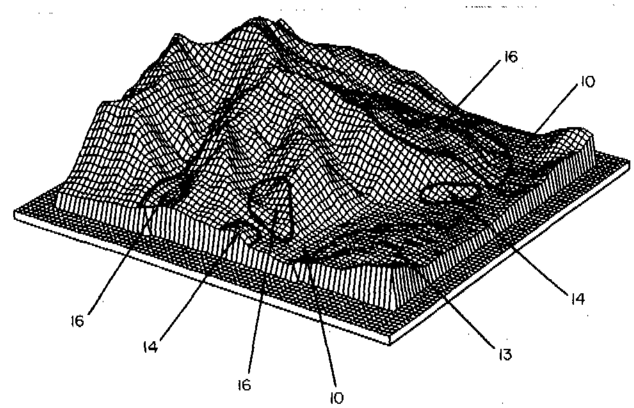
Typic Eutroboralfs, lacustrine over alluvial terraces

SUMMARY

The map unit occurs on terraces adjacent to the Clark Fork River and at the mouths of streams tributary to the Clark Fork River. Vegetation is dry Douglas-fir and moist, mixed coniferous forest. Soils form in lacustrine deposits which overlie very cobbly alluvial deposits.

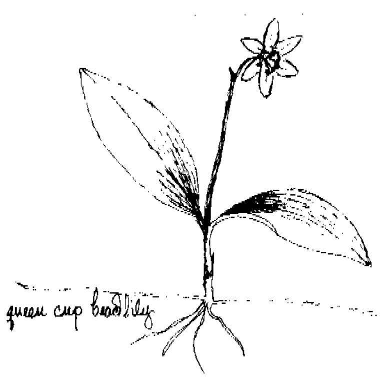
LANDFORM

The landform consists of high stream terraces, 50 to 500 feet above adjacent streams. Terraces have nearly flat benches with gradients of less than 10 percent and short steep descending slopes called risers along one side with gradients of up to 45 percent. Relief of risers can vary from 50 to 200 feet. Included in some map units are streams traversing below these terraces and their associated floodplains and low stream terraces.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-35	Variable	2800-4400	20-35	0-5

VEGETATION



Existing: Vegetation is a mixed forest of Douglas-fir, ponderosa pine, and western larch in southerly delineations. The understory contains dwarf huckleberry, kinnikinnick, serviceberry, pinegrass, snowberry, and Idaho fescue. Northerly delineations support grand fir, western larch, lodgepole pine, and Douglas-fir. Understories are dominated by twinflower, queencup beadlily, elderberry, red osier dogwood, serviceberry, rocky mountain maple, and western meadowrue.

Habitat Type (HT) Composition: This map unit contains two dissimilar habitat type groups. The dry Douglas-fir HT group occurs in delineations that have southerly trending terraces and the moist, mixed coniferous HT group occurs in delineations that have northerly trending terraces. Delineations rarely have both HT groups except in microsite inclusions. In delineations with southerly aspects, Douglas-fir/dwarf huckleberry (PSME/VACA) and Douglas-fir/snowberry (PSME/SYAL) are the major HTs on the nearly flat benches. Douglas-fir/ninebark (PSME/PHMA) or PSME/SYAL are on terrace risers where cobbly alluvium is at the surface. In delineations with northerly aspects, grand fir/twinflower (ABGR/LIBO) and grand fir/queencup beadlily (ABGR/CLUN) are the major HTs throughout the unit. Western redcedar/queencup beadlily (THPL/CLUN) and subalpine fir/twinflower (ABLA/LIBO) are included as similar.

Included are up to 10 percent dissimilar HTs. Douglas-fir/twinflower (PSME/LIBO) occurs in moist microsites such as swales and at the base of terrace risers in southerly delineations. Timber productivity is higher on these sites.

GEOLOGY

The map unit is underlain by silty lacustrine deposits 2 to 5 feet thick, which overlie very cobbly alluvium. The alluvium consists of stratified sands, many rounded rocks, and silts. These alluvial deposits are very thick and can be slightly consolidated at depths below 50 feet. The alluvial gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

Included are up to 5 percent rock outcrop. Belt Supergroup metasedimentary bedrock can occur along stream channels or near steep mountain slopes.

SOILS

Map Unit Summary: Soils are well-drained with medium to moderately fine textures. Soil properties vary with vegetation. Soils under dry Douglas-fir forest become dry early in the growing season and volcanic ash influenced loess is mixed with subsoils or is absent in the surface layer. Soils under moist, mixed coniferous forest are rarely dry in the growing season and have volcanic ash influenced loess in the surface layer. Soils supporting grand fir have a silty surface layer derived from volcanic ash influenced loess. Subsoils have clay accumulations. Substrata contains 55 to 85 percent rounded rock fragments and is moderately coarse to coarse textured.

Composition:
Typic Eutroboralfs, fine silty, mixed, frigid that occur on southerly aspects become dry early in the growing season, have light colored surface layers, and support dry Douglas-fir forests. Similar soils have dark surface layers. They are Mollic Eutroboralfs, fine silty, mixed, frigid. Typic Eutroboralfs, fine silty, mixed, frigid that occur on northerly aspects remain moist during the growing season and support moist, mixed coniferous forests.

Included are up to 15 percent dissimilar soils and rock outcrop. Soils are formed in very to extremely cobbly alluvium near delineation boundaries and on some steep terrace risers. These soils have a very gravelly loam surface layer about 8 inches thick over extremely cobbly sandy loam or loamy sand subsoil and substrata. These soils are Typic Xerochrepts, loamy skeletal, mixed on southerly aspects and Dystric Eutrochrepts, loamy skeletal, mixed, frigid on northerly aspects. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Typic Eutroboralfs, fine silty, mixed, frigid have dark grayish brown silt loams surface layers about 9 inches thick. Upper subsoils are brown to light brown silt loams about 17 inches thick and have thin continuous clay skins. Lower subsoils are dark brown silty clay loams about 6 inches thick and have thick continous clay skins coating ped faces. Substrata are brown very gravelly or very cobbly sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate on southerly aspects and very high on northerly aspects. Broken slopes limit tractor operation on terrace risers. Combinations of tractor and short line cable systems should be considered. Gentle bench surfaces are well suited to tractor operation. Tractor operation on moist soils can rut, compact or puddle the soil, and reduce soil productivity. Operating equipment only when soil is dry, frozen, or snow covered helps maintain soil productivity. Moisture stress and competition from graminoids limits regeneration on south aspects. Cold air drainage limits regeneration of some tree species.

Roads: Native road surfaces constructed in silty subsoils rut when wet and are dusty when dry. Excavation below silty surface, surfacing or seasonal closures help overcome bearing strength limitations. High cutslopes in this material tend to ravel because of the uncohesive sandy substratum and rounded cobbles. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: Potential forage production is moderate. Soils are susceptible to compaction in the spring. Delaying grazing until the soil is dry will reduce soil impacts. Erosion can occur on trails made on terrace risers that access stream bottoms.

Wildlife: This map unit provides yearlong whitetail deer range, elk winter range, and habitat for numerous bird and small mammal species. Young to mature Douglas- fir and ponderosa pine communities provide excellent whitetail deer thermal cover. Forage in such stands is provided by foliose lichens. In the moist, mixed coniferous forest, regeneration timber harvest or prescribed burning can dramatically increase shrub production. Often, during heavy snow years, shrub forage may be unavailable in openings. A mix of timbered and nontimbered stands managed over time will provide for diverse foraging opportunities of lichens and shrubs.

Fisheries: Substrates are dominated by cobbles, and pools may be in short supply. Pools are provided primarily from woody debris. In many cases, the fisheries production is moderate due to lack of structural diversity. Stream downcutting can create oversteepened banks in this map unit. These unstable banks are sources of increased sediment to the stream.

Watershed: Logging skid trails, firelines, and roads have a high erosion hazard. Roads constructed in substratum have a low erosion hazard. Sediment delivery efficiency is low on benches and high from terrace risers adjacent to streams. The major watershed management concern is protection of stream channels and banks included in this unit. Bridges and culverts should be carefully planned to maintain channel stability. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

13UA

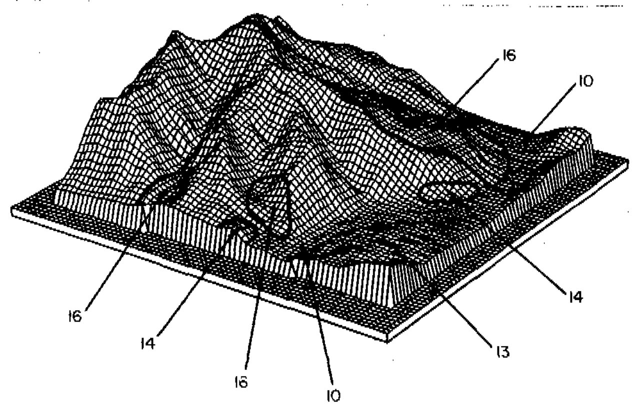
Andic Ustochrepts and Typic Ustochrepts, alluvial substratum

SUMMARY

The map unit occurs on stream terraces adjacent to the Clark Fork River and at the mouths of streams tributary to the Clark Fork River. Vegetation is dry, mixed coniferous forest. Soils are formed in very gravelly or very cobbly alluvial deposits.

LANDFORM

The landform consists of high stream terraces, 50 to 500 feet above adjacent streams. Terraces have nearly flat benches with gradients of less than 10 percent and short steep descending slopes called risers along one side with gradients of up to 45 percent. Relief of risers can vary from 50 to 200 feet. Included in some map units are streams traversing below these terraces and their associated floodplains and low stream terraces.



Slope (%)	Aspect	Elevation (ft)	Precipitation (In)	Rock Outcrop (%)
1-45	Variable	2800-4400	20-35	0-5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir, ponderosa pine, and western larch. The understory contains dwarf huckleberry, ninebark, kinnikinnick, serviceberry, pinegrass, snowberry, and Idaho fescue.

Habitat Type (HT) Composition: Douglas-fir/ninebark (PSME/PHMA), Dougals-fir/twinflower (PSME/LIBO), and Douglas-fir/dwarf huckleberry (PSME/VACA) are the major HTs on the nearly flat benches. Douglas-fir/snowberry (PSME/PHMA) or(PSME/SYAL) are on terrace risers and where cobbly alluvium is at the surface. PSME/VACA tends to favor soils with silty surfaces.

Included are up to 15 percent dissimilar HTs. Grand fir/twinflower (ABGR/LIBO) on northerly aspects and at elevations greater than 4500 feet. Moderately high timber productivity is associated with this HT. Stream bottom communities are included in those delineations that include stream channels. Refer to Map Unit description 10UA for detailed description. Dry HTs such as Douglas-fir/Idaho fescue (PSME/FEID) and Douglas-fir/rough fescue (PSME/FESC) can occur at the lower elevation limits (<3200 feet). Moisture stress and competition from graminoids limit regeneration.

13UA

GEOLOGY

The map unit is underlain by thick, very cobbly alluvial deposits. The alluvium consists of stratified sands, many rounded rocks, and silts. These alluvial deposits are very thick and can be slightly consolidated at depths below 50 feet. The alluvial gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

Included are up to 5 percent rock outcrop. Belt Supergroup metasedimentary bedrock can occur along stream channels or near steep mountain slopes.

SOILS

Map Unit Summary: Soils are well-drained to excessively drained with moderately coarse to coarse textures. Subsoils have 55 to 80 percent rock fragments. Soils on terrace treads in delineations west of Missoula have a silty surfaces formed from volcanic ash influenced loess. Delineations along the Clark Fork River and east of Missoula have mixed loess surface layers or lack loess surface layers.

Composition:
Andic Ustochrepts, sandy skeletal, mixed, frigid have silty loess surface layers about 10 inches thick. Similar soils have silty loess surface layers about 18 inches thick. They are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid.

Typic Ustochrepts, sandy skeletal, mixed, frigid have mixed loess surface layers or they are absent and have subsoils with moderately coarse textures. Similar soils have coarse textures in a portion of the subsoil. They are Typic Ustochrepts, loamy skeletal, mixed, frigid.

Every delineation has at least one of these soils and can have both.

Included are up to 15 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support moist mixed coniferous forest where grand fir or western redcedar is a major component. These soils can occur above 4500 feet and along northerly trending drainages. Timber productivity is higher on these soils. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Andic Ustochrepts, sandy skeletal, mixed, frigid have dark brown and dark yellowish brown gravelly silt loam surface layers about 8 inches thick. Subsoils are brown very gravelly sandy loams about 6 inches thick. Substrata are grayish brown extremely gravelly coarse sandy loams to a depth of 60 inches or more.

Typic Ustochrepts, sandy skeletal, mixed, frigid have grayish brown gravelly sandy loams surface layers about 5 inches thick. Subsoils are pale brown extremely gravelly sandy loams about 14 inches thick. Substrata are pale brown very cobbly sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Steep slopes limit tractor operation on terrace risers. Gentle bench surfaces are well suited to tractor operation. Cold air drainage limits regeneration of some tree species on PSME/VACA HTs.

Roads: Native road surfaces constructed in cobbly substratum materials are rough and difficult to grade smoothly. Many rock fragments are larger than 3 inches in diameter. High cutslopes in this material tend to ravel because of the uncohesive sandy substratum and rounded cobbles. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

13UA

Range: Potential forage production is moderate. Erosion can occur on trails made on terrace escarpments that access stream bottoms.

Wildlife: This map unit provides excellent whitetail deer winter range. Forage is availabe from foliose lichens and shrubs. Large delineations can lack habitat diversity. Moderate shrub forage increases occur with vegetation manipulation.

Fisheries: Substrates are dominated by cobbles, and pools may be in short supply. Pools are provided primarily from woody debris. In many cases, the fisheries production is moderate due to lack of structural diversity. Stream downcutting can create oversteepened banks in this map unit. These unstable banks are sources of increased sediment to the stream.

Watershed: Logging skid trails, firelines, and roads have a low erosion hazard on benches. High sediment delivery efficiency on terrace escarpments or risers contribute to high erosion hazards on these slopes. The major watershed management concern is protection of stream channels and banks included in this unit. Bridges and culverts should be carefully planned to maintain channel stability. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

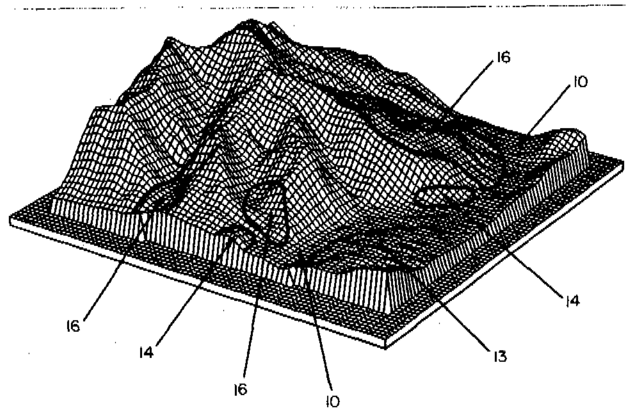
Andic Dystric Eutrochrepts-Andic Cryochrepts association, alluvial terraces

SUMMARY

The map unit contains stream and outwash terraces and their associated perennial streams. Vegetation is moist, mixed coniferous forest and subalpine forest. Soils are formed in volcanic ash influenced loess overlying very gravelly or very cobbly alluvial deposits.

LANDFORM

The landform consists of high stream terraces, 15 to 40 feet above adjacent streams. Terraces have nearly flat benches with gradients of less than 10 percent and short steep descending slopes called risers along one side with gradients of up to 45 percent. Relief of risers is about 20 feet. Included in map units are streams traversing below these terraces with their associated floodplains and low stream terraces.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-45	Variable	3300-4900	35-45	0-5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir, western larch, lodgepole pine, grand fir, and some western redcedar. The understory contains dwarf huckleberry, oregon grape, serviceberry, pinegrass, twinflower, queencup beadlily, rocky mountain maple, elderberry, and beargrass. The more well-drained subalpine forest above 4700 feet are characterized by stands of lodgepole pine with an understory of beargrass and blue huckleberry.

Habitat Type (HT) Composition: The map unit contains an association of HT groups. Western redcedar/queencup beadlily (THPL/CLUN), grand fir/queencup beadlily (ABGR/CLUN), and grand fir/twinflower (ABGR/LIBO) occur below 4600 feet. This group occupies approximately 70 percent of the map unit. These sites have cool, moist climates. Subalpine fir/fool's huckleberry (ABLA/MEFE), subalpine fir/queencup beadlily (ABLA-/CLUN), subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL), and subalpine fir/dwarf huckleberry (ABLA/VACA) occur above 4600 feet and occupy approximately 25 percent of the map unit. These HTs have cold, moist to very moist climates and are located in narrow stream valleys which are subject to cold air drainage. ABLA/XETE-VAGL and ABLA/VACA are confined to well-drained terraces high above ground water influences. ABLA/MEFE and ABLA/CLUN occur on lower terraces near streams edge and at map unit bounds with steep mountain slopes.

Included are up to 5 percent dissimilar HTs. Douglas-fir/dwarf huckleberry (PSME/VACA) occurs near map unit bounds at the lower elevations. Timber productivity is moderate and climates are drier. Stream bottom communities are included in those delineations that include stream channels and floodplains.

13UB

GEOLOGY

The map unit is underlain by thick, very cobbly alluvial deposits. These deposits comprise both stream and glacial outwash terraces. Rock fragments are derived from argillites, siltites, and quartzites of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are well-drained with moderately coarse textures. Soils have silty surface layers formed from volcanic ash influenced loess. Subsoils contain 55 to 80 percent rock fragments. Soils supporting subalpine fir forests have been observed to remain cold during the growing season while soil supporting mixed, moist coniferous forests generally become warmer during the growing season.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support moist, mixed coniferous forests. They have silty loess surface layers from 8 to 14 inches thick and a base saturation of more than 60 percent. Similar soils have base saturation less than 60 percent and support some western redcedar stands. These soils are Andic Dystrochrepts, loamy skeletal, mixed, frigid. Other similar soils have loess surface layers greater than 14 inches thick and are Typic Vitrandepts, medial over loamy skeletal. These soils occupy about 60 percent of the map unit.

Andic Cryochrepts, loamy skeketal, mixed have silty loess surface layers from 8 to 12 inches thick and have moderately coarse textured subsoils. Similar soils have coarse textures in a portion of the subsoil or substrata. They are Andic Cryochrepts, sandy skeletal, mixed. These soils occupy about 35 percent of the map unit.

Included are up to 5 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid supporting dry, mixed coniferous forests. They occur at lower elevation map unit bounds. Climate is drier and timber productivity is less. Aquents occur along stream bottoms and support riparian vegetation similar to Map Unit 10UC.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 4 inches thick. Surface layers are dark brown gravelly silt loam about 14 inches thick. Subsoils are yellowish brown extremely cobbly sandy loams about 25 inches thick. Substrata are light yellowish brown extremely cobbly loamy sands and sandy loams to a depth of 60 inches or more.

These Andic Cryochrepts, loamy skeletal, mixed have a surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown non-gravelly and very gravelly silt loams up to 14 inches thick. Subsoils are brown extremely gravelly or cobbly sandy loams about 35 inches thick. Substrata are yellowish brown extremely gravelly coarse sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Gentle bench surfaces are well suited to tractor operation. Cable systems may be used on terrace risers. The eastern portion of the survey area (Seeley and Missoula RD) has thinner loess surface layers that are easily removed or displaced during harvest and site preparation. Removal or displacement of loess layer exposing moderately coarse subsoil can reduce productivity and limit regeneration. Cold air drainage limits regeneration of some tree species.

Roads: Native road surfaces constructed in cobbly substratum materials are rough and difficult to grade smoothly. Many rock fragments are larger than 3 inches in diameter. High cutslopes in this material tend to ravel because of the uncohesive sandy substratum and rounded cobbles. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: Potential forage production is low. Erosion can occur on trails made on terrace escarpments that access stream bottoms.

Wildlife: This map unit provides spring, summer, and fall range for deer and elk, and in some circumstances, moose. Cold air drainage generally precludes winter use by deer and elk except in severe winters. Management that provides a variety of age classes and stand diversity with minimal human disturbance will optimize wildlife values. Shrub forage is greatly increased by vegetative manipulation. In occupied grizzly bear habitat, berry-producing shrub communities provide late summer/fall forage.

Fisheries: Substrates are dominated by cobbles, and pools may be in short supply. Pools are provided primarily from woody debris. In many cases, the fisheries production is moderate due to lack of structural diversity. Stream downcutting can create oversteepened banks in this map unit. These unstable banks are sources of increased sediment to the stream.

Watershed: Logging skid trails, firelines, and roads have a low erosion hazard on benches. High sediment delivery efficiency on terrace escarpments or risers contribute to high erosion hazards on these slopes. The major watershed management concern is protection of stream channels and banks included in this unit. Bridges and culverts should be carefully planned to maintain channel stability. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

14JA

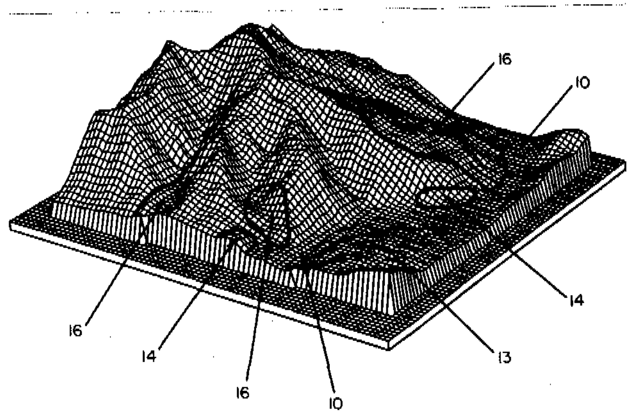
Typic Eutroboralfs, lacustrine substratum, dry

SUMMARY

The map unit consists of low relief, dissected foothills and benches located along the Clark Fork River. Vegetation is dry Douglas-fir. Soils form in deep silty lacustrine deposits.

LANDFORM

The landform consists of rolling foothills to nearly flat benches in mountain valleys along the Clark Fork River drainage. Gentle undulating slopes have broad ephemeral channels. Benches near perennial streams and terraces from ancestoral Clark Fork River channels have inclusions of steep escarpments.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-30	Variable	2800-4400	15-25	0

VEGETATION

Existing: Vegetation is a mixed forest of ponderosa pine and Douglas-fir. The understory is dominated by kinnikinnick, serviceberry, chokecherry, snowberry, Idaho fescue, and rough fescue. Some delineations are under cultivation or pasture.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU), Douglas-fir/twinflower (PSME/LIBO), and Douglas-fir/elk sedge (PSME/CAGE) are the major HTs. PSME/CAGE and PSME/PHMA-CARU are on southerly aspects and occupy about 60 percent of the map unit. PSME/LIBO is on northerly aspects and in drainageways and occupies about 30 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/Idaho fescue (PSME/FEID) occurs on low elevation south aspects. This HT is less productive. Grand fir/queencup beadlily (ABGR/CLUN) occurs on north aspects in delineations near St. Regis near bounds of map unit. This HT is more productive.

GEOLOGY

The map unit is underlain by silty lake sediments originating from ancestral Glacial Lake Missoula. Many of these lacustrine sediments occurring on benches have been reworked by the Clark Fork River creating areas predominated by fine sands, silts, or clays. The bedrock underlying these deep sediments consist of argillites, siltites and quartzites of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are moderately well-drained with medium to fine textures and have subsoil clay accumulation. Silt content is very high and rock fragments are rare. Calcium carbonate accumulation occurs in some subsoils a depths below 5 feet.

Composition:
Typic Eutroboralfs, fine silty, mixed, frigid have light colored surface layers and have 20 to 35 percent clay in the subsoils. Similar soils have dark colored surface layers. These soils are Mollic Eutroboralfs, fine silty, mixed, frigid. Another similar soil has 35 to 50 percent clay content in the subsoil. These soils are Typic Eutroboralfs, fine, mixed, frigid, and occupy about 95 percent of the map unit.

Included are up to 5 percent dissimilar soils. Soils supporting ABGR/CLUN occur near map unit delineation boundaries near St. Regis. These soils have a surface layer formed in volcanic ash influence loess. They are Typic Eutroboralfs, fine-silty, mixed and support more productive timber sites.

Representative Profile:
Typic Eutroboralfs, fine silty, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 9 inches thick. Subsurface layers are light brown and pinkish gray silt loams about 7 inches thick. Subsoils are dark brown silty clay loams about 16 inches thick with many thick clay films. Substrata are a brown silt loams with calcium carbonate pendants to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow covered helps maintain soil productivity. Moisture stress and competition from graminoids limits regeneration. Seedlings are subject to frost heaving.

Roads: Native roads surfaces constructed in silty subsoils rut when wet because of low bearing strength and are dusty when dry. Surfacing helps control dust and prevents rutting. Cutslopes are highly erosive, slough easily, and are difficult to revegetate.

Range: Potential forage production is moderate to high. Clearing coniferous vegetation favors graminoid production over shrub production. Grazing when soils are wet can cause compaction. Erosion can occur on livestock trails.

Wildlife: This map unit provides excellent whitetailed deer winter range. Forage is available from foliose lichens and shrubs in forested stands. Best shrub response on these moderately fine textured soils has been observed after thinning or shelterwoods rather than clearcuts.

Fisheries: Where streams occur, inherent streambank stability is low due to fine textured soils. Transport of these silty materials to potential fisheries is particularly detrimental to spawning success.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

14JB

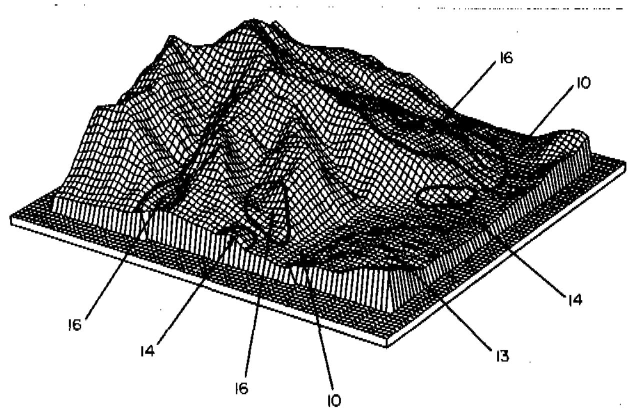
Typic Eutroboralfs, lacustrine substratum

SUMMARY

The map unit consists of low relief, dissected foothills and benches located along the Clark Fork River. Native vegetation is moist, mixed coniferous forest. Soils are formed in volcanic ash influenced loess overlying deep silty lacustrine deposits.

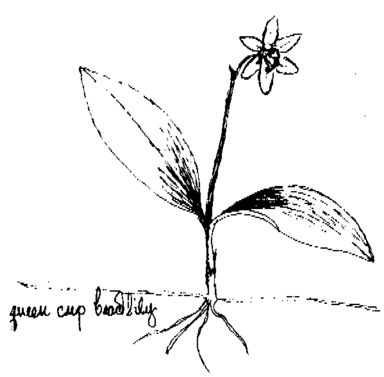
LANDFORM

This landform consists of rolling foothills to nearly flat benches in mountain valleys along the Clark Fork River drainage. Gentle undulating slopes have broad ephemeral channels. Benches near perennial streams and terraces from ancestoral Clark Fork River channels have inclusions of steep escarpments.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-30	Northerly	3500-4000	25-35	0

VEGETATION



Existing: Vegetation is a mixed forest with western larch, Douglas-fir, lodgepole pine, and western white pine. The understory is dominated by rocky mountain maple, serviceberry, twinflower, blue huckleberry, sitka alder, and queencup beadlily.

Habitat Type (HT) Composition: Grand fir/twinflower (ABGR/LIBO) and grand fir/queencup beadlily (ABGR/CLUN) are the major HTs. They occupy about 75 percent of the map unit. Western redcedar/queencup beadlily (THPL/CLUN) occurs near drainages and occupies about 10 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/twinflower (PSME/LIBO) is on east and west aspect inclusions. Timber productivity is lower on these sites.

GEOLOGY

The map unit is underlain by silty glacial lake sediments originating from ancestral Glacial Lake Missoula. Many of these lacustrine sediments occurring on benches have been reworked by the Clark Fork River creating areas predominated by fine sands, silts or clays. The bedrock underlying these deep sediments consist of argillites siltites and quartzites of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are moderately well-drained with medium to fine textures and have subsoil clay accumulation. Silt content is very high and rock fragments are rare. Surface layers are formed in volcanic ash influenced loess.

Composition:
Typic Eutroboralfs, fine silty, mixed, frigid have 25 to 35 percent clay and have subsoil clay accumulation. A similar soil, Typic Eutroboralfs, fine, mixed, frigid, has 35 to 50 percent clay in the subsoil. Another similar soil has little subsoil clay accumulation, Andic Dystric Eutrochrepts, fine-silty, mixed, frigid. These soils occupy about 95 percent of the map unit.

Included are up to 5 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have greater than 35 percent rock fragments and have moderately coarse to medium textures. They occur along map unit bounds. Timber productivity is lower and native road surface quality is higher.

Representative Profile:
These *Typic Eutroboralfs, fine silty, mixed, frigid* have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Subsurface layers are light brown and pinkish gray silt loams about 9 inches thick. Subsoil are dark brown silty clay loams about 16 inches thick with many thick clay films. Substrata are a brown silt loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is very high. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow covered helps maintain soil productivity.

Roads: Native roads surfaces constructed in silty subsoils rut when wet because of low bearing strength and are dusty when dry. Surfacing helps control dust and prevents rutting. Cutslopes are highly erosive, slough easily, and are difficult to revegetate.

Range: This map unit is poorly suited for range management. The forest understory produces little forage.

Wildlife: Where associated with adjacent south-facing winter ranges, this map unit has high winter thermal cover values. Deer and elk select for mature and old growth timber stands during severe winter weather. This unit also provides good spring and fall deer range and shrub forage response to vegetative manipulation such as harvest is excellent.

Fisheries: Where streams occur, inherent streambank stability is low due to fine textured soils. Transport of these silty materials to potential fisheries is particularly detrimental to spawning success.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a high erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

14XA

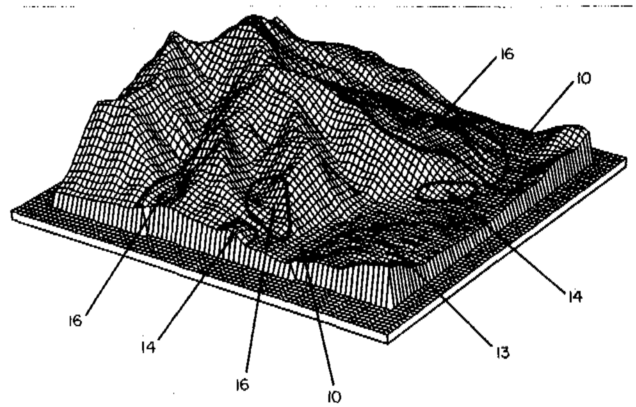
Typic Ustochrepts and Alfic Ustipsamments, sandy lacustrine substratum

SUMMARY

The map unit consists of low relief, dissected foothills, and benches. Vegetation is dry Douglas-fir. Soils are formed in deep fine sandy and silty lacustrine deposits.

LANDFORM

The landform consists of rolling foothills to nearly flat benches. Foothills are dissected by ephemeral stream channels. Benches near perennial streams and ancestoral Clark Fork River channels have inclusions of steep escarpments.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-20	Variable	2800-4400	15-25	0

VEGETATION

Existing: Native vegetation is a mixed forest with ponderosa pine and Douglas-fir. The understory is dominated by bittercherry, kinnikinnick, snowberry, Idaho fescue, and rough fescue. Some delineations are under cultivation or pasture.

Habitat Type (HT) Composition: Douglas-fir/snowberry (PSME/SYAL), Douglas-fir/twinflower (PSME/LIBO), and Douglas-fir/Pinegrass (PSME/CARU) are the major HTs. PSME/SYAL is on steeper southerly slopes and PSME/CARU is usually on nearly flat benches. These HTs occupy about 60 percent of the map unit. PSME/LIBO is in swales, on northerly aspects, and on toeslope positions and occupies about 30 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/Idaho fescue (PSME/FEID) occurs on low elevation south aspects and has a lower timber productivity. Grand fir/queencup beadlily (ABGR/CLUN) is on toeslopes of steep mountain slopes. This HT has a higher productivity.

GEOLOGY

The map unit is underlain by fine sandy to silty lake sediments originating from ancestral Glacial Lake Missoula and sand bars formed from the Clark Fork River. Some of these deposits where possibly reworked by wind and appear to be restricted to the Tarkio/Cyr Flats area. The bedrock underlying these deep sediments consist of argillites, siltites and quartzites of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are well-drained and coarse to moderately coarse. Soils are nearly rock free and some substrata have evidence of calcium carbonate. Soils vary with the amount of sand in the parent material.

Composition:
Typic Ustochrepts, coarse silty, mixed, frigid are formed in very fine sandy loams to silt loams with less than 12 percent clay.

Alfic Ustipsamments, coarse loamy, mixed, frigid are formed in loamy fine and very fine sands. These soils have thin clay lamellae in the subsoil.

Every delineation has at least one of these soils and can have both.

Included are up to 5 percent dissimilar soils. Typic Eutroboralfs, fine silty, mixed, frigid have subsoil clay accumulation and silty clay loam textures, occur along map unit delineation boundaries, and can be randomly scattered through the map unit. These sites have a higher water and nutrient holding capacity and are more productive.

Representative Profiles:
Typic Ustochrepts, coarse silty, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are very dark grayish brown and light yellowish brown silt loams about 8 inches thick. Subsoils are brown silt loams about 4 inches thick. Upper substratum is brown and yellowish brown silt loams about 33 inches thick. Lower substratum are yellowish brown silt loams with evidence of calcium carbonate to a depth of 60 inches or more.

Alfic Ustipsamments, coarse loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown loamy fine sands about 9 inches thick. Lower surface layers are brown and pale brown loamy fine sands about 27 inches. Subsoils have brown fine sandy loam bands with light gray loamy fine sands about 30 inches thick.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow-covered helps maintain soil productivity. Moisture stress and competition from grass can limit regeneration. Seedlings are subject to frost heaving.

Roads: Native roads surfaces rut when wet because of low bearing strength and are dusty when dry. Surfacing helps control dust and prevents rutting. This material pipes easily. Cutslopes are highly erosive, slough easily, and are difficult to revegetate.

Range: Potential forage production is moderate to high. Clearing coniferous vegetation favors graminoid production over shrub production. The soil is susceptible to compaction when wet. Erosion can occur on livestock trails.

Wildlife: This map unit provides excellent whitetail deer winter range. Forage is available from foliose lichens in forested stands and from scattered shrubs. Graminoid response is greater than shrub response after timber harvest. Maintenance of thermal and security cover can be important on these sites.

Fisheries: Where streams occur, inherent streambank stability is low due to fine textured soils. Transport of these silty materials to potential fisheries is particularly detrimental to spawning success.

14XA

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is low. Practices which disturb soil on or near streams have a high potential for increasing sediment.

15JA

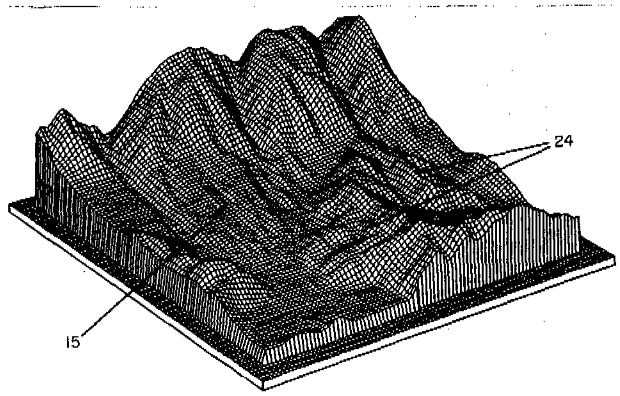
Typic Eutroboralfs complex, valley fill, dry

SUMMARY

The map unit consists of toeslopes and alluvial fans. Vegetation is dry Douglas-fir and dry, mixed coniferous forest. Soils form in valley fill deposits. Soil surfaces range from stony to very stony.

LANDFORM

This landform consists of low relief footslopes, benches, and fans positioned at the base of moderate to high relief mountain slopes. Drainageways are broad and low gradient. Subsurface water is common in these drainageways. Ponds, seeps, and perched water tables occur along these drainageways and occasionally in swales and depressions.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-35	Variable	3000-4400	18-25	0

VEGETATION

Existing: Vegetation is a mixed forest with inclusions of non-forested riparian. Dry Douglas-fir forests are dominated by ponderosa pine and Douglas-fir. The understory is composed of kinnikinnick, pinegrass, serviceberry, snowberry, ninebark, and Idaho fescue. Dry, mixed coniferous forests occur in some delineations above 4000 feet and along moist drainageways. Western larch is included in these forests. Several delineations in the Little Thompson River drainage are dominated by lodgepole pine. Understories contain serviceberry, buffaloberry, dwarf huckleberry, twinflower, wood's rose, grouse whortleberry, and pinegrass. Non-forested riparian consists of sedge, bluejoint, aspen, and willow.

Habitat Type (HT) Composition: This map unit contains Douglas-fir/dwarf huckleberry (PSME/VACA), Douglas-fir/snowberry (PSME/SYAL), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/ninebark (PSME/PHMA). PSME/VACA occurs on nearly flat landscapes and is supported by non-stony to stony surface soils. This habitat type is most prevalent in delineations above 4000 feet. PSME/PHMA occurs on very to extremely stony surface soils below 4000 feet. PSME/SYAL and PSME/CARU are in delineations east of Alberton below about 4000 feet.

Included are up to 20 percent dissimilar HTs. Grand fir/twinflower (ABGR/LIBO) occurs in some moist drainageways. Timber productivity is higher in this HT. Non-forested riparian vegetation consisting of grasses and sedges occurs on poorly-drained areas along broad, poorly defined drainageways. High water tables pose limitations to roads and timber regeneration.

15JA

GEOLOGY

This map unit is underlain by valley fill material which was deposited in mountain valleys over a long period of time, most likely during Tertiary and early Quaternary periods. This valley fill material is highly variable. Most of the deposits exhibit a high degree of weathering in the subsoils with higher than average clay contents for soils formed from Belt metasedimentary rocks. Rock fragment contents range from 0 to 45 percent, are poorly sorted, and are mostly comprised of Belt metasedimentary rocks. Stones occur on the surface to a depth of 5 feet in some delineations. Stony surfaces are most common on fans formed below stream channels flowing from adjacent mountain slopes. Glacial till deposits cap some of these Tertiary valley fill benches at the higher elevations. Somewhat poorly-drained areas and ponds occur in areas of fine and moderately fine textured valley fill.

Included are up to 5 percent parent materials derived from slightly weathered metasedimentary bedrock. Rock fragment content is 45 to 75 percent and clay contents are less.

SOILS

Map Unit Summary: Soils are moderately well-drained with some poorly-drained inclusions and are have medium to moderately fine. Surface soils have a high silt content and can contain up to 40 percent large stones in some delineations. Subsoils have clay accumulation and contain 0 to 45 percent rock fragments.

Composition:
Typic Eutroboralfs, loamy skeletal, mixed, frigid have greater than 35 percent rock fragments and 20 to 35 percent clay in the subsoil. These soils occupy about 50 percent of the map unit.

Typic Eutroboralfs, fine loamy, mixed, frigid have less than 35 percent rock fragments and 25 to 35 percent clay in the subsoil. Similar soils are Typic Eutroboralfs, fine, mixed, frigid. They have about 35 to 45 percent clay content in the subsoil. These soils occupy about 35 percent of the map unit.

Included are up to 15 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid and Udic Ustochrepts, loamy skeletal, mixed, frigid are on inclusions of soils formed in Belt metasedimentary bedrock. These soils have 45 to 75 percent rock fragments in the subsoil. Quality of native road surfaces is higher on these soils. Aquepts and Aquolls are in poorly-drained areas supporting non-forested riparian vegetation. These soils pose severe limitations to roads and timber regeneration.

Representative Profiles:
Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown gravelly silt loams about 8 inches thick. Subsurface layers are brown very cobbly silty clay loams about 10 inches thick. Subsoil layers are brown very gravelly silty clay loams about 25 inches thick and have moderately thick clay skins on ped faces. Substrata are light brown very cobbly silty clay loams to a depth of 60 inches or more.

Typic Eutroboralfs, fine loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are brown gravelly silt loams about 11 inches thick. Subsurface layers are brown and pale brown silt loams about 9 inches thick. Susoils are pale brown to brownish yellow gravelly and cobbly silty clay loams about 29 inches thick. Substrata are light brown cobbly silty clay loams or silt loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow-covered helps maintain soil productivity. Designated skid trails that avoid wet areas will reduce potential for soil impacts.

15JA

Roads: Native roads surfaces rut when wet because of low bearing strength and are very dusty when dry. Surfacing helps control dust and prevents rutting. Poorly sorted material with a high content of rock fragments over 10 inches (stones) produce poor running surfaces in some delineations. Seeps and poorly-drained areas can be avoided in most cases during road location.

Range: This map unit is well suited to range management. The forest understory produces good transitory range. Forage can be enhanced through timber harvest or burning. Spring and early summer grazing increases potential for soil compaction.

Wildlife: This map unit provides good spring, summer, and fall habitat and critical winter range for deer and elk. Timber harvest or underburning can increase forage production. Foliose lichens are an important source of forage in the winter.
A diversity of timbered and nontimbered areas can be provided for by timber harvest.

Fisheries: Stream channels through many alluvial fans are unstable and change location frequently. Where developed, these channels provide the only reaches of many streams suppporting fish, particularly in the second order drainages. They often have gravel conducive to spawning.

Watershed: Skid trails, roads, and firelines have a high erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

15JB

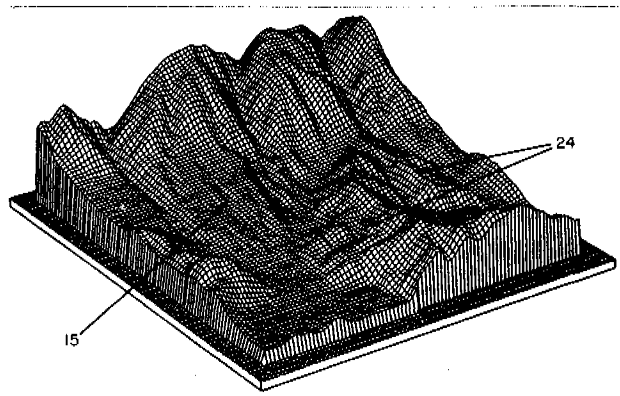
Typic Eutroboralfs complex, valley fill

SUMMARY

The map unit consists of toeslopes and alluvial fans. Vegetation is moist, mixed coniferous and subalpine forests. Soils form in volcanic ash influenced loess overlying valley fill deposits. Soil surfaces range from stony to very stony.

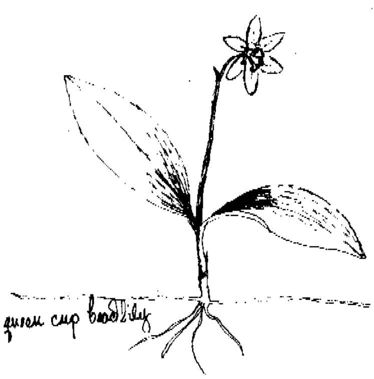
LANDFORM

The landform consists of low relief footslopes, benches, and fans positioned at the base of moderate to high relief mountain slopes. Drainageways are broad and low gradient. Subsurface water is common in these drainageways. Ponds, seeps, and perched water tables occur along these drainageways and occasionally in swales and depressions.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-35	Variable	3000-4400	25-35	0

VEGETATION



Existing: Vegetation is a mixed forest with inclusions of non-forested riparian. The forest overstory consists of western larch, lodgepole pine, Douglas-fir, grand fir, western white pine, and subalpine fir. Understory vegetation has abundant shrubs which includes serviceberry, mountain maple, sitka alder, elderberry, and blue huckleberry. Non-forested riparian consists of sedge, bluejoint, aspen, and willow.

Habitat Type (HT) Composition: This map unit contains grand fir/twinflower (ABGR/LIBO), grand fir/queencup beadlily (ABGR/CLUN), and western redcedar/queencup beadlily (THPL/CLUN). Similar included HTs are subalpine fir/twinflower (ABLA/LIBO) and spruce/queencup beadlily (PICEA/CLUN).

Included are up to 20 percent dissimilar HTs. Douglas-fir/pinegrass (PSME-/CARU) and Douglas-fir/blue huckleberry (PSME/VAGL) occur on moderately steep southerly slopes and occupy less than 5 percent of the map unit. Timber productivity is lower in these HTs. Non-forested riparian forests occur in poorly-drained areas along broad, poorly defined drainageways. High water tables pose limitation to roads and timber.

15JB

GEOLOGY

This map unit is underlain by valley fill material which has been deposited in mountain valleys over a long period of time, most likely during Tertiary and early Quaternary periods. This valley fill material is highly variable. Most of the deposits exhibit a high degree of weathering in the subsoils with higher than average clay contents for soils formed from Belt metasedimentary rocks. Rock fragment contents range from 0 to 45 percent, are poorly sorted, and are mostly comprised of Belt metasedimentary rocks. Stones occur at the surface to a depth of 5 feet in some delineations. Stony surfaces are most common on fans formed below stream channels flowing from adjacent mountain slopes. Glacial till deposits cap some of the valley fill benches. Somewhat poorly-drained areas and ponds occur in areas of fine and moderately fine textured valley fill.

Included are up to 5 percent dissimilar parent materials derived from slightly weathered metasedimentary bedrock. Rock fragment content is 45 to 75 percent and clay content is less.

SOILS

Map Unit Summary: Soils are moderately well-drained with some poorly-drained inclusions. Subsoils are medium to moderately fine textured, have subsoil clay accumulation, and contain 0 to 45 percent rock fragments. Surface soils form in volcanic ash influenced loess. Some surfaces contain up to 40 percent large stones.

Composition:
Typic Eutroboralfs, loamy skeletal, mixed, frigid support moist, mixed coniferous forests and have 35 percent rock fragments in the subsoil. Similar soils support subalpine forests and are Andeptic Cryoboralfs, loamy skeletal, mixed. They occupy about 50 percent of the map unit.

Typic Eutroboralfs, fine loamy ,mixed, frigid have less than 35 percent rock fragments. These soils occupy about 35 percent of the map unit.

Included are up to 15 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on soil inclusions formed from Belt metasedimentary bedrock. These soils have moderately coarse to medium textures and have 55 to 75 percent rock fragments in the subsoil. Quality of native road surfaces is better on these soils. Aquepts and Aquolls are in poorly-drained areas supporting non-forested riparian. These soils pose severe limitations to roads and timber regeneration.

Representative Profiles:
These Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 13 inches thick. Subsurface layers are yellowish brown cobbly silt loams about 19 inches thick. Subsoils are yellowish brown and brownish yellow very cobbly silt loams about 33 inches thick and have moderately thick clay skins. Substrata are below a depth of 60 inches or more.

These Typic Eutroboralfs, fine loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 10 inches thick. Subsurface layers are yellowish brown gravelly sandy clay loams about 12 inches thick. Subsoils are yellowish brown gravelly heavy loams about 15 inches thick and have moderately thick clay skins. Substrata are brownish yellow gravelly silt loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow-covered helps maintain soil productivity. Designated skid trails that avoid wet areas will reduce potential for soil impacts.

Roads: Native roads surfaces rut when wet because of low bearing strength and are very dusty when dry. Surfacing helps control dust and prevents rutting. Poorly sorted rock fragments over 10 inches in diameter produce poor running surfaces. Seeps and poorly-drained areas can be avoided in most cases during road location.

Range: This map unit is moderately suited to range management. The forest understory produces fair forage in recent harvest units. Spring and early summer grazing increases the hazard of soil compaction.

Wildlife: This map unit provides spring, summer, and fall range for deer and elk, and in some circumstances, moose. Cold air drainage generally precludes winter use by deer and elk except in severe winters. Management that provides a variety of age classes and stand diversity with minimal human disturbance will optimize wildlife values. Shrub forage is greatly increased by vegetative manipulation.

Fisheries: Stream channels through many alluvial fans are unstable and change location frequently. Where developed, these channels provide the only reaches of many streams supporting fish, particularly in the second order drainages. They often have gravel conducive to spawning.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

15UA

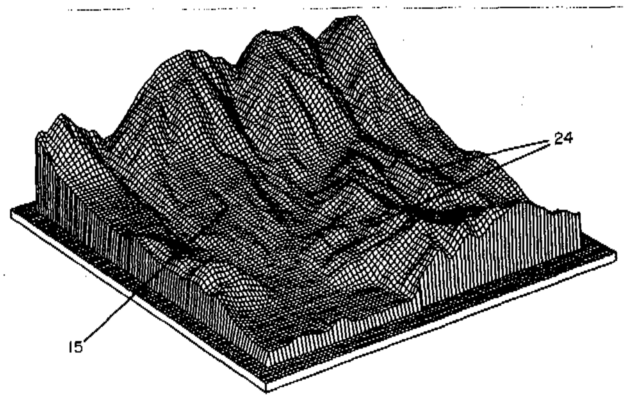
Typic Ustochrepts - Andic Dystric Eutrochrepts association, colluvial and alluvial fans

SUMMARY

The map unit consists of toeslopes and alluvial fans. Vegetation is dry Douglas-fir and dry, mixed coniferous forest. Soils form in undifferentiated toeslope deposits.

LANDFORM

The landform consists of low relief foot-slopes, benches, and fans positioned at the base of moderate to high relief mountain slopes. Drainageways are broad and low gradient. Subsurface water is common in these drainageways.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-35	Variable	3000-4400	18-25	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine and Douglas-fir. East/west aspects and drainageways support western larch. The understory is composed of dwarf huckleberry, twinflower, pinegrass, serviceberry, snowberry, ninebark, and Idaho fescue.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) are the major HTs. Douglas-fir/twinflower (PSME/LIBO) is in moist draws and swales. This HT occupies about 15 percent of the map unit. PSME/PHMA-CARU and PSME/CARU are on southerly aspects. Douglas-fir/snowberry (PSME/SYAL) is a similar HT that occurs in some delineations below 4000 feet. A few delineations support the drier phase of Douglas-fir/dwarf huckleberry (PSME/VACA). These HTs occupy about 60 percent of the map unit. PSME/PHMA-PHMA generally occurs on east and west aspects. This HT occupies about 25 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Douglas-fir/Idaho fescue (PSME/FEID) occur on steeper south slopes. Timber productivity is lower in this HT.

15UA

GEOLOGY

This map unit is underlain by valley fill material which was deposited in mountain valleys over a long period of time, most likely during early Quaternary periods. This valley fill material is highly variable. These deep deposits have medium textures and clay contents with 35 to 60 percent rock fragments. Stones can occur on the surface to a depth of 5 feet in some delineations.

Included are up to 15 percent dissimilar parent materials derived from slightly weathered metasedimentary bedrock. Rock fragment content is greater than 65 percent and clay contents are less.

SOILS

Map Unit Summary: Soils are deep, well-drained and medium textured. Subsoils contain 14 to 25 percent clay and 35 to 60 percent rock fragments. Soil properties vary with vegetation. Soils supporting dry, mixed coniferous forest can have silty surface layers formed in volcanic ash influence loess.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid support dry Douglas-fir forests. They have loam surface layers that lack volcanic ash influence. These soils occupy about 60 percent of the map unit.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support dry, mixed coniferous forests. They have silt loam surface layers formed in volcanic ash influenced loess. Similar soils have loam surface layers with less loess influence. They are Dystric Eutrochrepts, loamy skeletal, mixed, frigid. These soils occupy about 40 percent of the map unit.

Representative Profiles:
Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark yellowish brown gravelly loams about 6 inches thick. Subsurface layers are dark brown very gravelly loams about 10 inches thick. Subsoils are brown very gravelly loams about 25 inches thick. Substrata are light brown very gravelly loams and sandy loams to a depth of 60 inches or more.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 8 inches thick. Subsurface layers are light gray very gravelly loams about 14 inches thick. Subsoils are very pale brown very gravelly loams about 29 inches thick. Substrata are light brown very gravelly loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. The terrain is well suited for tractor operation. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Native road surfaces rut when wet and near drainages. Surfacing helps prevent rutting. Poorly sorted material with a high content of rock fragments over 10 inches in size (stones) produce poor running surfaces in some delineations.

Range: This map unit is well suited to range management. The forest understory produces good transitory range. Forage can be enhanced through timber harvest or burning. Spring and early summer grazing increases the hazard of soil compaction.

Wildlife: This map unit provides good spring, summer, and fall habitat and critical winter range for deer and elk. Timber harvest or underburning can increase forage production. Foliose lichens are an important source of forage in the winter.

A diversity of timbered and nontimbered areas can be provided for by timber harvest.

Fisheries: Stream channels through alluvial fans are unstable and change location frequently. Where developed, these channels provide the only reaches of many streams supporting fish, particularly in the second order drainages. They often have gravel conducive to spawning.

Watershed: Skid trails, roads, and firelines have a moderate erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

15UB

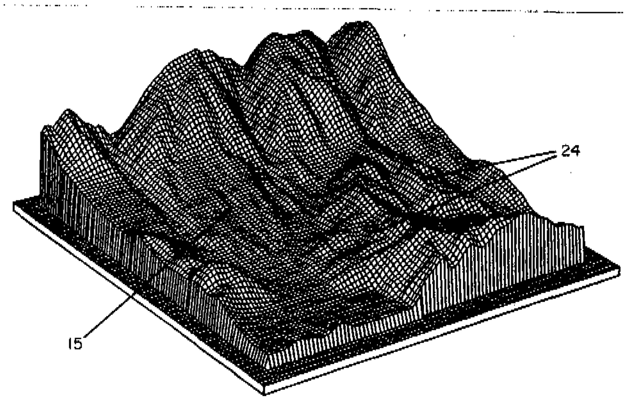
Andic Dystric Eutrochrepts, colluvial and alluvial fans

SUMMARY

The map unit consists of toeslopes and alluvial fans. Vegetation is moist, mixed coniferous forest. Soils form in undifferentiated toeslope deposits.

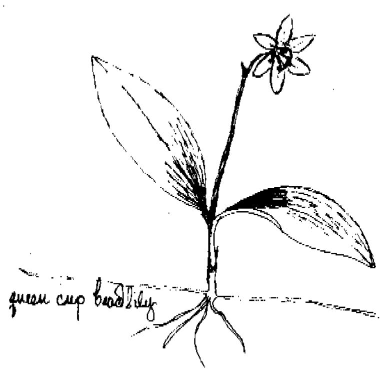
LANDFORM

The landform consists of low relief footslopes, benches, and fans positioned at the base of moderate to high relief mountain slopes. Drainageways are broad and low gradient. Subsurface water is common in these drainageways.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-35	Variable	3000-4600	25-35	0

VEGETATION



Existing: Vegetation is a mixed forest dominated by western larch, lodgepole pine, Douglas-fir, and western white pine. Some drainages support subalpine fir. The understory is composed of blue huckleberry, twinflower, pinegrass, and rocky mountain maple.

Habitat Type (HT) Composition: Douglas-fir/twinflower (PSME/LIBO) and grand fir/twinflower (ABGR/LIBO) are the major HTs. Subalpine fir/twinflower (ABLA/LIBO) is a similar HT that occurs in some delineations above 4700 feet. These HTs occupy about 75 percent of the map unit. Grand fir/queencup beadlily (ABGR/CLUN) occurs in swales and near drainageways and occupies less than 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/dwarf huckleberry (PSME/VACA) and Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) can occur on southerly inclusions. Timber productivity is lower in these HTs.

15UB

GEOLOGY

This map unit is underlain by valley fill material which was deposited in mountain valleys over a long period of time, most likely during early Quaternary periods. This valley fill material is highly variable. These deep deposits have medium textures and clay contents with 35 to 60 percent rock fragment. Stones occur on the surface to a depth of 5 feet in some delineations.

Included are up to 15 percent dissimilar parent materials derived from slightly weathered metasedimentary bedrock. Rock fragment content is greater than 65 percent and clay contents are less.

SOILS

Map Unit Summary: Soils are deep, well-drained and medium textured. Subsoils have 14 to 25 percent clay and 35 to 60 percent rock fragments. Surface layers form in volcanic ash influence loess.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have silt loam surface layers about 7 to 14 inches thick formed in volcanic ash influenced loess. Similar soils have loam surface layers with less loess influence or thin loess layers less than 7 inches thick. They are Dystric Eutrochrepts, loamy skeletal, mixed, frigid. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Typic Eutroboralfs, loamy skeletal, mixed, frigid appear to be associated with swales and toeslopes. They have subsoil clay accumulation with high total clay content and fewer rock fragments. They have higher water holding capacity and higher clay contents reduce bearing strength in native road surfaces.

Representative Profiles:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 8 inches thick. Subsurface layers are light gray loams about 14 inches thick. Subsoils are very pale brown very gravelly loams about 29 inches thick. Substrata are light brown very gravelly loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. The terrain is well suited for tractor operation. Tractor harvest or equipment operation can compact or rut soils when they are moist. Operating tractors only when soils are dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Native road surfaces rut when wet and near drainages. Surfacing helps prevent rutting. Subsurface drainages can be avoided in most cases during road location.

Range: This map unit is moderately suited to range management. The forest understory after harvest produces fair transitory range. Spring and early summer grazing increases the hazard of soil compaction.

Wildlife: This map unit provides good spring, summer, and fall habitat. Timber harvest or underburning can increase forage production. Foliose lichens are an important source of forage in the winter. A diversity of timbered and nontimbered areas can be provided for by timber harvest.

Fisheries: Stream channels through many alluvial fans are unstable and change location frequently. Where developed, these channels provide the only reaches of many streams supporting fish, particularly in the second order drainages. They often have gravel conducive to spawning.

Watershed: Skid trails, roads, and firelines have a moderate erosion hazard. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

16UA

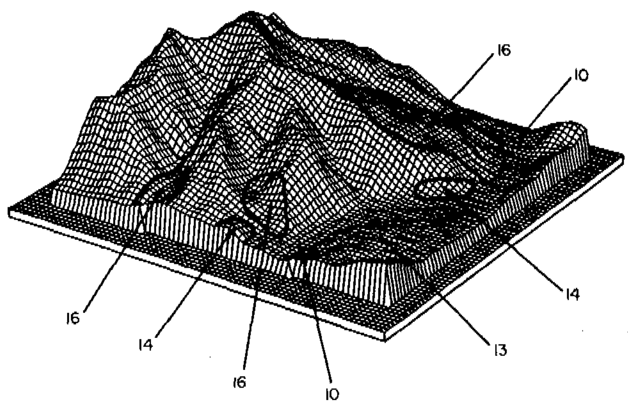
Typic Xerorthents-Andeptic Udorthents association, rolling alluvial terraces

SUMMARY

The map unit consists of rolling foothills and terraces. Vegetation is open grown and moist, mixed coniferous forests. Soils are formed in extremely gravelly coarse sandy alluvial deposits. Surface layers on northerly aspects form in volcanic ash influenced loess.

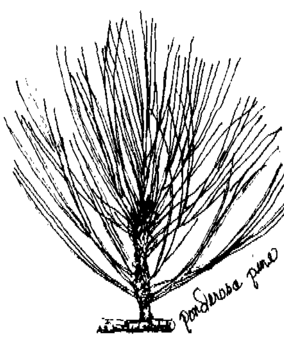
LANDFORM

The landform consists of contains rounded, rolling low hills and moderate relief benches perched on steep mountain slopes at the mouths of tributary streams to the Clark Fork River. Some benches can have steep escarpments with perennial stream channels below. Live streams on the rolling low hills portion of the map unit are rare.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-45	Variable	2800-4400	20-30	0

VEGETATION



Existing: Vegetation varies with aspect. Southerly aspects have a forest overstory of ponderosa pine and Douglas-fir. The understory is dominated by Idaho fescue, rough fescue, and pinegrass. Northerly aspects have a forest overstory of western larch, grand fir, Douglas-fir, and ponderosa pine. The understory is dominated by twinflower, ninebark, rocky mountain maple, and in the moistest portions, queencup beadlily.

Habitat Type (HT) Composition: Douglas-fir/rough fescue (PSME/FESC), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/Idaho fescue (PSME/FEID) are the major HTs on southerly aspects. Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) occurs occasionally as a similar HT. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) can occur on steeper south slopes. These HTs occupy about 60 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) and grand fir/queencup beadlily (ABGR/CLUN) are the major HTs on north aspects. They occupy about 40 percent of the map unit.

16UA

GEOLOGY

The map unit is underlain by thick deposits of extremely gravelly coarse textured alluvium. These deposits are generally stratified with lenses of loamy sands, extremely gravelly coarse sandy loams, and silts. Rock fragments are typically pea-sized and occasional boulder erratics occur in these deposits.

Included are up to 5 percent dissimilar silty lacustrine sediments with medium to moderately fine textures.

SOILS

Map Unit Summary: Soils are excessively drained and coarse. Soils vary with vegetation and surface layer textures. Soils on southerly aspects support open grown forests and have moderately coarse textured surface layers. Soils on north aspects support moist, mixed coniferous forests and have medium textured surface layers.

Composition:
Typic Xerorthents, sandy skeletal, mixed, frigid are on southerly aspects. They have a moderately coarse surface layer less than 10 inches thick. Similar soils have a moderately coarse surface layer and upper subsoil layer about 20 inches thick. They are Typic Xerochrepts, sandy skeletal, mixed, frigid. These soils occupy about 60 percent of the map unit.

Andeptic Udorthents, sandy skeletal, mixed, frigid are on northerly aspects. They have a medium textured surface layer less than 10 inches thick. Similar soils have a medium textured surface layer about 15 inches thick or a subsoil layer with moderately coarse textures. They are Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils occupy about 35 percent of the map unit.

Included are up to 5 percent dissimilar soils. Typic Eutroboralfs, fine-silty, mixed, frigid have medium to moderately fine subsoil textures and have a high silt or clay content. These soils can be scattered at random through the map unit but have been observed on nearly level benches within the map unit. These soils are moderately well-drained, have higher water holding capacity, and are more productive.

Representative Profiles:
Typic Xerorthents, sandy skeletal, mixed, frigid have light gray gravelly sandy loam upper surface layers about 5 inches thick. Lower surface layers are very pale brown gravelly coarse sandy loams about 4 inches thick. Substrata are light yellowish brown extremely gravelly loamy coarse sands to a depth of 60 inches or more.

Andeptic Udorthents, sandy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are light yellowish brown gravelly silt loams about 9 inches thick. Subsurface layers are pale brown extremely gravelly coarse sandy loams about 9 inches thick. Substrata are light yellowish brown extremely gravelly loamy coarse sands to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is low on south apsects and moderately high on north aspects. Broken dissected slopes limit tractor operation. Combinations of tractor and short line cable systems should be considered. Site productivity depends on the relatively thin, finer textured soil surface layers. Displacement of the surface layers will decrease productivity. Rotting wood is an important nitrogen source for southerly slopes in this unit. Leaving large diameter logging slash helps maintain fertility. Competition for moisture from understory vegetation and high insolation limits forest regeneration on south aspects. Shelterwood and selection silvicultural systems improve regeneration on these sites.

Roads: Material exposed by road construction is subject to ravel on steep cuts and fills. Delineations perched on steep mountain sideslopes above perennial streams pose slope stability hazards. Position of these map units on slopes deeply incised by major streams leaves these uncohesive soils perched high on the slope. These alluvial deposits are good pit run sources for surfacing material. Native road surfaces will erode on road grades above 10 percent. Small inclusions of silts will rut when wet.

Range: This map unit is moderately suited to range management. Potential forage production on southerly aspects is high. Steep short slopes may limit access to portions of the map unit to grazing.

Wildlife: This map unit provides excellent whitetail deer winter range. The southerly aspects provide bunchgrass communities for foraging and northerly aspects provide shrub and foliose lichen forage as well as thermal cover.

Fisheries: Where streams occur, inherent streambank stability is low because of uncohesive soils. Most stream reaches have steep gradients with some boulders. Small gravel may create good spawning material downstream.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is high on bench escarpments perched along steep mountain slopes. Sediment delivery efficiency is low on rolling footslopes. Establishing vegetative cover is difficult and sediment from road cut and fill slope erosion is difficult to control adjacent to perennial streams.

22MA

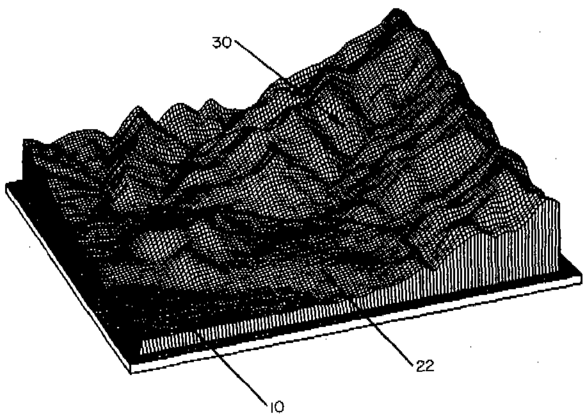
Andic Dystric Eutrochrepts-Typic Ustochrepts-Lithic Ustorthents complex, flood scoured footslopes

SUMMARY

The map unit consists of flood scoured footslopes. Vegetation is dry, mixed and moist, mixed coniferous forest. Southerly aspects support open-grown forests. Soils form in material from moderately weathered metasedimentary rocks and alluvium. Some soils have surface layers formed in volcanic ash influenced loess.

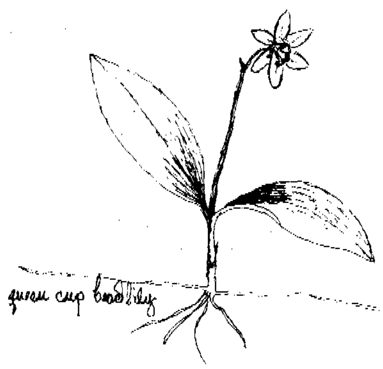
LANDFORM

The landform consists of low to moderate relief footslopes and terraces with scoured crests, small undulating benches, and broad, moderately sloping drainages. Some delineations have small areas of ponded water.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
20-45	Variable	3200-4500	25-35	0

VEGETATION



Existing: Vegetation is a mixed forest of Douglas-fir, grand fir, and western larch. The forest understory on southerly slopes is composed of bluebunch wheatgrass, Idaho fescue, snowberry, and pinegrass. The forest understory on northerly slopes is composed of twinflower, pinegrass, ninebark, queencup beadlily, and beargrass.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA), grand fir/queencup beadlily (ABGR/CLUN), and grand fir/twinflower (ABGR/LIBO) are the major HTs. PSME/PHMA-PHMA occurs on east and west aspects and occupies about 35 percent of the map unit. North aspects support ABGR/LIBO and ABGR/CLUN. These HTs occupy about 50 percent of the map unit. Douglas-fir/Idaho fescue (PSME/FEID) occurs on southerly aspects with shallow soils and occupies about 15 percent of the map unit.

22MA

GEOLOGY

Surficial deposits are a complex of colluvial deposits from moderately weathered Belt metasedimentary rocks, water scoured surfaces exposing bedrock, and extremely gravelly coarse sandy alluvial lakeshore deposits on sideslopes and in drainages. Exposed bedrock and surficial geology is a result of submergence, scouring, and wave action from Glacial Lake Missoula during glacial (quaternary) times. Bedrock is composed of moderately weathered limestone, siltite, and argillite of the Belt Supergroup.

Included are up to 20 percent deposits with dissimilar properties. Surficial deposits of silty lakebed sediments occur in depressions and along some terraces. Highly weathered zones in the moderately weathered metasedimentary bedrock occur along toeslopes and drainageways.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to coarse. Soil texture and depth vary with topography and aspect. Coarse textured soils occur on the lower portion of the slopes and along sideslopes of drainageways. Shallow soils with depths less than 2 feet occur along crests of sideslopes and benches and are most common on southerly aspects. Soils on north aspects have surface layers formed in volcanic ash influence loess. Subsoils contain 55 to 75 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on north aspects and support dry and moist, coniferous forests. Surface layers are formed in volcanic ash influence loess. Subsoils are moderately coarse textured. Similar soils are Andic Udorthents, sandy skeletal, mixed, frigid. They have coarse textures and occur where there is more alluvial influence on the parent material. These soils occupy about 60 percent of the map unit.

Typic Ustochrepts, loamy skeletal, mixed, frigid are on east and west aspects and support dry, mixed coniferous forest. These soils occupy about 25 percent of the unit.

Lithic Ustorthents, loamy skeletal, mixed, frigid are on southerly aspects and support open grown and dry, Douglas-fir forests. Soil depth is less than 2 feet. These soils occupy about 15 percent of the map unit.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly sandy loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly sandy loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 40 inches or more.

Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. The surface layer is a dark grayish brown gravelly silt loam about 9 inches thick. The subsoil is a grayish brown extremely gravelly silt loam about 30 inches thick.

Lithic Ustorthents, loamy skeletal, mixed, frigid have very dark gray very gravelly loam surface layers about 3 inches thick. Subsoils are brown extremely gravelly sandy loams about 7 inches thick. Substrata are fragmental with highly fractured bedrock to a depth of less than 20 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate on southerly slopes, high on northerly slopes, and low on shallow soils. This map unit contains slopes suitable for tractor operation. Site productivity depends on the relatively thin, finer textured soil surface layers. Displacement of the surface layers will decrease productivity. Rotting wood is an important nitrogen source for southerly slopes. Leaving large diameter logging slash helps maintain fertility. Shelterwood and selection silvicultural systems improve regeneration on steeper south aspects with high insolation.

Roads: Sandy material exposed in drainageways is subject to ravel on steep cuts. Hard rock frequently limits excavation. Silty lakebed and highly weathered bedrock inclusions will cause rutting in native road surfaces.

Range: This map unit is moderately suited to range management. Potential forage production on southerly aspects is high and fair on northerly slopes. Dense brush and steep short slopes may restrict access to portions of the map unit.

Wildlife: This unit provides excellent yearlong deer range and good elk winter range. Forage is available in small bunchgrass openings, shrubfields, and lichen rich timber stands. East, west, and north facing stands provide thermal cover. Regeneration with underburning can be beneficial by increasing shrub productivity on northerly aspects.

Fisheries: The amount of fractured bedrock near the surface and location of these lands preclude all but a few isolated streams.

Watershed: Skid trails and firelines have a low erosion hazard. Roads have a moderate erosion hazard. Sediment delivery efficiency is low except at stream crossings.

22UA

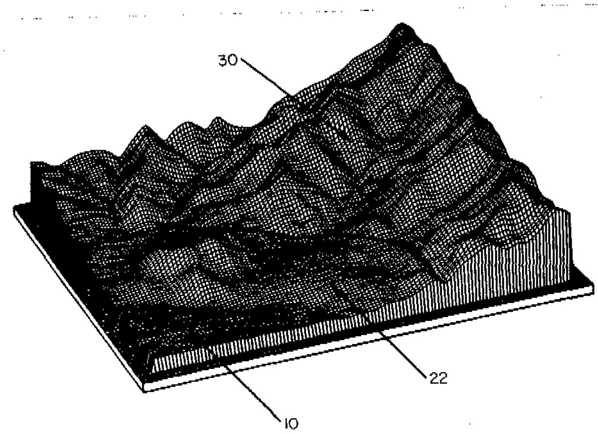
Andeptic Udorthents-Typic Ustochrepts-Lithic Ustorthents complex, flood scoured footslopes

SUMMARY

The map unit consists of flood scoured footslopes. Vegetation is dry Douglas-fir and dry, mixed coniferous forest. Soils form in material from weakly weathered metasedimentary rocks and alluvium. Some soils have surface layers formed in volcanic ash influenced loess.

LANDFORM

The landform consists of low to moderate relief footslopes and terraces with scoured crests, small undulating benches, and broad, moderately sloping drainages. Some delineations have small areas of ponded water.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
20-45	Variable	3200-4500	25-35	5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir, grand fir, and western larch. The forest understory on southerly slopes is composed of bluebunch wheatgrass, ninebark, snowberry, and pinegrass. The forest understory on northerly slopes is composed of twinflower, pinegrass, ninebark, queencup beadlily, and beargrass.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA), Douglas-fir/pinegrass (PSME/CARU), and grand fir/twinflower (ABGR/LIBO) are the major HTs. PSME/PHMA-PHMA and ABGR/LIBO occur on northerly aspects. These HTs occupy about 40 percent of the map unit. PSME/CARU occurs on southerly aspects and occupies about 35 percent of the map unit. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) occurs on shallow soils on southerly aspects and occupies about 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) is on very moist northerly aspects and along northerly drainageways. Soils have thick surface layers formed in volcanic ash influenced loess. These soils are more productive.

22UA

GEOLOGY

Surficial deposits are a complex of colluvial deposits from weakly weathered Belt metasedimentary rocks, water scoured surfaces exposing bedrock, and extremely gravelly coarse sandy alluvial lakeshore deposits on sideslopes and drainages. Exposed bedrock and surficial geology is a result of submergence, scouring, and wave action from Glacial Lake Missoula during glacial (quaternary) times. Bedrock is composed of weakly weathered quartzite, siltite, and argillite of the Belt Supergroup.

Included are up to 5 percent surficial deposits with dissimilar properties. These deposits contain silty lakebed sediments and occur in low depressions and along terraces. Some delineations have large boulders on the surface. These boulders occur in association with narrow canyons along the Clark Fork River where flood waters have plucked rocks from adjacent sideslopes.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse to coarse. Soil texture and depth vary with topography. Coarse textured soils occur on the lower portion of the slopes and along sideslopes of drainageways. Shallow soils with depths less than 2 feet occur along crests of sideslopes and benches. Soils on north aspects have surface layers formed in volcanic ash influence loess. Subsoils contain 65 to 85 percent rock fragments.

Composition:
Andeptic Udorthents, sandy skeletal, mixed, frigid are on north aspects and support dry and moist, coniferous forests. Surface layers are formed in volcanic ash influence loess. Subsoils are coarse textured. Similar soils are Andic Dystric Eutrochrepts, loamy skeletal, mixed frigid. They have moderately coarse textures and occur where there is less alluvial influence in the parent material. These soils occupy about 45 percent of the map unit.

Typic Ustochrepts, loamy skeletal, mixed, frigid are on east and west aspects. They have loamy surface layers and moderately coarse textured subsoils. Similar soils Typic Ustochrepts, sandy skeletal, mixed, frigid. They have coarse textures and occur where there is more alluvial influence in the parent material. These soils occupy about 40 percent of the map unit.

Lithic Xerochrepts, loamy skeletal, mixed, frigid are on southerly aspects. They support PSME/AGSP and PSME/CARU HTs. Soil depth is less than 2 feet. Similar soils are Lithic Eutrochrepts, loamy skeletal, mixed, frigid. They support PSME/LIBO and ABGR/LIBO HTs. These soils occupy about 15 percent of the map unit.

Representative Profiles:
Andeptic Udorthents, sandy skeletal, mixed, frigid have a soil surface covered by partially decomposed forest litter about 1 inch thick. Surface layers are dark yellowish brown gravelly silt loam about 9 inches thick. The substratum are yellowish brown and brown extremely gravelly coarse loamy sands to a depth of 60 inches or more.

Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by partially decomposed forest litter about 1 inch thick. Surface layers are dark yellowish brown very gravelly loam about 7 inches thick. Subsoils are brown extremely gravelly sandy loams about 27 inches thick. Substrata are brown extremely gravelly sandy loams to a depth of less than 40 inches.

Lithic Ustorthents, loamy skeletal, mixed, frigid have very dark gray very gravelly loam surface layers about 3 inches thick. Subsoils are brown extremely gravelly sandy loams about 7 inches thick. Substrata are fragmental with highly fractured quartzite rocks to a depth of less than 20 inches.

22UA

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate on southerly slopes, high on northerly slopes, and low on shallow soils. This map unit contains slopes suitable for tractor operation. Site productivity depends on the relatively thin, finer textured soil surface layers. Displacement of the surface layers will decrease productivity. Rotting wood is an important nitrogen source for southerly slopes. Leaving large diameter logging slash helps maintain fertility. Shelterwood and selection silvicultural systems improve regeneration on steeper south aspects with high insolation. Regeneration is limited by moisture stress and effective rooting depth on shallow soils.

Roads: Sandy material exposed in drainageways is subject to ravel on steep cuts. Hard rock frequently limits excavation. Silty lakebed and bouldery inclusions present localized limitations in some delineations.

Range: This map unit is moderately suited to range management. Potential forage production on southerly aspects is high and fair on northerly slopes. Dense brush and steep short slopes may restrict access to portion of the map unit.

Wildlife: This unit provides excellent yearlong deer range and good elk winter range. Forage is available on small bunchgrass openings, shrubfields, and lichen rich timber stands. East, west, and north facing stands provide thermal cover. Regeneration with underburning can be beneficial by increasing shrub productivity on northerly aspects.

Fisheries: The amount of fractured bedrock near the surface and location of these lands preclude all but a few isolated streams.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low except at stream crossings.

24JA

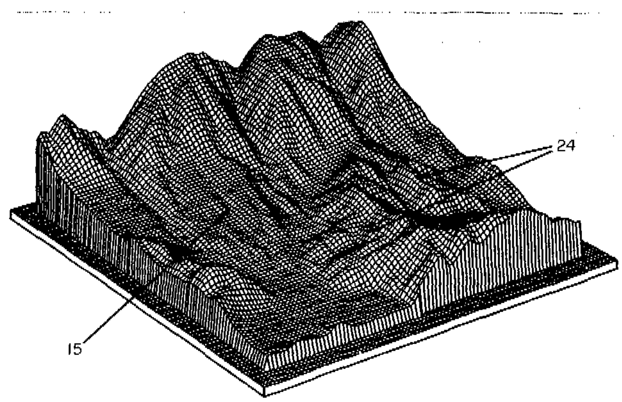
Typic Eutroboralfs, dissected footslopes, dry

SUMMARY

The map unit consists of dissected footslopes. Vegetation is dry Douglas-fir. Soils form in material from highly weathered metasedimentary rocks.

LANDFORM

The landform consists of complex, undulating footslopes and mountain slopes with moderate relief. The majority of the unit has slopes of less than 35 percent except adjacent to drainageways. Drainages are broad at the head and are increasingly more entrenched downslope with sideslopes approaching 55 percent mid to down stream. Most stream channels are ephemeral. This map unit is most common along major fault lines e.g. Osborn Fault where bedrock is highly weathered.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-45	S,E,W	3600-4000	25-35	0

VEGETATION

Existing: Vegetation is a mixed forest of ponderosa pine and Douglas-fir. The understory contains kinnikinnick, pinegrass, serviceberry, chokecherry, snowberry, Idaho fescue, and rough fescue.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/snowberry (PSME/SYAL) are the major HTs. These HTs occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/twinflower (PSME/LIBO) occurs in moist drainageways. Grand fir/twinflower (ABGR/LIBO) occurs in moist bottoms and on northerly inclusions. Productivity is higher on these sites.

24JA

GEOLOGY

The map unit is underlain by highly weathered argillites and siltites of the Belt Supergroup. This highly weathered bedrock occurs along major fault zones. This map unit is common along the Osborn Fault which trends east/west near Superior through St. Regis along Mullan Gulch and north of Deborgia. Soils formed in this highly weathered bedrock are silty and substratum contains many shaly rock fragments that have low durability. Many of these fragments crush under slight pressure.

SOILS

Map Unit Summary: Soils are moderately well-drained and medium to moderately fine. Subsoils contain 20 to 45 percent rock fragments. Many rock fragments are soft and can be crushed with slight to moderate pressure.

Composition:
Typic Eutroboralfs, fine loamy, mixed, frigid have slight clay accumulation in the subsoils and occur throughout the map unit. Similar soils have less clay accumulation and are Udic Ustochrepts, fine loamy, mixed. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Udic Ustochrepts, loamy skeletal, mixed are formed from moderately weathered bedrock that have medium textures and 35 to 55 percent rock fragment content. These soils have rock fragments of high durability. Native road surfaces have higher bearing strength than those constructed in the major soil.

Representative Profile:
Typic Eutroboralfs, fine loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are brown gravelly silt loams about 11 inches thick. Subsurface layers are brown gravelly silt loams about 8 inches thick. Subsoils are pale brown gravelly silty clay loams about 29 inches thick. Some subsoils have calcium carbonate accumulation below 35 inches in depth. Substrata are yellowish brown gravelly silt loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Broken dissected slopes limit tractor operation. Combinations of tractor and short line cable systems should be considered. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Competition for moisture from understory vegetation limits forest regeneration on southerly aspects. Protection from high insolation can help improve regeneration.

Roads: Native road surfaces rut when wet because of low bearing strength and are dusty when dry. Surfacing helps control dust and prevents rutting. Material exposed by road construction tends to erode and slough. Revegetation is limited by surface crusts which form on substrata material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success.

Range: This map unit is moderately suited to range management. The forest understory produces fair forage in recent harvest units. Erosion can occur on livestock trails.

Wildlife: This unit provides excellent deer winter range and fair deer summer range. Forested stands provide thermal cover and forage from foliose lichens and understory shrubs. Timber harvest can result in an increase in shrub forage.

Fisheries: Streams are typically ephemeral and not capable of supporting fish populations.

Watershed: Skid trails and firelines have a high erosion hazard. Roads have a moderate erosion hazard. Sediment delivery efficiency is low. Practices which disturb soil on or near streams have a high potential for increasing sediment.

24JB

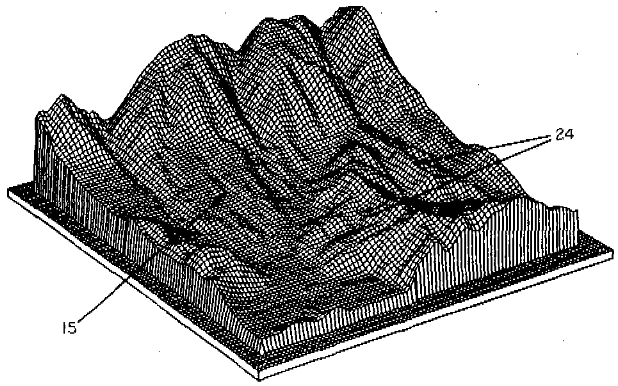
Typic Eutroboralfs, dissected footslopes

SUMMARY

The map unit consists of dissected footslopes and mountain slopes. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from highly weathered metasedimentary rocks.

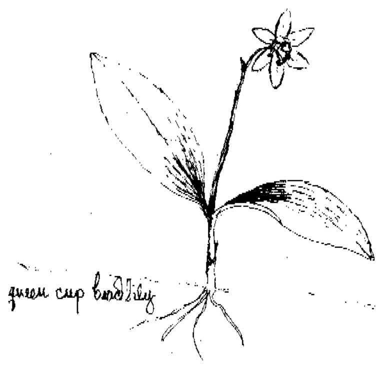
LANDFORM

The landform consists of complex, undulating footslopes and mountain slopes with moderate relief. The majority of the unit has slopes of less than 35 percent except adjacent to drainageways. Drainages are broad at the head and are increasingly more entrenched downslope with sideslopes approaching 55 percent mid to down stream. Most stream channels are ephemeral. This map unit is most common along major fault lines (e.g., Osborn Fault) where bedrock is highly weathered.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
5-45	N,E,W	3600-4000	30-45	0

VEGETATION



Existing: Vegetation is a mixed forest of Douglas-fir, western white pine, lodgepole, western redcedar, western larch, and spruce. Subalpine fir is often a component of this stand but not abundant enough to type into ABLA HTs. The forest understory is dominated by twinflower, mountain maple, sitka alder, queencup beadlily, and blue huckleberry.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN), grand fir/twinflower (ABGR/LIBO), and western redcedar/queencup beadlily (THPL/CLUN) are major HTs. ABGR/CLUN and THPL/CLUN occur throughout the unit. AGBR/LIBO occurs on convex knolls on west and east aspects. These HTs occupy about 95 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) occurs on upper slopes near the edge of the map unit. Productivity is lower on these sites.

24JB

GEOLOGY

The map unit is underlain by highly weathered argillites and siltites of the Belt Supergroup. This highly weathered bedrock occurs along major fault zones. This map unit is common along the Osborn Fault which trends east/west near Superior through St. Regis along Mullan Gulch and north of Deborgia. Soils formed in this highly weathered bedrock are silty and substratum contains many shaly rock fragments that have low durability. Many of these fragments crush under slight pressure.

SOILS

Map Unit Summary: Soils are moderately well-drained and medium to moderately fine surface soils form in volcanic ash influenced loess and have a high silt content. Subsoils contain 20 to 45 percent rock fragments. Many rock fragments are soft and can be crushed with slight to moderate pressure.

Composition:
Typic Eutroboralfs, fine loamy, mixed, frigid have slight clay accumulation in the subsoils and occur throughout the map unit. Similar soils have less clay accumulation and are Andic Dystric Eutrochrepts, fine loamy, mixed. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed are formed from moderately weathered bedrock that have medium textures and 35 to 55 percent rock fragment content. These soils have rock fragments of high durability. Native road surfaces have higher bearing strength than those constructed in the major soil.

Representative Profile:
Typic Eutroboralfs, fine loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are brown gravelly silt loams about 8 inches thick. Subsurface layers are brown gravelly silt loams about 11 inches thick. Subsoils are pale brown gravelly silty clay loams about 29 inches thick. Some subsoils have calcium carbonate accumulation below 35 inches in depth. Substrata are yellowish brown gravelly silt loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is very high. Broken dissected slopes limit tractor operation. Combinations of tractor and short line cable systems should be considered. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Native road surfaces rut when wet because of low bearing strength and are dusty when dry. Surfacing helps control dust and prevents rutting. Material exposed by road construction tends to erode and slough. Revegetation is limited by surface crusts which form on substrata material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success.

Range: This map unit is poorly suited to range management. The forest understory produces poor forage.

Wildlife: This unit provides excellent deer winter range and fair deer summer range. Forested stands provide thermal cover and forage from foliose lichens and understory shrubs. Timber harvest can result in an increase in shrub forage.

Fisheries: Streams are typically ephemeral and not capable of supporting fish populations.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is low. Practices which disturb soil on or near streams have a high potential for increasing sediment.

26UA

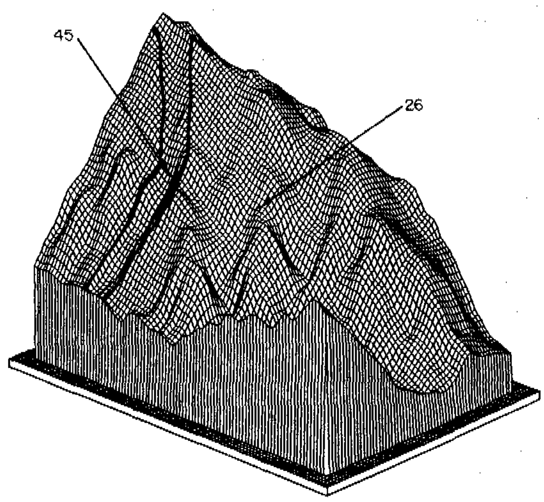
Rock Outcrop-Ochrepts complex, stream breaklands

SUMMARY

The map unit consists of stream breaklands. Vegetation is dry Douglas-fir. Rock outcrop and talus is a major component. Soils form in material from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of steep and very steep mountain slopes. These slopes usually have perennial streams at the toe of the slope. Rock outcrop forms a craggy appearance. Slopes vary with orientation of bedrock sometimes forming shallow benches between outcrops. Large stringers of talus between and below rock outcrops are common. Drainages are rare and limited to intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-100	Variable	3800-6800	25-35	>50

VEGETATION

Existing: Vegetation is a sparse forest of ponderosa pine and Douglas-fir intermixed between talus and rock outcrop. The understory is dominated by pinegrass, chokecherry, Idaho fescue, bluebunch wheatgrass, and snowberry.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU), SCREE, Douglas-fir/bluebunch wheatgrass (PSME/AGSP), and Douglas-fir/snowberry (PSME/SYAL) are the major HTs. PSME/PHMA-CARU and PSME/SYAL occur as sparse stands where bedrock does not restrict vegetation. These HTs occupy about 65 percent of the vegetated portion of this map unit. PSME/AGSP and SCREE occur on southerly aspects where soil surfaces are extremely gravelly. These HTs occupy about 30 percent of the vegetated portion of this map unit.

Included are up to 5 percent dissimilar HTs. Douglas-fir/twinflower (PSME/LIBO) occurs in moist drainageways. Grand fir/twinflower (ABGR/LIBO) occurs along some moist toeslopes. Productivity is higher on these sites.

26UA

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Rock outcrop and talus are major components of this map unit. Soils are excessively drained and moderately coarse. Subsoils contain greater than 65 percent rock fragments. Talus commonly has loess influenced by volcanic ash filtered through the spaces beween rock fragments.

Composition:
Rock outcrop and talus occur throughout and occupy greater than 50 percent of the map unit.

Ochrepts occur along benches and between rock outcrops where soils have begun to form.
These soils have average depths ranging from 2 to 6 feet and occupy up to 45 percent of the map unit.

Included are up to 5 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a silty surface layer formed in volcanic ash influenced loess and soil depth is greater than 6 feet. They occur along toeslopes, some upper more convex slopes, and some drainageways. They support PSME/LIBO and ABGR/LIBO. These soils are more productive.

Representative Profile:
Ochrepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers range from brown to darkish brown very gravelly loams to extremely gravelly sandy loams from 2 to 10 inches thick. Subsoils are typically brown extremely gravelly sandy loams from 7 to 30 inches thick. Substrata are a pale brown extremely gravelly sandy loams to a depth of 24 to 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. Steep slopes and rock can limit access to timber harvest. Rock and moisture stress severely limit regeneration. Natural regeneration recovery period is long.

Roads: Slope steepness increases the quantity of material excavated and hard rock frequently limits excavation. Lack of fine soil material and abundance of large, angular rock fragments contribute to rough road surfaces. Rocky material exposed by road construction is difficult to revegetate and tends to ravel on steep cutbanks. Potential for landslides are high where deep soils are encountered between rock outcrops.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent yearlong bighorn sheep and mule deer range. Some delineations provide good elk winter range. Forage is limited to bunchgrass and sparse shrubs. Increase in forage by underburning has a moderate potential. Rock outcrops provide excellent nesting habitat for golden eagles and prairie falcons.

Fisheries: The amount of fractured bedrock near the surface and location of these lands preclude all but a few isolated streams.

Watershed: Firelines and roads have a low erosion hazard. Slopes are steep and sediment delivery efficiency is high.

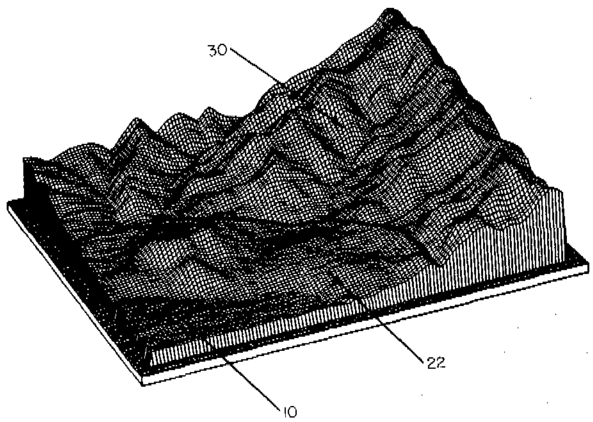
Andic Dystric Eutrochrepts-Typic Eutroboralfs-Typic Eutrochrepts complex, sedimentary substratum

SUMMARY

This map unit consists of moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests and moist, mixed coniferous forests in the Fishtrap Drainage. Soils are formed in volcanic ash influenced loess overlying parent materials derived from Cambrian limestones and shales. Delineations in the Harvey-Tyler Drainage support dry Douglas-fir forests. Soils lack the loess surface layer.

LANDFORM

This landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Slightly weathered bedrock form slope gradients above 45 percent. Highly weathered bedrock form slopes and benches with slope gradients below 40 percent. Most drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-50	Variable	3800-4800	20-35	0-5

VEGETATION

Existing: Vegetation is a mixed forest of ponderosa pine and Douglas-fir on southerly aspects and Douglas-fir, western larch, and lodgepole pine on northerly aspects. The Fishtrap drainage supports grand fir on northerly slopes, also. On southerly slopes, the forest understory is dominated by pinegrass, Idaho fescue, and snowberry. Elevation above 4800 feet support beargrass and blue huckleberry. Northerly slopes support twinflower, queencup beadlily, mountain maple, and sitka alder.

Habitat Type (HT) Composition: In the Fishtrap Area, grand fir/twinflower (ABGR/LIBO) and grand fir/queencup beadlily (ABGR/CLUN) are major HTs on northerly aspects. A similar HTs, subalpine fir/twinflower (ABLA/LIBO) occur along drainageways and upper bounds of the unit. These HTs occupy about 35 percent of the map unit. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is the major HTs on southerly aspects. These HTs occupy about 40 percent of the map unit.

In the Tyler-Harvey Area, Douglas-fir/snowberry (PSME/SYAL) and Douglas-fir/ninebark (PSME/PHMA) are the major HTs on northerly aspects. These HTs occupy about 55 percent of the map unit.

Southerly aspects support grassy openings with Douglas-fir/pinegrass (PSME/CARU). This HT occupies about 20 percent of the map unit.

Included are up to 25 percent of dissimilar HTs. Subalpine fir/mensiezia (ABLA/MEFE) occurs on steeper inclusions generally above 4800 feet. Soils are often formed in hard dolomite parent materials. Shrub competition for space/light can limit regeneration. Douglas-fir/pinegrass (PSME/CARU) occurs on southerly convex slopes. Regeneration is limited by moisture stress. Somewhat poorly-drained inclusions support subalpine/bluejoint (ABLA/CACA) and regeneration can be limited by water table rise.

GEOLOGY

The unit is underlain by Cambrian aged bedrock of the Hasmark, Red Lion, Silver Hill (Woolsey Shale) formations. These formations consist of thin to thick-bedded, light gray dolomite; thin-bedded dark gray limestone and red or gray green fissile shales; and dark gray-green fissile shale, respectively.

In the Fishtrap area, Woolsey shales are located in the lowermost portion of the unit between 3600 feet and 4000 feet. Rock fragments in soils formed in Woolsey shale parent material are shaly and have low durability. This shale component occupies approximately 10-25 percent of this map unit. Above 4000 feet, the Red Lion and Hasmark outcrop. Red Lion exhibits slight to high weathering. Soils formed in Red Lion limestone parent material have more clay and tend to be slightly plastic. This limestone component occupies approximately 25-60 percent of the map unit. Soils formed in Hasmark dolomite parent material have more than 45 percent hard rock fragments and are non-plastic. This dolomite component occupies approximately 15 to 45 percent of this map unit. Included as similar are glacial till deposits that occur in some drainageways or on toeslopes of some delineations.

Included as dissimilar properties are the Flathead Formation and bedrocks of the Belt Supergroup. They occupy less than 10 percent of the map unit. Soil materials have less clay and have higher rock fragment content and pose no limitations to quality of native road surfaces.

SOILS

Map Unit Summary: Soils properties vary with underlying bedrock. Soils from highly weathered limestone and shales are moderately well-drained with somewhat poorly-drained inclusions, have fine subsoil textures, are plastic, have 20 to 45 percent rock fragment content, and have subsoil clay accumulation. Soils formed from Woolsey shales are moderately well-drained, have moderately fine subsoil textures, are slightly plastic, have soft shaly rock fragments, and soft bedrock within 3 feet of the surface. Soils formed from Hasmark dolomite and slightly weathered limestone are well-drained, have medium textures, are non-plastic, and have 35 to 50 percent rock fragment content.

Composition:
Typic Eutroboralfs, clayey skeletal, mixed, frigid form from highly weathered llimestones and shales. They have surface layers formed in a somewhat mixed volcanic ash influenced loess. Similar soils are Typic Eutroboralfs, fine, mixed, frigid. They have less than 35 percent rock fragments. Typic Eutroboralfs, loamy skeletal, mixed, frigid have moderately fine textures. Andeptic Cryoboralfs, fine, mixed support ABLA/LIBO. These soils occupy about 20 percent of the map unit.

Typic Eutrochrepts, loamy skeletal, mixed, frigid form from Woolsey shales. They lack a loess surface layer. These soils occupy about 15 percent of the map unit.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid form from slightly weathered limestones and dolomites. They have surface layers formed in volcanic ash influenced loess. Similar soils are Andic Cryochrepts, loamy skeletal, mixed. They support ABLA/MEFE. (The Tyler-Harvey Area has less pure loess surface layers. Soils are Dystric Eutrochrepts, loamy skeletal, mixed, frigid.) These soils occupy 40 percent of the map unit.

Included are up to 25 percent dissimilar soils and rock outcrop. Typic Ustochrepts, loamy skeletal, mixed occur on southerly aspects and support Douglas-fir/pinegrass (PSME/CARU). Regeneration is limited by grass competition for moisture. Aquepts occur along somewhat poorly-drained benches associated with highly weathered limestones and red shales. Trafficability of roads is severely limited.

Representative Profiles:
Typic Eutroboralfs, clayey skeletal, mixed, frigid have a soil surface covered by partially decomposed forest litter about 1 inch thick. Surface layers are brown silt loams about 12 inches thick. Subsurface layers are dark brown very gravelly silt loams about 15 inches thick. Subsoils are brown very gravelly silty clay loams about 8 inches thick with many thick clay skins. Substrata is brown extremely cobbly silt loam to a depth of 40 inches or more.

Typic Eutrochrepts, loamy skeletal, mixed, frigid have a dark grayish brown silt loam surface layer about 5 inches thick. Upper subsoils are dark grayish brown very gravelly sandy clay loams about 10 inches thick. Lower subsoils are grayish brown very gravelly sandy loam about 8 inches thick. This layer may have calcium carbonate accumulation. Substrata is light olive brown very gravelly sandy clay loam and soft bedrock structure extends to a depth of 40 inches.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by partailly decomposed forest litter about 1 inch thick. Surface layers are brown silt loams about 10 inches thick. Subsoils are brown very gravelly fine sandy loams about 15 inches thick. Lower subsoils are pale brown extremely gravelly fine sandy loams about 10 inches thick. Substrata is a pale brown extremely gravelly fine sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Some slopes are suited for tractor operation. Fine textured soils will rut when wet. Designated skid trails that avoid wet areas will reduce potnetial for soil impacts on fine textured soils. Compaction on all soil surface layers can lower soil productivity. Moderately fine and fine textured soils favor graminoids therefore competition for moisture from pinegrass can limit forest regneration, especially in PSME/CARU and PSME/VAGL HTs.

Roads: Interpretations for roads vary widely because of the complex of soil types occuring in this map unit. Landform, vegetation, and position within the map unit will help identify which soil type will be encountered. Roads constructed in medium textured soils formed from slightly weathered limestones and dolomites should perform well with standard location, construction, and maintenance practices. Roads constructed in moderately fine textured soils formed from Woolsey shales will rut and are slippery when wet. Surfacing on northerly aspects and in drainageways will improve quality. Material exposed by road construction is difficult to revegetate because of mateial tends to ravel. Roads constructed in fine textured soils formed from highly weathered limestones and shales are limited by severe rutting which restricts travel. Drainage of the road prism is difficult to maintain. Filter cloth and rock subgrade will improve quality of road. These rock types have a moderate potential for rotational slumping.

Range: This map unit is moderately suited to range management on southerly aspects only. Slope steepnes limits access.

Wildlife: The diversity of the map unit provides good elk and deer summer range and winter range. Timber harvest where openings are scarse can provide increased forage.

Fisheries: Where streams occur, they are small, gradients can be steep, and pool quality and quantity are low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a high erosion hazard on all soils but those extremely gravelly medium textured soils. Slopes are moderately steep and sediment delivery is moderate.

30GA

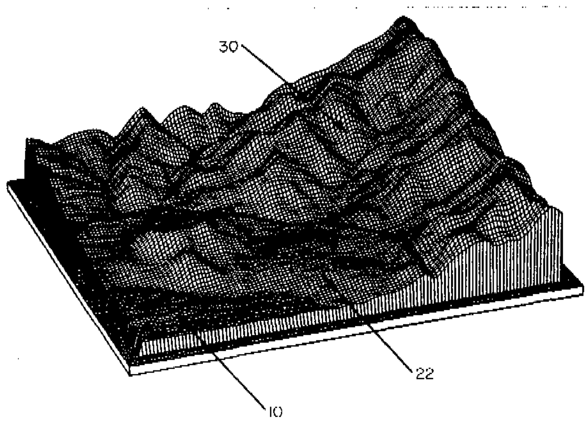
Dystric Eutrochrepts, well weathered granitic substratum

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests. Soils form in material from well weathered granitics.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1000 to 2500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	4000-5000	30-45	0

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine, grand fir, and western larch. The understory is dominated by beargrass, pinegrass, and blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). A similar HT, grand fir/beargrass (ABGR/XETE) occurs in some delineations on northerly slopes. These HTs occupy about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/ninebark (PSME/PHMA) occurs at the lower elevation bounds of this unit on southerly aspects. This HT does not support lodgepole pine and is slightly warmer. Grand fir/twinflower (ABGR/LIBO) and spruce/twinflower (PICEA/LIBO) occur on northerly slopes below 5000 feet and in some moist drainageways. These HTS are more productive.

30GA

GEOLOGY

The unit is underlain by well weathered, fine-grained gneisses and granites. Rock fragments weather easily because of smaller mineral size and high mafic mineral content.

Included as similar is alluvium from well weathered granites that is deposited at the base of these mountain slopes.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Subsoils contain 15 to 35 percent rock fragments. These soils are distinguished from other soils formed from decomposed granitics because of soil properties that provide for different management response.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have sandy loam textures and 35 to 45 percent rock fragments. Similar soils are Dystric Eutrochrepts, fine loamy, mixed, frigid. They have 15 to 35 percent rock fragments. Other similar soils have a slight increase in clay content in the subsoil. These are Typic Eutroboralfs, fine loamy, mixed, frigid, which occupy less than 5 percent of the map unit. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils have coarse textured subsoils and are more erosive and less productive.

Representative Profile:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are pale brown gravelly sandy loams about 8 inches thick. Subsurface layers are light gray gravelly sandy loams about 10 inches thick. Subsoils are pale brown very gravelly sandy loams about 33 inches thick. Substrata are pale brown very gravelly sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Slopes less than 35 percent are well suited for tractor harvest. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Native road surfaces rut when wet. Erosion from rutting and tread wear on unsurfaced roads tends to remove fine material. The remaining gravel and cobble form a rough surface. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good spring and fall range for deer and elk. Primary forage value is forbs and grasses available in early successional communities and within timbered understories. Shrub forage value is low on this soil type.

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment on roads is moderately difficult. Controlling sediment can be difficult adjacent to stream crossings under standard practice.

30GB

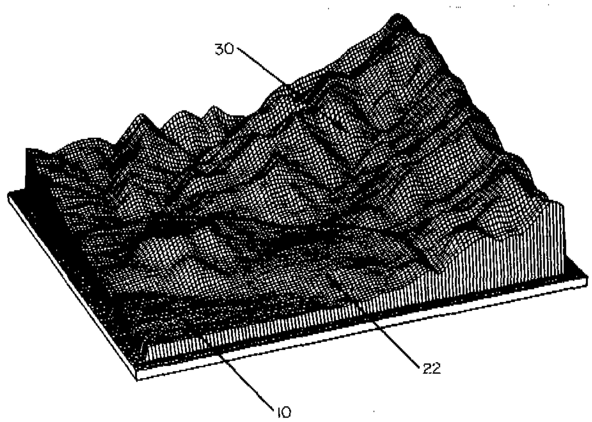
Andic Cryochrepts, well weathered granitic substratum

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forests. Soils form in volcanic ash influenced loess overlying material from well weathered granitics.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Most drainages are perennial or ephemeral. Drainage spacing ranges from 800 to 1,500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	5000-6800	45-60	0

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and western larch with an occasional subalpine fir and Douglas-fir. The understory can be dominated by beargrass, menziesia, twinflower, queencup beadlily, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass,(ABLA/XETE), subalpine fir/menziesia (ABLA/MEFE), and subalpine fir/queencup beadlily (ABLA/CLUN) are the major HTs. ABLA/XETE occurs on southerly slopes and occupies about 40 percent of the map unit. ABLA/MEFE occurs on northerly slopes and occupies about 30 percent of the map unit. ABLA/CLUN occur near drainages and on moist benches. A similar HT is spruce/twinflower (PICEA/LIBO). These HTs occupy 20 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occur at the lower elevation bounds of this map unit. These HTS are less productive.

GEOLOGY

The unit is underlain by well weathered, fine-grained gneisses and granites. Rock fragments weather easily because of smaller mineral size and high mafic mineral content.

Included as similar are alluvium from well weathered granites that is deposited at the base of these mountain slopes.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Rock fragment content ranges from 15 to 35 percent. Surface soils formed in volcanic ash influenced loess. These soils are distinquished from other soils formed from decomposed granitics because of soil properties that provide for different management response.

Composition:
Andic Cryochrepts, loamy skeletal, mixed, frigid have silty loess surface layers, sandy loam subsoil textures and 35 to 45 percent rock fragments. Similar soils are Andic Cryochrepts, fine loamy, mixed frigid. They have 15 to 35 percent rock fragments. These soils occupy 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Dystric Eutrochrepts, loamy skeletal, mixed, frigid. These soils support cool, somewhat dry Douglas-fir forests where regeneration can be limited by moisture stress. Andic Cryochrepts, sandy skeletal, mixed, frigid have coarse textured subsoils and are more erosive and less productive. Auic Cryochrepts and Cryaquepts occur in some broad, basin-like drainageways. These soils are wet for significant periods and pose limitations to harvest and regeneration.

Representative Profiles:
Andic Cryochrepts, loamy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown gravelly loam about 12 inches thick. The subsoil layers are very pale brown and yellowish brown very gravelly sandy loam about 24 inches thick. Substrata are pale brown very gravelly sandy loam to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTs and high in ABLA/CLUN and ABLA/MEFE HTs. Slopes less than 35 percent are suited for tractor harvest. Tractor operation can reduce site productivity by compacting or displacing the surface layer.

Roads: Native road surfaces rut when wet. Erosion from rutting and tread wear on unsurfaced roads tends to remove fine material. The remaining gravel and cobble form a rough surface. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good summer range for deer and elk. Primary forage value is forbs and grasses available in fully stocked conifer stands. Forage response from treatment is minimal. Opportunities for habitat enhancement are limited.

Fisheries: Where streams occur, they are small, gradients can be steep and pool quality and quantity is low. Some of these streams are marginally capable of supporting low number os small fish.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment from roads is moderately difficult. Controlling sediment can be difficult adjacent to stream crossings under standard practice.

30KA

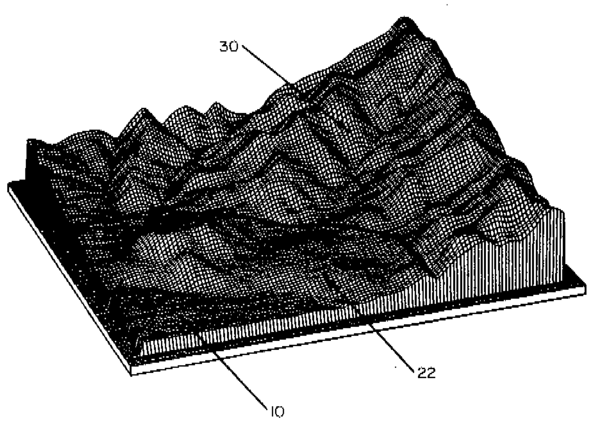
Dystric Eutrochrepts, moderately well weathered granitic substratum

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas- fir forests. Soils form in material from moderately well weathered or grussic granitics.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1,000 to 2,500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	4000-5000	30-45	0

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine, grand fir, and western larch. The understory is dominated by beargrass, pinegrass, and blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). A similar HT occurs grand fir/beargrass (ABGR/XETE) occurs in some delineations on northerly slopes. These HTs occupy about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/ninebark (PSME/PHMA) occurs at the lower elevation bounds of this unit on southerly aspects. These HTs do not support lodgepole pine and are slightly warmer. Grand fir/twinflower (ABGR/LIBO) and spruce/twinflower (PICEA/LIBO) occur on northerly slopes below 5000 feet and in some moist drainageways. These HTs are more productive.

30KA

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Rock fragment content ranges from 35 to 55 percent. These soils are distinquished from other soils formed from granitics because of soil properties that provide for different management response.

Composition:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have coarse sandy loam and loamy sand textures. Similar soils are Dystric Eutrochrepts, loamy skeletal, mixed frigid. They have sandy loam textures with a low fine fraction content. These soils occupy 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils have volcanic ash influenced loess surface layers and can be more productive.

Representative Profiles:
Dystric Eutrochrepts, sandy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are pale brown gravelly sandy loam about 8 inches thick. The subsurface layers are light gray gravelly sandy loam about 10 inches thick. The subsoil is a pale brown very gravelly coarse sandy loam about 33 inches thick. Substrata are brownish yellow very gravelly loamy coarse sand to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Slopes less than 35 percent are well suited for tractor harvest. Site productivity depends on the relatively thin topsoil. Tractor operation can reduce site productivity by displacing the surface layer. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and much can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good spring and fall range for deer and elk. Primary forage value is forbs and grasses available in early successional communities and within timbered understories. Shrub forage value is low on this soil type.

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

30KAb

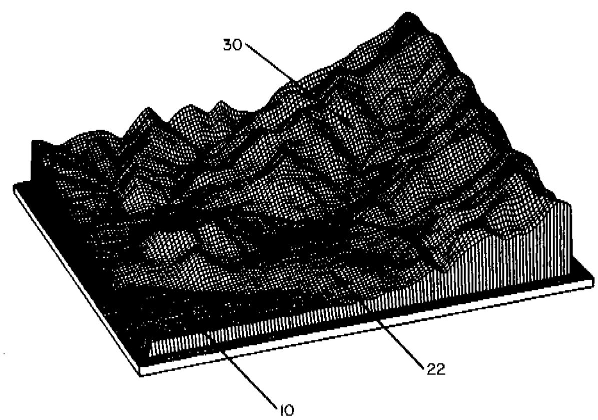
Dystric Eutrochrepts, moderately well weathered granitic substratum, bouldery

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests. Soils form in material from moderately well weathered or grussic granitics. Granitic tors and boulders are throughout this unit.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Large granitic outcrops called tors are dispersed throughout this unit which creates a complex relief. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1,000 to 2,500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	4000-5000	30-45	15-25

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine, grand fir, and western larch. The understory is dominated by beargrass, pinegrass, and blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). A similar HT occurs grand fir/beargrass (ABGR/XETE) occurs in some delineations on northerly slopes. These HTs occupy about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/ninebark (PSME/PHMA) occurs at the lower elevation bounds of this unit on southerly aspects. These HTs do not support lodgepole pine and are slightly warmer. Grand fir/twinflower (ABGR/LIBO) and spruce/twinflower (PICEA/LIBO) occur on northerly slopes below 5000 feet and in some moist drainageways. These HTS are more productive.

30KAb

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites. Granitic tors composed of harder granite are significant features of this landscape.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Rock fragment content ranges from 35 to 55 percent. These soils are distinquished from other soils formed from granitics because of soil properties that provide for different management response.

Composition:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have coarse sandy loam and loamy sand textures. Similar soils are Dystric Eutrochrepts, loamy skeletal, mixed frigid. They have sandy loam textures with a low fine fraction content. These soils occupy about 75 percent of the map unit.

Included are up to 25 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils have volcanic ash influenced loess surface layers and can be more productive.

Representative Profiles:
Dystric Eutrochrepts, sandy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are pale brown bouldery sandy loam about 8 inches thick. The subsurface layers are light gray gravelly sandy loam about 10 inches thick. The subsoil is a pale brown very gravelly coarse sandy loam about 33 inches thick. Substrata are brownish yellow very gravelly loamy coarse sand to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Slopes less than 35 percent are well suited for tractor harvest. Granitic outcrops and boulders present limitations to skid trail placement. Site productivity depends on the relatively thin topsoil. Tractor operation can reduce site productivity by displacing the surface layer. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Hard granitic bedrock occasionally limits excavation. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and much can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good spring and fall range for deer and elk. Primary forage value is forbs and grasses available in early successional communities and within timbered understories. Shrub forage value is low on this soil type.

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

30KB

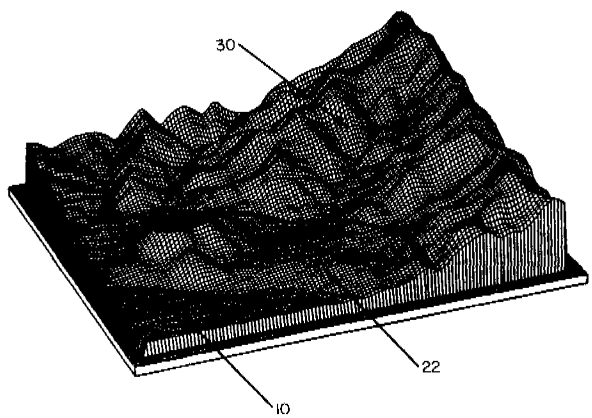
Andic Cryochrepts, moderately well weathered granitic substratum

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forests. Soils form in volcanic ash influenced loess overlying material from moderately well weathered granitics or grussic granites.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Most drainages are perennial or ephemeral. Drainage spacing ranges from 800 to 1,500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	5000-6800	45-60	0

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and western larch with an occasional subalpine fir and Douglas-fir. The understory can be dominated by beargrass, menziesia, twinflower, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass,(ABLA/XETE) and subalpine fir/menziesia (ABLA/MEFE) are the major HTs. ABLA/XETE occurs on southerly slopes and occupies about 50 percent of the map unit. ABLA/MEFE occurs on northerly slopes. A similar HT, spruce/twinflower (PICEA/LIBO) occurs along drainageways and some gentle northerly slopes. These HTs occupy about 40 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occur at the lower elevation bounds of this map unit. These HTs are less productive.

30KB

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Rock fragment content ranges from 35 to 55 percent. Surface soils are formed in volcanic ash influenced loess. These soils are distinquished from other soils formed from granitics because of soil properties that provide for different management response.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have coarse sandy loam and loamy sand textures. They have sandy loam textures with a low fine fraction content. These soils occupy 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils support cool, somewhat dry Douglas-fir forests where regeneration can be limited by moisture stress. Aquic Cryochrepts and Cryaquepts occur in some broad, basin-like drainageways. These soils are wet for significant periods and pose limitations to harvest and regeneration.

Representative Profiles:
Andic Cryoochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loam about 8 inches thick. The subsurface layers are light gray very gravelly coarse sandy loam about 10 inches thick. The subsoil is a very pale brown and yellowish brown very gravelly coarse sandy loam about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sand and coarse sandy loam to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTS and high in ABLA/MEFE HTs. Slopes less than 35 percent are well suited for tractor harvest. Site productivity depends on the relatively thin, fine textured soil surface layer. Tractor operation can reduce site productivity by displacing or compacting the surface layer. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and much can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good summer range for deer and elk. Primary forage value is forbs and grasses available in fully stocked conifer stands. Forage response from treatment is minimal. Opportunities for habitat enhancement are limited.

Fisheries: Where streams occur, they are small, gradients can be steep and pool quality and quantity is low. Some of these streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

30KBb

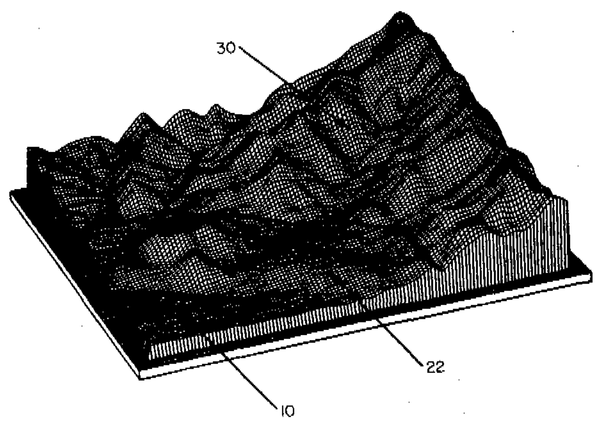
Andic Cryochrepts, moderately well weathered granitic substratum, bouldery

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forests. Soils form in volcanic ash influenced loess overlying material from moderately well weathered granitics or grussic granites. Granitic tors and boulders are thoughout this unit.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are smooth and convex. Large granitic outcrops called tors are dispersed thoughtout this unit creating complex relief. Most drainages are perennial or ephemeral. Drainage spacing ranges from 800 to 1500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
30-55	Variable	5000-6800	45-60	15-25

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and western larch with an occasional subalpine fir and Douglas-fir. The understory can be dominated by beargrass, menziesia, twinflower, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass,(ABLA/XETE) and subalpine fir/menziesia (ABLA/MEFE) are the major HTs. ABLA/XETE occurs on southerly slopes and occupies about 50 percent of the map unit. ABLA/MEFE occurs on northerly slopes. A similar HT, spruce/twinflower (PICEA/LIBO) occurs along drainageways and some gentle northerly slopes. These HTs occupy about 40 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry -beargrass (PSME/VAGL-XETE) occur at the lower elevation bounds of this map unit. This HT is less productive.

30KBb

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites. Granitic tors composed of harder granite are significant features of this landscape.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Rock fragment content ranges from 35 to 55 percent. Surface soils are formed in volcanic ash influenced loess. Boulders and tors are a common feature.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have coarse sandy loam and
loamy sand textures. They have sandy loam textures with a low fine fraction content. These soils occupy 75 percent of the map unit.

Included are up to 25 percent dissimilar soils. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils support cool, somewhat dry Douglas-fir forests where regeneration can be limited by moisture stress. Aquic Cryochrepts and Cryaquepts occur in some broad, basin-like drainageways. These soils are wet for significant periods and pose limitations to harvest and regeneration. Rock outcrop occupies 15 to 25 percent of the unit.

Representative Profiles:
Andic Cryoochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loam about 8 inches thick. The subsurface layers are light gray very gravelly coarse sandy loam about 10 inches thick. The subsoil is a very pale brown and yellowish brown very gravelly coarse sandy loam about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sand and coarse sandy loam to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTS and high in ABLA/MEFE HTs. Slopes less than 35 percent are well suited for tractor harvest. Site productivity depends on the relatively thin, fine textured soil surface layer. Tractor operation can reduce site productivity by displacing or compacting the surface layer. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and much can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: *This map unit is poorly suited to range management. The forest understory produces little forage.*

Wildlife: This unit provides good summer range for deer and elk. Primary forage value is forbs and grasses available in fully stocked conifer stands. Forage response from treatment is minimal. Opportunities for habitat enhancement are limited.

Fisheries: Where streams occur, they are small, gradients can be steep and pool quality and quantity is low. Some of these streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is moderate. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

30MA

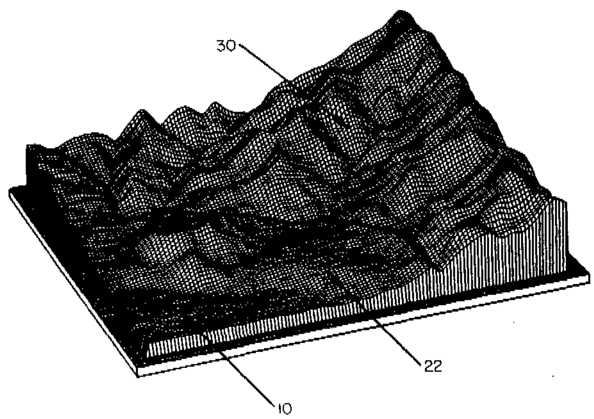
Calcixerollic Xerochrepts-Typic Haploxerolls association, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is open grown forest. Soils form in material from moderately weathered metasedimentary rocks.

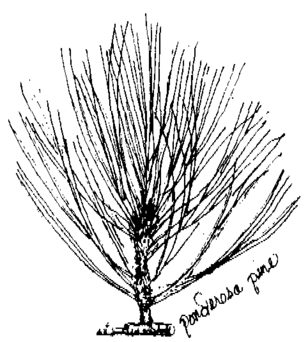
LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1500 to 2500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Southerly	3000-4400	20-30	0-5

VEGETATION



Existing: Vegetation is a mixed forest of low to moderate stocking dominated by Douglas-fir and ponderosa pine with some grassy openings. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and some delineations have rough fescue. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/rough fescue (PSME/FESC), and Douglas-fir/Idaho fescue (PSME/FEID) are the major HTs. PSME/AGSP occurs on the shallower and rockier sites. PSME/FESC occurs on deeper soils and less rocky soils. A similar included habitat type is Douglas-fir/pinegrass-bluebunch, wheatgrass (PSME/CARU-AGSP) which occurs in areas where the annual precipitation is slightly higher than the average (greater than 20 to 25 inches). These habitat types occupy 90 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) occur in some drainages. Douglas- fir/ninebark-ninebark (PSME/PHMA-PHMA) occurs on inclusions of east and west aspects. Timber productivity is higher and there are less limitations to regeneration.

30MA

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soil properties vary with degree of weathering of the underlying bedrock. They have dark colored surface horizons and subsoil clay accumulations occur in soils formed from more highly weathered bedrock. Subsoils contain 35 to 50 percent rock fragments and typically have calcium carbonate accumulations. Rock fragment durability can be quite low on highly weathered bedrock. Soils become dry early in the growing season.

Composition:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have dark colored surface layers about 2 to 5 inches thick and carbonate accumulation in the subsoils. Similar soils lack subsoil carbonate accumulation but have similar physical properties. They are Typic Xerochrepts, loamy skeletal, mixed, frigid. Other similar soils form on highly weathered bedrock inclusions and have subsoil clay accumulation. They are Mollic Haploxeralfs, loamy skeletal, mixed, frigid. These soils occupy about 45 percent of the unit.

Typic Haploxerolls, loamy skeletal, mixed, frigid have dark colored surface layers about 7 to 11 inches thick and often have carbonate accumulation in the subsoils. These soils occupy about 35 percent of the unit.

Included are up to 20 percent dissimilar soils and rock outcrop. Typic Xerochrepts, loamy skeletal, mixed, frigid are formed in weakly weathered non-calcareous bedrock have hard angular rock fragments of greater than 55 percent of the subsoils and substrata, textures are moderately coarse, and subsoil clay accumulations are absent. These soils have higher bearing strength on native road surfaces. Lithic Xerochrepts, loamy skeletal, frigid, mixed are shallow with bedrock within 2 feet of the surface. They can occur along ridgenose positions and below 4000 feet along the Clark Fork River. These soils have lower productivity. Typic Xerochrepts, loamy skeletal, mixed, frigid are under dry Douglas-fir forest. They lack the dark colored surface layer and have higher productivity. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark grayish brown and dark brown loams about 13 inches thick. Upper subsoils are dark yellowish brown and yellowish brown very gravelly silt loams about 21 inches thick. Lower subsoils are pale brown gravelly loams about 9 inches thick. Substrata are light olive brown very gravelly silt loams and highly weathered calcareous argillite to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

These Typic Haploxerolls, loamy skeletal, mixed, frigid have surface layers very dark brown gravelly silt loams about 13 inches thick. Subsoils are yellowish brown very gravelly loams about 27 inches thick. Substrata are brown extremely cobbly loams to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. This map unit contains some slopes suitable for tractor harvest. Competition for moisture from understory vegetation and high insulation severely limits forest regeneration. Protection from high insolation can help improve regeneration. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is moderately suited to range management. The forest understory produces excellent forage, but slope steepness can limit access. Forest openings in this map unit are susceptible to invasion by spotted knapweed (Centauria maculosa).

Wildlife: This unit provides excellent deer and elk winter range, and yearlong bighorn sheep range were associated with Map Unit 26UA. Graminoids provide the primary forage. Shrubs are scarce to nonexistent. Timber harvest is generally not beneficial to winter range maintenance. Underburning is the best form of vegetative manipulation. Invasion by and conversion to knapweed can result in loss in forage and is a severe risk in this unit.

Fisheries: Perennial streams are absent in this map unit because of dry environments or locations.

Watershed: Skid trails and firelines have a low erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is low.

30MB

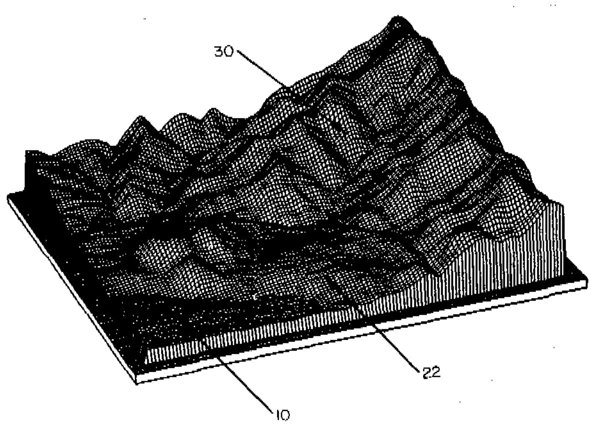
Typic Ustochrepts-Mollic Eutroboralfs complex, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is dry Douglas-fir forest. Soils form in material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, gently sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1500 to 2500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (In)	Rock Outcrop (%)
35-55	S,E,W	3000-5000	25-35	0-5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry. Ceanothus is present in some openings where seed source is present.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) are the major HTs. Douglas-fir/pinegrass (PSME/CARU) occurs in some delineations and occupies less than 20 percent. These HTs occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and Douglas-fir/twinflower(PSME/LIBO) are in drainageways, on toeslope positions, and on northerly aspects. Timber productivity is higher and there are less limitations to regeneration.

30MB

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soils become dry early in the growing season. Soil properties vary with degree of weathering of the underlying bedrock. Subsoil clay accumulations occur in soils formed from more highly weathered bedrock. Subsoils contain less than 50 percent rock fragments and typically have calcium carbonate accumulations. Rock fragment durability can be quite low.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have carbonate accumulation in the subsoils. Similar soils lack subsoil carbonate accumulation but have simila physical properties. They are Typic Xerochrepts, loamy skeletal, mixed, frigid. These soils occupy about 50 percent of the unit.cent of the unit.

Mollic Haploxeralfs, loamy skeletal, mixed, frigid are formed in material from morehighly weathered metasedimentary rock. These soils have dark colored surfaces, subsoils clay accumulations, and carbonate accumulations in the lower subsoil. Rock fragment content is 35 to 45 percent. Similar soils have less than 35 percent rock fragments because of high amounts of soft crushable rock. They are Mollic Eutroboralfs, fine loamy, mixed, frigid. Other similar soils have a light surface horizon. They are Typic Haploxeralfs, loamy skeletal, mixed, frigid. These soils occupy about 35 percent of the unit.

Included are up to 15 percent dissimilar soils and rock outcrop. Typic Xerochrepts, loamy skeletal, mixed, frigid that are formed in slightly weathered non-calcareous bedrock have hard angular rock fragments of greater than 55 percent of the subsoils and substrata, textures are moderately coarse, and subsoil clay accumulations are absent. These soils have lower productivity. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark grayish brown and dark brown loams about 13 inches thick. Upper subsoils are dark yellowish brown and yellowish brown very gravelly silt loams about 21 inches thick. Lower subsoils are pale brown gravelly loams about 9 inches thick. Substrata are light olive brown very gravelly silt loams and highly weathered calcareous argillite to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

Mollic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Surface layers are very dark gray very gravelly silt loams about 4 inches thick. Upper subsoils are brown very gravelly loams about 9 inches thick. Middle subsoils are grayish brown very cobbly loams about 16 inches thick. Lower subsoils are olive very gravelly loams about 11 inches thick. They have few moderately thick clay films lining pores. Substrata are olive very gravelly loams to a depth of 66 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. This map unit contains some slopes suitable for tractor harvest. Compaction and displacement of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen or snow covered helps maintain soil productivity. Competition for moisture from understory vegetation and high insulation limits forest regeneration. Protection from high insolation can help improve regeneration.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is moderately suited to range management. The forest understory produces fair forage but slope steepness can limit access. Clearcuts in the first years after harvest offer increased forage. Forest openings in this map unit are susceptble to invasion by spotted knapweed (Centauria maculosa).

Wildlife: This unit provides excellent deer and elk winter range. Shrubs and grasses provide the primary forage. Timber harvest and prescribed burning can provide moderate benefits by increasing shrub production.

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Roads constructed on subsoils and substrata with more than 35 percent rock fragments have slightly less erosion hazard. Sediment delivery efficiency is low.

30MC

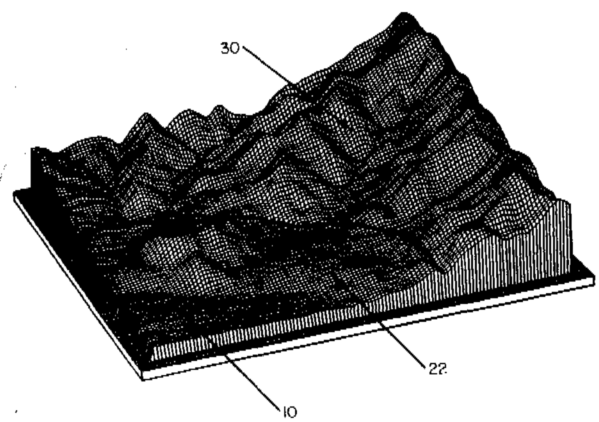
Typic Eutrochrepts-Typic Eutroboralfs-Andic Dystric Eutrochrepts complex, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is dry, mixed coniferous forest. Soils form in material from moderately weathered metasedimentary rocks. Some soils have a surface layer formed in volcanic ash influenced loess.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1000 to 2500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	N,E,W	3800-5200	30-45	0-5

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in the Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, pinegrass. The Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) and grand fir/beargrass (ABGR/XETE) HTs support blue huckleberry, beargrass, pine- grass, rocky mountain maple, serviceberry, arnica, and pachystima and twinflower in drainageways.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a wide climatic transition boundary within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy about 60 percent of the map unit. Grand fir (ABGR/XETE) is on northerly aspects above 4600 feet and occupies less than 25 percent of the map unit. ABGR/XETE is rare in the Rock Creek drainage.

30MC

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4600 feet. Grand fir/twinflower (ABGR/LIBO) can occur in draws and on toeslopes. This habitat type occupies about 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4600 feet and occupies less than 25 percent of the map unit.

Douglas-fir/blue huckleberry (PSME/VAGL) occurs in the eastern edge of the survey area above 4500 feet and is supported by a similar environment as grand fir/beargrass (ABGR/XETE) in this map unit. Douglas-fir/snowberry-snowberry (PSME/SYAL-SYAL) is supported by some low elevation calcareous soils and is supported by a similar environment as Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA).

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) or Douglas- fir/snowberry-pinegrass (PSME/SYAL-CARU) occur on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soil properties vary with degree of weathering of the underlying bedrock and aspect. Some soils have surface layers formed in volcanic ash influenced loess. Subsoil clay accumulations occur in soils formed from more highly weathered bedrock. Subsoils contain 35 to 50 percent rock fragments. Rock fragment durability can be quite low on highly weathered bedrock.

Composition:
Typic Eutrochrepts, loamy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock that is calcareous and are on southerly aspects. These soils are most common east of St. Regis. Subsoils have carbonate accumulations at a depth of 25 to 40 inches. These soils occupy 35 to 55 percent of the map unit.

Typic Eutroboralfs, loamy skeletal, mixed, frigid form in material from moderately to more highly weathered metasedimentary rock. These soils have subsoil clay accumulations with carbonate accumulations in the lower subsoil. They occupy 15 to 40 percent of the map unit.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock that can be calcareous or non-calcareous. Calcareous soils have subsoil carbonate accumulations at a depth greater than 40 inches. Surface layers are formed in volcanic ash influenced loess and are 8 to 13 inches thick. These soils occupy about 25 percent of the map unit.

Included are up to 15 percent dissimilar soils and rock outcrop. Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid and Typic Xerochrepts, loamy skeletal, mixed, frigid support Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) on slopes that receive high amounts of insulation. Soils have an extended dry period during the growing season and productivity is lower. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Typic Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark grayish brown silt loams about 5 inches thick. Upper subsoils are brown and dark grayish brown gravelly silt loams about 14 inches thick. Lower subsoils are grayish brown very gravelly silt loams about 18 inches thick. Substrata are light olive brown very gravelly silt loams to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark grayish brown very gravelly loams about 10 inches thick. Upper subsoils are olive brown very gravelly loams about 16 inches thick. Middle subsoils are dark yellowish brown very gravelly loams about 17 inches thick. They have common moderately thick clay skins along ped faces. Lower subsoils are pale brown gravelly silt loams about 9 inches thick. Accumulations of calcium carbonate are throughout the lower subsoil. Substrata are brown very gravelly loams to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 60 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. This map unit contains some slopes suitable for tractor harvest. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Protection from high insolation can help improve regeneration on southerly aspects.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access. Southerly inclusion and clearcuts in the first years after harvest may offer some forage.

Wildlife: This unit can provide excellent deer and elk spring and fall range when openings are present. Where associated with southerly slopes, this unit provides excellent deer and elk winter range thermal cover. Shrubs are a significant part of the stand structure and songbird populations tend to be high as a result. Timber harvest can be beneficial in enhancing deer and elk forage or to increase the overall age class diversity.

Fisheries: Where streams occur, they are small, gradients can be steep and pool quality and quantity is low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is low.

30MD

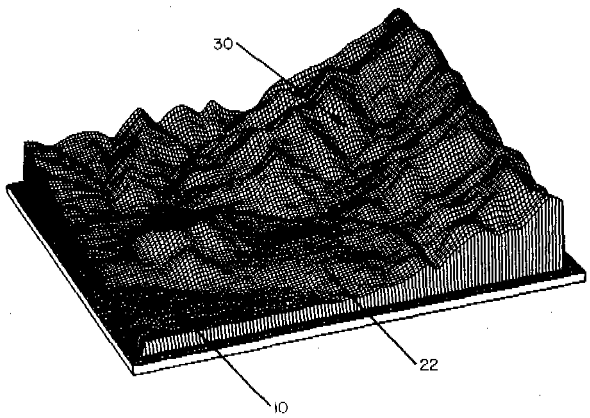
Andic Dystric Eutrochrepts, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or perennial, first and second order streams. Drainage spacing ranges from 800 to 1500 feet and drainage patterns are trellis or parallel. Subsurface drainage is common in zones of thin-bedded bedrock.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	3700-5400	35-55	0-5

VEGETATION

Existing: Vegetation is a mixed forest dominate by western larch, grand fir, lodgepole pine, western red cedar (in THPL/CLUN), spruce, and Douglas- fir. The understory consists of twinflower, queenscup beadlily, service- berry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Western red cedar/queencup beadlily (THPL/CLUN) and grand fir/queencup beadlily (ABGR/CLUN) are the major HTs. They are on northerly slopes, drainageways, benches and toeslopes. They occupy about 60 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) is mostly on east and west aspects and occupies about 30 percent of the map unit. A similar habitat type, spruce/twinflower (PICEA/LIBO), occurs along with grand fir/twinberry (ABGR/LIBO) in northerly delineations in the Lolo Creek drainage.

Included are up to 10 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/menziesia (ABLA/MEFE) occurs in some cold drainageways. Timber productivity is similar but these sites present heavy brush competition to regeneration.

30MD

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium textures. These soils have a silty surface derived from volcanic ash influenced loess. Subsoils have 35 to 55 percent rock fragments. Rock fragment durability can be quite low on highly weathered bedrock.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. Subsoils and substrata contain rock fragments of low durability. Similar soils have loess layers 14 to 16 inches thick. They occur west of St. Regis and are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Typic Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects where loess surface layers are mixed with the subsoils or absent. Rock outcrop occupies up to 5 percent of the unit.

Representative Profile:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 60 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

Classification Remarks: This map unit comprises a range of bedrock weathering from moderate to high over short distances. Some soils from highly weathered bedrock have clay skins but rarely meet argillic classification criteria for percent increase in clay.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is very high. This map unit can contain slopes suitable for tractor harvest. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen or snow covered helps maintain soil productivity.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access.

Wildlife: Early seral shrub communities provide very productive songbird habitat. Mature or old-growth forests provide good deer and elk winter range and thermal cover. Thinning overstocked pole communities and regeneration timber harvest to improve age class diversity can improve wildlife habitat.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to stream channels below that provide spawning habitat.

Watershed: Skid trails and firelines have moderate erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is low except near stream crossings where delivery efficiency is high.

30ME

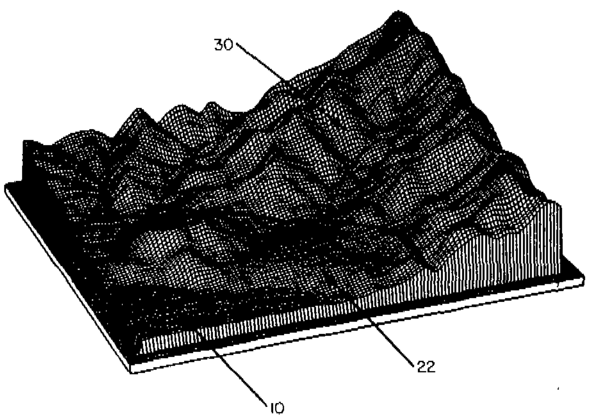
Andic Cryochrepts, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, moderately sloping draws, basins, and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or perennial, first and second order streams. Drainage spacing ranges from 800 to 1,500 feet and drainage patterns are trellis or parallel. Subsurface drainage is common in zones of thin-bedded bedrock.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	4800-6600	45-55	0-5

VEGETATION

Existing: Vegetation is a mixed forest dominated by western larch, Douglas-fir, lodgepole pine, spruce, some subalpine fir, and mountain hemlock (in TSME HTs). Basins have more subalpine fir, spruce and mountain hemlock than convex mountain slopes. At upper elevation limits, western larch is a less important component of the stand. The understory consists of beargrass, sitka alder, menziesia (in ABLA/MEFE HTs), rocky mountain maple, elderberry (in ABLA/MEFE HTs), and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes, along drainageways, and in basins. Subalpine fir/beargrass (ABLA/XETE) is on convex upper mountain slopes and east and west aspects. Similar HTs, mountain hemlock/menziesia (TSME/MEFE) and mountain hemlock/beargrass (TSME/XETE) occur west of Superior. These HTS occupy at least 75 percent of the map unit. Subalpine fir/sitka alder (ABLA/ALSI) is less frequent in occurrence than subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/beargrass (ABLA/XETE) and occurs on northerly convex slopes on upper slopes near the ridge and as stringers within subalpine fir/beargrass (ABLA/XETE) in swales. Subalpine fir/sitka alder (ABLA/ALSI) occupies less than 20 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas- fir/blue huckleberry (PSME/VAGL) can occur on southerly inclusions at lower slope positions. Timber productivity is lower on these sites.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite and siltite of the Belt Supergroup. Dominant formations are Walace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in this material are less silty, have less easily weathered rock fragments,and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium textures. These soils support subalpine forests. They have a silty surface derived from volcanic ash influenced loess. Subsoils have 35 to 55 percent rock fragments. Rock fragment durability can be quite low on highly weathered bedrock.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 14 inches thick. Similar soils have slightly deeper loess layers. They occur along south and west of Superior on toeslopes and benches. They are Entic Cryandepts, medial over loamy skeletal, mixed. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects that support cool, somewhat dry Douglas-fir forests dominated by ABGR/XETE or PSME/VAGL. Soils are warmer during the growing season, growing seasons are longer, and productivity is moderate. Rock outcrop or rubble occupies up to 5 percent of the unit.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 13 inches thick. Subsoils are reddish yellow very gravelly loams about 32 inches thick. Substrata are strong brown very gravelly loams to a depth of 60 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and ABLA/ALSI HTs. Potential annual productivity is moderate on ABLA/XETE HTs. This map unit can contain some slopes which are suitable for tractor harvest. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow covered helps maintain soil productivity. Regeneration competes for light and space with understory vegetation in basins and northerly slopes supporting ABLA/MEFE and ABLA/ALSI HTs.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access.

Wildlife: This unit provides good deer and elk summer range. The highest wildlife value s security cover from mature conifer communities when they are available. Forage enhancement potential is low. Menziesia provides forage under fully stocked stands. Consequently, security cover takes precedent over forage enhancement for wildlife habitat needs. Partial removal harvest can be beneficial where age class diversity is severely limited.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to stream channels below which provide spawning habitat.

Watershed: Skid trails and firelines have moderate erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is moderate because crossings of perennial streams are common. This increases area for sediment to enter the stream system.

30MG

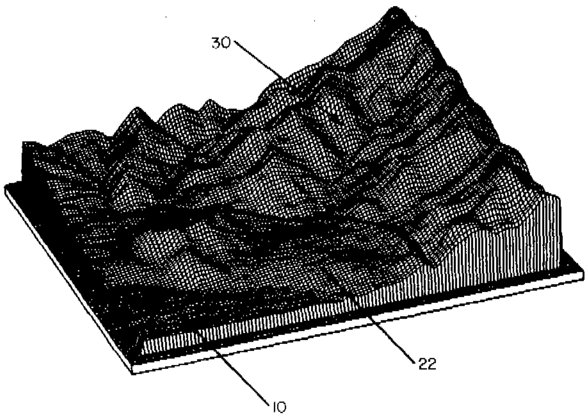
Dystric Eutrochrepts-Andic Dystric Eutrochrepts complex, moderate relief mountain slopes

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests. Soils form in material from moderately weathered metasedimentary rocks. Some soils have a surface layer formed in volcanic ash influenced loess.

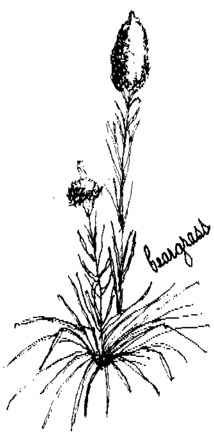
LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1000 to 2500 feet and drainage patterns are trellis or parallel. Subsurface drainage is common in zones of thin-bedded bedrock.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Southerly	5000-6500	35-45	0-5

VEGETATION



Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine and western larch. Grand fir occurs only in the far western portion of the survey area. The understory consists of blue huckleberry, beargrass, pinegrass, snowberry, scattered rocky mountain maple, spirea, and inclusions of bluebunch wheatgrass in openings. Ceanothus is well adapted to this site and will occur in openings where seed source is available.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is the major HT. The most common HT phase is beargrass (XETE). This HT occupies about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs on openings and on windy ridges. This HT occupies about 20 percent of the map unit. Grand fir/beargrass (ABGR/XETE) replaces Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) in some delineations west of St. Regis and has similar responses to management.

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) occur occasionally on openings where soils are moderately shallow. These HTs are less productive timber sites. Subalpine fir/beargrass-blue huckleberry

(ABLA/XETE-VAGL) occurs at the ridge line, on northerly inclusions, and some drainage stringers. This HT appears to have better regeneration success.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium textures. Subsoils have 35 to 55 percent rock fragments. Rock fragment durability can be quite low on highly weathered bedrock. Soil surface layers have varying purity of volcanic ash influenced loess. Loess surface layers vary with density of vegetation cover, degree of soil disturbance, and location within the survey area.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have thin loess surface layers less than 8 inches thick or surface layers formed in loess mixed with the subsoil. They are under moderate to low vegetation cover, areas where windthrow has been active, or where harvest has occurred. They occupy about 50 percent of the map unit. (On Missoula and Seeley Lake Ranger Districts, soils with less volcanic ash content can occupy as much as 80 percent of the map unit.)

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. They are under more dense vegetation cover and less disturbed areas. These soils are more common west of Superior. These soils occupy 10 to 40 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Andic Cryochrepts, loamy skeletal, mixed support ABLA/XETE-VAGL HT. Productivity is slightly higher on these soils because of less direct insulation. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
These Dystric Eutrochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter less than 2 inches thick. Surface layers are dark yellowish brown gravelly silt loams about 8 inches thick. Subsoils are yellowish brown very gravelly loams about 25 inches thick. Substrata are yellowish brown very gravelly gravelly loams to a depth of 60 inches or more.

These Andic Dystric Eutrochrepts, loamy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter less than 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Subsoils are yellowish brown to brownish yellow very gravelly loams about 35 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 60 inches or more.

Classification Remarks: This map unit occurs on high elevation southerly slopes where natural erosion has played a big part in mixing and displacing the volcanic ash influenced loess. Where vegetative cover has remained relatively heavy the loess "andic" surface has remained relatively unmixed. Wildfires and long regeneration periods have produced scattered areas where this loess has been mixed or partially removed from the surface.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. This map unit contains some slopes suitable for tractor harvest. Regeneration is limited by moisture stress and high soil surface temperatures in unshaded areas. Leaving about 15 tons per acre of larger than 3 inches diameter logging slash improves regeneration success and helps maintain soil producitivity. Protection from high insolation can improve regeneration on southerly aspects. Competition from ceanothus thickets can limit regeneration in those areas where there is a seed source.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. The forest understory produces some forage in openings and under low stocked stands. Limitations are proximity to a water source, access to unit since these units are high elevation units, and steepness of slope. Clearcuts may offer some forage in the first years after harvest.

Wildlife: Mature stands on southerly aspects provide good deer and elk spring range. East and west aspects and draws provide fair deer and elk summer range. Forage response to timber harvest is fair on south aspects and good in draws and other aspects. Openings dominated by ceanothus can provide good winter forage if snows depths are minimal.

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails and firelines have moderate erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is low.

30PA

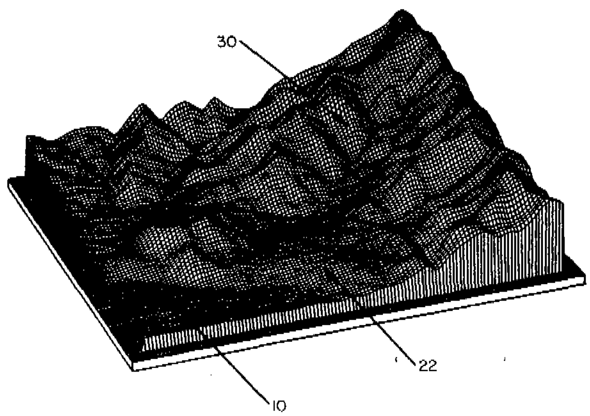
Typic Eutroboralfs, volcanic substratum

SUMMARY

This map unit occurs on moderate relief mountain slopes. Vegetation is dry Douglas-fir and dry, mixed coniferous forests. Soils form in material from volcanic bedrock.

LANDFORM

The landform consists of convex sideslopes with gentle benches and moderately incised drainages. Most drainages are ephermeral or perennial. Drainage spacing ranges from 1,000 to 2,000 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Southerly	3500-5500	30-45	0-5

VEGETATION

Existing: Vegetation is a mixed forest of ponderosa pine, Douglas-fir, and in some delineations, western larch and lodgepole. The understory is dominated by pinegrass, ninebark, snowberry, and some delineations, blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/pinegrass (PSME/CARU), Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA), and Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) are the dominant HTs. PSME/CARU occurs on gentle benches and ridge crests throughout the unit and occupies about 45 percent of most delineations. PSME/SYAL-CARU occur on southerly sideslopes. A similar HT, Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs in some delineations. These HTs occupy about 30 percent of the map unit. PSME/PHMA-PHMA occurs along drainageways and east or west sideslopes. This HT occupies about 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry (PSME/VAGL) occurs at elevation above 5000 feet. These sites are slightly cooler and limitations to regenerations from severe insolation are expected to be less.

30PA

GEOLOGY

The unit is underlain by shallow igneous intrusive and extrusive (volcanic) rocks, generally gabbro, diabase, or basalt rock types. Other similar included rock types are dacite and rhyodacite.

SOILS

Map Unit Summary: Soils are well-drained and have to medium and moderately fine textures. Subsoils are slightly plastic, have subsoil clay accumulation, and contain 20 to 45 percent rock fragments.

Composition:
Typic Eutroboralfs, fine loamy, mixed, frigid have less that 35 percent rock fragments. Similar soils have 35 to 45 percent rock fragments in the subsoils. They are Typic Eutroboralfs, loamy skeletal, mixed, frigid. These soils occupy 85 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Lithic Eutroboralfs, loamy skeletal, mixed occur on gently sloping benches where bedrock is near the surface. These soils have less effective rooting depth and can be less productive.

Representative Profile:
These Typic Eutroboralfs, fine loamy, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inches thick. Surface layers are dark brown loams about 6 inches thick. The subsoils are brown gravelly coarse sandy clay loams about about 15 inches thick and have few, thin clay skins. Substrata are strong brown very gravelly loam to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slopes less than 35 percent are well suited for tractor harvest. Compaction and puddling of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen or snow covered helps maintain soil productivity. Competition for moisture from pinegrass and insolation on steeper slopes can limit forest regeneration.

Roads: Unsurfaced roads are slick and rut severely when wet. Material exposed on steep cutbanks is subject to sloughing. Revegetation is limited by sloughing and surface crusts which form on material exposed by construction. Some slopes are prone to rotational slumping.

Range: This map unit is moderately suited to range management. The forest understory produces moderate transitory range. Forage can be enhanced through timber harvest or burning. Spring and early summer grazing increases potential for soil compaction.

Wildlife: This unit provides excellent deer and elk winter range. Shrubs and grasses provide the primary forage. Timber harvest and prescribed burning can provide moderate benefits by increasing shrub production.

Fisheries: Perennial streams are absent in this map unitybecause of dry environments or location.

Watershed: Skid trails, firelines and roads have a high erosion hazard. Slopes are moderate and sediment delivery efficiency is low.

30PE

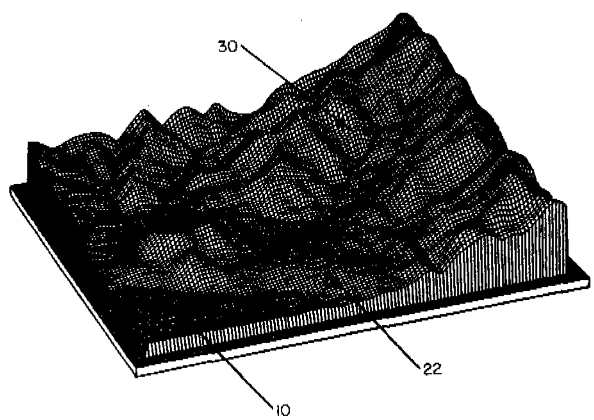
Typic Cryoboralfs, volcanic substratum

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forests. Soils form in material from volcanic bedrock.

LANDFORM

The landform consists of convex sideslopes with gentle benches and moderately incised drainages. Most drainages are ephemeral or perennial. Drainage spacing ranges from 1000 to 1500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	5000-6500	25-40	0-5

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine, Douglas-fir, and western larch. The understory is dominated by pinegrass, blue huckleberry, twinflower, and menziesia.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/twinflower (ABLA/LIBO) are the major HTs. These HTs occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/blue huckleberry (PSME/VAGL) occurs on southerly inclusions. Regeneration may be limited by competition with pinegrass for moisture and space.

GEOLOGY

The unit is underlain by shallow igneous intrusive and extrusive (volcanic) rocks, generally gabbro, diabase, or basalt rock types. Other similar included rock types are dacite and rhyodacite.

30PE

SOILS

Map Unit Summary: Soils are well-drained and moderately fine to medium textured. Subsoils are slightly plastic, have subsoil clay accumulation, and contain 20 to 45 percent rock fragments.

Composition:
Typic Cryoboralfs, fine loamy, mixed, frigid have less that 35 percent rock fragments. Similar soils have 35 to 45 percent rock fragments in the subsoils. They are Typic Cryoboralfs, loamy skeletal, mixed, frigid. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Lithic Cryoboralfs, loamy skeletal, mixed occur on gently sloping benches where bedrock is near the surface. These soils have less effective rooting depth and can be less productive. Rock outcrop occupies up to 5 percent of the unit.

Representative Profile:
These *Typic Cryoboralfs, fine loamy, mixed, frigid* have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown loams about 11 inches thick. Subsoils are reddish brown gravelly coarse sandy clay loams about 20 inches thick and have few, thin clay skins. Substrata are reddish brown very gravelly loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slopes less than 35 percent are well suited for tractor harvest. Compaction and puddling of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Unsurfaced roads are slick and rut severely when wet. Material exposed on steep cutbanks is subject to sloughing. Revegetation is limited by sloughing and surface crusts which form on material exposed by construction. Some slopes are prone to rotational slumping.

Range: This map unit is poorly suited to range management. The forest understory produces poor forage and brush limits access.

Wildlife: This unit provides good deer and elk summer range. The highest wildife value is security cover from mature conifer communities when they are available. Forage enhancement potential is low. Menziesia provides forage under fully stocked stands. Consequently, security cover takes precedent over forage enhancement for wildife habitat needs. Partial removal harvest can be beneficial where age class diversity is severely limited.

Fisheries: Where streams occur, they are small, gradients can be steep and pool quality and quantity is low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Slopes are moderate and sediment delivery efficiency is low.

30QA

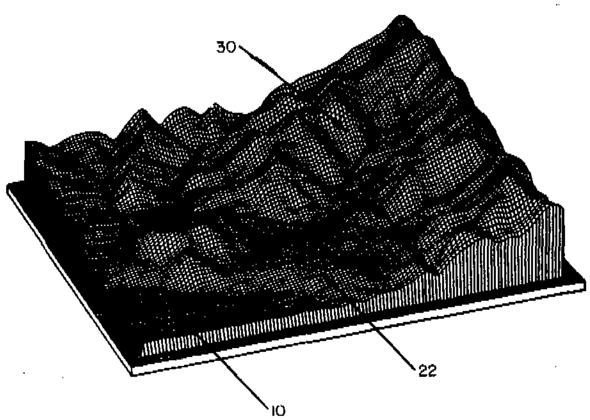
Typic Xerochrepts-Typic Haploxerolls complex, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is open grown forest. Soils form in material from weakly weathered metasedimentary rocks.

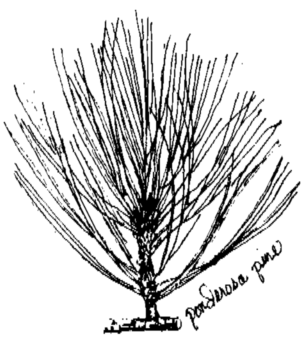
LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1500 to 2500 feet, and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Southerly	3000-4800	20-30	0-5

VEGETATION



Existing: Vegetation is open grown stands of ponderosa pine and Douglas-fir. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and some delineations have rough fescue. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas- fir/rough fescue (PSME/FESC), and Douglas-fir/Idaho fescue (PSME/FEID) are the major HTs. PSME/AGSP occurs on the shallower and rockier sites. PSME/FESC occurs on deeper soils and less rocky soils. A similar included habitat type is Douglas-fir/pinegrass-bluebunch (PSME/CARU-AGSP) which occurs in areas where the annual precipitation is slightly higher than the average (greater than 25 inches). These habitat types occupy 90 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) occur in some drainages. Douglas- fir/ninebark-ninebark (PSME/PHMA-PHMA) occurs on inclusions of east and west aspects. Timber productivity is higher and there are fewer limitations to regeneration.

30QA

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Subsoils contain 55 to 90 percent rock fragments. Soils become dry early in the growing season.

Composition:
Typic Xerochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Typic Xerochrepts, loamy skeletal, mixed, frigid. They support moderately dense forest stands. These soils occupy about 50 percent of the unit.

Typic Haploxerolls, loamy skeletal, mixed, frigid have dark colored surface layers. They support sparsely forested stands and grassy openings. They occupy about 40 percent of the unit. (A few delineations that are dominated by grassland have been included in this unit. Occurrence of these soils are about 80 percent in these delineations).

Included are up to 10 percent dissimilar soils and rock outcrop. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA and PSME/LIBO HTs. They lack the dark colored surface layer and have lower surface soil summer temperatures. They have slightly fewer limitations to regeneration. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
These *Typic Xerochrepts, loamy skeletal, mixed, frigid* have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Upper surface layers are very dark grayish brown gravelly silt loams about 5 inches thick. Lower surface layers are brown very gravelly sandy loams about 12 inches thick. Subsoils are yellowish brown extremely gravelly sandy loams about 16 inches thick. Substrata are light yellowish brown extremely gravelly coarse sandy loams to depths of 40 inches or more.

Typic Haploxerolls, loamy skeletal, mixed, frigid have very dark brown surface layers about 8 inches thick. Subsoils are light brownish gray and light gray very gravelly or extremely gravelly sandy loams about 39 inches thick. Substrata are light gray extremely gravelly coarse sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. This map unit contains some slopes suitable for tractor harvest. Competition for moisture from understory vegetation and high insulation severely limits forest regeneration. Protection from high insolation can help improve regeneration. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility and offers shade for seedlings.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surfaces can be dusty when dry.

Range: This map unit is moderately suited to range management. The forest understory produces excellent forage but slope steepness limits access. These areas are highly susceptible to weed invasion.

Wildlife: This unit provides excellent big game spring and fall range and yearlong bighorn sheep range where associated with Map Unit 26UA. Graminoids provide the primary forage. Shrubs are scarce to nonexistent. Timber harvest is generally not beneficial to winter range maintenance. Underburning is the best form of vegetation manipulation. Invasion by and conversion to knapweed can result in loss of forage and is a severe risk in this unit.

30QA

Fisheries: Perennial streams are absent in this map unit because of dry environments or location.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low.

30QB

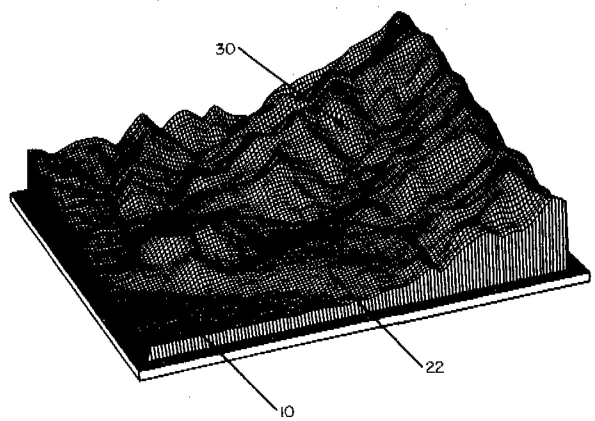
Typic Ustochrepts, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is dry Douglas-fir forest. Soils form in material from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1500 to 2500 feet, and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	S,E,W	3000-5800	25-35	0-5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry. *Ceanothus* is present in some openings where seed source is present.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/pinegrass (PSME/CARU) are the major HTs. PSME/PHMA-CARU is the most common HT and occurs throughout the map unit occupying about 65 percent of the area. PSME/CARU occurs on upper elevation, southerly slopes and on ridges where soils are moderately shallow. Important HT phases are ponderosa pine (-PIPO) and kinnikinnick (-ARUV). This HT occupies less than 20 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Complex mountain slopes create northerly sideslope inclusions of Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA). Douglas-fir-/twinflower (PSME/LIBO) occur in some northerly drainages, benches, and toeslopes. These HTs are more productive timber sites with fewer regeneration limitations. Some delineations have south sideslope inclusions of Douglas-fir/bluebunch wheatgrass (PSME/AGSP) or Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP). These HTs are less productive timber sites.

30QB

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permiable to water.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Subsoils contain 55 to 90 percent rock fragments. Soils become dry early in the growing season.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Typic Ustochrepts, loamy skeletal, mixed, frigid. These soils occupy about 90 percent of the unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA and PSME/LIBO HTs. They have surface layers formed in volcanic ash influenced loess and are more productive. Rock outcrop occupies up to 5 percent of the unit.

Representative Profile:
These Typic Ustochrepts, loamy skeletal, mixed frigid have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Upper surface layers are very dark grayish brown gravelly silt loams about 5 inches thick. Lower surface layers are brown very gravelly sandy loams about 12 inches thick. Subsoils are yellowish brown extremely gravelly sandy loams about 16 inches thick. Substrata are light yellowish brown extremely gravelly coarse sandy loams to depths of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. This map unit contains some slopes suitable for tractor harvest. Tractor operation can reduce site productivity by displacing the surface layer. Competition for moisture from understory vegetation and high insulation limits forest regeneration. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation and root disease.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surfaces can be dusty when dry.

Range: This map unit is moderately suited to range management. The forest understory produces fair forage and slope steepness limits access. Regeneration harvest in the first years after harvest offer increased forage.

Wildlife: This unit provides excellent big game spring and fall range. Shrubs and grasses provide the primary forage. Timber harvest and prescribed burning can provide moderate benefits by increasing shrub production.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low.

30QC

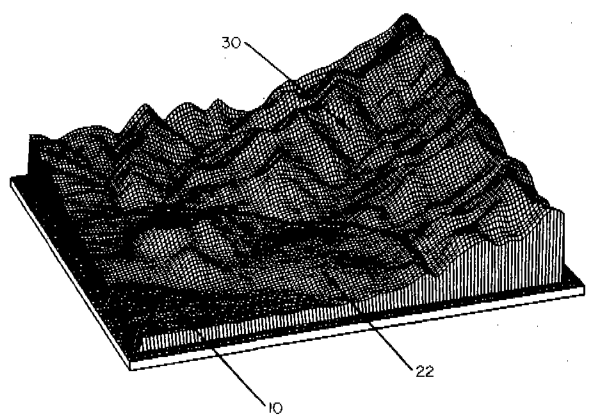
Andic Dystric Eutrochrepts and Dystric Eutrochrepts, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is dry, mixed coniferous forest. Soils form in somewhat mixed volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1000 to 2500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	N,E,W	3800-5200	30-45	0-5

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in the Douglas-fir HTs is dominated by ninebark and twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnikinnick, wood's rose, and pinegrass. The PSME/VAGL-XETE and ABGR/XETE HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima and twinflower in drainageways.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a wide climatic transition within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4,600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy approximately 55 percent of the map unit. ABGR/XETE is on northerly aspects above 4,600 feet and occupies less than 25 percent of the map unit. (ABGR/XETE is rare in the Rock Creek drainage.)

30QC

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4,600 feet. This habitat type occupies approximately 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4,600 feet and occupies less than 25 percent of the map unit.

A similar habitat type, Douglas-fir/blue huckleberry (PSME/VAGL) occupies up to 5 percent of the map unit. PSME/VAGL is more common in the eastern edge of the survey area and occurs above 4,500 feet.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Subsoils contain 55 to 90 percent rock fragments. Soil surface layers vary with aspect. Soils on northerly aspects and other aspects west of Superior have silty surface layers formed in volcanic ash influenced loess. Soils on east and west aspects have loamy surface layers formed in volcanic ash influenced loess mixed with subsoil material.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on northerly slopes east of Alberton and on all slopes west of Superior. They have silt loam surface layers containing high amounts of volcanic ash influenced loess.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on east and west aspects, east of Alberton. They have loam surface layers containing volcanic ash influenced loess mixed with subsoil material.

Every delineation has at least one of these soils and can have both. These soils occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar soils and rock outcrop. Udic Ustochrepts, loamy skeletal, mixed, frigid are under PSME/PHMA-CARU HT on southerly aspects. Surface layers formed in volcanic ash influenced loess are absent. These soils are less productive and have limitations to regeneration. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
Andic Dystric Eutrochrepts, loamy skeletal, mixed frigid have a soil surface covered by a layer of partially decomposed forest litter about 4 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely gravelly sandy loams to very fine sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to depths of 60 inches or more.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soils surface covered by a layer of partially decomposed forest litter less than 4 inches thick. Surface layers are dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inches thick. Substrata are grayish brown extremely gravelly sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. This map unit contains some slopes suitable for tractor harvest. Site productivity depends on the relatively thin, finer textured soil surface layer. Tractor operation can reduce site productivity by compacting or displacing the surface layer. Protection from high insolation can help improve regeneration on southerly aspect inclusions.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access. Southerly inclusion and clearcuts in the first years after harvest may offer some forage.

Wildlife: This unit can provide excellent big game spring and fall range when openings are present. Where associated with southerly slopes, this unit provides excellent big game winter range and thermal cover. Shrubs are a significant part of the stand structure and songbird populations tend to be high as a result. Timber harvest can be beneficial in enhancing big game forage or to increase the overall age class diversity.

Fisheries: Where streams occur, they are small, gradients can be steep, and pool quality and quantity are low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low.

30QD

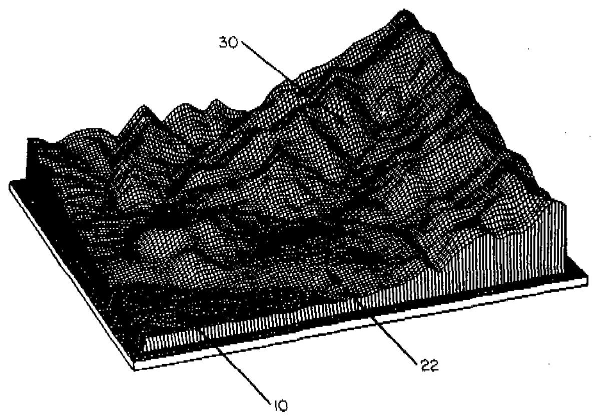
Andic Dystric Eutrochrepts, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks.

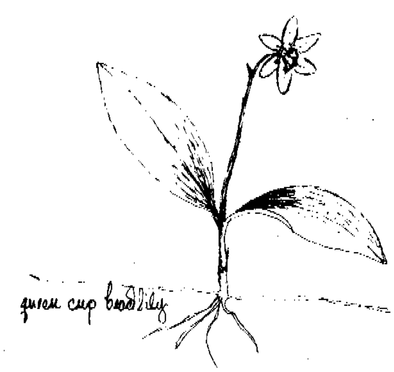
LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or perennial, first and second order streams. Drainage spacing ranges from 800 to 1500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	4000-5200	35-55	0-5

VEGETATION



Existing: Vegetation is a mixed forest of western larch, grand fir, lodgepole pine, western red cedar in moist areas, spruce, and Douglas-fir. The forest understory consists of twinflower, queencup beadlily, serviceberry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN) and western red cedar/queencup beadlily (THPL/CLUN) are the major HTs. They are on northerly slopes, drainageways, benches, and toeslopes. These HTs occupy about 60 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) occurs on east and west aspects and occupies about 30 percent of the map unit. An included similar habitat type, spruce/twinflower (PIEN/LIBO), occurs along with ABGR/LIBO in northerly delineations in the Lolo Creek drainage.

Included are up to 10 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/fool's huckleberry (ABLA/MEFE) occurs in some cold drainageways. These sites offer heavy brush competition to regeneration.

30QD

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Soils have a silty surface layer derived from volcanic ash influenced loess. Subsoils contain 55 to 95 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, frigid mixed have loess surface layers less than 14 inches thick. Similar soils have slightly deeper loess layers. They occur west of St. Regis and are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on southerly aspects where the silty volcanic ash influenced loess surface is mixed with subsoils or is absent. These are less productive timber sites. Rock outcrop occupies up to 5 percent of the unit.

Representative Profile:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 6 inches thick. Surface layers are dark brown silt loams less than 14 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown very gravelly sandy loams to very fine sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is very high. This map unit can contain slopes which are suitable for tractor harvest. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow covered helps maintain soil productivity.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access.

Wildlife: Early seral shrub communities provide extremely productive songbird habitat. Mature or old-growth forests provide good big game winter range and thermal cover. Overstocked pole community thinning and regeneration timber harvest will improve age class diversity and can improve wildlife habitat.

Fisheries: Streams are small, high gradient, and have poor quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is low except near stream crossings where delivery efficiency is high.

30QE

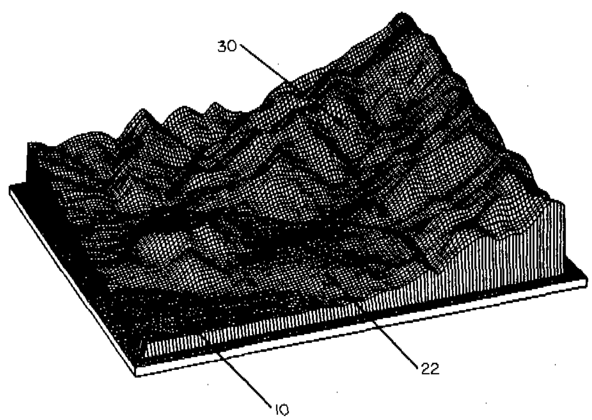
Andic Cryochrepts, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedock. Most drainages are intermittent or perennial, having first and second order streams. Drainage spacing ranges from 800 to 1500 feet and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	4600-6600	45-55	0-5

VEGETATION

Existing: Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine, spruce, some subalpine fir, and mountain hemlock (in TSME HTs). Basins have more subalpine fir, spruce, and mountain hemlock than convex mountain slopes. At upper elevation limits of this map unit, western larch and Douglas-fir are a less important components. The forest understory consists of beargrass, Sitka alder, menziesia (in ABLA/MEFE HTs), rocky mountain maple, elderberry, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes, along drainageways, and in basins. Subalpine fir/beargrass (ABLA/XETE) is on convex upper mountain slopes and east and west aspects. Similar HTs, mountain hemlock/menziesia (TSME/MEFE) and mountain hemlock-/beargrass (TSME/XETE), occur west of Superior. These HTs occupy at least 75 percent of the map unit. Subalpine fir/Sitka alder (ABLA/ALSI) is less frequent in occurrence than ABLA/MEFE and ABLA/XETE. It occurs on northerly convex slopes near the ridge and as stringers within ABLA/XETE in swales. ABLA/ALSI occupies less than 20 percent of the map unit or occurs in localized areas such as the Thompson River drainage.

Included are up to 5 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on southerly inclusions below 5600 feet. Timber productivity is lower on these sites, and regeneration can be prolonged by insulation.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permiable to water.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. These soils support subalpine forests. They have a silty surface derived from volcanic ash influenced loess. Subsoils contain 55 to 80 percent rock fragments.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 13 inches thick. Similar soils have slightly deeper loess layers. They occur west of St. Regis on toeslopes and benches and are Entic Cryandepts, medial over loamy skeletal, mixed. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop or rubble. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects that support cool, somewhat dry Douglas-fir forests dominated by ABGR/XETE or PSME/VAGL. The growing season is longer, and productivity is moderate. Typic Cryochrepts, loamy skeletal, mixed occur on southerly aspects above 5,600 feet on some slopes east of Alberton. Productivity is lower on these sites. Rock outcrop or rubble occupies up to 5 percent of the unit.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers ar dark brown silt loams about 10 to 14 inches thick. Upper subsoils are light gray extremely gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely gravelly sandy loams to very fine sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and ABLA/ALSI HTs. Potential annual productivity is moderate on ABLA/XETE HTs. This map unit can contain some slopes which are suitable for tractor harvest. Regeneration competes for light and space with understory vegetation in basins and northerly slopes supporting ABLA/MEFE and ABLA/ALSI HTs. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow covered helps maintain soil productivity.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. The forest understory produces little forage, and slope steepness limits access.

Wildlife: This unit provides good big game summer range. The highest wildlife value is security cover in mature conifer communities when they are available. Forage enhancement potential is low. Menzesia provides forage under fully stocked stands. Consequently, security cover takes precedent over forage enhancement for wildlife habitat needs. Partial removal harvest can be beneficial where age class diversity is severely limited.

30QE

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is moderate because crossings of perennial streams are common. This increases area for sediment to enter the stream system.

30QG

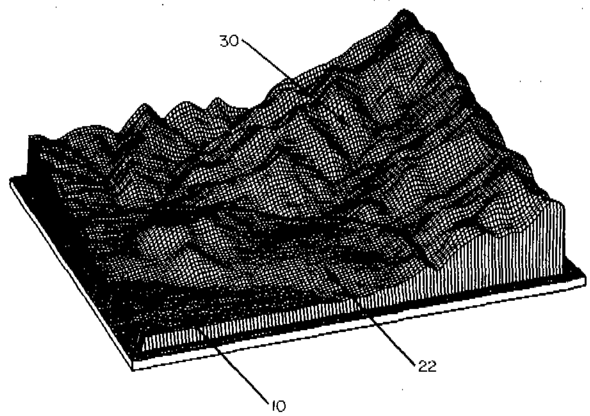
Andic Dystric Eutrochrepts-Dystric Eutrochrepts complex, moderate relief mountain slopes

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas- fir forests. Soils form in material from weakly weathered metasedimentary bedrock.

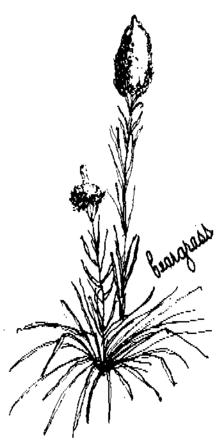
LANDFORM

The landform consists of broad, moderately sloping draws and convex sideslopes. Slopes are complex and are often influenced by the structure of the underlying bedrock. Most drainages are intermittent or ephemeral. Drainage spacing ranges from 1000 to 2500 feet, and drainage patterns are trellis or parallel.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Southerly	4600-6000	35-45	0-5

VEGETATION



Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine and western larch. Grand fir occurs only in the far western portion of the survey area. The understory is dominated by blue huckleberry, beargrass, pinegrass, snowberry, scattered rocky mountain maple, spirea, and inclusions of bluebunch wheatgrass in openings. Ceanothus is well adapted to this site and will occur in openings where seed source is available.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). This HT occupies about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 20 percent of the map unit. Grand fir/beargrass (ABGR/XETE) replaces PSME/VAGL-XETE on some delineations west of St. Regis and has similar response to management.

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME-/AGSP), Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) occur occasionally on openings where soils are moderately shallow. These HTs are less productive timber sites. Subalpine fir/beargrass-blue huckleberry (ABLA/

XETE-VAGL) occurs at the ridge line, on northerly inclusions, and in some drainage stringers. This HT appears to have better regeneration success.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Soil surface layers have varying purity of volcanic ash influenced loess. Loess surface layers vary with density of vegetation cover, degree of soil disturbance, and location within survey area. Subsoils contain 55 to 95 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. These soils occupy about 60 percent of the map unit.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid have thin loess surface layers less than 8 inches thick or surface layers are formed in loess mixed with the subsoil. They are under moderate to low vegetation cover, areas where windthrow has been active, or where harvest has occurred. They occupy about 30 percent of the map unit. (On Missoula and Seeley Lake Ranger Districts, soils with less volcanic ash content can occupy as much as 60 percent of the map unit.)

Included are up to 10 percent dissimilar soils and rock outcrop. Andic Cryochrepts, loamy skeletal, mixed support ABLA/XETE-VAGL HT. Productivity is slightly higher on these soils because of less direct insulation. Rock outcrop occupies up to 5 percent of the unit.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly to extremely gravelly sandy loams about 10 inches thick. Lower subsoils are very pale brown very gravelly to extremely gravelly sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 60 inches or more.

These Dystric Eutrochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inches thick. Substrata are grayish brown extremely gravelly sandy loams to a depth of 60 inches or more.

Classification Remarks: This map unit occurs on high elevation southerly slopes where erosion has played a big part in mixing and displacing the volcanic ash influenced loess. Where vegetative cover has remained relatively heavy, the loess "andic" surface has remained relatively unmixed. Wildfires and long regeneration periods have produced scattered areas where this loess has been mixed or partially removed from the surface.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. This map unit contains some slopes suitable for tractor harvest. Regeneration is limited by moisture stress and high soil surface temperatures in unshaded areas. Leaving about 15 tons per acre of larger than 3 inches diameter logging slash improves regeneration success and helps maintain soil productivity. Protection from high insolation can also help regeneration on southerly aspects. Competition from ceanothus thickets can limit regeneration in those areas where there is a seed source.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. The forest understory produces some forage in openings and under low stocked stands. Limitations are proximity to a water source, access to unit since these are high elevation units, and steepness of slope. Clearcuts may offer some forage in the first years after harvest.

Wildlife: Mature stands on southerly aspects provide good big game spring range. East and west aspects and draws provide fair deer and elk summer range. Forage response to timber harvest is fair on south aspects and good in draws and other aspects. Openings dominated by ceanothus can provide good winter forage if snows depths are minimal.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low.

30SA

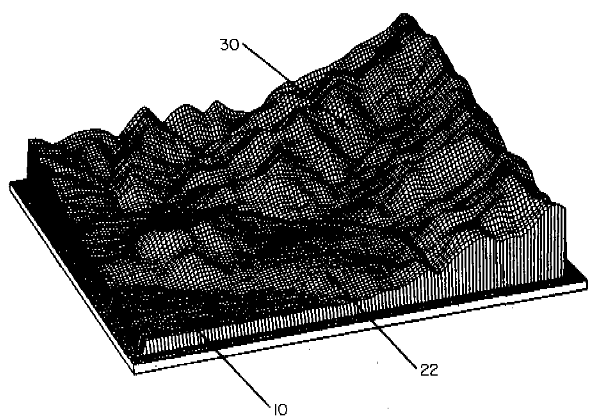
Dystric Eutrochrepts, mica schist substratum

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests and dry, mixed coniferous forests. Soils form in material from mica schist and associated rocks.

LANDFORM

The landform consists of convex sideslopes with gentle benches and moderately incised drainages. Most drainages are ephemeral or perennial. Drainage spacing ranges from 1000 to 2000 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-55	Northerly	3800-5000	30-45	0-5

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine, western larch and Douglas-fir. The understory is dominated by ninebark, twinflower, beargrass, pinegrass, and blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL), Douglas-fir/ninebark (PSME/PHMA), and Douglas-fir/twinflower (PSME/LIBO) are the dominant HTs. PSME/PHMA occurs below about 4500 feet and occupies about 30 percent of the map unit. PSME/LIBO occurs near drainageways and on some gentle benches. This HT occupies about 25 percent of the map unit. PSME/VAGL occupies 35 percent of the map unit and occurs above about 4500 feet.

Included are up to 10 percent dissimilar HTs. Spruce/twinflower (PICEA/LIBO) occurs on northerly slopes below 5000 feet and in some moist drainageways. These HTs are associated with landforms that collect significant amounts of seasonal groundwater and are more productive.

30SA

GEOLOGY

The unit is underlain by mica schists associated with the border zone of the Idaho Batholith. Other associated bedrock are micaceous sandstones and phyllites. Upper bedrock layers are very fractured and splay off steep roadcuts easily. Rock fragments exposed on the surface weather rapidly. Soils have a high mica content.

Included are up to 10 percent dissimilar bedrock. Gneiss is a harder, more resistant to weathering bedrock associated with the Idaho Batholith. Gneiss is recognized by a characteristic banding of light and dark colored minerals. Soils have many, hard rock fragments, roadcuts are more stable, and soils are less erosive.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. They have high mica content. Soil properties vary with aspect. Surface layers are formed in a mixed layer of volcanic ash influenced loess and subsoil materials. This loess surface layer is absent on soils on southerly aspects. Subsoils contain 35 to 55 percent rock fragments.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects. These soils have greater than 35 percent rock fragments. Similar soils have 25 to 35 percent hard rock fragments with many highly weathered fragments that crush under pressure. These soils are Dystric Eutrochrepts, fine loamy, mixed, frigid. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop or rubble. Aquic Cryochrepts and Cryumbrepts support aspen and moist forest openings where spring activity is present. These soils are in somewhat poorly-drained areas and present limitations to logging, roads, and regeneration. Rock outcrop occupies up to 5 percent of the unit.

Representative Profile:
These Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light gray gravelly sandy loams about 14 inches thick. Subsurface layers are light gray very gravelly sandy loams about 12 inches thick. Subsoils are pale brown very gravelly sandy loams and brown very gravelly silt loams about 13 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 40 inches or more. These soils have a very high mica content.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate except near wet inclusions where productivity is higher. Slopes less than 35 percent are well suited for tractor harvest. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Roads have a moderate potential for increasing the frequency of landslides where ground water is encountered. Slope stability should be evaluated before locating roads. Unsurfaced roads are slick and rut when wet. Erosion can be severe on unsurfaced roads and drainage ditches on grades above 6 percent. Native rock materials in road surfaces break down over time and vehicle use.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides good spring and summer range for deer and elk. Forage response to timber harvest is moderate. Wet inclusions provide excellent late summer elk range.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have a high erosion hazard. Slopes are moderate and sediment delivery efficiency is moderate.

30SB

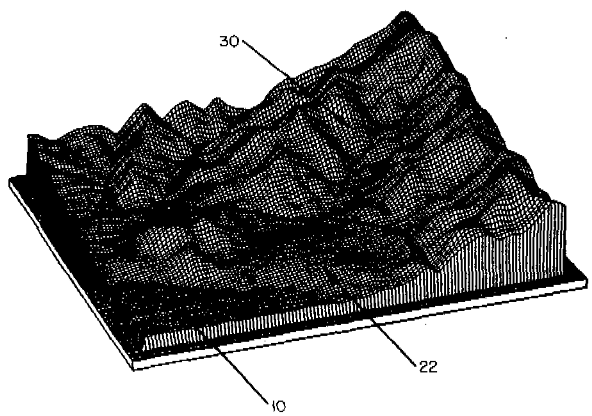
Andic Cryochrepts, mica schist substratum

SUMMARY

The map unit occurs on moderate relief mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from mica schist and associateed rocks.

LANDFORM

The landform consists of convex sideslopes with gentle benches and moderately incised drainages. Most drainages are ephemeral or perennial. Drainage spacing ranges from 500 to 1500 feet. Drainage patterns are dendritic.



Slope (%)	Aspect	Elevation (ft)	Precipitation (In)	Rock Outcrop (%)
35-55	Northerly	5000-6800	45-70	0-5

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, lodgepole pine, western larch, and Douglas-fir. The understory is dominated by menziesia, queencup beadlily, beargrass, and blue huckleberry. Wet inclusions are dominated by aspen, bluejoint, false hellebore, and other forbs.

Habitat Type (HT) Composition: Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL), subalpine fir/queencup beadlily (ABLA/CLUN), and subalpine fir/menziesia (ABLA/MEFE) are dominant HTs. ABLA/XETE-VAGL occurs on some upper convex slopes and occupies about 35 percent of the unit. ABLA/MEFE occurs on concave slopes and occupies about 30 percent of the unit. ABLA/CLUN occurs along springs, drainageways, concave basins, and toeslopes. A similar HT, subalpine fir/twinflower (ABLA/LIBO) occurs on some gentle benches. These HTs occupy about 20 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/bluejoint (ABLA/CACA) occurs in wet inclusions near springs. These sites are more productive, but groundwater rise after harvest will limit regeneration.

GEOLOGY

The unit is underlain by mica schists associated with the border zone of the Idaho Batholith. Other associated bedrock are micaceous sandstones and phyllites. Upper bedrock layers are very fractured and splay off steep roadcuts easily. Rock fragments exposed on the surface weather rapidly. Soils have a high mica content.

Included are up to 10 percent dissimilar bedrock. Gneiss is a harder, more resistant to weathering bedrock associated with the Idaho Batholith. Gneiss is recognized by a characteristic banding of light and dark colored minerals. Soils have many, hard rock fragments, roadcuts are more stable, and soils are less erosive.

SOILS

Map Unit Summary: Soils are well-drained with somewhat poorly-drained inclusions. They are moderately coarse to medium textured and have high mica content. Soil properties vary with aspect. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 35 to 55 percent rock fragments.

Composition:
Andic Cryochrepts, loamy skeletal, micaceous have greater than 35 percent rock fragments. Similar soils have 25 to 35 percent hard rock fragments with many highly weathered fragments that crush under pressure. These soils are Andic Cryochrepts, fine loamy, micaceous. These soils occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar soils and rock outcrop or rubble. Aquic Cryochrepts and Cryumbrepts support ABLA/CACA HTs, aspen, and moist forest openings where spring activity is present. These soils are in somewhat poorly-drained areas and present limitations to logging, roads, and regeneration. Rock outcrop or rubble occupies up to 5 percent of the unit.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are yellowish brown silt loams about 9 inches thick. Subsurface layers are light gray gravelly silt loams about 9 inches thick. Subsoils are light gray and brown gravelly silt loams about 12 inches thick. Substrata are light yellowish brown very gravelly silt loams to a depth of 60 inches or more. These soils have a very high mica content.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high except on convex ridges in ABLA/XETE HTs where potential productivity is moderate. Slopes less than 35 percent are well suited for tractor harvest. Tractor operation near springs and moist depressions can rut, compact, or puddle the soil and reduce soil productivity. Designated skid trails that avoid wet areas will reduce potential for soil impacts.

Roads: Roads have a moderate potential for increasing the frequency of landslides where ground water is encountered. Slope stability should be evaluated before locating roads. Unsurfaced roads are slick and rut when wet. Springs are difficult to avoid in road location. Erosion can be severe on unsurfaced roads and drainage ditches on grades above 6 percent. Native rock materials in road surfaces break down over time and vehicle use.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: Moderate slopes, cool habitat types, and numerous wet depressions make for excellent deer and elk summer range. Wet inclusions have all the components of critical elk summer range. Adequate forage is provided under a fully stocked canopy, hence timber harvest seldom enhances foraging opportunities.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Skid trails, firelines, and roads have a high erosion hazard. Slopes are moderate and sediment delivery efficiency is moderate.

32KA

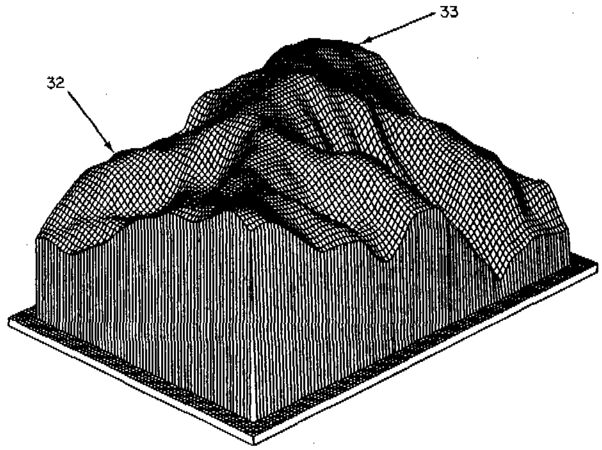
Andic Cryochrepts, broadly convex ridges, granitic substratum

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from moderately well weathered granitic rocks. Stringers or patches of rubble are common in this unit.

LANDFORM

The landform consists of broad, rounded mountain ridgetops. There are few defined drainageways. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Generally, springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Dissimilar slope inclusions of 40 to 50 percent occupy less than 15 percent of this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	5500-6800	50-65	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine and western larch in delineations with a frequent fire history. Mature stands consist of subalpine fir, spruce, and local occurrences of mountain hemlock with lodgepole pine and western larch seral remnants. The understory is composed of beargrass, menziesia, grouse whortleberry, alder, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass (ABLA/XETE) is the major HT. This HT occupies about 50 percent of the map unit. Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes and drainageways. This HT occupies about 30 percent of the map unit. Subalpine fir/sitka alder (ABLA/ALSI) is similar and occurs as stringers along subsurface drainageways and along slope breaks. This HT occupies about 10 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occurs on some southerly slopes at about 5500 feet. Regeneration can be delayed by insolation. Subalpine fir/woodrush (ABLA/LUHI) can occur in some delineations above 6500 feet. Productivity is lower and regeneration recovery periods are much longer.

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Soil surface layers are formed in volcanic ash influenced loess. Subsoils contain 55 to 75 percent rock fragments.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have coarse sandy loam and loamy sand textures. Similar soils are Andic Cryochrepts, loamy skeletal, mixed. They have sandy loam textures with a low fine fraction content. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These are warmer soils that support cool, somewhat dry Douglas-fir forests.

Representative Profile:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown extremely gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown extremely gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTs and high in ABLA/MEFE HTs. Slopes less than 35 percent are well suited for tractor harvest. Site productivity depends on the relatively thin, fine textured soil surface layer. Tractor operation can reduce site productivity by displacing or compacting the surface layer.

Roads: Erosion occurs from rutting and tread wear on unsurfaced roads and along ditches on grades above 6 percent. Tread erosion tends to remove fine material. The remaining gravel and cobble form a rough surface. Springs are common at the lower boundary of this unit and unpredicted groundwater can be encountered in this unit.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides excellent big game summer range by providing movement corridors and bedding areas. Potential forage value is low and opportunities for enhancing habitat are minimal. Wildlife habitat is maintained by avoidance of ridgetop road systems and minimizing openings. Extensive surface woody debris inhibits big game movement.

Fisheries: Perennial streams do not occur due to the ridgetop location of this map unit.

Watershed: Roads, skid trails, and firelines have a moderate erosion hazard. Slope steepness is moderate and sediment delivery efficiency is low.

32MA

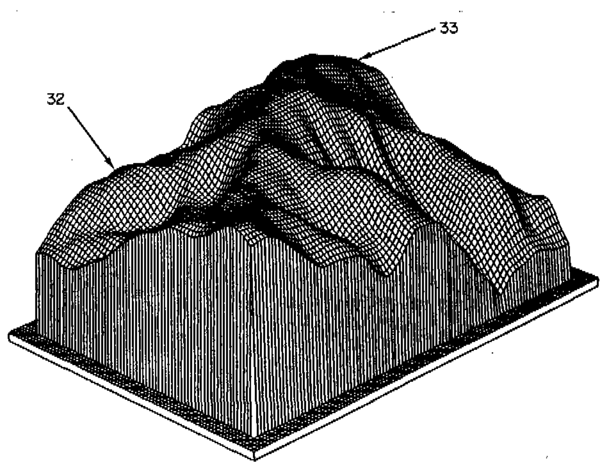
Andic Cryochrepts complex, broadly convex ridges

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of broad, rounded mountain ridgetops. There are few defined drainageways. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Generally, springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Dissimilar slope inclusions of 40 to 50 percent occupy less than 15 percent of this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	5000-6800	50-65	0

VEGETATION

Existing: Vegetation is a mixed forest usually dominated by lodgepole pine due to frequent fire history. Climax stands consist of subalpine fir, spruce, and local occurrences of mountain hemlock with lodgepole pine and western larch seral remnants. The understory is composed of beargrass, menziesia, grouse whortleberry, alder, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass (ABLA/XETE) is the major HT. Mountain hemlock/beargrass (TSME/XETE) is a similar HT. These HTs occupy about 55 percent of the map unit. Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes. Subalpine fir/sitka alder (ABLA/ALSI) and mountain hemlock/menziesia (TSME/MEFE) are similar HTs. Subalpine fir/sitka alder (ABLA/ALSI) is most common as stringers along subsurface drainageways and along slope breaks. These HTs occupy about 35 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) can occur in wet swale inclusions and near springs. This HT has a higher productivity. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) or grand fir/beargrass (ABGR/XETE) occurs on some southerly slopes below 5500 feet. Regeneration can be delayed by insolation. Subalpine fir/woodrush (ABLA/LUHI) can occur in some delineations above 6500 feet. Productivity is lower and regeneration recovery periods are much longer.

32MA

GEOLOGY

The unit is underlain by moderately weathered quartzite, siltite, and argillite of the Belt Supergroup. Zones of highly weathered argillites and thin bedded shales are important components of this unit. They are often difficult to predict and can occupy 5 to 15 percent of the unit. Most dominant Belt formations are Wallace and Helena. Included are Libby, Empire, and some sections of the McNamara formations.

SOILS

Map Unit Summary: Soils are well-drained and medium textured. Surface layers are formed in volcanic ash influenced loess. Most subsoils have 35 to 55 percent rock fragments and are slightly plastic. The unit contains a complex of soils that have varying degrees of rock fragment weathering. Soils that occur in some saddles and near where bedrock is highly weathered (by faulting) have a large proportion of soft rock fragments and subsoils textures are somewhat finer. These soils occupy 5 to 15 percent of the map unit.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have an 8 to 13 inch thick volcanic ash influenced loess surface layer. Similar soils have 13 to 18 inch thick loess layers. They are Entic Cryandepts, medial over loamy skeletal, mixed. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Andic Cryochrepts, fragmental, mixed occur on highly frost churned ridgetops and have greater than 90 percent rock fragments with only a small amount of fine soils material filling voids (fragmental) in subsoils. These soils are less productive and produce rough road surfaces. Warmer soils that support cool, somewhat dry Douglas-fir forests are Andic Dystric Eutrochrepts, loamy skeletal, mixed.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Upper surface layers are dark yellowish brown loams about 8 inches thick. Lower surface layers are yellowish brown very gravelly loams about 9 inches thick. Subsoils are light brownish gray and light yellowish brown very gravelly loams about 11 inches thick. Substrata are pale brown extremely gravelly loams to a depth of 36 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Windswept ridges induce high evaporative demands and very rocky soils reduce productivity in these habitat types. The terrain is well suited to tractor operation. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Wet swale or spring inclusions are easily avoided with designated skid trails.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Spot surfacing or seasonal haul restrictions will help protect the road surface. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent big game summer range by providing movement corridors and bedding areas. Potential forage value is low and opportunities for enhancing habitat are minimal. Wildlife habitat is maintained by minimizing openings and ridgetop road systems. Extensive woody surface debris inhibits big game movement.

Fisheries: Perennial streams do not occur due to the ridgetop location of this map unit.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a moderately low erosion hazard. Sediment delivery efficiency is low.

32QA

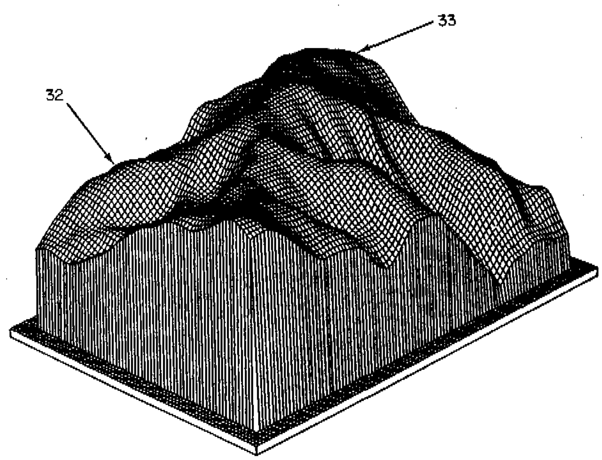
Andic Cryochrepts, broadly convex ridges

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks. Stringers or patches of rubble are common in this unit.

LANDFORM

The landform consists of broad, rounded mountain ridgetops. There are few defined drainageways. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Generally, springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Dissimilar slope inclusions of 40 to 50 percent occupy less than 15 percent of this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	5000-6800	50-65	0-5

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine in delineations with a frequent fire history. Mature stands consist of subalpine fir, spruce, and local occurrences of mountain hemlock with lodgepole pine and western larch seral remnants. The understory is composed of beargrass, menziesia, grouse whortleberry, alder, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass (ABLA/XETE) is the major HT. Mountain hemlock/beargrass (TSME/XETE) is a similar HT. These HTs occupy about 60 percent of the map unit. Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes. Subalpine fir/sitka alder (ABLA/ALSI) and mountain hemlock/ menziesia (TSME/MEFE) are similar HTs. Subalpine fir/sitka alder (ABLA/ALSI) is most common as stringers along subsurface drainageways and along slope breaks. These HTs occupy about 30 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) can occur in wet swale inclusions and near springs. This HT has a higher productivity. Douglas-fir/blue huckleberry-beargrass (PSME/ VAGL-XETE) or grand fir/beargrass (ABGR/XETE) occurs on some southerly slopes below **5500 feet**. Regeneration can be delayed by insolation. Subalpine fir/woodrush (ABLA/LUHI) can occur in some delineations above 6500 feet. Productivity is lower and regeneration recovery periods are much longer.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured and rock fragments have been churned upward by frost action producing extremely rocky soils along with intermittent patches of rubble on the surface. Ground water moves freely through soils and fractured bedrock.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 65 to 90 percent angular rock fragments. Rock size increases with depth.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 13 inches thick. Similar soils have slightly deeper loess layers. They occur in some delineations west of St. Regis and are Entic Cryandepts, medial over loamy skeletal, mixed. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils and rock outcrop or rubble. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support ABGR/XETE or PSME/VAGL. Regeneration can be delayed by insolation and productivity is moderate. Typic Cryochrepts, loamy skeletal, mixed occur on southerly aspects above 5500 feet on some slopes east of Alberton. Productivity is lower on these sites. Rock outcrop or rubble occupies up to 5 percent of the unit.

Representative Profile:
Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Upper surface layers are dark yellowish brown silt loams about 8 inches thick. Lower surface layers are yellowish brown very gravelly silt loams about 9 inches thick. Subsoils are light brownish gray and light yellowish brown extremely gravelly silt loams* about 11 inches thick. Substrata are pale brown extremely gravelly sandy loams to a depth of 36 inches or more. (* Subsoils range from non-plastic silt loams to sandy loams.)

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Windswept ridges induce high evaporative demands and very rocky soils reduce productivity in these habitat types. The terrain is well suited to tractor operation. Site productivity depends on the relatively thin, finer textured soil surface layer. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Wet swale or spring inclusions are easily avoided with designated skid trails.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surface can be dusty when dry. Cutslopes can encounter springs along poorly defined drainageways at the lower edge of this map unit. Culvert placement at these drainageways will improve road drainage.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides excellent big game summer range by providing movement corridors and bedding areas. Potential forage value is low and opportunities for enhancing habitat are minimal. Wildlife habitat is maintained by avoidance of ridgetop road systems and minimizing openings. Extensive woody surface debris inhibits big game movement.

Fisheries: Perennial streams do not occur due to the ridgetop location of this map unit.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is low.

32QC

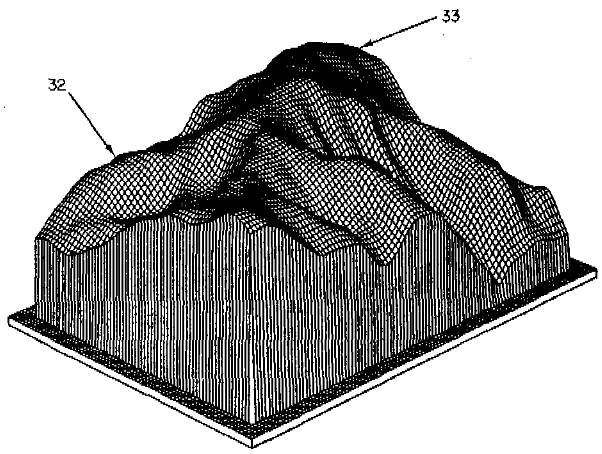
Andic Dystric Eutrochrepts, broadly convex ridges

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation is cool, somewhat dry Douglas-fir forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks. Occasional stringers or patches of rubble are common.

LANDFORM

The landform consists of broad, rounded mountain ridgetops. There are few defined drainageways. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Generally, springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Dissimilar slope inclusions of 40 to 50 percent occupy less than 15 percent of this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	4500-5600	35-55	0-5

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir, lodgepole pine, and western larch. Some delineations west of Superior support grand fir and ponderosa pine. The understory is dominated by blue huckleberry, beargrass, ceanothus, and pinegrass.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is the major HT. A similar HT for this landform which occurs in some delineations west of Superior is grand fir/beargrass (ABGR/XETE). Productivity can be slightly higher in this HT. These HTs occupy about 75 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in delineations east of Superior associated with southerly shallow ridgetops. This HT occupies about 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) occurs at upper elevation boundaries and on some north aspects. These sites have colder soils, support predominantely lodgepole pine, and often present fewer regeneration limitations.

32QC

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured and rock fragments have been churned upward by frost action producing extremely rocky soils along with intermittent patches of rubble on the surface. Ground water moves freely through soils and fractured bedrock.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 65 to 90 percent angular rock fragments. Rock size increases with depth.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. Similar soils have slightly deeper loess layers. They occur west of St. Regis and are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils and rock outcrop or rubble. Dystric Eutrochrepts, loamy skeletal, mixed, frigid lack a loess surface layer. They occur most frequently east of Alberton on southerly aspects. Productivity is lower on these sites. Andic Cryochrepts, loamy skeletal, mixed support subalpine fir forests and can occur at the upper elevation bounds of this unit. Rock outcrop or rubble occupies up to 5 percent of the unit.

Representative Profile:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Subsurface layers are light gray very gravelly sandy loams about 6 inches thick. Subsoils are light gray and very pale brown extremely gravelly and extremely cobbly sandy loams* about 25 inches thick. Substrata are pale brown extremely cobbly sandy loams to a depth of 40 inches or more. (* Subsoils range from non-plastic silt loams to sandy loams.)

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Windswept ridges induce high evaporative demands and very rocky soils reduce productivity in these habitat types. The terrain is well suited to tractor operation. Site productivity depends on the relatively thin, finer textured soil surface layer. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Southerly aspects present large temperature variations which can limit regeneration. Shelterwood and selection silvicultural systems can help improve regeneration. Ceanothus can be a vigorous competitor if seed source is present.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surface can be dusty when dry.

Range: This map unit is poorly suited to range management. The forest understory produces little forage.

Wildlife: This unit provides excellent big game summer range by providing movement corridors and bedding areas. Potential forage value is high and opportunities for enhancing habitat are moderate. Wildlife habitat is maintained by avoidance of ridgetop road systems and minimizing openings. Extensive woody surface debris inhibits big game movement.

Fisheries: Perennial streams do not occur due to the ridgetop location of this map unit.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is low.

32QD

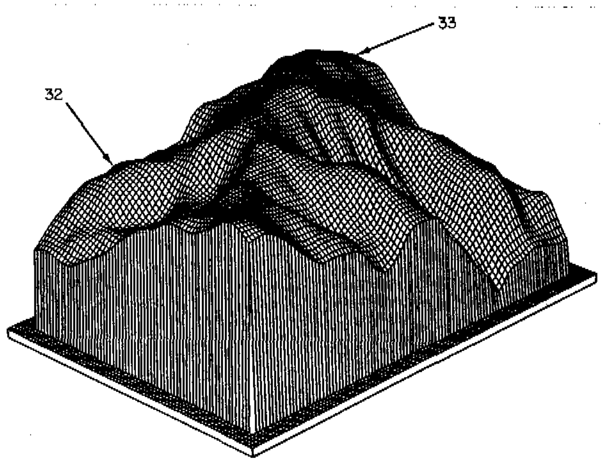
Typic Cryochrepts, broadly convex ridges

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation consists of grassy balds. Soils form in material from metasedimentary rocks. Stringers or patches of rubble are common in this unit.

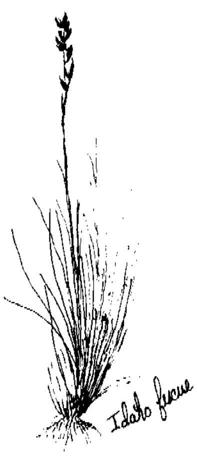
LANDFORM

The landform consists of broad, rounded mountain ridgetops and high elevation mountain sideslopes. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Generally, springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Dissimilar slope inclusions of 40 to 50 percent occupy less than 15 percent of this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
25-45	Southerly	5800-7000	40-65	0

VEGETATION



Existing: Vegetation is a mosaic of grassy bald openings and mixed forest of Douglas-fir and subalpine fir. Grassy balds have scattered "wolfy" Douglas-fir or subalpine fir deformed by wind and snow. Openings are dominated by elk sedge, pinegrass, beargrass, and Idaho fescue. Mixed forests are dominated by Douglas-fir and subalpine fir with whitebark pine occurring at the upper elevation limits of the map unit. The understory is dominated by pinegrass, beargrass, stunted blue huckleberry, and grouse whortleberry.

Habitat Type (HT) Composition: Grassy balds are the dominant community type. They occupy about 50 percent of the map unit. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE), Douglas-fir/Idaho fescue (PSME/FEID), and Douglas-fir/elk sedge (PSME/CAGE) occur as a mosaic along southerly aspects which occupies about 25 percent of the map unit. Subalpine fir/pinegrass (ABLA/CARU) occurs along northerly aspects and ridgetops. This HT occupies about 10 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occurs along the boundaries of this map unit. Douglas-fir/ninebark- pinegrass (PSME/PHMA-CARU) occurs along the low elevation bounds and along some included low elevation drainageways. These sites have higher productivity and better regeneration success.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured and rock fragments have been churned upward by frost action producing extremely rocky soils along with intermittent patches of rubble on the surface. Ground water moves freely through soils and fractured bedrock.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. Soils have dark colored surface layers that have high organic matter content. Soils remain cold for extended periods and become dry early in the growing season. Subsoils are moderately coarse textured and contain 55 to 75 percent rock fragments.

Composition:
Typic Cryochrepts, loamy skeletal, mixed have dark surface layers less than 7 inches thick. Similar soils have slightly deeper and slightly darker surface layers. They are Typic Cryoborolls. They occur on gentle slopes and under vegetation dominated by graminoids. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Lithic Cryoborolls, loamy skeletal, mixed occur along ridgetops where soils are shallow. Effective rooting depth is less and productivity is somewhat lower. Andic Cryochrepts, loamy skeletal, mixed occur along some northerly slopes under ABLA/XETE-VAGL and productivity is higher.

Representative Profile:
Typic Cryochrepts, loamy skeletal, mixed have surface layers that are dark grayish brown very gravelly loams about 7 inches thick. Subsoils are brown extremely gravelly loams about 8 inches thick. Substrata are grayish brown extremely gravelly fine sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. This map unit contains some slopes suitable for tractor operation. High evaporative demands, high summer insolation on southerly slopes, and cold soils reduce productivity and severely limit forest regeneration on windswept ridges.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Native road surface can be dusty when dry.

Range: This map unit is moderately suited to range management. The forest understory produces good forage. Access is limited by slope steepness in some delineations.

Wildlife: This unit provides excellent late summer forage opportunities for elk and deer. Opportunities for forage enhancement are limited. Late-maturing wildflowers provide important foraging areas for both insectivorous and seed-eating songbirds. This map unit provides important grizzly bear foraging opportunities of biscuit-root and other root crops in occupied grizzly bear habitat .

Fisheries: Perennial streams do not occur due to the ridgetop location of this map unit.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Slope steepness is moderate and sediment delivery efficiency is low.

33UA

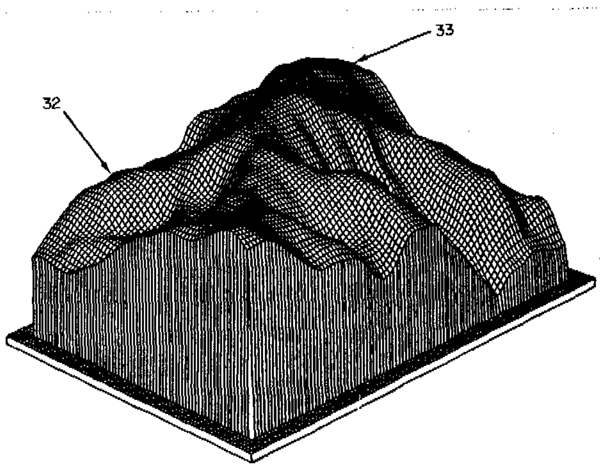
Andic Cryochrepts, broadly convex ridges, cold

SUMMARY

The map unit occurs on high elevation broad convex ridges. Vegetation consists of upper subalpine forests. Soils form in volcanic ash influenced loess overlying material from metasedimentary rocks. Stringers or patches of rubble are common in this unit.

LANDFORM

The landform consists of broad, rounded mountain ridgetops and high elevation mountain sideslopes. Drainage is generally subsurface through fractured bedrock and extremely rocky subsoils. Springs and first order streams orginate at the lower elevation map unit boundary where the slope breaks to a steeper landform. Strong frost churning of these slopes is characterized by zones of rubble, stone stripes, and rubbly "balds.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-40	Variable	6200-8000	60-70	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, whitebark pine, and subalpine fir. Alpine larch is a component in some delineations. The forest understory is dominated by grouse whortleberry, beargrass, woodrush, menziesia, and blue huckleberry. Brush species are somewhat dwarfed from the high elevation climate.

Habitat Type (HT) Composition: Subalpine fir/woodrush (ABLA/LUHI) is the dominant HT. A similar HT is mountain hemlock/woodrush (TSME/LUHI). These HTs occupy about 55 percent of the map unit. Subalpine fir/beargrass (ABLA/XETE) or mountain hemlock/beargrass (TSME/XETE) occur on southern aspects where climatic conditions do not support LUHI. (LUHI is generally found in microsites on these aspects.) Both blue huckleberry (-VAGL) and grouse whortleberry (-VASC) phases are represented. In this unit these HTs have a whitebark pine component and shrub species are low growing and lack vigor. These HTs occupy about 35 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) and subalpine fir/menziesia (ABLA/MEFE) with robust shrubs occurs along the boundaries of this map unit. These sites have higher productivity and better regeneration success.

33UA

GEOLOGY

The unit is underlain by quartzite, siltite, and argillite of the Belt Supergroup. Delineations in Lolo Creek are underlain by granitics. Bedrock is highly fractured and rock fragments have been churned upward by frost action producing extremely rocky soils along with intermittent patches of rubble on the surface. Ground water moves freely through soils and fracture bedrock.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse. These soils support upper subalpine forests. Surface layers are formed in volcanic ash influenced loess. Harsh high elevation climate affects plant growth significantly by persistent cold soils, deep snow accumulation, and strong winds. Subsoils contain 65 to 95 percent rock fragments. Rock size increases with depth.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 13 inches thick. These soils have 65 to 85 percent rock fragments in the soils with small layers of fragmental horizons with higher rock fragment content. Similar soils have thicker fragmental horizons. These soils appear to be associated but not confined to ridgetop positions. They are Andic Cryochrepts, fragmental, mixed. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Soils that support subalpine forest have a more favorable climate and somewhat longer growing season. Potential productivity is higher and re-establishment periods for conifers is shorter. These soils are Andic Cryochrepts, loamy skeletal, mixed.

Representative Profile:
Andic Cryochrepts, loamy skeletal, mixed have surface layers that are dark brown and strong brown very gravelly silt loams about 8 inches thick. Subsoils are brown extremely cobbly sandy loams or silt loams about 10 inches thick. Substrata are grayish brown extremely cobbly sandy loams with fragmental layers to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. The terrain is well suited to tractor operation. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. High evaporative demands and shortened growing seasons due to deep snows and cold soils reduce productivity and lengthen conifer re-establishment periods. On windswept ridges. Some stands take as long as 50 years to achieve a 15 foot height. Saplings and poles are susceptible to wind, frost, and blowing snow damage. Small unit size can minimize harsh climatic effects.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Cutslopes along the lower edge of map unit can encounter springs along poorly defined drainageways. Culvert placement at these drainageways will improve road drainage.

Range: This map unit is poorly suited to range management.

Wildlife: This unit is rather sterile for most wildlife species. Larger delineations provide late summer mule deer range. In occupied grizzly bear habitat, whitebark pine seed provides spring and fall food. Seed production declines in old growth succession and is threatened by blister rust. Regeneration harvest or prescribed burning are tools to rejuvenate seed producing stands.

Fisheries: Perrenial streams do not occur due to the ridgetop location of this map unit.

Watershed: Soils are subject to overland flow conditions because of reduced infiltration in saturated soil conditions in early summer. High intensity summer storms are more frequent at this elevation. Skid trails, firelines, and roads have a moderate erosion hazard. Slope steepness is moderate and sediment delivery efficiency is low.

38KA

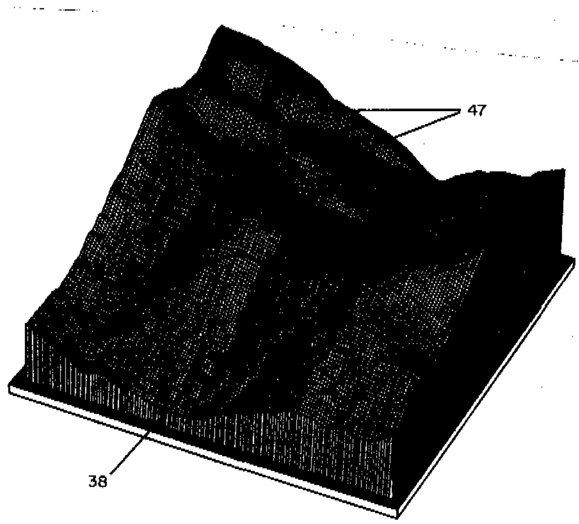
Andic Cryochrepts-Andic Cryumbrepts complex, undulating uplands

SUMMARY

The map unit occurs on high elevation undulating uplands. Vegetation consists of subalpine forests. Soils form in volcanic ash influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of rolling, undulating uplands which form gentle basins at the headwaters of major stream systems. Hydrologic recharge of these basins is high. Seasonally high water tables are an important feature of this landscape. Drainage systems are deranged to somewhat dendritic with low gradient sections forming poorly and somewhat poorly-drained inclusions. Perched water tables are common in this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Northerly	5800-6800	70-90	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, subalpine fir, and spruce. The forest understory is dominated by menziesia, Labrador tea, coneflower, and sitka alder. Inclusions of moist forest openings are dominated by bluejoint, sedges, false hellebore, willow, and sitka alder.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/bluejoint (ABLA/CACA), and subalpine fir/woodrush (ABLA/LUHI) are the dominant HTs. ABLA/MEFE occupies about 55 percent of the map unit. Secondary understory plants indicate soil moisture regime differences in the ABLA/MEFE HT within this map unit. The occurrence of coneflower, Labrador tea, and false hellebore indicate seasonal high water tables. ABLA/CACA occurs in somewhat poorly-drained areas and occupies about 20 percent of the map unit. ABLA/LUHI occurs at the upper limits of this map unit and along some ridgetop positions. Seasonal water tables are less significant but persistent snowbanks and cold are associated with this HT. This HT occupies about 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Moist forest openings occur along low gradient streams and in poorly-drained depressions. These sites have a year-long high water table and pose severe limitations to timber and road management.

GEOLOGY

The unit is underlain by granitics and associated rocks of the Idaho Batholith. Concave depressions or basin sideslopes are underlain by intermittently compacted and less dense glacial tills. Till materials can vary from coarse and sandy to medium textured. These materials perch water. Ridges are mostly underlain by residual materials.

SOILS

Map Unit Summary: Soils are well-drained to somewhat poorly-drained depending on position of slope. These soils are moderately coarse to medium textured. Soil surface layers are formed in volcanic ash influenced loess. Surface layer color and soil drainage varies with topographic position. Moderately well-drained and somewhat poorly-drained soils are on compacted till soils in basin and lower slope positions. They have dark colored surface layers. Well-drained soils are on ridges and have light colored surface layers. Subsoils contain 30 to 55 percent rock fragments.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have light colored surface layers formed in volcanic ash influenced loess. Similar soils are Andic Cryochrepts, loamy skeletal, mixed. They have sandy loam textures with a higher fine fraction content. These soils occupy about 50 percent of the map unit.

Andic Cryumbrepts, loamy skeletal, mixed have dark colored surface layers formed in volcanic ash influenced loess. They have subsoils with more than 35 percent rock fragments. Similar soils have less than 30 to 35 percent rock fragments and are Andic Cryumbrepts, coarse loamy, mixed. These soils occupy about 40 percent of the map unit.

Included are up to 10 percent dissimilar soils. Aquepts occur along low gradient streams and depressions. These soils are saturated year-long and pose severe limitations to timber and road management.

Representative Profiles:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown extremely gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown extremely gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

Andic Cryumbrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown loams about 8 inches thick. Subsoils are yellowish brown very gravelly coarse sandy loams about 10 inches thick. Substrata are dark grayish brown gravelly and very gravelly coarse sandy loams to a depth of 60 inches or more. Substrata have grey and red mottles throughout.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Tractor operation is limited by wet areas with low bearing strength. Compaction, rutting, and severe erosion can occur. Some soils rarely dry during the harvest season. Cable or aerial logging systems or designated logging on snow and hand piling slash can minimize impacts. Water table rise after harvest on concave slopes can limit regeneration. ABLA/LUHI HTs have harsh climates that can limit regeneration.

38KA

Roads: Erosion occurs from rutting and tread wear on unsurfaced roads and along ditches on grades above 6 percent. Excavation can intercept large amounts of ground water. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent big game late summer range. The inherent diversity provides an optimal combination of forage and cover. Moist forest openings are often selected for wallow sites. Prescribed burning or timber harvest are tools for habitat enhancement in large expanses of conifers to increase habitat diversity.

Fisheries: The low gradient streams that occur in this map unit can provide good fish habitat. Most streams are shallow, but overhanging banks and deep pools provide good cover when present.

Watershed: This map unit receives high annual precipitation and groundwater moves slowly through this landform creating high soil moisture for prolonged periods. Operating equipment in moist draws and depressions when soils are wet can cause ruts and soil puddling which concentrates runoff water. Concentrated runoff causes rilling and gullying of relatively gently slopes. Roads, skid trails, and fireline have a very high erosion hazard. Many live streams traverse this map unit and sediment delivery efficiency is moderate.

38QA

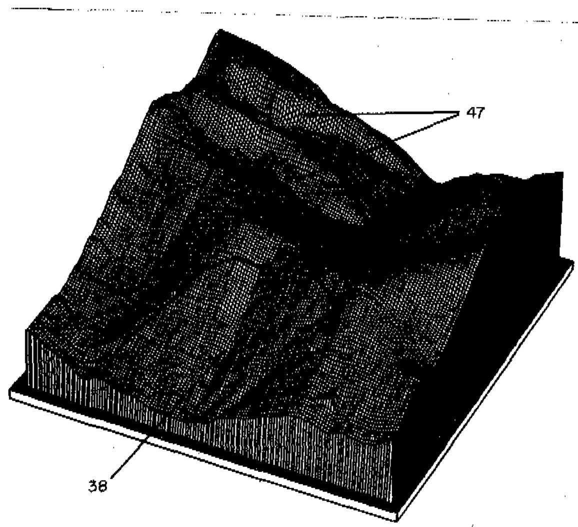
Andic Cryochrepts-Aquic Cryochrepts complex, undulating uplands

SUMMARY

The map unit occurs on high elevation undulating uplands. Vegetation consists of subalpine forests. Soils form in volcanic ash influenced loess overlying material from metasedimentary rocks.

LANDFORM

The landform consists of rolling, undulating uplands which form gentle basins at the headwaters of major stream systems. Hydrologic recharge of these basins is high. Seasonally high water tables are an important feature of this landscape. Drainage systems are deranged to somewhat dendritic with low gradient sections forming poorly and somewhat poorly-drained inclusions. Perched water tables occur in this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Northerly	5000-6800	50-60	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, western larch, subalpine fir, and spruce. The forest understory is dominated by menziesia, queencup beadlily, coneflower, beargrass, and sitka alder. Inclusions of moist forest openings are dominated by bluejoint, sedges, false hellebore, willow, and sitka alder.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/bluejoint (ABLA/CACA), and subalpine fir/queencup beadlily (ABLA/CLUN) are the dominant HTs. ABLA/MEFE occupies about 40 percent of the map unit. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). ABLA/CLUN occurs on benches and concave areas and occupies about 30 percent of the map unit. A similar HT is grand fir/queencup beadlily (ABGR/CLUN) that occurs in some delineations below 5400 feet. Secondary understory plants indicate soil moisture regime differences in these HTs. The occurrence of coneflower, Labrador tea, and false hellebore indicate seasonal high water tables. ABLA/CACA occurs in somewhat poorly-drained areas and occupies about 20 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Moist forest openings occur along low gradient streams and in poorly-drained depressions. These sites have a year-long high water table and pose severe limitations to timber and road management.

GEOLOGY

The unit is underlain by quartzite, siltite, and argillite of the Belt Supergroup. Concave depressions or basin sideslopes are underlain by intermittently compacted and less dense glacial tills. Till materials can vary from coarse and sandy to medium textured. These materials perch water. Ridges are mostly underlain by residual materials.

SOILS

Map Unit Summary: Soils are well-drained to moderately well-drained depending on position of slope. These soils are moderately coarse to medium textured. Soil surface layers are formed in volcanic ash influenced loess. Soil drainage varies with topographic position. Moderately well-drained soils are along benches, lower slope positions, and in compacted till soils in basin positions. Well-drained soils are on along ridges and upper convex slopes. Subsoils contain 35 to 55 percent rock fragments.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have light colored surface layers formed in volcanic ash influenced loess. These soils are well-drained and support subalpine forests. Similar soils are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid. They support moist, mixed coniferous forests. These soils occupy about 60 percent of the map unit.

Aquic Cryochrepts, loamy skeletal, mixed have thin, dark colored surface layers formed in volcanic ash influenced loess. Subsoil mottling characterizes seasonal and fluctuating high water tables. Similar soils have thicker dark colored surface layers and are Andic Cryumbrepts, loamy skeletal, mixed. These soils occupy about 30 percent of the map unit.

Included are up to 10 percent dissimilar soils. Aquepts occur along low gradient streams and depressions. These soils are saturated year-long and pose severe limitations to timber and road management.

Representative Profiles:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown extremely gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown extremely gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

Aquic Cryochrepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 4 inches thick. Subsoils are light brown gravelly silty clay loams about 12 inches thick with many distinct mottles. Substrata are brown gravelly loams with many large distinct mottles to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Terrain is well suited to tractor operation on well-drained soils. Tractor operation is limited in wet areas by low bearing strength. Compaction, rutting, and severe erosion can occur. Some soils rarely dry during the harvest season. Cable or aerial logging systems or designated logging on snow and hand piling slash can minimize impacts. Water table rise can occur on moderately well-drained soils after harvest which can limit regeneration.

Roads: Excavation can intercept large amounts of ground water. Road drainage systems must handle unusually large volumes of runoff. Roads built on well-drained soils should perform well with standard location, construction, and maintenance practices. Roads are dusty when dry.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent big game late summer range. The inherent diversity provides an optimal combination of forage and cover. Moist forest openings are often selected for wallow sites. Prescribed burning or timber harvest are tools for habitat enhancement in large expanses of conifers to increase habitat diversity.

Fisheries: The low gradient streams that occur in this map unit can provide good fish habitat. Most streams are shallow, but overhanging banks and deep pools provide good cover when present.

Watershed: This map unit receives high annual precipitation and groundwater moves slowly through this landform creating high soil moisture for prolonged periods. Operating equipment in moist benches and depressions when soils are wet can cause ruts and soil puddling which concentrates runoff water. Concentrated runoff causes rilling and gullying of relatively gently slopes. Roads, skid trails, and fireline have a moderate erosion hazard. Many live streams traverse this map unit and sediment delivery efficiency is moderate.

40KA

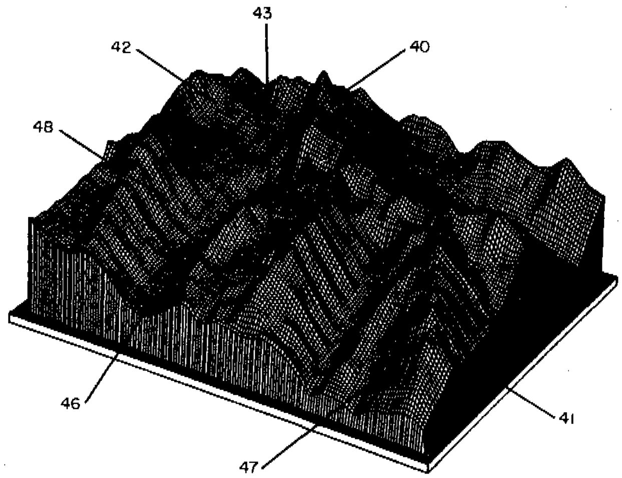
Rock Outcrop-Cryochrepts complex, glacial cirque headwalls

SUMMARY

The map unit occurs on glacial cirque headwalls and alpine ridges. Vegetation is upper subalpine forest. Soils form in volcanic ash influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of very steep alpine ridges or aretes, amphitheater-shaped cirque headwalls. Slopes are nearly vertical on upper slopes changing to concave at the lower slopes. Tarns or glacial lakes often occur in the basins beneath these headwalls. Runoff is concentrated by these landforms and converges in the basins below. Avalanche chutes are characteristic features of the landscape.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-85	Northerly	6000-8000	80-100	35-50

VEGETATION

Existing: Vegetation is a complex of mixed forest, alpine openings, avalanche chutes, and rock. Mixed forests are dominated by subalpine fir, spruce, and whitebark pine. Forest understories are dominated by grouse whortleberry, woodrush, and beargrass. Alpine openings have similar vegetation as grassy balds and are dominated by sedges, alpine grasses such as tufted hairgrass, beargrass, and many flowering forbs. Avalanche chutes are dominated by forbs, alder, menziesia, and some scattered pockets of conifers.

Habitat Type (HT) Composition: Subalpine fir/woodrush (ABLA/LUHI) and subalpine fir/menziesia-woodrush (ABLA/MEFE-LUHI) are the most important HTs in the mixed forest component. They occur where soils are deeper and on slopes not often influenced by avalanche. These HTs occupy up to 40 percent of the map unit. Subalpine fir/beargrass-grouse whortleberry (ABLA/XETE-VASC) occurs along ridges that do not support LUHI. This HT occupies up to 15 percent of the map unit. Alpine openings, rock outcrop, and avalanche chutes occupy up to 40 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Subalpine fir/menziesia (ABLA/MEFE) occurs on lower elevation toeslopes above basins. Harsh climate is moderated on this portion of the landform and productivity is higher.

40KA

GEOLOGY

The unit is underlain by granites of the Idaho Batholith. Mica schist and gniess are included as similar bedrock types. These rock types form hard bedock outcrops in this map unit.

SOILS

Map Unit Summary: Rock outcrop and talus are major components. Soils are somewhat excessively drained and moderately coarse to coarse. Subsoils contain 55 to 90 percent rock fragments. Soil depth ranges from 12 to 40 inches. Most soil surface layers are formed in volcanic ash influenced loess.

Composition:
Rock outcrop and talus occur throughout and occupy from 35 to 50 percent of the map unit.

Cryochrepts occur between rock outcrops and talus deposits. They have moderately coarse subsoils. Similar soils have coarse textured subsoils and are Cryorthents. These soils occupy up to 50 percent of the map unit.

Representative Profile:
Cryochrepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are light yellowish brown loams from 2 to 8 inches thick. Subsurface layers are light gray extremely gravelly coarse sandy loams from 4 to 8 inches thick. Substrata are pale brown extremely gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is low. Steep slopes, sparse timber, and rock limit access for timber harvest. Rock and harsh high elevation climate severly limit regeneration. Natural regeneration recovery period is long.

Roads: Excavation is frequently limited by hard bedrock. Material exposed by road construction is subject to cutbank and fill sloughing. Avalanches increase maintenance costs. Tread erosion tends to remove fine material. The remaining cobble forms a rough surface. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Rock outcrops provide mountain goat habitat. Talus provides habitat for pikas and hoary marmots. These sites in turn provide feeding opportunities for predators such as wolverines and fishers. Deeper soils provide habitat for Columbian and golden-mantle ground squirrels. Habitat enhancement opportunities are minimal.

Fisheries: Perennial streams do not occur due to the steepness and location of this map unit.

Watershed: Roads, skid trails, and firelines have a moderate erosion hazard. Slope steepness is high and sediment delivery efficiency is very high. Potential for landslides and avalanches is high.

40QA

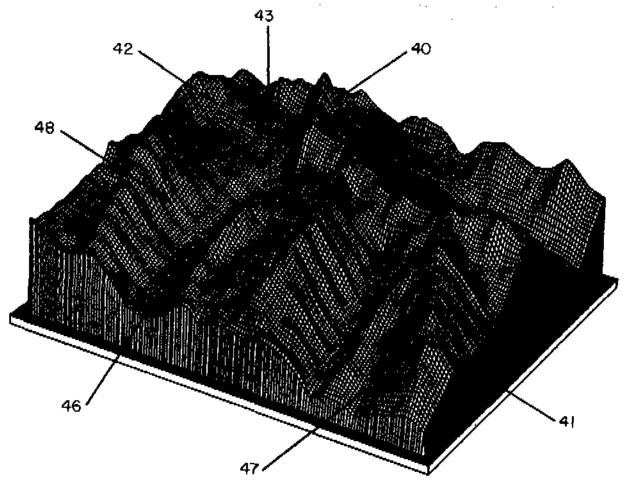
Cryandepts-Rock Outcrop complex, glacial cirque headwalls

SUMMARY

The map unit occurs on glacial cirque headwalls and alpine ridges. Vegetation is upper subalpine forest. Soils form in volcanic ash influenced loess overlying material from metasedimentary rock.

LANDFORM

The landform consists of very steep alpine ridges or aretes, amphitheater-shaped cirque headwalls. Slopes are nearly vertical on upper slopes changing to concave at the lower slopes. Tarns or glacial lakes often occur in the basins beneath these headwalls. Runoff is concentrated by these landforms and converges in the basins below. *Avalanche chutes are a characteristic* feature of the landscape.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-85	Northerly	6000-8000	80-100	20-40

VEGETATION

Existing: Vegetation is a complex of mixed forest, alpine openings, avalanche chutes, and rock. Mixed forests are dominated by subalpine fir, spruce, and whitebark pine. Forest understories are dominated by grouse whortleberry, woodrush, and beargrass. Alpine openings have similar vegetation to grassy balds and are dominated by sedges, alpine grasses such as tufted hairgrass, beargrass, and many flowering forbs. Avalanche chutes are dominated by forbs, alder, menziesia, and some scattered pockets of conifers.

Habitat Type (HT) Composition: Subalpine fir/woodrush (ABLA/LUHI) and subalpine fir/menziesia-woodrush (ABLA/MEFE-LUHI) are the most important HTs in the mixed forest component. They occur where soils are deeper and on slopes not often influenced by avalanche. These HTs occupy up to 60 percent of the map unit. Alpine openings, rock outcrop, and avalanche chutes occupy up to 35 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Subalpine fir/menziesia (ABLA/MEFE) occurs on lower elevation toeslopes above basins. Harsh climate is moderated on this portion of the landform and productivity is higher.

40QA

GEOLOGY

The unit is underlain by quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured and ground water moves freely through bedrock.

SOILS

Map Unit Summary: Rock outcrop and talus are major components. Soils are well-drained and moderately coarse to medium textured. Subsoils contain 55 to 90 percent rock fragments. Soil depth ranges from 12 to 40 inches. Soil surface layers are formed in volcanic ash influenced loess.

Composition:
Rock outcrop and talus occur throughout and occupy from 20 to 40 percent of the map unit.

Cryandepts occur between rock outcrops and talus deposits. They have moderately coarse subsoils. Loess surface layers are 17 to 20 inches thick. Some Cryandepts have dark colored surface layers. Similar soils have loess surface layers 10 to 16 inches thick and are Cryochrepts. These soils occupy up to 80 percent of the map unit.

Representative Profile:
Cryandepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown very gravelly silt loams about 5 inches thick. Subsurface layers are dark brown very cobbly silt loams about 11 inches thick. Substrata are yellowish brown extremely cobbly sandy loams to a depth of 40 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is low. Steep slopes, sparse timber, and rock limit access for timber harvest. Rock and harsh high elevation climate severely limit regeneration. Natural regeneration recovery period is long.

Roads: Excavation is frequently limited by hard bedrock. Material exposed by road construction is subject to cutbank sloughing. Avalanches increase maintenance costs. Tread erosion tends to remove fine material. The remaining cobble forms a rough surface. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Rock outcrops provide mountain goat habitat. Talus provides habitat for pikas and hoary marmots. These sites in turn provide feeding opportunities for predators such as wolverines and fishers. Deeper soils provide habitat for Columbian and golden-mantle ground squirrels. Habitat enhancement opportunities are minimal.

Fisheries: Perrenial streams do not occur due to the steepness and location of this map unit.

Watershed: Roads, skid trails, and firelines have a moderate erosion hazard. Slope steepness is high and sediment delivery efficiency is very high. Potential for landslides and avalanches is high.

41KA

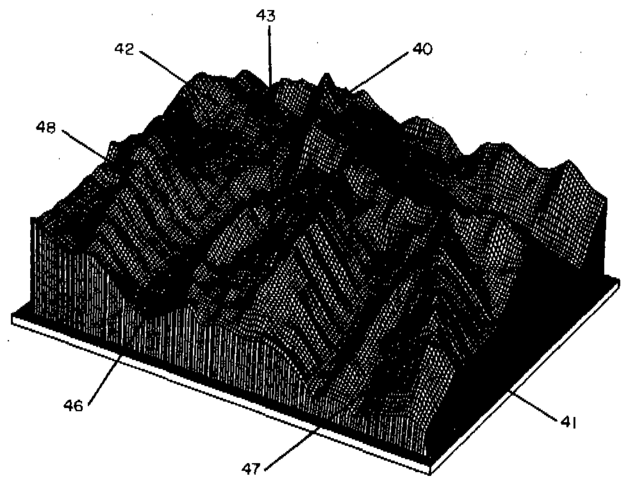
Cryochrepts complex, steep subalpine mountain slopes

SUMMARY

The map unit occurs on steep subalpine ridges and headwalls. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of very steep subalpine ridges, forested glacial cirque headwalls, and very steep, high elevation mountain slopes. These landscapes receive and transport high amounts of precipitation. Avalanche chutes are an occasional feature.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-100	Northerly	5500-6800	60-80	20-40

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, Douglas-fir, lodgepole pine, and western larch. Forest understories are dominated by menziesia, mountain maple, and sitka alder.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is the major HT. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). These HTs occupy about 75 percent of the map unit. Some delineations in the lower elevation range for this unit have subalpine fir/queencup beadlily (ABLA/CLUN) which occupies less than 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) occurs on southerly inclusions. Productivity is slightly lower and there is less competition for regeneration from shrub species. Subalpine fir/woodrush (ABLA/LUHI) occurs in some delineations above 6500 feet. This HT indicates a harsh high elevation climate that has slow regeneration recovery periods.

41KA

GEOLOGY

The unit is underlain by granites and associated rocks of the Idaho Batholith.

SOILS

Map Unit Summary: *Soils are somewhat excessively drained and moderately coarse. Soil surface layers are* formed in volcanic ash influenced loess. Subsoils contain 55 to 90 percent rock fragments. Soil depth varies from shallow to moderately deep.

Composition:
Cryochrepts have loess surface layers about 8 to 12 inches thick. Shallow Cryochrepts have depths of less than 20 inches. These soils occupy up to 40 percent of the map unit. Moderately deep Cryochrepts have depths of 20 to 40 inches and occupy up to 40 percent of the map unit.

Included is 20 to 40 percent rock outcrop and talus.

Representative Profile:
Cryochrepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are light yellowish brown loams from 2 to 8 inches thick. Subsurface layers are light gray extremely gravelly coarse sandy loams from 4 to 8 inches thick. Substrata are pale brown extremely gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Steep slopes limit tractor operation. Regeneration competes for light and space with understory shrub vegetation. Regeneration limitations occur on ABLA/LUHI HT inclusions. Removal of timber can increase avalanche hazard.

Roads: Excavation is frequently limited by hard bedrock. Material exposed by road construction is subject to cutbank and fill sloughing. Avalanches can occur especially where previous evidence is noted. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: When associated with adjacent cirque basins this map unit provides good elk and deer late summer range. Where human disturbance is high, this unit provides important security cover. Opportunities to enhance habitat are minimal.

Fisheries: This map unit contains only small, high gradient streams which are generally above the range of fish use due to steepness and location.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a high erosion hazard. Slope steepness is high and slopes can be highly dissected. Sediment delivery efficiency is high. Potential for landslides is high. Avalanche hazard is moderate.

41QA

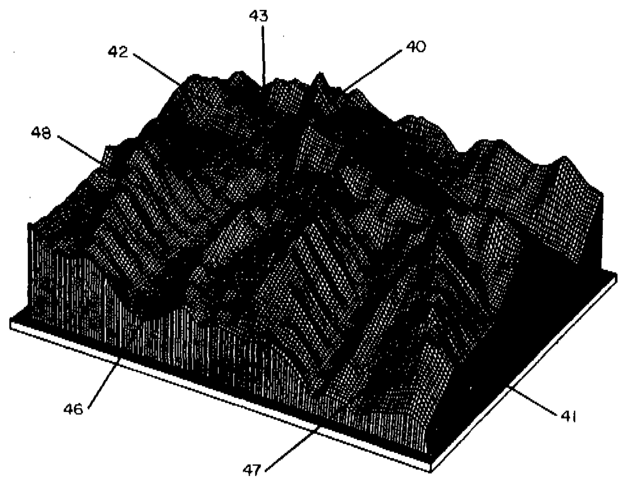
Entic Cryandepts-Lithic Cryandepts complex, steep subalpine mountain slopes

SUMMARY

The map unit occurs on steep subalpine ridges and headwalls. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from metasedimentary rocks.

LANDFORM

The landform consists of very steep subalpine ridges, forested glacial cirque headwalls, and very steep, high elevation mountain slopes. These landscapes receive and transport high amounts of precipitation. Avalanche chutes are an occasional feature.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
50-100	Northerly	4400-6600	55-65	20-40

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, Douglas-fir, lodgepole pine, and western larch. Forest understories are dominated by menziesia, mountain maple, and sitka alder.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is the major HT. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). These HTs occupy about 75 percent of the map unit. Some delineations in the lower elevation range for this unit have subalpine fir/queencup beadlily (ABLA/CLUN) which occupies less than 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) occurs on southerly inclusions. Productivity is slightly lower and there is less competition for regeneration from shrub species. Subalpine fir/woodrush (ABLA/LUHI) occurs in some delineations above 6500 feet. This HT indicates a harsh high elevation climate that can slow regeneration recovery periods. Avalanche chutes support forbs and shrubs. They do not support timber.

41QA

GEOLOGY

The unit is underlain by quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured near the surface and ground water moves freely through fractured bedrock.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. Soil surface layers are formed in thick deposits of volcanic ash influenced loess. Subsoils contain 55 to 90 percent rock fragments. Soil depth varies from shallow to moderately deep.

Composition:
Entic Cryandepts, medial skeletal, mixed have loess surface layers about 16 to 20 inches thick. Soil depth is 20 to 40 inches. These soils occupy up to 50 percent of the map unit.

Lithic Cryandepts, medial skeletal, mixed have loess surface layers about 10 to 20 inches thick. Soil depth is 10 to 20 inches. These soils occupy up to 30 percent of the map unit.

Included is 20 to 40 percent rock outcrop and talus.

Representative Profiles:
Entic Cryandepts, medial skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown very cobbly and extremely cobbly silt loams about 33 inches thick. Subsoils and substrata are brown extremely cobbly sandy loams to a depth of 40 inches thick.

Lithic Cryandepts, medial skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown very cobbly silt loams about 16 inches thick. Substrata are yellowish brown extremely cobbly sandy loams to a depth of 18 inches to bedrock.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Steep slopes limit tractor operation. Regeneration competes for light and space with understory shrub vegetation. Regeneration limitations occur on ABLA/LUHI HT inclusions. Removal of timber can increase avalanche hazard.

Roads: Excavation is frequently limited by hard bedrock. Material exposed by road construction is subject to cutbank and fill sloughing. Avalanches can occur especially where previous evidence is noted. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: When associated with adjacent cirque basins this map unit provides good elk and deer late summer range. Where human disturbance is high, this unit provides important security cover. Opportunities to enhance habitat are minimal.

Fisheries: This map unit contains only small, high gradient streams which are generally above the range of fish use due to steepness and location.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Slope steepness is high and slopes can be highly dissected. Sediment delivery efficiency is high. Potential for landslides is moderate. Avalanche hazard is moderate.

41SA

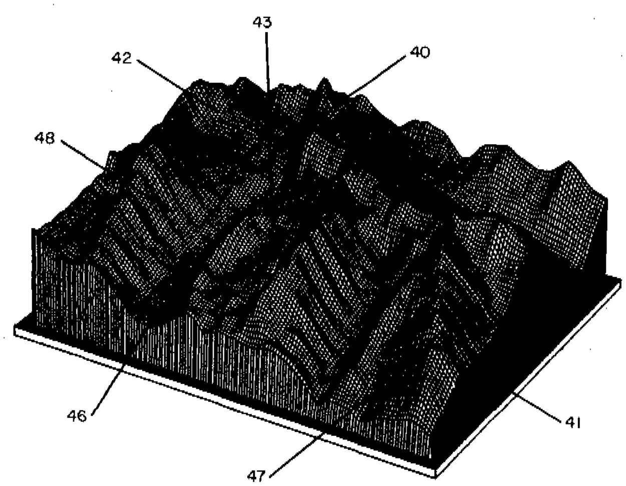
Cryochrepts complex, steep subalpine mountain slopes

SUMMARY

The map unit occurs on steep subalpine ridges and headwalls. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying materials from mica schists.

LANDFORM

The landform consists of very steep subalpine ridges, forested glacial cirque headwalls, and very steep, high elevation mountain slopes. These landscapes receive and transport high amounts of precipitation. Avalanche chutes are an occasional feature.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-100	Northerly	5500-6800	60-80	20-40

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, Douglas-fir, lodgepole pine, and western larch. Forest understories are dominated by menziesia, mountain maple, and sitka alder.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is the major HT. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). These HTs occupy about 75 percent of the map unit. Some delineations in the lower elevation range for this unit have subalpine fir/queencup beadlily (ABLA/CLUN) which occupies less than 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) occurs on southerly inclusions. Productivity is slightly lower and there is less competition for regeneration from shrub species. Subalpine fir/woodrush (ABLA/LUHI) occurs in some delineations above 6500 feet. This HT indicates a harsh high elevation climate that can slow regeneration recovery periods.

41SA

GEOLOGY

The unit is underlain by micaceous schists and gneiss. Included are moderately weathered granitics of the Idaho Batholith. Bedrock has many fracture zones that transport groundwater.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. Soil surface layers are formed in volcanic ash influenced loess. Subsoils contain 55 to 90 percent rock fragments. Soil depth varies from shallow to moderately deep.

Composition:
Cryochrepts have loess surface layers about 8 to 12 inches thick. Shallow Cryochrepts have depths of less than 20 inches. These soils occupy up to 40 percent of the map unit. Moderately deep Cryochrepts have depths of 20 to 40 inches and occupy up to 40 percent of the map unit.

Included is 20 to 40 percent rock outcrop and talus.

Representative Profile:
Cryochrepts have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are yellowish brown silt loams about 9 inches thick. Subsurface layers are light gray extremely gravelly silt loams about 9 inches thick. Substrata are light yellowish brown extremely gravelly silt loams to a depth of 40 inches.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Steep slopes limit tractor operation. Regeneration competes for light and space with understory shrub vegetation. Regeneration limitations occur on ABLA/LUHI HT inclusions. Removal of timber can increase avalanche hazard.

Roads: Excavation is frequently limited by hard bedrock. Material exposed by road construction is subject to cutbank and fill sloughing. Slope stability should be evaluated before locating roads. Avalanches can occur especially where previous evidence is noted. Road drainage systems must handle unusually large volumes of runoff.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: When associated with adjacent cirque basins this map unit provides good elk and deer late summer range. Where human disturbance is high, this unit provides important security cover. Opportunities to enhance habitat are minimal.

Fisheries: This map unit contains only small, high gradient streams which are generally above the range of fish use due to steepness and location.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a high erosion hazard. Slope steepness is high and slopes can be highly dissected. Sediment delivery efficiency is high. Potential for landslides is very high. Avalanche hazard is moderate.

42KA

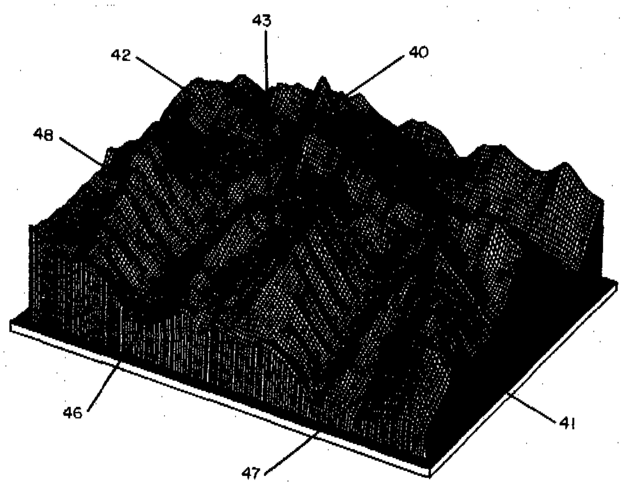
Andic Cryochrepts-Andic Cryumbrepts complex, glacial cirque basins

SUMMARY

The map unit occurs in glacial cirque bottoms. Vegetation is upper subalpine forest. Soils form in volcanic ash influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of concave alpine basins called cirques. These basins are relatively gentle but can contain a series of steep stair-step features between gentle concave benches. This landform collects runoff from adjacent steep slopes. Incised streams often cascade over these stair-step features forming the headwaters of major stream systems below. Small lakes are common on the benches between these steeper features.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Northerly	5800-7800	60-80	5-15

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, lodgepole pine, and western larch. Mountain hemlock is a major component west of Superior. Forest understories are dominated by menziesia, blue huckleberry, grouse whortleberry, queencup beadlily, beargrass, and woodrush. Somewhat poorly-drained sites support bluejoint, baneberry, sweetscented bedstraw, and false hellebore. Inclusions of moist meadow openings support tufted hairgrass, coneflower, sedges, false hellebore, cow parsnip, and numerous other forbs.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/woodrush (ABLA/LUHI), and subalpine fir/bluejoint (ABLA/CACA) are important HTs. ABLA/MEFE occurs below 6100 feet throughout and occupies about 25 percent of the map unit. A similar HT is mountain hemlock/menziesia (TSME/MEFE). ABLA/LUHI occurs above 6100 feet and occupies about 40 percent of the map unit. ABLA/CACA occurs along drainages and wet depressions and occupies about 25 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Moist meadow openings generally occur below cirque headwalls and in somewhat poorly-drained areas. Regeneration is limited by competition by forbs and grasses.

42KA

GEOLOGY

The unit is underlain by a complex of glacial deposits and moderately shallow, residual material from argillites, siltites, and quartzites of the Belt Supergroup. Rubble piles occasionally occur at the outer edge of the map unit.

SOILS

Map Unit Summary: Soils are well-drained to somewhat poorly-drained and moderately coarse to coarse. Soil surface layers are formed in deposits of volcanic ash influenced loess. Subsoils contain 35 to 65 percent rock fragments. Soil depth varies from shallow to moderately deep.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have loess surface layers about 8 to 14 inches thick. These soils are well-drained to moderately well-drained and support ABLA/MEFE and ABLA/LUHI HTs. These soils occupy about 50 percent of the map unit.

Andic Cryumbrepts mixed have dark colored loess surface layers about 10 to 14 inches thick. These soils are moderately well-drained to somewhat poorly-drained and support ABLA/CACA and moist meadow openings. These soils occupy about 35 percent of the map unit.

Included are up to 15 percent dissimilar soils and rock outcrop or talus. Lithic Cryochrepts, loamy skeletal, mixed are shallow soils with bedrock within 2 feet of the surface. These soils have less effective rooting depth. Rock outcrop or talus occupies 5 to 15 percent of the unit.

Representative Profiles:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsoils are very pale brown and yellowish brown very gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

Andic Cryumbrepts mixed have surface layers that are dark brown silt loams about 14 inches thick. Subsoils are dark yellowish brown very cobbly silt loams about 18 inches thick. Substrata are yellowish brown very gravelly silt loams to a depth to 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderately high to high. The terrain is well suited to tractor operation on benches. Designated skid trails that avoid wet areas will reduce potential for soil impacts. Windthrow can be a problem in wet areas. Site productivity depends on the relatively thin, fine textured soil surface layer. Observations indicate regeneration limitations can be expected on soils having dark colored surface layers. At the highest elevations, the harsh subalpine climate, indicated by ABLA/LUHI HT, slows stand re-establishment.

Roads: Excavation can intercept large amounts of ground water. Maintaining road drainage can be difficult because of gentle terrain. Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent.

Wildlife: This unit provides excellent late summer and fall range for elk and deer. Forage is available from forbs, shrubs, and grasses. At lower elevations diversity diminishes. Creating openings and vegetative manipulation to increase forage can enhance habitat. Treatment should be carefully evaluated against natural food availability.

Fisheries: Streams form at the lower edge of this map unit, but are very shallow with a high pool-riffle ratio. Channels have a stairstep character and some sections have very steep gradients. Morphology of low gradient reaches is easily damaged by pack stock. Reaches above and below the cirque lakes that occur in this unit serve as key spawning areas for resident introduced populations. Extreme winter conditions create a marginal environment for a self-sustaining fish population.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Slope steepness is low. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

42QA

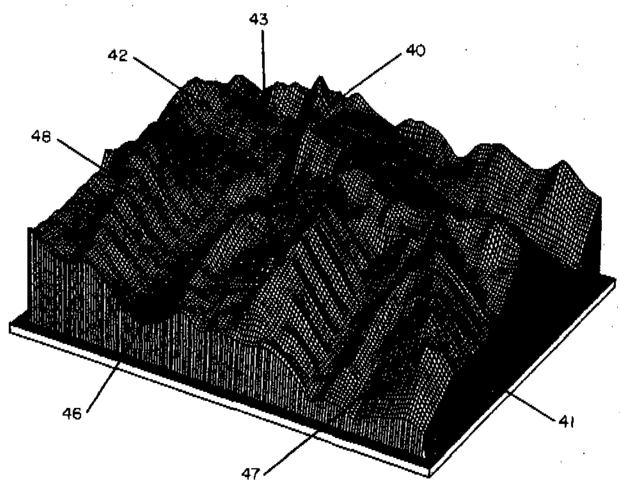
Andic Cryochrepts-Entic Cryandepts-Andic Cryumbrepts undifferentiated, glacial cirque basins

SUMMARY

The map unit occurs in glacial cirque bottoms. Vegetation is subalpine and upper subalpine forest. Soils form in volcanic ash influenced loess overlying material from metasedimentary rocks.

LANDFORM

The landform consists of concave alpine basins called cirques. These basins are relatively gentle but can contain a series of steep stair-step features between gentle concave benches. This landform collects runoff from adjacent steep slopes. Incised streams often cascade over these stair-step features forming the headwaters of major stream systems below. Small lakes are common on the benches between these steeper features.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-30	Northerly	5400-6700	60-80	5-15

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, lodgepole pine, and western larch. Mountain hemlock is a major component west of Superior. Forest understories are dominated by menziesia, blue huckleberry, grouse whortleberry, queencup beadlily, beargrass, and woodrush. Somewhat poorly-drained sites support bluejoint, baneberry, sweetscented bedstraw, and false hellebore. Inclusions of moist meadow openings support tufted hairgrass, coneflower, sedges, false hellebore, cow parsnip, and numerous other forbs.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/woodrush (ABLA/LUHI), and subalpine fir/bluejoint (ABLA/CACA) are important HTs. ABLA/MEFE occurs below 6100 feet throughout and occupies about 30 percent of the map unit. A similar HT is mountain hemlock/menziesia (TSME/MEFE). ABLA/LUHI occurs above 6100 feet and occupies about 35 percent of the map unit. ABLA/CACA and ABLA/CLUN occur along drainages and wet depressions and occupy about 15 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) in delineations east of Alberton where lower precipitation and well-drained soils contribute to drier summer conditions. Productivity is lower and there is less competition for regeneration from shrub species. Moist meadow openings generally occur below cirque headwalls and in somewhat poorly-drained areas. Regeneration is limited by competition from forbs and grasses.

GEOLOGY

The unit is underlain by a complex of glacial deposits and moderately shallow, residual material from argillites, siltites, and quartzites of the Belt Supergroup. Rubble piles occasionally occur at the outer edge of the map unit.

SOILS

Map Unit Summary: Soils are well-drained to somewhat poorly-drained and moderately coarse to medium textured. Soil surface layers are formed in deposits of volcanic ash influenced loess. Loess surface layer thickness varies with geography. Subsoils contain 35 to 65 percent rock fragments. Soil depth varies from shallow to moderately deep.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers about 8 to 14 inches thick. They occur more often in delineations east of Alberton where loess surface layers tend to be thinner. These soils are well-drained to moderately well-drained and support ABLA/MEFE, ABLA/CLUN, and ABLA/LUHI HTs.

Entic Cryandepts, medial over skeletal, mixed have loess surface layers about 14 to 20 inches thick. These soils occur more often in delineations west of Alberton where loess surface layers are thicker. Soils are well-drained to moderately well-drained and support ABLA/MEFE, ABLA/CLUN, and ABLA/LUHI HTs.

Andic Cryumbrepts, loamy skeletal, mixed have dark colored loess surface layers about 10 to 14 inches thick. Similar soils have slightly thicker dark colored loess surface layers. They are Typic Cryandepts, medial skeletal, mixed. These soils are moderately well-drained to somewhat poorly-drained and support ABLA/CACA, ABLA/CLUN, and moist meadow openings.

Every delineation has at least one of these soils and can have all.

Included are up to 15 percent dissimilar soils and rock outcrop or talus. Lithic Cryandepts, medial-skeletal, mixed are shallow soils with bedrock within 2 feet of the surface. These soils have less effective rooting depths. Trees are more susceptible to windthrow and productivity is less.

Representative Profiles:
Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 8 to 14 inches thick. Subsoils are light gray very gravelly sandy loams to loams about 10 inches thick. Substrata are very pale brown very gravelly sandy loams to loams to a depth of 40 inches or more.

Entic Cryandepts, medial over skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown cobbly silt loams about 15 inches thick. Subsurface layers are light brownish gray very cobbly fine sandy loams about 3 inches thick. Subsoils are light yellowish brown extremely cobbly silt loams about 17 inches thick. Substrata are light yellowish brown extremely cobbly silt loams and fractured siltite to a depth of 40 inches or more.

Andic Cryumbrepts, loamy skeletal, mixed have dark brown silt loam surface layers about 1 inch thick. Subsoils are dark yellowish brown very cobbly silt loams about 18 inches thick. Substrata are yellowish brown very gravelly silt loams to a depth of 40 inches or more.

42QA

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderately high to high. The terrain is well suited to tractor operation on benches. Designated skid trails that avoid wet areas will reduce potential for soil impacts. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Observations indicate regeneration limitations can be expected on soils having dark colored surface layers. The harsh subalpine climate, indicated by ABLA/LUHI HT, slows stand re-establishment at the highest elevations. Regeneration competes for light and space in ABLA/MEFE HT.

Roads: Excavation can intercept large amounts of ground water. Maintaining road drainage can be difficult because of gentle terrain. Native road surfaces that incorporate silty loess surface layers have low bearing capacity when wet.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent late summer and fall range for elk and deer. Forage is available from forbs, shrubs, and grasses. At lower elevations diversity diminishes. Creating openings and vegetative manipulation to increase forage can enhance habitat. Treatment should be carefully evaluated against natural food availability. Within occupied grizzly bear habitat, this unit provides an important late summer feeding area. Grizzly bear foods include forbs available from somewhat poorly-drained areas and meadows, and from huckleberries in the forest understory.

Fisheries: Streams form at the lower edge of this map unit, but are very shallow with a high pool-riffle ratio. Channels have a stairstep character and some sections have very steep gradients. Morphology of low gradient reaches is easily damaged by pack stock. Reaches directly above and below the cirque lakes that occur in this unit serve as key spawning areas for resident introduced populations. Extreme winter conditions create a marginal environment for a self-sustaining fish population.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Slope steepness is low. Sediment delivery efficiency is low. Only practices which disturb soil on or near streams have a high potential for increasing sediment.

43QA

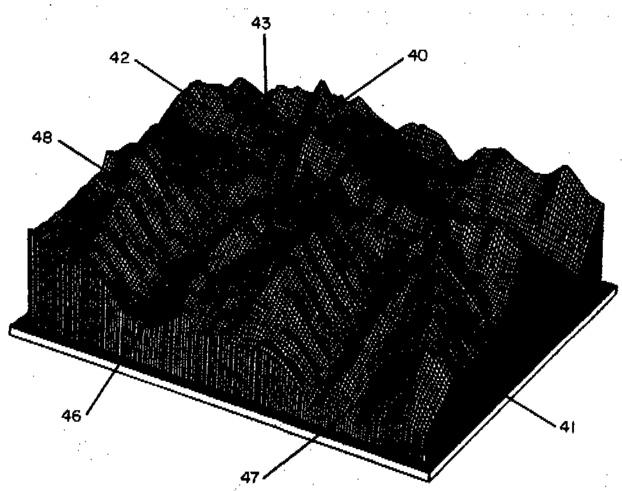
Entic Cryandepts, cool

SUMMARY

The map unit occurs in high elevation basins. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from metasedimentary rocks.

LANDFORM

The landform consists of concave, moderate to moderately steep stream basins. These basins are amphitheater-shaped some probably being of glacial or nivational origin. Inclusions of slopes from 45 to 55 percent occur near map unit boundaries. Drainages are perennial, can be densely spaced, and converge in an apex at the lower boundary of the map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
20-45	Northerly	4800-6000	55-65	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, lodgepole pine, and western larch. Mountain hemlock is a major component west of Superior. Forest understories are dominated by menziesia, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is the dominant HT. A similar HT is mountain hemlock/menziesia (TSME/MEFE). These HTs occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) occurs on southerly inclusions. Productivity is lower and competition to regeneration by shrubs is less. Subalpine fir/bluejoint (ABLA/CACA) occurs in wet inclusions and along stream channels. Productivity is very high and high water tables pose limitations to equipment operation and road management.

43QA

GEOLOGY

The unit is underlain by a complex of glacial deposits and residual material from argillites, siltites, and quartzites of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are well-drained to moderately well-drained and moderately coarse to medium textured. Soil surface layers are formed in deposits of volcanic ash influenced loess about 14 to 20 inches thick. Subsoils contain 35 to 65 percent rock fragments. Soil depth varies from moderately deep to deep.

Composition:
Entic Cryandepts, medial over loamy skeletal, mixed have loess surface layers about 14 to 20 inches thick. Similar soils have loess surface layers about 10 to 14 inches thick and are Andic Cryochrepts, loamy skeletal, mixed. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils. Typic Cryandepts, medial over skeletal, mixed have dark colored loess surface layers and are moderately well-drained in this map unit. Aquic Cryochrepts have mottling in the subsoil indicating seasonal high water tables. They support wet indicator forbs or moist meadow openings.

Representative Profile:
Entic Cryandepts, medial over skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown cobbly silt loams about 15 inches thick. Subsurface layers are light brownish gray very cobbly fine sandy loams about 3 inches thick. Subsoils are light yellowish brown extremely cobbly silt loams about 17 inches thick. Substrata are light yellowish brown extremely cobbly silt loams and fractured siltite to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is very high. This map unit contains slopes well suited for tractor operation. Compaction of soil surface layers can lower soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Regeneration competes for light and space with menziesia.

Roads: Excavation can intercept large amounts of ground water. Approach through stream crossings can be difficult because of the incised nature of the streams at the lower elevation boundary of this unit. Brush tends to encroach on roads.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides good late summer and fall range for elk and deer. Forage availability can be created with openings and vegetative manipulation. Treatment should be carefully evaluated against natural food availability. Within occupied grizzly bear habitat, this unit provides an important late summer feeding area. Grizzly bear foods includes forbs available from somewhat poorly-drained areas and meadows, and from huckleberries in the forest understory.

Fisheries: Streams are very shallow with a high pool-riffle ratio. Channel gradients can vary from very steep to moderately low within short reaches. These streams may support marginal small fish populations, but mainly are important because of their potential to deliver sediment to major channels below. Most lakes that occur in this map unit are too shallow to overwinter fish.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Slope steepness is low to moderate. Stream density is high and channels can be incised. Sediment delivery efficiency is moderate.

43QB

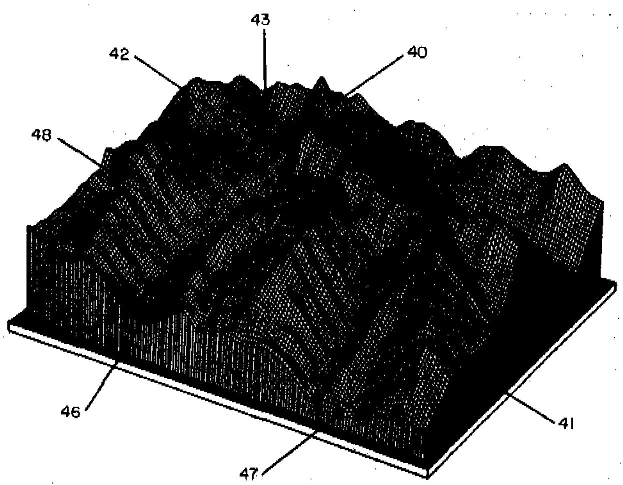
Andic Cryumbrepts, cool

SUMMARY

The map unit occurs in high elevation basins. Vegetation is moist forest openings. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of concave, moderate to moderately steep slopes and basins. This map unit commonly occurs on glaciated mountain slopes and steep subalpine ridges and headwalls. Springs surface seasonally and overland flow is common on slopes vegetated with forbs.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
20-45	Northerly	4800-6000	55-65	0

VEGETATION

Existing: Vegetation is a moist forb/shrubfield meadow community with occasional spruce and subalpine fir especially along the map unit perimeter. Community vegetation includes coneflower, sitka alder, false hellebore, and braken fern.

Habitat Type (HT) Composition: No HT represents this community well to date. Moist meadow opening community occupies about 95 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occur along map unit bounds. Although these sites support conifers, there is a undefined tension zone that creates limitations to regeneration. Further into the forested stand where soil surface color is less dark, there are few limitations to regeneration.

GEOLOGY

The unit is underlain by moderately weathered argillites and siltites of the Belt Supergroup. Because of high amounts of moisture flowing through the soil mantle, fractured surface bedrock layers are moderately weathered.

43QB

SOILS

Map Unit Summary: Soils are well-drained to moderately well-drained and medium textured. Soil surface layers are formed in deposits of volcanic ash influenced loess. Surface layers are dark in color, have high amounts of organic matter, and have low base saturation. Subsoils contain 35 to 55 percent rock fragments.

Composition:
Andic Cryumbrepts have dark colored loess surface layers about 8 to 14 inches thick. Similar soils have dark colored loess surface layers about 14 to 18 inches thick and are Typic Cryandepts, medial over skeletal, mixed. These soils occupy about 95 percent of the map unit.

Included are up to 5 percent dissimilar soils. Andic Cryochrepts, loamy skeletal, mixed support subalpine forests. Few regeneration limitations exist on these soils.

Representative Profile:
Andic Cryumbrepts have dark brown silt loam surface layers about 14 inches thick. Subsoils are dark yellowish brown very cobbly silt loams about 18 inches thick. Substrata are yellowish brown very gravelly silt loams to a depth to 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: This map unit contains only scattered trees. Regeneration is severely limited by a not well understood complex of environmental factors. The dark surface layers and vegetation community appear to indicate where regeneration limitations will occur. This unit is poorly suited to timber management.

Roads: Excavation can intercept large amounts of ground water. Unsurfaced roads rut when wet. Spot surfacing will help protect the road surface. Material exposed by road construction tends to slough on steep cutbanks.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent late summer and fall range for elk and deer. Forage is available from a variety of forbs and grasses. Rodents such as Columbian ground squirrels are usually abundant, consequently such are favored late summer feeding areas for predators such as prairie falcons, coyotes, and wolverines. Within occupied grizzly bear habitat, this unit provides an excellent late summer food source. Grizzly bear foods include forbs, grasses, insects, and rodents. The steeper slopes can provide critical denning habitat. Habitat enhancement opportunities are minimal.

Fisheries: Spring activity is common. Where streams occur, gradients are
high. These streams may support marginal small fish populations, but mainly important bacause of their high potential to deliver sediment to major channels below. Most lakes that occur in this map unit are too shallow to overwinter fish.

Watershed: Skid trails and firelines have a high erosion hazard. Roads have a moderate erosion hazard. Slope steepness is moderate and sediment delivery efficiency is moderate. Potential for landslides and avalanches is high.

43SA

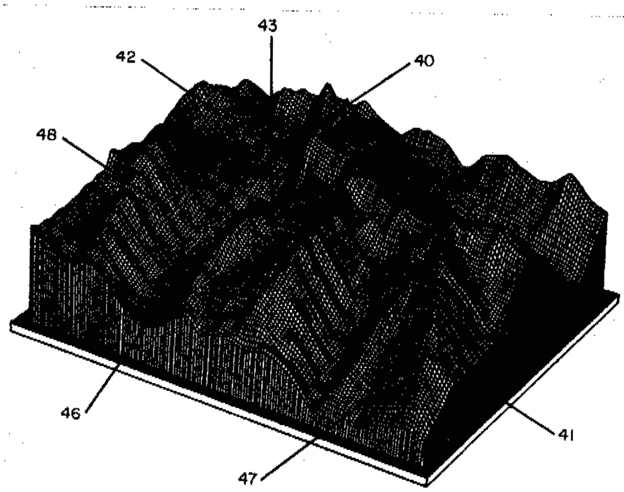
Andic Cryumbrepts, mica schist substratum

SUMMARY

The map unit occurs in high elevation basins. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from mica schist and associated rocks.

LANDFORM

The landform consists of concave, moderate to moderately steep stream basins. These basins are slightly amphitheater-shaped, some probably being of glacial or nivational origin. Inclusions of slopes from 45 to 55 percent occur near map unit boundaries. Springs surface throughout and generally form flowing streams at the lower boundary of this unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
20-45	Northerly	4800-6000	55-65	0

VEGETATION

Existing: Vegetation is a mixed forest dominated by subalpine fir, spruce, lodgepole pine, and western larch. Forest understories are dominated by bluejoint, false hellebore, coneflower, queencup beadlily, aspen, and arnica.

Habitat Type (HT) Composition: Subalpine fir/queencup beadlily (ABLA/CLUN) and subalpine fir/bluejoint (ABLA/CACA) are important HTs. A similar HT is spruce/cleft-leaf groundsel (PICEA/SEST). These HTs occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/beargrass (ABLA/XETE) and subalpine fir/menziesia (ABLA/MEFE) occurs along the boundary of this map unit. Productivity is slightly less and regeneration is not limited by water table rise.

GEOLOGY

The unit is underlain by mica schists associated with the border zone of the Idaho Batholith. Other associated bedrock are micaceous sandstones and phyllites. Upper bedrock layers are very fractured and splay off steep roadcuts easily. Rock fragments exposed on the surface weather rapidly. Soils have a high mica content.

Included are up to 10 percent dissimilar bedrock. Gneiss is a harder, more resistant to weathering bedrock associated with the Idaho Batholith. Gneiss is recognized by a characteristic banding of light and dark colored minerals. Soils have many, hard rock fragments, roadcuts are more stable, and soils are less erosive.

SOILS

Map Unit Summary: Soils are moderately well-drained to somewhat poorly-drained and moderately coarse to medium textured. Surface layers are silty and have a high amount of volcanic ash influenced loess. Subsoils contain 10 to 30 percent rock fragments and have high mica content.

Composition:
Andic Cryumbrepts have dark colored surface layers. Similar soils have light colored surface layers and are Aquic Cryochrepts. Both of these soils have fluctuating water tables which are dependent on the amount of vegetation growing on the site. These soils occupy about 80 percent of the map unit.

Included are up to 15 percent dissimilar soils. Andic Cryochrepts, loamy skeletal, micaceous support ABLA/XETE and ABLA/MEFE. Soils are well-drained and offer less limitations to road and timber management.

Representative Profile:
Andic Cryumbrepts have dark brown silt loam surface layers about 9 inches thick. Subsoils are brown silt loams about 18 inches thick. Substrata are grayish brown gravelly silt loams to a depth to 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Broken slope gradients and seasonal water tables limit tractor operation. Designated skid trails that avoid wet areas and using short-line cable systems to avoid wet areas will reduce potential for soil impacts. Water tables can rise after harvest which will limit regeneration.

Roads: Excavation can intercept large amounts of ground water. Native road surfaces rut severely impeding travel. Rock subgrade and filter cloth will help improve drainage in the road prism. Some delineations contain old slumps which can be activated by roads and timber harvest.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides excellent late elk and deer summer range. Aspen is a seral component which enhances elk and deer as well as songbird habitat. Regeneration timber harvest and broadcast burning is useful in reestablishing aspen communities.

Fisheries: Streams are very shallow with a high pool-riffle ratio. Channel gradients can vary from very steep to moderately low within short reaches. These streams may support marginal small fish populations, but mainly are important because of their potential to deliver sediment to major channels below. Most lakes that occur in this map unit are too shallow to overwinter fish.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Slope steepness is moderate and sediment delivery efficiency is moderate. Potential for landslides and slumps are high.

45UA

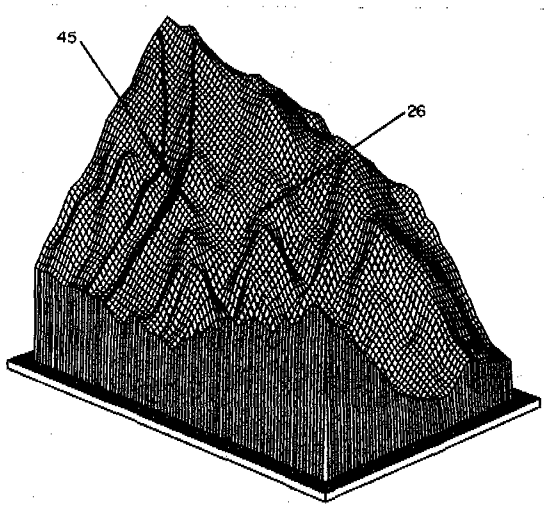
Cryumbrepts-Cryochrepts complex, avalanche chutes

SUMMARY

The map unit occurs on avalanche paths. Vegetation is forest openings characteristic of avalanche chutes. Soils form in material from metasedimentary rock.

LANDFORM

The landform consists of long narrow stringers on glaciated mountain slopes and very steep mountain slopes. Identifying features are existing avalanche scars, very steep headwalls, concave slopes, and lobate fans at the base. These steep slopes receive high accumulations of snow, have sparse vegetation, and therefore, are highly susceptible to avalanche. Perennial or intermittent streams are common and occur in steep incised drainages. Soil mantles carry high amounts of subsurface moisture.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
40-80	Variable	4800-8000	50-80	10-20

VEGETATION

Existing: Vegetation is a forest opening with scattered or clumps of sapling spruce and subalpine fir usually bent downslope due to force of avalanche. The avalanche path community consists of bracken fern, coneflower, elderberry, false hellebore, cow parsnip, thimbleberry, sitka alder, menziesia, and beargrass.

Habitat Type (HT) Composition: No HT represents this community well to date. The avalanche path community occupies about 95 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Subalpine fir/menziesia (ABLA/MEFE) occurs along the boundaries of this map unit. Avalanches are rare. Removal of trees increases risk of avalanche when adjacent to existing avalanche chutes.

GEOLOGY

The unit is underlain by quartzite, siltite, and argillite of the Belt Supergroup. Bedrock is highly fractured and ground water moves freely through bedrock.

45UA

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. Soil surface layers may or may not have surface layers formed in volcanic ash influenced loess. Subsoils contain 65 to 90 percent rock fragments and are extremely cobbly. Soil depth ranges from 25 inches to 40 inches increasing in depth downslope.

Composition:
Cryumbrepts have dark colored surface layers. They occur more often on the lower one-third of the slope where vegetation is abundant and surface soil movement is less common. These soils occupy up to 50 percent of the map unit.

Cryochrepts have light colored surface layers. They occur where vegetation is sparse and surface soil movement is common. These soils occur on the upper one-third of the slope and in delineations where avalanches are frequent. They occupy about 30 percent of the map unit.

Included are up to 20 percent dissimilar soils, rock outcrop and rubble. Lithic Cryochretps are shallow soils in steep headwall positions adjacent to rock outcrops. These soils support sparse vegetation. Rock outcrop or rubble occupy 10 to 20 percent of the unit.

Representative Profiles:
Cryumbrepts have soil surface layers that are dark brown gravelly silt loams about 8 inches thick. Subsoils are dark yellowish brown very cobbly silt loams about 18 inches thick. Substrata are yellowish brown very cobbly silt loams to a depth of 40 inches or more.

Cryochrepts have a soil surface covered by a layer of partially decomposed forest and graminoid litter about 1 inch thick. Surface layers are dark brown silt loams about 8 inches thick. Subsoils are light gray very gravelly sandy loams to loams about 10 inches thick. Substrata are very pale brown very cobbly sandy loams to loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: This map unit contains only scattered trees and is poorly suited to timber management.

Roads: Avalanches increase maintenance costs. Material exposed by road construction is subject to cutbank sloughing. Road drainage systems must handle unusually large volumes of runoff. Brush tends to encroach on roads.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Forb communities are utilized by mule deer, elk, and goats in summer and fall. Grizzly bears utilize the grass/forb communities in spring and early summer through mid summer. Berry producing shrubs provide food for songbirds, black bears, and grizzly bears. Rubble provides yearlong habitat for pikas and hoary marmots. Rock outcrops create excellent habitat for goats.

Fisheries: Intermittent streams occur in some of these map units. There is high potential to deliver sediment to major channels below.

Watershed: Roads have moderate erosion hazard. Slope steepness is high and sediment delivery efficiency is very high. Potential for avalanche is very high. Landslide potential is moderate to high.

46KA

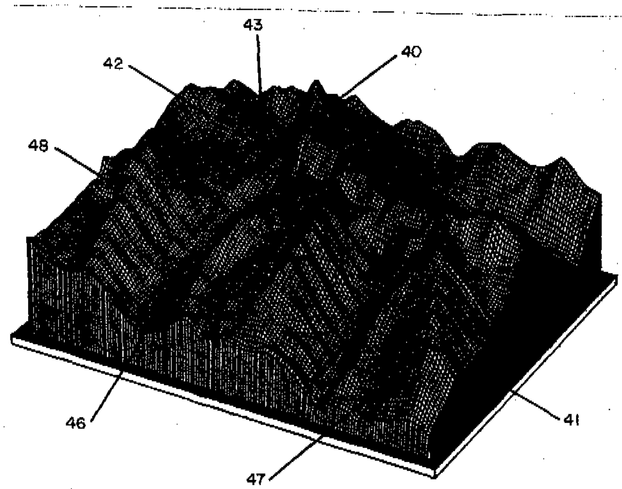
Andic Cryochrepts, glacial till substratum

SUMMARY

The map unit occurs on glacial valley trains. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying glacial till derived from granitics and associated rocks.

LANDFORM

The landform consists of mountain valley bottoms confined in narrow U-shaped glaciated drainages called glacial valley trains. These glaciated bottoms are long, relatively narrow and are gently sloping to undulating. They contain moderate gradient, perennial streams and associated ponded areas or poorly-drained inclusions. Springs are common along map unit boundaries with the steeper glaciated mountain slopes.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	5400-6600	50-70	0

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, spruce, lodgepole pine, western larch, and some Douglas-fir. The understory is dominated by important vegetation such as menziesia, queencup beadlily, sitka alder, mountain maple, elderberry, and thimbleberry. Aspen, willow and wet meadow vegetation occupy poorly-drained inclusions.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/queencup beadlily (ABLA/CLUN) are important HTs. ABLA/CLUN occurs in moist swales and near streams and occupies about 25 percent of the map unit. ABLA/MEFE occurs throughout the map unit and occupies about 50 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occurs on well-drained to somewhat excessively drained soils that tend to be sandier and have higher cobble content. Productivity is lower on these sites. Poorly-drained inclusions support moist meadow openings or forested riparian communities.

46KA

GEOLOGY

The unit is underlain by glacial till deposits derived from granitics and associated gniess and schist. Till deposits contain many cobbles to boulder sized rocks on the surface and at depth. Included are up to 10 percent dissimilar glacial deposits formed from silty lake sediments originating from old fill-in glacial lakes.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to coarse. Surface layers are formed in volcanic ash influenced loess and are about 8 to 10 inches thick. Subsoils contain 35 to 55 percent rock fragments. Boulder erratics are common on the surface.

Composition: Andic Cryochrepts, sandy skeletal, mixed have loamy sand and coarse sandy loam subsoils. Similar soils have sandy loam subsoil textures with a low fine fraction content. They are Andic Cryochrepts, loamy skeletal, mixed. These soils occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar soils. Aquepts occur in poorly-drained inclusions. They limit road and timber management because of high water tables and poor bearing strength. Andic Cryochrepts, coarse loamy, mixed occur in glacial lake sediments remnant from past glacial pothole lakes. Native road surfaces have low bearing strength.

Representative Profile:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very cobbly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown very cobbly coarse sandy loams about 24 inches thick. Substrata are pale brown very cobbly loamy coarse sands and coarse sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is very high. The terrain is well suited to tractor operation. Tractor operation in moist draws and depressions can rut, compact, or puddle the soil and reduce soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity. Productivity depends on the relatively thin, finer textured soil surface layer. Surface layer displacement by tractor operation can reduce productivity.

Roads: Large boulders can limit excavation. Excavation can intercept ground water in depressions and along map unit boundaries. Tread erosion on unsurfaced roads tends to remove fine material. The remaining gravel and cobble form a rough surface. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Perennial stream flows vary widely with the season. Bridges and culverts should be carefully planned to maintain channel stability.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides good big game summer range. Forage is available from forbs under the forest overstory and from forbs, grasses, and shrubs in early successional stages and openings. Timber stands provide important late summer thermal and security cover. The U-shaped nature of the drainage increases viewing distances in openings. Combinations of high open road densities and intensive regeneration harvesting reduces big game security.

Fisheries: Channel gradients are high and usually dominated by boulders. Streams are dominated by riffles but pool quality can be better than average. Fish recruitment often occurs from upstream lakes.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is low. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

46OA

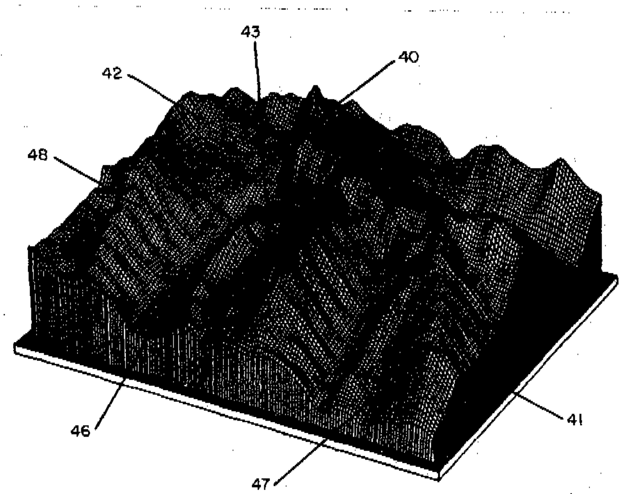
Entic Cryandepts, glacial trough bottoms

SUMMARY

The map unit occurs on glacial valley trains. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying glacial till derived from metasedimentary rocks.

LANDFORM

The landform consists of mountain valley bottoms confined in narrow U-shaped glaciated drainages called glacial valley trains. These glaciated bottoms are long, relatively narrow and are gently sloping to undulating. They contain moderate gradient, perennial streams and associated ponded areas or poorly-drained inclusions. Springs are common along map unit boundaries with the steeper glaciated mountain slopes.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
10-35	Variable	5400-6600	45-55	0

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, spruce, western white pine, western redcedar, lodgepole pine, western white pine, western redcedar, western larch, and some Douglas-fir. The understory is dominated by important vegetation such as menziesia, blue huckleberry, queencup beadlily, sitka alder, mountain maple, elderberry, and thimbleberry. Aspen, willow, and wet meadow vegetation occupy poorly-drained inclusions.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/queencup beadlily (ABLA/CLUN) are important HTs. ABLA/CLUN occurs in moist swales and near streams. A similar HT is western redcedar/queencup beadlily (THPL/CLUN). These HTs occupy about 35 percent of the map unit. ABLA/MEFE occurs throughout the map unit. A similar HT is mountain hemlock/menziesia (TSME/MEFE). These HTs occupy about 50 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occurs on well-drained to somewhat excessively drained soils that tend to be sandier and have higher cobble content. Productivity is lower on these sites. Poorly-drained inclusions support moist meadow openings or forested riparian communities.

46OA

GEOLOGY

The unit is underlain by glacial till deposits derived from argillites, siltites, and quartzites of the Belt Supergroup. Till deposits contain many cobbles to boulder sized rocks on the surface and at depth. Included are up to 5 percent dissimilar glacial deposits formed from silty lake sediments originating from old fill-in glacial lakes.

SOILS

Map Unit Summary: Soils are moderately well-drained to well-drained and moderately coarse to medium textured. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 35 to 55 percent rock fragments. Boulder erratics occur infrequently on the surface. Subsoils show indications of clay accumulation.

Composition:
Entic Cryandepts, medial over loamy skeletal, mixed have loess surface layers about 14 to 18 inches thick. Similar soils have loess surface layers about 11 to 13 inches thick and are Andic Cryochrepts, loamy skeletal, mixed. Other similar soils have slightly more clay accumulation in the subsoils and are Andeptic Cryoboralfs, loamy skeletal, mixed. These soils occupy about 85 percent of the map unit.

Included are up to 15 percent dissimilar soils. Aquepts and Cryumbrepts occur in poorly-drained and somewhat poorly-drained inclusions, respectively. They limit road and timber management because of high water tables and poor bearing strength. Andic Cryochrepts, fine loamy, mixed occur in glacial lake sediments remnant from past glacial pothole lakes. Native road surfaces have low bearing strength.

Representative Profile:
Entic Cryandepts, medial over loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown cobbly silt loams about 15 inches thick. Subsurface layers are light brwonish gray very cobbly fine sandy loams about 3 inches thick. Subsoils are light yellowish brown very cobbly loams about 17 inches thick. Substrata are light yellowish brown very cobbly loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is very high. The terrain is well suited to tractor operation. Tractor operation in moist draws and depressions can rut, compact, or puddle the soil and reduce soil productivity. Operating equipment only when soil is dry, frozen, or snow-covered helps maintain soil productivity.

Roads: Large boulders can limit excavation. Excavation can intercept ground water in depressions and along map unit boundaries. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Perennial stream flows vary widely with the season. Bridges and culverts should be carefully planned to maintain channel stability.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides good big game summer range. Forage is available from forbs under the forest overstory and from forbs, grasses, and shrubs in early successional stages and openings. Timber stands provide important late summer thermal and security cover. The U-shaped nature of the drainage increases viewing distances in openings. Combinations of high open road densities and intensive regeneration harvesting reduces big game security.

Fisheries: Channel gradients are high and usually dominated by boulders. Streams are dominated by riffles, but pool quality can be better than average. Fish recruitment often occurs from upstream lakes.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is low. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

47KA

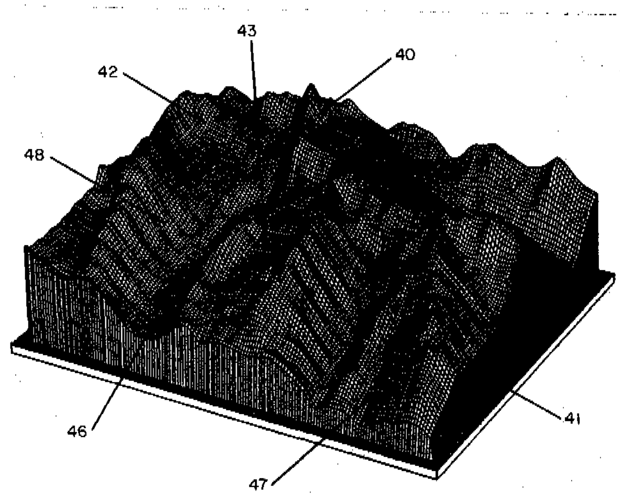
Andic Cryochrepts, moderately steep, glacial till substratum

SUMMARY

The map unit occurs on glacial valley trains. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying glacial till derived from granitics and associated rocks.

LANDFORM

The landform consists of mountain valley bottoms confined in narrow U-shaped glaciated drainages called glacial valley trains. These glaciated bottoms are long, relatively narrow and are moderately sloping to undulating. They contain moderate to high gradient, incised, perennial streams. Springs are common along map unit boundaries with the steeper glaciated mountain slopes.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-45	Variable	5400-6500	50-70	5

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, spruce, lodgepole pine, western larch, and some Douglas-fir. The understory is dominated by important vegetation such as menziesia, queencup beadlily, sitka alder, mountain maple, elderberry, beargrass, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) are important HTs. ABLA/MEFE occurs throughout the map unit. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). These HTs occupy about 40 percent of the map unit. ABLA/XETE-VAGL occurs on soils with high cobble content and well-drained benches. This HT occupies about 35 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) occurs in moist swales and near streams. Productivity is higher on these sites.

47KA

GEOLOGY

The unit is underlain by glacial till deposits derived from granitics and associated gniess and schist. Till deposits contain many cobbles to boulder sized rocks on the surface and at depth.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to coarse. Surface layers are formed in volcanic ash influenced loess and are about 8 to 10 inches thick. Subsoils contain 50 to 75 percent rock fragments. Boulder erratics are common on the surface.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have loamy sands and coarse sandy loam subsoils. Similar soils have sandy loam subsoil textures with a low fine fraction content. They are Andic Cryochrepts, loamy skeletal, mixed. These soils occupy about 95 percent of the map unit.

Included are up to 5 percent rock outcrop and rubble.

Representative Profile:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very cobbly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown extremely coarse sandy loams about 24 inches thick. Substrata are pale brown extremely cobbly loamy coarse sands and coarse sandy loams to a depth of 60 inches of more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Slope steepness limits tractor operation on most of the map unit. Cable systems should be considered. Productivity depends on the relatively thin, finer textured soil surface layer. Surface layer displacement can reduce productivity.

Roads: Large boulders can limit excavation. Excavation can intercept ground water in depressions and along map unit boundaries. Tread erosion on unsurfaced roads tends to remove fine material. The remaining gravel and cobble form a rough surface. Care is required when constructing roads in and near incised stream channels to keep sediment from entering the channel system. Perennial stream flows vary widely with the season. Bridges and culverts should be carefully planned to maintain channel stability.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides good big game summer range. Forage is available from forbs under the forest overstory and from forbs, grasses, and shrubs in early successional stages. Timber stands provide important late summer thermal and security cover. The U-shaped nature of the drainage increases viewing distances in openings. Combinations of high open road densities and intensive regeneration harvesting reduces big game security.

Fisheries: Channel gradients are very high and are dominated by boulders. Streams are dominated by riffles and pool quality tends to be poor.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is moderate. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

47OA

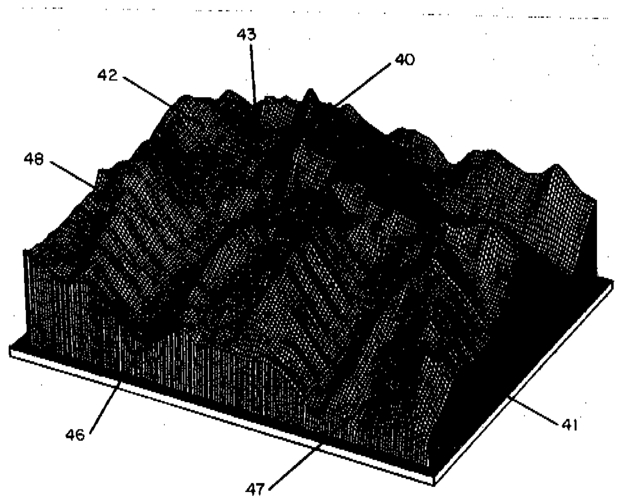
Entic Cryandepts, moderately steep, glacial till substratum

SUMMARY

The map unit occurs on glacial valley trains. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying glacial till derived from metasedimentary rocks.

LANDFORM

The landform consists of mountain valley bottoms confined in narrow U-shaped glaciated drainages called glacial valley trains. These glaciated bottoms are long, relatively narrow and are moderately sloping to undulating. They contain moderate to high gradient, incised, perennial streams. Springs are common along map unit boundaries with the steeper glaciated mountain slopes. Some delineations include the lower slopes of glaciated mountain slopes where deep glacial till deposits exist.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
35-45	Variable	5400-6500	45-55	5

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, spruce, lodgepole pine, western white pine, western larch, and Douglas-fir. The understory is dominated by important vegetation such as menziesia, queencup beadlily, sitka alder, mountain maple, elderberry, beargrass, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) are important HTs. ABLA/MEFE occurs throughout the map unit. A similar HT is subalpine fir/sitka alder (ABLA/ALSI). These HTs occupy about 40 percent of the map unit. ABLA/XETE-VAGL occurs on soils with high cobble content and well-drained benches. This HT occupies about 35 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) occurs in moist swales and near streams. Productivity is higher on these sites.

47OA

GEOLOGY

The unit is underlain by glacial till deposits derived from argillites, siltites, and quartzites of the Belt Supergroup. Till deposits contain many cobbles to boulder sized rocks on the surface and at depth.

SOILS

Map Unit Summary: Soils are well-drained and modertely coarse to medium textured. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 50 to 75 percent rock fragments. Boulder erratics occur infrequently on the surface.

Composition:
Entic Cryandepts, medial over loamy skeletal, mixed have loess surface layers about 14 to 18 inches thick. Similar soils have loess surface layers about 11 to 13 inches thick and are Andic Cryochrepts, loamy skeletal, mixed. These soils occupy about 95 percent of the map unit.

Included are up to 5 percent rock outcrop and rubble.

Representative Profile:
Entic Cryandepts, medial over loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown cobbly silt loams about 15 inches thick. Subsurface layers are light brownish gray very cobbly fine sandy loams about 3 inches thick. Subsoils are light yellowish brown very cobbly loams about 17 inches thick. Substrata are light yellowish brown very stony loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high. Slope steepness limits tractor operations on most of the map unit. Cable systems should be considered.

Roads: Large boulders can limit excavation. Excavation can intercept ground water in depressions and along map unit boundaries. Care is required when constructing roads in and near incised stream channels to keep sediment from entering the channel system. Perennial stream flows vary widely with the season. Bridges and culverts should be carefully planned to maintain channel stability.

Range: This map unit is poorly suited to range management.

Wildlife: This unit provides good big game summer range. Forage is available from forbs under the forest overstory and from forbs, grasses, and shrubs in early successional stages. Timber stands provide important late summer thermal and security cover. The U-shaped nature of the drainage increases viewing distances in openings. Combinations of high open road densities and intensive regeneration harvesting reduces big game security.

Fisheries: Channel gradients are very high and are dominated by boulders. Streams are dominated by riffles and pool quality tends to be poor.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is moderate. Practices which disturb soils on or adjacent to streambanks can increase stream sediment.

48KA

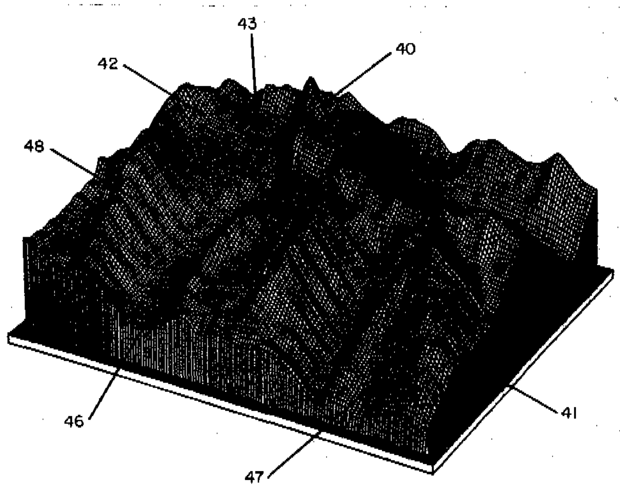
Andic Cryochrepts-Rock Outcrop complex, glaciated mountain slopes

SUMMARY

The map unit occurs on glaciated mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of steep and very steep glaciated mountain slopes, glacial troughwalls, and truncated spurs. These landforms form the sideslopes that drain into the glacial valley trains below. Upper slopes are convex. Glacially scoured midslopes are concave. Depositional midslopes are convex. Lower slopes are convex and generally have high spring activity at the boundary of deposited till and residual soil mantles. Drainages are perennial and ephemeral. Included are avalanche chutes.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Variable	5500-7500	60-90	20-40

VEGETATION

Existing: Vegetation is a mixed forest of subalpine fir, spruce, lodgepole pine, western larch, and Douglas-fir. The understory is dominated by important vegetation such as menziesia, queencup beadlily, sitka alder, mountain maple, elderberry, beargrass, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/queencup beadlily (ABLA/CLUN), and subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) are important HTs. ABLA/MEFE occurs on northerly slopes and occupies about 35 percent of the map unit. ABLA/CLUN occurs on the lower one-third of the slope on soils derived from glacial till. This HT occupies about 10 percent of the map unit. ABLA/XETE-VAGL occurs on southerly slopes on mid to upper slope positions and occupies about 35 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Moist forest openings and avalanche chutes occur in some delineations. These sites are not suitable for timber management.

48KA

GEOLOGY

Mid and upper slopes are underlain by residual material derived from granitics and associated gneiss and schist. Lower slopes are underlain by glacial till deposits derived from granitics and associated gneiss and schist.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately moderately coarse to coarse. Surface layers are formed in volcanic ash influenced loess and have light colors. Subsoils contain 45 to 65 percent rock fragments.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have loess surface layers about 8 to 10 inches thick. These soils occupy up to 60 percent of the map unit.

Included are up to 40 percent dissimilar soils and rock outcrop or rubble. Andic Cryumbrepts have dark colored surface layers and occur in avalanche chutes and moist forest openings. Regeneration limitations are associated with these sites. Rock outcrop or rubble occupies 10 to 25 percent of this unit.

Representative Profile:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown very gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate except on lower one-third where production can be high. Slope steepness limits tractor operation. Observations indicate regeneration limitations can be expected when soils have dark colored surface layers and are associated with moist forest openings. Regeneration competes for light and space with understory vegetation in ABLA/MEFE HTs.

Roads: Boulders frequently limit excavation. Excavation can intercept large amounts of groundwater. Mid to lower slope positions have high slope stability hazards from landslides or road cut slumping. Material exposed by road construction is subject to cutbank and fill sloughing. Avalanches can increase maintenance costs. Tread erosion on unsurfaced roads tend to remove fine material. The remaining gravel and cobble form a rough surface. Brush tends to encroach on roads on northerly slopes and in draws.

Range: This map unit is poorly suited to range management.

Wildlife: This unit is a composite of good to excellent big game summer range. Openings and avalanche chutes on the upper slopes provide good early summer foraging opportunities for graminoids and forbs. Mature stands of conifers on lower slopes provide good summer thermal cover. Withing occupied grizzly bear habitat, bear foods are provided in avalanche chutes and by berry-producing shrubs. Timber harvest can occasionally enhance habitat where natural openings are lacking.

Fisheries: Perennial streams are rare due to steepness and location of this map unit.

Watershed: Skid trails, firelines, and roads have high erosion hazard. Sediment delivery efficiency is high. Landslide hazard is high. These slopes deliver high amounts of seasonal runoff.

48QA

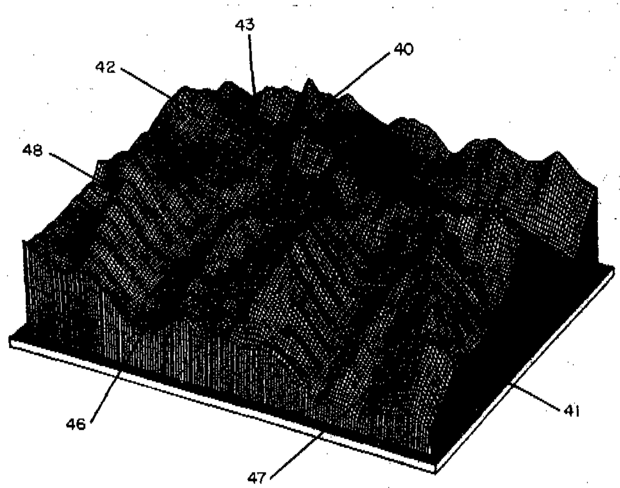
Entic Cryandepts and Typic Vitrandepts, glaciated mountain slopes

SUMMARY

The map unit occurs on glaciated mountain slopes. Vegetation is moist, mixed coniferous and subalpine forest. Soils form in volcanic ash influenced loess overlying material from from metasedimentary rocks.

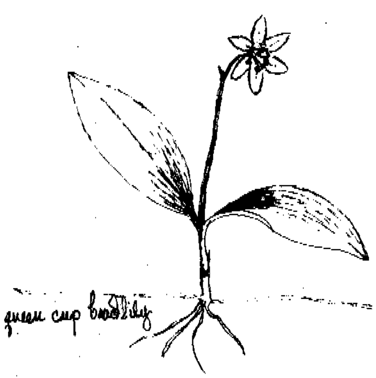
LANDFORM

The landform consists of steep and very steep glaciated mountain slopes, glacial troughwalls, and truncated spurs. These landforms form the sideslopes that drain into the glacial valley trains below. Upper slopes are convex. Glacially scoured midslopes are concave. Depositional midslopes are convex. Lower slopes are convex and generally have high spring activity at the boundary of deposited till and residual soil mantles. Drainages are perennial and ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Variable	4500-6500	50-65	10-25

VEGETATION



Existing: Vegetation is a mixed forest of subalpine fir, spruce, lodgepole pine, western white pine, western larch, and Douglas-fir. The understory is dominated by important vegetation such as menziesia, queencup beadlily, sitka alder, mountain maple, elderberry, beargrass, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE), subalpine fir/queencup beadlily (ABLA/CLUN), and subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) are important HTs. ABLA/MEFE occurs on northerly slopes and at elevations above 5200 feet. This HT occupies about 35 percent of the map unit. ABLA/CLUN occurs on the lower one-third of the slope on soils derived from glacial till. A similar HT that occurs below 4500 feet is grand fir/queencup beadlily (ABGR/CLUN). These HTs occupy about 30 percent of the map unit.

Included are up to 35 percent dissimilar HTs. ABLA/XETE occurs on southerly slopes on mid to upper slope positions. Mountain hemlock/beargrass (TSME/XETE) is a similar HT. Below 5000 feet, grand fir/beargrass (ABGR/XETE) occupies similar sites. Productivity is lower on these sites. Moist forest openings and avalanche chutes occur in some delineations. These sites are not suitable for timber management.

48QA

GEOLOGY

Mid and upper slopes are underlain by residual material derived from weakly weathered argillites, siltites, and quartzities of the Belt Supergroup. Lower slopes are underlain by glacial till deposits derived from weakly weathered metasedimentary rocks of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. Surface layers are formed in volcanic ash influenced loess and have light colors. Soil properties vary with vegetation. Soils that remain cool in the growing season support subalpine forests. Other soils support moist, mixed coniferous forests. Subsoils contain 35 to 65 percent rock fragments.

Composition:
Entic Cryandepts, medial-skeletal, mixed have loess surface layers about 15 to 40 inches thick. They support subalpine forests. Similar soils have loess surface layers about 10 to 14 inches thick and are Andic Cryochrepts, loamy skeletal, mixed. These soils occupy about 55 percent of the map unit.

Typic Vitrandepts, medial skeletal, mixed have loess surface layers about 14 to 18 inches thick. They support moist, mixed coniferous forests. Similar soils have loess surface layers about 11 to 13 inches thick and are Andic Dystric Eutrochrepts, loamy skeletal, mixed. These soils occupy about 35 percent of the map unit.

Included are up to 25 percent dissimilar soils and rock outcrop or rubble. Andic Cryumbrepts have dark colored surface layers and occur in avalanche chutes and moist forest openings. Regeneration limitations are associated with these sites. Rock outcrop or rubble occupy 10 to 25 percent of the unit.

Representative Profiles:
Entic Cryandepts, medial skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown very cobbly silt loams about 33 inches thick. Subsoils are brown extremely cobbly sandy loams about 7 inches thick. Substrata are brown extremely cobbly sandy loams to a depth of 60 inches or more.

Typic Vitrandepts, medial skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 3 inches thick. Surface layers are dark brown and dark yellowish brown extremely cobbly and very gravelly silt loams about 24 inches thick. Subsoils are yellowish brown extremely gravelly silt loams and sandy loams about 19 inches thick. Substrata are to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is very high. Slope steepness limits tractor operations. Observations indicate regeneration limitations can be expected when soils have dark colored surface layers and are associated with moist forest openings. Regeneration competes for light and space with understory vegetation in ABLA/MEFE HTs.

Roads: Roads should perform well with standard location, construction, and maintenance on the upper slopes of this unit. Mid to lower slope positions have moderate slope stability hazards from landslides or road cut slumping. Roadcuts encounter springs along the lower one-third of slope. Brush tends to encroach on roads on northerly slopes and in draws.

Wildlife: Mature stands of conifers provide good summer thermal cover. Springs and moist forest opening inclusions provide excellent big game foraging opportunities. Berry-producing shrubs provide excellent food for black bears and grizzly bears. Timber harvest can occasionally enhance habitat when natural openings are lacking.

48QA

Fisheries: Perennial streams are rare due to steepness and location of this map unit.

Watershed: Skid trails and firelines have a moderate erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is high.

60KA

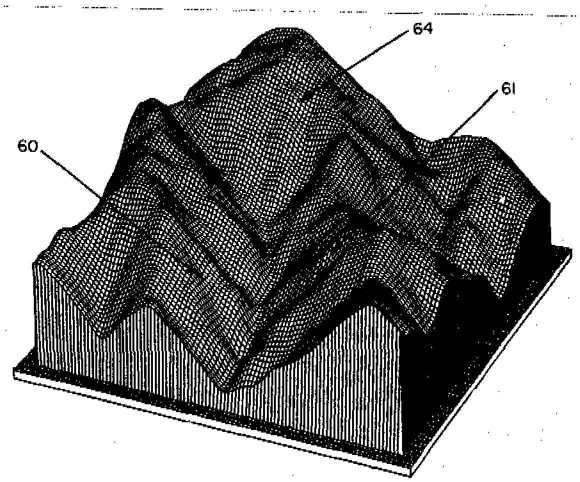
Dystric Eutrochrepts, stream breaklands, granitic substratum

SUMMARY

The map unit occurs on stream breaklands. Vegetation is cool, somewhat dry Douglas-fir forest. Soils form in material from granitics and associated rocks.

LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral, intermittent, and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacings are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Variable	4200-5500	25-35	15-30

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine, Douglas-fir and in some delineations, lodgepole pine. The understory is dominated by beargrass, blue huckleberry, and pinegrass.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is the major HT. This HT occupies about 80 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs in some lower elevation delineations on southerly aspects. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) occurs along rock outcrop inclusions on south aspects. Timber productivity is lower and regeneration is limited by moisture and grass competition.

60KA

GEOLOGY

The unit is underlain by granites and grussic granites of the Idaho Batholith. Associated bedrock includes gneiss and schist.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse to moderately textured. Subsoils contain 65 to 75 percent rock fragments.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have sandy loam textures. Similar soils are Dystric Eutrochrepts, sandy skeletal, mixed, frigid. They have coarse sandy loam and loamy sand textures. These soils occupy about 85 percent of the map unit.

Included are up to 40 percent dissimilar soils and rock outcrop or talus. Udic Ustochrepts, loamy skeletal, mixed support PSME/AGSP and PSME/PHMA-CARU. These soils can be droughty. Rock outcrop and talus occupies 15 to 30 percent of this map unit.

Representative Profile:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are pale brown gravelly sandy loams about 8 inches thick. Subsurface layers are light gray gravelly sandy loams about 10 inches thick. Subsoils are pale brown extremely gravelly sandy loams about 33 inches thick. Substrata are brownish yellow extremely gravelly loamy coarse sands to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Steep slopes limit tractor operations. Site productivity depends on the relatively thin topsoil and displacement of the surface layer can reduce site productivity. Regeneration is limited by moisture stress and high soil surface temperatures on southerly unshaded areas. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility and provides shade for regeneration.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and extremely difficult to revegetate. Hard rock occasionally limits excavation.

Range: This map unit is poorly suited to range management. Slope limits access.

Wildlife: Steep slopes limit wildlife use and opportunities to enhance habitat are minimal. South slope inclusions of PSME/AGSP and PSME/PHMA-CARU provide good big game winter range. Broadcast burning and regeneration harvest can increase available forage.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a very high erosion hazard. Sediment delivery efficiency is very high. Controlling sediment from roads can be difficult.

60KB

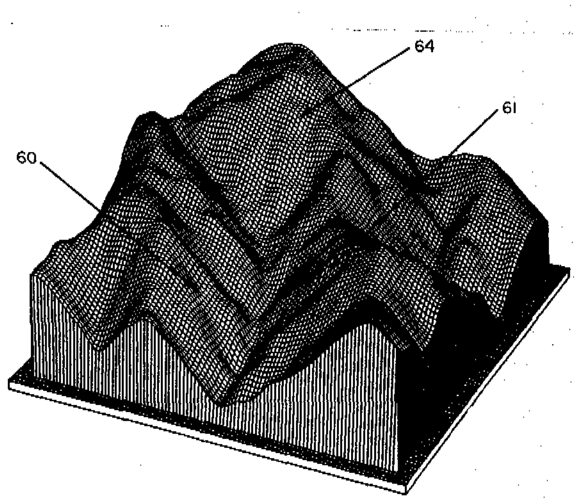
Andic Cryochrepts, stream breaklands, granitic substratum

SUMMARY

The map unit occurs on stream breaklands. Vegetation is subalpine forest. Soils form in volcanic influenced loess overlying material from granitics and associated rocks.

LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral, intermittent, and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes, and sediment moves rapidly during runoff from these slopes. Drainage spacings are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Variable	5000-6000	35-45	15-30

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, Douglas-fir, and subalpine fir. The understory is dominated by beargrass, blue huckleberry, and pinegrass.

Habitat Type (HT) Composition: Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) is the major HT. This HT occupies about 80 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occurs in some lower elevation delineations on southerly aspects. Timber productivity is lower and regeneration is limited by moisture and grass competition. Subalpine fir/menziesia (ABLA/MEFE) occurs in drainageways and on some north aspects. Timber productivity is higher and regeneration can be limited by competition for light or space by shrubs.

60KB

GEOLOGY

The unit is underlain by granites and grussic granites of the Idaho Batholith. Associated bedrock includes gneiss and schist.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse to moderately textured. Surface layers are formed in volcanic ash influenced loess and are 8 to 10 inches thick. Subsoils contain 65 to 75 percent rock fragments.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have sandy loam subsoil textures. Similar soils are Andic Cryochrepts, sandy skeletal, mixed. They have coarse
sandy loam and loamy sand subsoil textures. These soils occupy about 85 percent of the map unit.

Included are up to 40 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/VAGL-XETE. These soils lack a loess surface layer and can be less productive. Rock outcrop or talus occupies 15 to 30 percent of this unit.

Representative Profile:
Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown extremely gravelly sandy loams about 24 inches thick. Substrata are pale brown extremely gravelly sandy loams and coarse sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Steep slopes limit tractor operations. Site productivity depends on the relatively thin, fine textured soil surface layer and displacement of the surface layer can reduce site productivity. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and extremely difficult to revegetate. Hard rock occasionally limits excavation.

Range: This map unit is poorly suited to range management. Slope limits access.

Wildlife: Steep slopes limit wildlife use and opportunities to enhance habitat are minimal. Unroaded, dense forests provide big game security cover during hunting season.

Fisheries: Perennial streams are rare due to steepness and location of this map unit.

Watershed: Firelines and roads have a very high erosion hazard. Sediment delivery efficiency is very high. Controlling sediment from roads can be difficult.

60MA

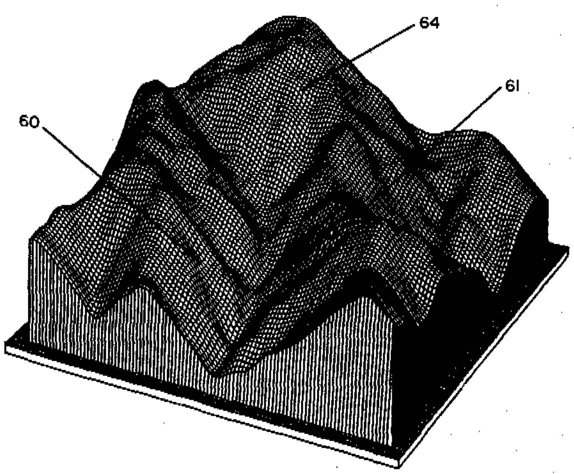
Calcixerollic Xerochrepts-Typic Xerochrepts-Rock Outcrop complex,
stream breaklands, warm

SUMMARY

The map unit occurs on stream breaklands. Vegetation is open grown forest. Soils form in material from moderately weathered metasedimentary rocks. Rock outcrop can be a significant component on this map unit.

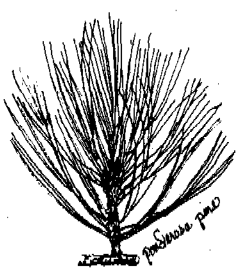
LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and intermittent first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 1000 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Southerly	3400-4800	20-30	25

VEGETATION



Existing: Vegetation is open grown stands of ponderosa pine and Douglas-fir. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, rough fescue, Idaho fescue, and arrowleaf balsamroot. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/rough fescue (PSME/FESC) is the major habitat type. The scree vegetation type, Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/Idaho fescue (PSME/FEID) HT and Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP) HT are similar. PSME/AGSP tends to occur near rock outcrop and where soils are coarser than the norm. These HTs occupy up to 80 percent of the unit.

Included are up to 20 percent dissimilar HTs. Douglas-fir/blue huckleberry (PSME/VAGL) can occur at the upper elevation bounds of the map unit. Douglas-fir/ninebark (PSME/PHMA) occurs in drainageways and on east/west aspect inclusions. Timber productivity is higher and regeneration limitations are less severe. A non-forest component occurs in some delineations associated with large areas of rock outcrop or debris avalanche. These inclusions are poorly suited for timber management.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Combination of steep slopes and southerly aspects create a very high insolation factor. Summer surface soil temperature can be quite high and soils become dry early in the growing season. Soil properties vary with degree of weathering of the underlying bedrock. Soils have thin dark colored surface horizons less than 6 inches thick and subsoils contain 45 to 65 percent rock fragments. Calcium carbonate accumulation occurs in subsoils formed from calcareous bedrock. Rock fragment durability varies with degree of bedrock weathering.

Composition:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have thin dark colored surface layers about 2 to 5 inches thick and carbonate accumulation in the subsoils. These soils most frequently occur on the lower third of the slope, in drainageways, and in calcareous bedrock which exhibits a higher degree of weathering. They occupy about 40 percent of the unit.

Typic Xerochrepts, loamy skeletal, mixed, frigid have light colored surface layers. These soils form in non-calcareous bedrock that has a lower degree of weathering. These soils have higher rock fragment contents. They occupy about 35 percent of the unit.

Included are up to 25 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA or PSME/VAGL. They usually have lower surface soil summer temperatures and are moist most of the growing season. Rock outcrop and talus may occupy up to 25 percent of the unit.

Representative Profiles:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark grayish brown and dark brown loams about 13 inches thick. Upper subsoils are dark yellowish brown and yellowish brown very gravelly silt loams about 21 inches thick. Lower subsoils are pale brown gravelly loams about 9 inches thick. Substrata are light olive brown very gravelly silt loams and highly weathered calcareous argillite to a depth of 40 inches or more. Many rock fragments can be crushed by moderate pressure by hand.

Typic Xerochrepts, loamy skeletal, mixed, frigid have dark brown very gravelly silt loam surface layers about 8 inches thick. Subsoils are yellowish brown loams and brown extremely gravelly sandy loams about 22 inches thick. Substrata are pale brown extremely cobbly fine sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. The rock outcrop and talus component is poorly suited for timber management. Slope steepness limits tractor operation. Competition for moisture from understory vegetation and very high insolation severely limits regeneration. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings.

Roads: Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and is difficult to revegetate because of moisture stress. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent deer, elk, and sheep winter range. The oversteepened slope and winter sun angle enhances snowmelt rates which makes winter forage more available. Medium textured soils produce good graminoid forage. Rocky soils produce fair graminoid forage. Timber harvest is generally not beneficial to winter range maintenance. Invasion by and conversion to knapweed can result in loss in forage and is a severe risk in this unit.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a moderately low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60MB

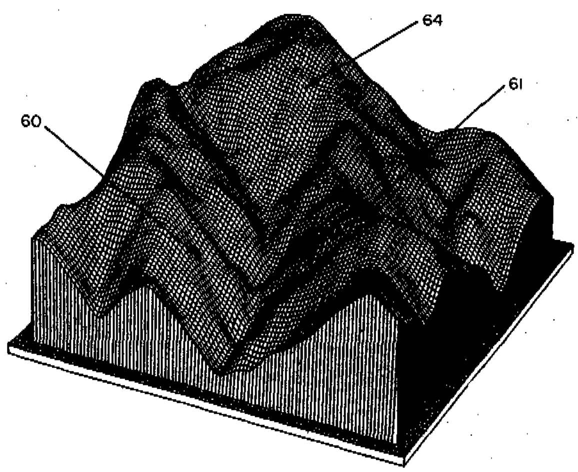
Typic Ustochrepts-Rock Outcrop complex, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is dry Douglas-fir forest. Soils form in material from moderately weathered metasedimentary rocks. Rock outcrop is a component of this map unit.

LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and intermittent first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 1000 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Variable	3400-4800	20-30	25

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry.

Habitat Type (HT) Composition: Douglas-fir/snowberry (PSME/SYAL), Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/pinegrass (PSME/CARU) are the major HTs. PSME/SYAL occurs on soils with calcium carbonate accumulation close to the surface and at some elevations below 4000 feet. This HT occupies about 30 percent of the map unit. PSME/PHMA-CARU occurs on other soils throughout the map unit and occupies about 35 percent of the area. PSME/CARU occurs on upper elevation southerly slopes and along ridges where soils are moderately shallow. This HT occupies about 20 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Complex mountain slopes create northerly sideslope inclusions of Douglas fir/ninebark-ninebark (PSME/PHMA-PHMA). Douglas fir/twinflower (PSME/LIBO) occur in some northerly drainages, benches, and toeslopes. These HTs are more productive timber sites with fewer regeneration limitations. Some delineations have south sideslope inclusions of

Douglas-fir/bluebunch wheatgrass (PSME/AGSP) or Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP). These HTs are less productive timber sites.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. The combination of steep slopes and southerly aspects create a very high insolation factor. Soils become dry early in the growing season. These soils support dry Douglas-fir forests. Soil properties vary with degree of weathering of the underlying bedrock. Calcium carbonate accumulation occurs in subsoils formed from calcareous bedrock. Rock fragment durability varies with degree of bedrock weathering. Some soils have thin dark colored surface horizons less than 6 inches thick and subsoils contain 45 to 65 percent rock fragments.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have light colored surface layers. These soils form in non-calcareous or slightly calcareous bedrock that has a lower degree of weathering. These soils have higher rock fragment contents. They occupy about 40 percent of the unit. Other Typic Ustochrepts have thin dark colored surface layers about 2 to 5 inches thick and carbonate accumulation in the subsoils. These soils frequently occur on the lower third of the slope, in drainageways, and form in calcareous bedrock that exhibits a higher degree of weathering. They occupy about 35 percent of the unit.

Included are up to 25 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA or PSME/VAGL. They usually have lower surface soil summer temperatures and are moist most of the growing season. Rock outcrop and talus may occupy up to 25 percent of the unit.

Representative Profiles:
Typic Ustochrepts, loamy skeletal, mixed, frigid have dark brown very gravelly silt loam surface layers about 8 inches thick. Subsoils are yellowish brown loams and brown extremely gravelly sandy loams about 22 inches thick. Substrata are pale brown extremely cobbly fine sandy loams to depths of 60 inches or more.

Typic Xerochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark grayish brown and dark brown loams about 13 inches thick. Upper subsoils are dark yellowish brown and yellowish brown very gravelly silt loams about 21 inches hick. Lower subsoils are pale brown gravelly loams about 9 inches thick. Substrata are light olive brown very gravelly silt loams and highly weathered calcareous argillite to a depth of 40 inches or more. Many rock fragments can be crushed by moderate pressure by hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderately low. Slope steepness limits tractor operation. Competition for moisture from understory vegetation and very high insolation severely limits regeneration. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation.

Roads: Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and is difficult to revegetate because of moisture stress. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivery to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent deer and elk winter range. The oversteepened slope and winter sun angle enhances snowmelt rates which makes winter forage more available. Shrubs and grasses provide forage. In HTs with shrub understories, regeneration timber harvest and/or burning can enhance forage by stimulating shrub growth.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a moderately low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60MC

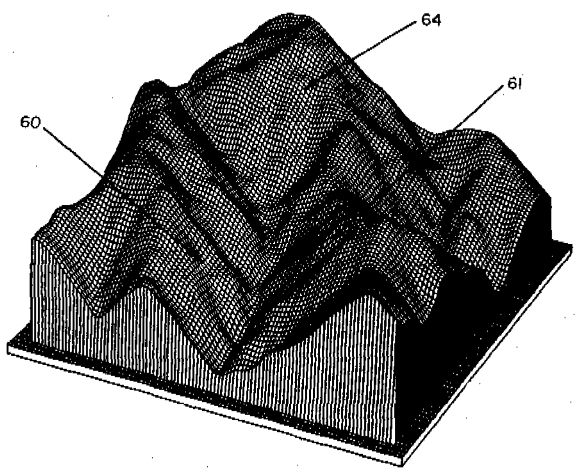
Andic Dystric Eutrochrepts-Dystric Eutrochrepts-Typic Eutroboralfs-Rock Outcrop, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is dry, mixed coniferous forest and cool, somewhat dry Douglas-fir forest. Soils form in material from moderately weathered metasedimentary rocks. Rock outcrop is a component in this map unit.

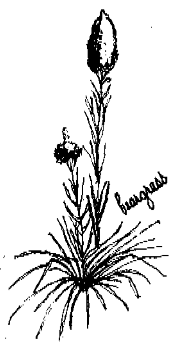
LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral, intermittent, and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Variable	3400-4800	30-45	25

VEGETATION



Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in the Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, pinegrass. The PSME/VAGL-XETE and ABGR/XETE HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a climatic transition boundary within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy approximately 55 percent of the map unit. ABGR/XETE is on northerly aspects above 4600 feet. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is a similar HT. These HTs occupy less than 25 percent of the map unit. (ABGR/XETE is rare in the Rock Creek drainage.)

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4600 feet. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is a similar HT. These habitat types occupies about 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4600 feet and occupies less than 25 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soils contain 45 to 65 percent rock fragments. Soils on northerly aspects and other aspects west of Superior have silty surface layers formed in volcanic ash influenced loess. This loess surface layer is absent or mixed with the subsoil on southerly aspects and on east and west aspects east of Superior. Soils formed from highly calcareous bedrock have deep subsoil carbonate accumulations. Soils formed from highly weathered bedrock have subsoil clay accumulation and usually have subsoil carbonate accumulation.

Composition:
Andic Dystric Eutrochrepts, laomy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock than is calcarous or non-calcarous. Calcarous soils have subsoil carbonate accumulations at a depth greater than 40 inches. surface layers are formed in volcanic ash influenced loess and are 8 to 13 inches thick.

Typic Eutrochrepts, loamy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock that is calcareous and are on southerly aspects. The loess surface layers is absent or mixed. These soils are most common east of St. Regis. Subsoils have carbonate accumulations at a depth of 25 to 40 inches.

Typic Eutroboralfs, loamy skeletal, mixed, frigid form in material from moderately to more highly weathered metasedimentary rock. These soils have subsoil clay accumulations with carbonate accumulations in the lower subsoil. Loess surface layers are present on northerly aspects.

Included are up to 25 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA or PSME/VAGL. They usually have lower surface soil summer temperatures and are moist most of the growing season. Rock outcrop and talus occupy up to 25 percent of the unit.

Representative Profiles:

These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 40 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

Typic Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark grayish brown silt loams about 5 inches thick. Upper subsoils are brown and dark grayish brown gravelly silt loams about 14 inches thick. Lower subsoils are grayish brown very gravelly silt loams about 18 inches thick. Substrata are light olive brown very gravelly silt loams to a depth of 40 inches or more.

Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. surface layers are dark grayish brown very gravelly loams about 10 inches thick. Upper subsoils are olive brown very gravelly loams about 16 inches thick. Middle subsoils are dark yellowish brown very gravelly loams about 17 inches thick. They have common moderately thick clay skins along ped faces. Lower subsoils are pale brown gravelly silt loams about 9 inches thick. Accumulations of calcium carbonate are throguhout the lower subsoil. Substrata are brown very gravelly loams to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepenss limits tractor operation. Protection from high insolation can help improve regeneration on included south aspects.

Roads: Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and minor slumping. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Mature stands of conifers provide witner thermal cover for deer and elk particularly where associated with other map units that support winter forage. Regeneration timber harvest or burning can improve shrub forage production. Activities designed to enhance forage should be evaluated against the need for maintaining thermal cover. Mideslope roads present physical barriers to deer and elk because of high cut and fill slopes.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a moderately low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60MD

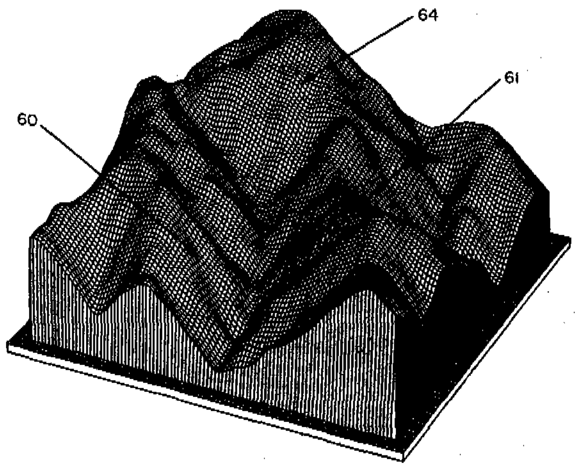
Typic Vitrandepts-Andic Dystric Eutrochrepts-Rock Outcrop, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is moist, mixed coniferous forest. Soils form in material from moderately weathered metasedimentary rocks. Rock outcrop is a component in this map unit.

LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Northerly	4000-5500	45-55	25

VEGETATION

Existing: Vegetation is a mixed forest of western larch, grand fir, lodgepole pine, western red cedar in moistest areas, western white pine, spruce, and Douglas-fir. The forest understory consists of twinflower, queencup beadlily, serviceberry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN) and western red cedar/queencup beadlily (THPL/CLUN) are common on northerly slopes, drainageways, benches and toeslopes. Subalpine fir/queencup beadlily (ABLA/CLUN) is a similar HT that occurs on some toeslopes and on some slopes above 4800 feet. These HTs occupy 50 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) occurs on east and west aspects and occupies 25 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/menziesia (ABLA/MEFE) occurs in some cold drainageways. These sites offer heavy brush competition to regeneration.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soils contain 45 to 65 percent rock fragments. Soils have thick surface layers formed from volcanic ash influenced loess.

Composition:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have silt loam surface layers formed in volcanic ash influenced loess about 14 to 25 inches thick with less than 35 percent rock fragments. Similar soils have loess surface layers about 12 to 14 inches thick or with more than 35 percent rock fragments. They are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid and Typic Vitrandepts, medial skeletal, mixed, frigid, respectively. These soils occupy about 60 percent of the map unit.

Included are up to 40 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers that are thin or impure loess surface layers mixed with the subsoils. They occur on disturbed areas and on southerly inclusions. They support dry, mixed coniferous forests. Rock outcrop and talus occupy up to 25 percent of the unit.

Representative Profile:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Upper surface layers are dark brown gravelly loams about 1 inch thick. Lower surface layers are dark yellowish brown gravelly silt loams about 14 inches thick. Subsoils are brown extremely gravelly silt loams about 30 inches thick. Substrata are to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepenss limits tractor operation. Rock outcrop and slope dissection can limit logging systems.

Roads: Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and slumping. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Steep slopes preclude use by wildlife. Unroaded timbered delineations can provide security habitat. Where associated with south-facing winter ranges, delineations can provide critical thermal cover.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a moderately low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60QA

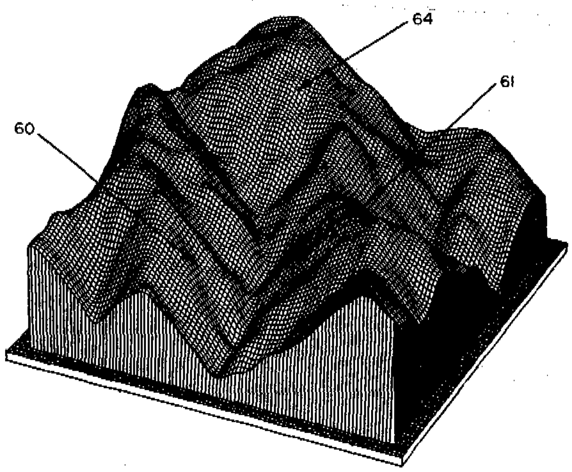
Typic Xerochrepts-Rock outcrop complex, stream breaklands, warm

SUMMARY

The map unit occurs on stream breaklands. Vegetation is open grown forest. Soils form in material formed from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

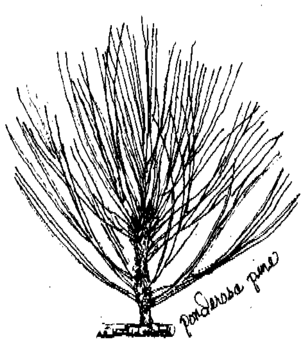
LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and intermittent first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 1000 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Southerly	3400-4800	20-30	20-40

VEGETATION



Existing: Vegetation is open grown stands of ponderosa pine and Douglas-fir with a intermingled non-forest component of talus or rock outcrop. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, Idaho fescue, and arrowleaf balsamroot. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/bluebunch wheatgrass (PSME/AGSP) is the major habitat type. The scree vegetation type, Douglas-fir/Idaho fescue (PSME/FEID) HT and Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP) HT are similar. These HTs occupy up to 70 percent of the unit.

The non-forested component covers very small areas throughout the entire unit. Cumulative area can occupy up to 40 percent of the unit but most delineations have about 20 percent of the area occupied by rock outcrop or talus.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry (PSME/VAGL) can occur at the upper elevation bounds of the map unit. Douglas-fir/ninebark (PSME/PHMA) occurs in drainageways and on east/west aspect inclusions. Timber productivity is higher and regeneration limitations are less severe.

GEOLOGY

The unit is underlain be weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Soils contain 65 to 90 percent rock fragments. Talus and rock outcrop are non-soil components of the unit. Combination of steep slopes and southerly aspects create a very high insolation factor. Summer surface soil temperatures can be high and soils become dry early in the growing season.

Composition:
Typic Xerochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Typic Xerochrepts, loamy skeletal, mixed, frigid. They occupy up to 75 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. This component supports non-forest and open grown forest. They occupy about 20 to 40 percent of the unit.

Included are upt to 5 percent dissimilar soils. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA or PSME/VAGL. They usually have lower surface soil summer temperatures and are moist most of the growing season.

Representative Profile:
Typic Xerochrepts, loamy skeletal, mixed, frigid have dark brown very gravelly silt loam surface layers about 8 inches thick. Subsoils are yellowish brown loams and brown extremely gravelly sandy loams about 22 inches thick. Substrata are pale brown extremely cobbly fine sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low in forested component. The rock outcrop and talus component is poorly suited for timber management. Slope steepenss limits tractor operation. Competition for moisture from understory vegetation and very high insolation severely limits regeneration. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and is difficult to revegetate because of moisture stress. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

60QA

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent deer, elk, and sheep winter range. The oversteepened slope and winter sun angle enhances snowmelt rates which makes winter forage more available. Rocky soils produce fair graminoid forage. Timber harvest is generally not beneficial to winter range maintenance. Invasion by and conversion to kanpweed can result in loss in forage and is a severe risk in this unit.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60QB

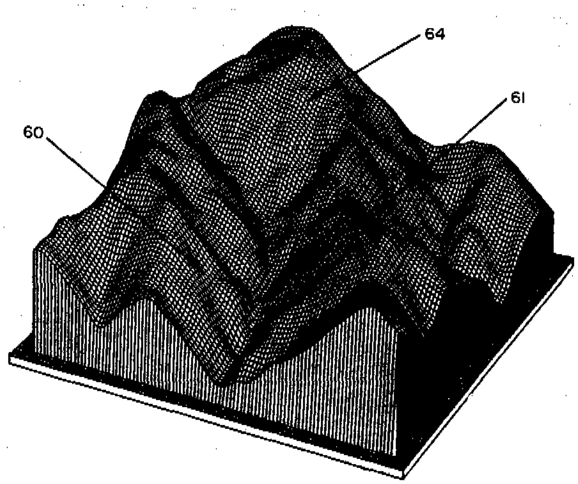
Typic Ustochrepts-Rock outcrop complex, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is dry Douglas-fir forest. Soils form in material formed from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and intermittent first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 1000 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (In)	Rock Outcrop (%)
65-100	Variable	3400-4800	25-35	20-40

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/pinegrass (PSME/CARU) are the major HTs. PSME/PHMA-CARU is the most common HT and occurs throughout the map unit occupying about 55 percent of the area. PSME/CARU occurs on upper elevation southerly slopes and on ridge are moderately shallow. Important HT phases are ponderosa pine (-PIPO) and kninnickinick (-ARUV). This HT occupies about 20 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Complex mountain slopes create northerly sideslope inclusions of Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA). Douglas-fir/twinflower (PSME/LIBO) occur in some northerly drainages, benches, and toeslopes. These HTs are more productive timber sites with less regeneration limitations. Some delineations have south sideslope inclusions of Douglas-fir/bluebunch wheatgrass (PSME/AGSP) or Douglas-fir/pinegrass-bluebunch wheatgrass

(PSME/CARU-AGSP). These HTs are less productive timber sites. Non-forested components are associated with talus or rock outcrop in some delineations and are poorly suited for timber management.

GEOLOGY

The unit is underlain be weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Soils contain 65 to 90 percent rock fragments. Talus and rock outcrop are non-soil components of the unit. Combination of steep slopes and southerly aspects create a very high insolation factor. Soils become dry early in the growing season. These soils support dry Douglas-fir forests.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Udic Ustochrepts, loamy skeletal, mixed, frigid. They occupy up to 60 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. This component supports non-forest and open grown forest. They occupy about 20 to 40 percent of the unit.

Included are up to 20 percent dissimilar soils. Udic Ustochrepts, loamy skeletal, mixed, frigid that support open grown forests on south aspects have lower productivity and more limitations to regneration. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support dry, mixed coniferous forest on northerly aspects and have higher productivity and less limitation to regeneration.

Representative Profile:
Typic Ustochrepts, loamy skeletal, mixed, frigid have dark brown very gravelly silt loam surface layers about 8 inches thick. Subsoils are yellowish brown loams and brown extremely gravelly sandy loams about 22 inches thick. Substrata are pale brown extremely cobbly fine sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderately low in forested component. The rock outcrop and talus component is poorly suited for timber management. Slope steepenss limits tractor operation. Cable logging systems should be considered. Regeneration limitations exist because of the long dry season in the summer and high insolation. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and is difficult to revegetate because of moisture stress. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent deer and elk winter range. The oversteepened slope and winter sun angle enhances snowmelt rates which makes winter forage more available. Shrubs and grasses provide forage. In

PSME/PHMA and other HTs with shrub understories, regeneration timber harvest and/or burning will enhance forage productivity.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks. Full bench roads and limited sidecasting of excavated material can help reduce slope stability hazard sedimentation risk.

60QC

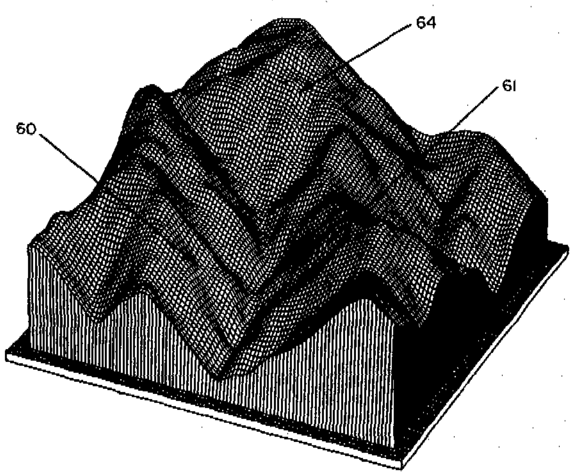
Andic Dystric Eutrochrepts-Dystric Eutrochrepts-Rock outcrop complex, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is dry, mixed coniferous forest and cool, somewhat dry Douglas-fir forest. Soils form in volcanic ash influenced loess or mixed loess overlying material formed from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

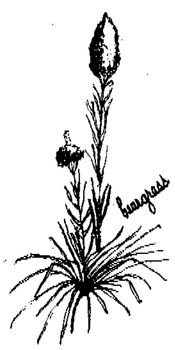
LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral, intermittent and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	N,E,W	3600-4800	30-45	20-40

VEGETATION



Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in the Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, pinegrass. The PSME/VAGL-XETE and ABGR/XETE HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a climatic transition boundary within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy approximately 55 percent of the map unit. ABGR/XETE is on northerly aspects above 4600 feet. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is a similar HT. These HTs occupy less than 25 percent of the map unit. (ABGR/XETE is rare in the Rock Creek drainage.)

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4600 feet. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is a similar HT. These habitat types occupies about 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4600 feet and occupies less than 25 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain be weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Soils contain 65 to 90 percent rock fragments. Talus and rock outcrop are non-soil components of the unit. Soils on northerly aspects and other aspects west of Superior have silty surface layers formed in volcanic ash influenced loess. Soils on east and west aspects and have loamy surface layers formed in volcanic ash influenced loess mixed with subsoils. These soils support dry Douglas-fir forests.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have silt loam surface layers formed in volcanic ash influenced loess about 8 to 14 inches thick. Similar soils have slightly deeper loess surface layers. They are Typic Vitrandepts, medial-skeletal, mixed, frigid. These soils occupy about 30 percent of the unit.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loamy surface layers formed in volcanic ash influenced loess mixed with subsoil material. They occupy about 25 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. This component supports non-forest and open grown forest. They occupy about 20 to 40 percent of the unit.

Included are up to 5 percent dissimilar soils. Typic Xerochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-CARU on south aspects. Surface layers formed in volcanic ash influenced loess are absent. These soils have lower productivity and more limitations to regneration. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid that support ABGR/CLUN on northerly aspects have higher productivity and less limitation to regeneration.

Representative Profile:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of decomposed forest litter less than 4 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely cobbly sandy loams about 16 inches thick. Substrata are very pale brown extremely cobbly sandy loams to depths of 40 inches or more.

60QC

These Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soils surface covered by a layer of decomposed forest litter less than 4 inches thick. Surface layers ar dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inches thick. Substrata are grayish brown extremely cobbly sandy loams to a depth of 40 inches or more.

Classification Remarks: This map unit encompasses a gradation of purity of volcanic ash content in the surface soil layers. The Dystric Eutrochrepts, loamy skeletal, mixed, frigid has a loam surface layer texture versus a silt loam texture of the Andic Dystric Eutrochrept, loamy skeletal, mixed. Both soils have an increased water holding capacity and similar conductivity properties over their extremely rocky substratums. Mappers felt that the "andic" influence of this Dystric Eutrochrept was important to recognize over other soils without "andic" influence. These soils are similar in regards to timber management. Thus, the undifferentiated unit was created with these two different taxonomic classes.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Protection from high insolation can help improve regeneration.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks. Full bench construction and en haul increase road prism stability on steep slopes. Lower portions of the slop carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Mature stands of conifers provide winter thermal cover for deer and elk particularly where associated with other map units that support winter forage. Regeneration timber harvest or burning can improve shrub forage production. Activities designed to enhance forage should be evaluated against the need for maintaining thermal cover. Midslope raods present physical barriers to big game because of high cut and fill slopes.

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steepp slopes. Road locations on the upper one third of slope reduce sedimentation risks.

60QD

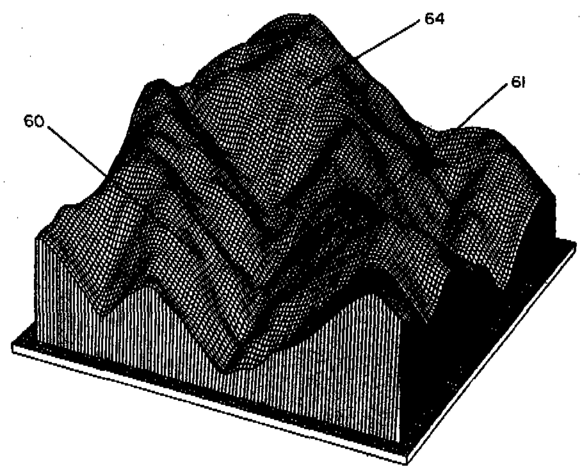
Typic Vitrandepts-Rock outcrop complex, stream breaklands

SUMMARY

The map unit occurs on stream breaklands. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

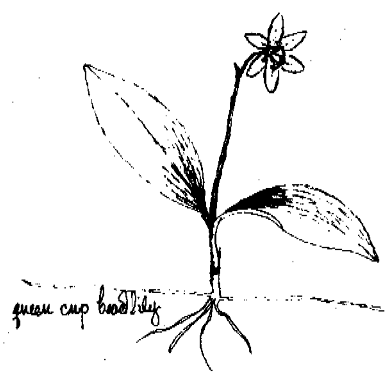
LANDFORM

The landform consists of very steep, straight mountain slopes with major perennial streams at their base. Ephemeral and perennial first order stream channels flow from these slopes and drain directly into third or larger order streams forming a trellis stream pattern. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 800 to 1500 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Northerly	3600-5000	45-55	20-40

VEGETATION



Existing: Vegetation is a mixed forest of western larch, grand fir, lodgepole pine, western red cedar in moistest areas, western white pine, spruce, and Douglas-fir. The forest understory consists of twinflower, queencup beadlily, serviceberry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN) and western red cedar/queencup beadlily (THPL/CLUN) are common on northerly slopes, drainageways, benches and toeslopes. Subalpine fir/ queencup beadlily (ABLA/CLUN) is a similar HT that occurs on some toeslopes and on some slopes above 4800 feet. These HTs occupy 50 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) occurs on east and west aspects and occupies 25 percent of the map unit.

Included are up to 25 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/menziesia (ABLA/MEFE) occurs in some cold drainageways. These sites offer heavy brush competition to regeneration.

GEOLOGY

The unit is underlain be weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are well-drained and have thick surface layers formed from volcanic ash influenced loess. Subsoils are moderately coarse and contain 65 to 90 percent rock fragments. Talus and rock outcrop are non-soil components of the unit.

Composition:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have silt loam surface layers formed in volcanic ash influenced loess about 14 to 25 inches thick with less than 35 percent rock fragments. Similar soils have loess surface layers about 12 to 14 inches thick or with more than 35 percent rock fragments. They are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid and Typic Vitrandepts, medial skeletal, mixed, frigid, respectively. These soils occupy about 50 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. This component supports non-forest and open grown forest. They occupy about 20 to 40 percent of the unit.

Included are up to 25 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support ABGR/XETE or PSME/VAGL-XETE and have slightly lower productivity.

Representative Profile:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Upper surface layers are dark brown gravelly loams about 1 inch thick. Lower surface layers are dark yellowish brown gravelly silt loams about 14 inches thick. Subsoils are brown extremely gravelly fine sandy loams and silt loams about 30 inches thick. Substrata are to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepness limits tractor operation. Cable systems should be considered.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Steep slopes preclude use by wildlife. Unroad, timbered delineatons can provide big game security habitat. Where associated with south-facing winter ranges, delineations can provide critical thermal cover. Forage response potential is high from timber harvest but big game avoid these slopes unless pursued.

60QD

Fisheries: Perennial streams are rare. Ephemeral and intermittent channels drain into major perennial channels at the base of these map units with little buffering. These lower perennial streams are high gradient, dominated by riffles, and have rocky, stable banks. As they have lower elevations, these streams have slightly higher temperatures and are more fertile than the higher elevation streams.

Watershed: Firelines and roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is high because slopes are very steep and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steepp slopes. Road locations on the upper one third of slope reduce sedimentation risks.

61MC

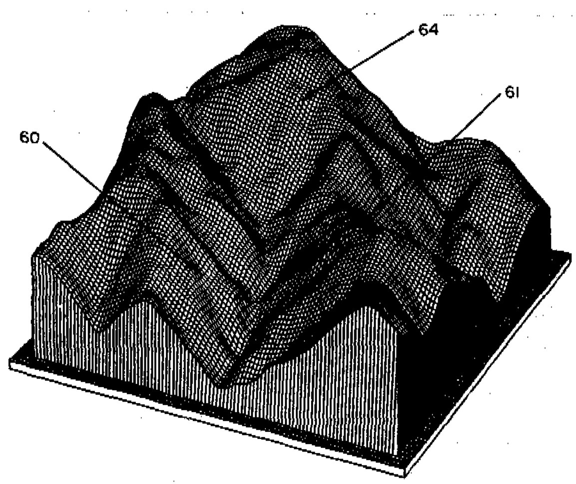
Typic Eutrochrepts-Calcixerollic Xerochrepts-Rock Outcrop complex, dissected stream breaklands

SUMMARY

The map unit occurs on dissected stream breaklands. Vegetation is open grown and dry, mixed coniferous forest. Soils form in material from moderately weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

LANDFORM

The landform consists of very steep, dissected mountain slopes with major perennial streams at their base. At least 25 percent of the area is near first order stream channels that drain directly into third or larger order streams. These channels are usually ephemeral and form a trellis stream pattern with the perennial stream at the base of this unit. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacings are 500 to 1000 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Southerly	3600-5800	30-45	15-30

VEGETATION

Existing: Vegetation on northerly aspects is a dense forest of ponderosa pine and Douglas-fir with inclusions of western larch and lodgepole pine. The understory is dominated by ninebark, pinegrass, beargrass, and twinflower in drainageways. Vegetation on southerly aspects is an open-grown forest of ponderosa pine and Douglas-fir. The understory on south aspects is dominated by bluebunch wheatgrass, Idaho fescue, and rough fescue.

Habitat Type (HT) Composition: Douglas-fir/ninebark (PSME/PHMA) is the major HT on northerly aspects with Douglas-fir/twinflower (PSME/LIBO) included. This HT occurs on east and west aspects and occupies about 40 percent of the map unit. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) occurs on south aspects. A similar HT is Douglas-fir/Idaho fescue (PSME/FEID). The amount of south exposure can vary in this map unit and not every delineation will have these HTs. In delineations where they occur, these HTs can occupy up to 35 percent of the map unit.

Scree community types occur on rock outcrop and occupy about 25 percent of this unit.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained and medium textured. Soils have carbonate accumulations at a depth of 25 to 40 inches. Some soils have a slight subsoil clay accumulation. Subsoils contain 35 to 65 percent rock fragments.

Composition:
Typic Eutrochrepts, loamy skeletal, mixed, frigid support dry, mixed coniferous forests and occur on northerly aspects. Similar soils have the subsoil clay accumulation and are Typic Eutroboralfs, loamy skeletal, mixed, frigid. These soils occupy about 40 percent of the map unit.

Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid support open grown forests and occur on southerly aspects. Similar soils lack the subsoil carbonate accumulation and are Typic Xerochrepts, loamy skeletal, mixed. These soils occupy about 35 percent of the unit.

Rock outcrop and rubble land occupy about 25 percent of this unit.

Representative Profiles:
Typic Eutrochrepts, loamy skeletal, mixed, frigid have a dark grayish brown silt loam surface layer about 5 inches thick. The upper subsoil is a brown or dark grayish brown gravelly silt loam about 14 inches thick. The lower subsoil is a calcareous grayish brown very gravelly silt loam to depths of 60 inches or more

Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have a dark grayish brown gravelly silt loam surface layer about 4 inches thick. The upper subsoil is grayish brown and olive brown gravelly silt loam about 25 inches thick. The lower subsoil is calcareous and is an olive brown very gravelly silt loam to depths of about 60 inches. Many rock fragments can be crushed by hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low in open grown forests and moderate in dry, mixed coniferous forests. Slope steepness limits tractor operations. Cable systems should be considered. Competition for moisture from understory vegetation and insolation limit forest regeneration. Protection from high insolation can help improve regeneration. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings. Productivity of Douglas-fir is often affected by insect infestation.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Slope steepness increases the quantity of material excavated. Native rock fragments with low durability break down over time under heavy traffic. Inclusions of highly weathered bedrock produce soil materials that rut easily when wet. Material exposed by road construction is difficult to revegetate because of moisture stress. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access. These areas are highly susceptible to weed invasion.

Wildlife: This unit provides excellent deer, elk, and sheep winter range. Steep slopes and winter sun angle enhance snowmelt rates which make winter forage more available. The primary forage is graminoids. Timber harvest is generally not beneficial to winter range maintenance. Invasion by conversion to knapweed can result in loss in forage and is a severe risk in this unit.

Fisheries: Perennial streams are rare due to steepness and location of this map unit. Steep valley side channels drain into major perennial channels at the base of this map unit with little buffering. Channels at the base of this map unit are high gradient, dominated by riffles, and have rocky, stable banks.

Watershed: Firelines and roads have a moderate erosion hazard. Slopes are steep and dissected and sediment delivery efficiency is very high. Landslide hazard is moderate.

61MD

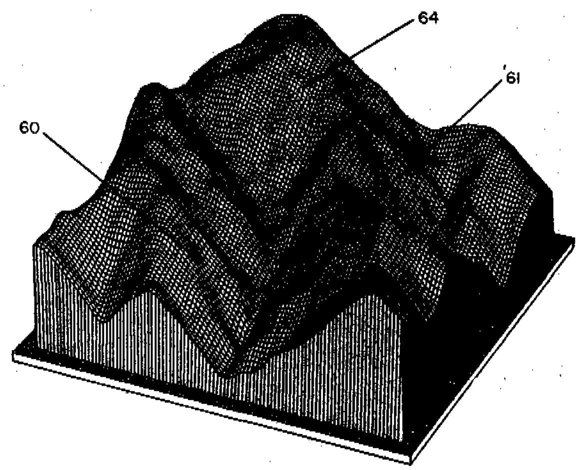
Typic Vitrandepts, dissected stream breaklands

SUMMARY

The map unit occurs on dissected stream breaklands. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

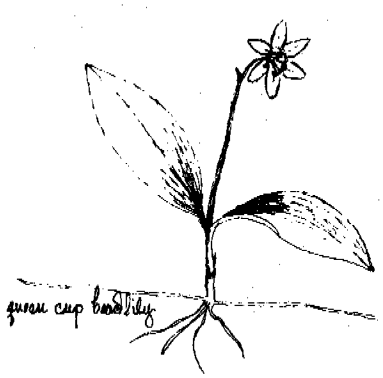
LANDFORM

The landform consists of very steep, dissected mountain slopes with major perennial streams at their base. At least 25 percent of the area is near first order stream channels that drain directly into third or larger order streams. These channels are usually ephemeral and form a trellis stream pattern with the perennial stream at the base of this unit. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacings are 500 to 1000 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Northerly	3600-5800	45-55	15-30

VEGETATION



Existing: Vegetation is a mixed forest dominated by western larch, Douglas-fir, lodgepole pine, western redcedar, grand fir, and western white pine. The understory is dominated by queencup beadlily, menziesia, twinflower, rocky mountain maple, and blue huckleberry.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN) and western redcedar/queencup beadlily (THPL/CLUN) are major HTs. These HTs occur throughout and occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) occurs on southerly inclusions. Timber productivity is slightly lower.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

61MD

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and occasional calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

SOILS

Map Unit Summary: Soils are well-drained and medium textured. Some soils have a slight subsoil clay accumulation. Surface layers form in volcanic ash influence loess. Subsoils contain 45 to 65 percent rock fragments.

Composition:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have loess surface layers about 14 to 25 inches thick with less than 35 percent rock fragments. Similar soils have less thick loess layers about 12 inches thick or more than 35 percent rock fragments. These soils are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid and Typic Vitrandepts, medial skeletal, mixed, frigid, respectively. These soils occupy about 70 percent of the map unit.

Included are up to 40 percent dissimilar soils and rock outcrop or talus. Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly inclusions where the loess surface layer is shallow or lacking. Soils formed from highly calcareous bedrock have subsoil carbonate accumulation. These are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid. Trees tend to be shallow rooted in these soils and can be susceptible to windthrow. Rock outcrop or talus occupy 15 to 30 percent of the unit.

Representative Profile:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Upper surface layers are dark brown gravelly loams about 1 inch thick. Lower surface layers are dark yellowish brown gravelly silt loams about 14 inches thick. Subsoils are brown extremely gravelly silt loams about 30 inches thick. Substrata are to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepness limits tractor operations. Rock outcrop and slope dissection can limit logging systems.

Roads: Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks and slumping. Full bench construction and end haul increase road prism stability on steep slopes. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Steep slopes preclude use by wildlife. Unroaded timbered delineations can provide security habitat. Where associated with south-facing winter ranges, delineations can provide critical thermal cover.

Fisheries: Perennial streams are rare due to steepness and location of this map unit. Steep valley side channels drain into major perennial channels at the base of this map unit with little buffering. Channels at the base of this map unit are high gradient, dominated by riffles, and have rocky, stable banks.

Watershed: Firelines and roads have a moderate erosion hazard. Oversteepened steep slopes have moderate risk of local slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is very high because slopes are very steep, dissected, and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of the slope reduce sedimentation risks.

61QC

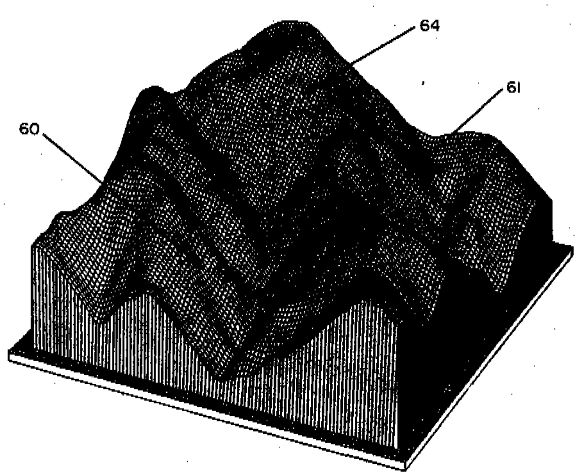
Andic Dystric Eutrochrepts-Dystric Eutrochrepts-Rock outcrop complex, dissected stream breaklands

SUMMARY

The map unit occurs on dissected stream breaklands. Vegetation is dry, mixed coniferous forest. Soils form in volcanic ash influenced loess or mixed loess overlying material from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

LANDFORM

The landform consists of very steep, dissected mountain slopes with major perennial streams at their base. At least 25 percent of the area is near first order stream channels that drain directly into third or larger order streams. These channels are usually ephemeral and form a trellis stream pattern with the perennial stream at the base of this unit. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 500 to 1000 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	E,W	3600-5800	30-45	15-40

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, western larch, grand fir, and Douglas-fir. The understory in the Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, pinegrass. The grand fir HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA), Douglas-fir/twinflower (PSME/LIBO), and grand fir/beargrass (ABGR/XETE) are major HTs. PSME/PHMA-PHMA is more common east of Superior and a the lower elevation range. ABGR/XETE is most common west of Superior. PSME/LIBO occurs on toeslopes and in drainageways and associated with PSME/PHMA-PHMA. Grand fir/twinflower (ABGR/LIBO) is similar and is associated with ABGR/XETE. The percent coverage of ABGR/XETE and PSME/PHMA-PHMA varies with geographical location. PSME/LIBO and ABGR/LIBO occupy about 20 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and moderately coarse. Talus and rock outcrop are non-soil components of the unit. Soils on northerly aspects and other aspects west of Superior have silty surface layers formed in volcanic ash influenced loess. Soils on east and west aspects and those soils east of Superior have loamy surface layers formed in volcanic ash influenced loess mixed with subsoils. Soils contain 65 to 90 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have silt loam surface layers formed in volcanic ash influenced loess about 8 to 14 inches thick. These soils occupy about 30 percent of the unit.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loamy surface layers formed in volcanic ash influenced loess mixed with subsoil material. They occupy about 25 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. They occupy about 15 to 40 percent of the unit.

Included are up to 5 percent dissimilar soils. Typic Xerochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-CARU on south aspects. Surface layers formed in volcanic ash influenced loess are absent. These soils have lower productivity and more limitations to regneration. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid that support ABGR/CLUN on northerly aspects have higher productivity and less limitation to regeneration.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 4 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely cobbly sandy loams about 16 inches thick. Substrata are very pale brown extremely cobbly sandy loams to depths of 40 inches or more.

These Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 4 inches thick. Surface layers ar dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inches thick. Substrata are grayish brown extremely cobbly sandy loams to a depth of 40 inches or more.

Classification Remarks: This map unit encompasses a gradation of purity of volcanic ash content in the surface soil layers. The Dystric Eutrochrepts, loamy skeletal, mixed, frigid has a loam surface layer texture versus a silt loam texture of the Andic Dystric Eutrochrept, loamy skeletal, mixed. Both soils have an increased water holding capacity and similar conductivity properties over their extremely rocky substratums. Mappers felt that the "andic" influence of this Dystric Eutrochrept was important to recognize over other soils without "andic" influence. These soils are similar in regards to timber management. Thus, the undifferentiated unit was created with these two different taxonomic classes.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Slope dissection can limit logging systems. Protection from high insolation can help improve regeneration.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks. Draws are closely spaced and must be crossed frequently. Roads have a moderate hazard for road prism failures. Lower portions of the slope carry very high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: High slope dissection provides important microsites for bedding, foraging, and cover. The high level of dissection adds to the value of security habitat by decreasing viewing distances. Midslope roads that weave in and out of steep draws elevate viewing angles which decreases security cover values. Midslope roads also present physical barriers to big game because of high cut and fill slopes.

Fisheries: Perennial streams are rare due to steepness and location of this map unit. Steep valley side channels drain into major perennial channels at the base of this map unit with little buffering. Channels at the base of this map unit are high gradient, dominated by riffles, and have rocky, stable banks.

Watershed: Firelines and roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is very high because slopes are very steep, highly dissected, and drain directly into a perennial stream system. Controlling sediment can be difficult due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks.

61QD

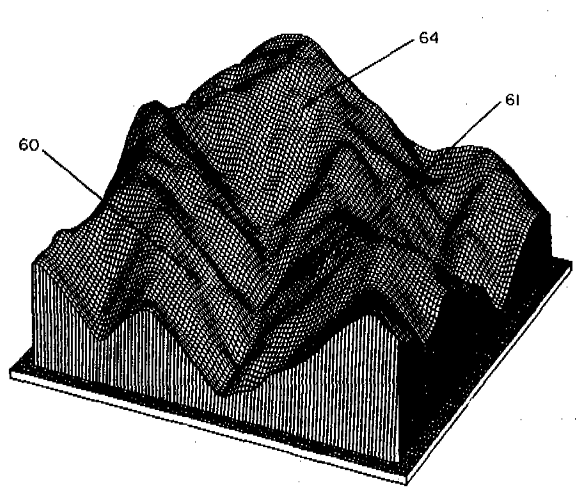
Typic Vitrandepts- Rock Outcrop complex, dissected stream breaklands

SUMMARY

The map unit occurs on dissected stream breaklands. Vegetation is moist, mixed coniferous forest and subalpine forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks. Talus stringers and rock outcrop are components of this map unit.

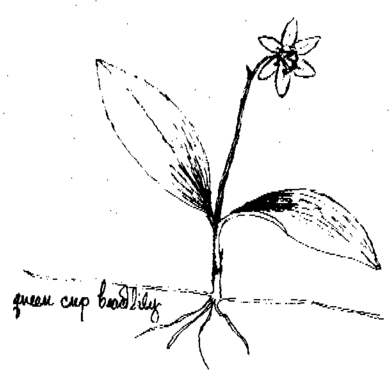
LANDFORM

The landform consists of very steep, dissected mountain slopes with major perennial streams at their base. At least 25 percent of the area is near first order stream channels that drain directly into third or larger order streams. These channels are usually ephemeral and form a trellis stream pattern with the perennial stream at the base of this unit. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacing are 500 to 1000 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Northerly	3600-5800	45-55	15-40

VEGETATION



Existing: Vegetation is a mixed forest dominated by lodgepole pine, western larch, grand fir, subalpine fir, western white pine, and Douglas-fir. The understory is dominated by twin flower, queencup beadlily, rocky mountain maple, serviceberry, oceanspray, blue huckleberry, and at elevations above 4800 feet, menziesia.

Habitat Type (HT) Composition: Grand fir/twinflower (ABGR/LIBO), grand fir/queencup beadlily (ABGR/CLUN), subalpine fir/menziesia (ABLA/MEFE), and western recedar/queencup beadlily (THPL/CLUN) are major HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) is a similar HT. ABLA/MEFE is most common above 4800 feet.

Included are up to 10 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) occur on southerly inclusions. Timber productivity is slightly lower on these sites.

61QD

GEOLOGY

The unit is underlain be weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and form talus stringers in drainageways and toeslopes.

SOILS

Map Unit Summary: Soils are well-drained and have thick surface layers formed from volcanic ash influenced loess. Subsoils are moderately coarse and contain 65 to 90 percent rock fragments. Talus and rock outcrop are non-soil components of the unit.

Composition:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have silt loam surface layers formed in volcanic ash influenced loess about 14 to 25 inches thick with less than 35 percent rock fragments. These soils support moist, mixed coniferous forest. Similar soils have loess surface layers about 12 to 14 inches thick or have more than 35 percent rock fragments. They are Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid and Typic Vitrandepts, medial skeletal, mixed, frigid, respectively. Other similar soils are Entic Cryandepts, medial-skeletal, mixed. They support subalpine fir forest. These soils occupy up to 50 percent of the unit.

Talus is in some drainageways, along toeslopes, and below rock outcrops. Rock outcrop can occur through out the unit but tends to be along ridge interfluvs and mid to lower slopes. They occupy about 15 to 40 percent of the unit.

Included are up to 10 percent dissimilar soils. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support ABGR/XETE or PSME/VAGL-XETE and have slightly lower productivity.

Representative Profile:
Typic Vitrandepts, medial over loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Upper surface layers are dark brown gravelly loams about 1 inch thick. Lower surface layers are dark yellowish brown gravelly silt loams about 14 inches thick. Subsoils are brown extremely gravelly fine sandy loams and silt loams about 30 inches thick. Substrata are to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepness limits tractor operation. Cable systems should be considered. Slope dissection can limit logging systems.

Roads: Slope steepness increases the quantity of material excavated. Hard rock frequently limits excavation. Material exposed by road construction is subject to rock ravel on steep cutbanks. Draws are closely spaced and must be crossed frequently. Roads have a moderate hazard for road prism failures. Lower portions of the slope carry high risk of sediment delivered to the stream system during and after construction.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Steep slopes preclude use by wildlife. Unroad, timbered delineatons can provide big game security habitat. Where associated with south-facing winter ranges, delineations can provide critical thermal cover. Forage response potential is high from timber harvest but big game avoid these slopes unless pursued.

Fisheries: Perennial streams are rare due to steepness and location of this map unit. Steep valley side channels drain into major perennial channels at the base of this map unit with little buffering. Channels at the base of this map unit are high gradient, dominated by riffles, and have rocky, stable banks.

61QD

Watershed: Firelines and roads have a low erosion hazard. Oversteepened steep slopes have moderate risk of slope stability hazard that should be assessed prior to roading. Sediment delivery efficiency is very high because slopes are very steep, highly dissected, and drain directly into a perennial stream system. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Road locations on the upper one third of slope reduce sedimentation risks.

61SA

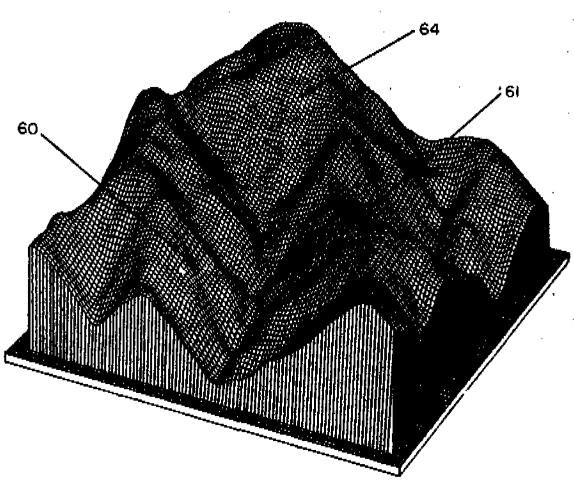
Dystric Eutrochrepts-Andic Cryochrepts association, dissected stream breaklands

SUMMARY

The map unit occurs on dissected stream breaklands. Vegetation is cool, somewhat dry Douglas-fir and subalpine forest. Soils form in material from micaceous schist and associated rocks. Talus stringers and rock outcrop are components of this map unit.

LANDFORM

The landform consists of very steep, dissected mountain slopes with major perennial streams at their base. At least 25 percent of the area is near first order stream channels that drain directly into third or larger order streams. These channels are usually ephemeral and form a trellis stream pattern with the perennial stream at the base of this unit. There is little capacity to store sediment in these first order channels or on the lower third of these mountain slopes and sediment moves rapidly during runoff from these slopes. Drainage spacings are 500 to 1000 feet apart.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
65-100	Variable	4000-5500	25-45	15-30

VEGETATION

Existing: Vegetation is a mixed forest dominated by lodgepole pine, western larch, subalpine fir, and Douglas-fir. The understory is dominated by beargrass, blue huckleberry, and menziesia. Aspen stringers occur on talus and are associated with shallow ground water.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE), subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL), and subalpine fir/menziesia (ABLA/MEFE) are dominant HTs. PSME/VAGL-XETE occurs on southerly aspects below 5000 feet and occupies about 35 percent of the map unit. ABLA/XETE-VAGL occurs on southerly aspects above 5000 feet and occupies about 15 percent of the map unit. ABLA/MEFE occurs on northerly aspects and occupies about 10 percent of the map unit.

Included are up to 40 percent dissimilar vegetation and rock outcrop or talus. Aspen groves and HTs associated with wet soils such as subalpine fir/bluejoint (ABLA/CACA) occur near springs. Timber productivity is higher and regeneration is limited by elevated water tables after harvest.

GEOLOGY

The unit is underlain by mica schists associated with the border zone of the Idaho Batholith. Other associated bedrock are micaceous sandstones and phyllites. Upper bedrock layers are very fractured and splay off steep roadcuts easily. Rock fragments exposed on the surface weather rapidly. Soils have a high mica content.

Included are up to 10 percent dissimilar bedrock. Gneiss is a harder, more resistant to weathering bedrock associated with the Idaho Batholith. Gneiss is recognized by a characteristic banding of light and dark colored minerals. Soils have many, hard rock fragments, roadcuts are more stable, and soils are less erosive.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured. They have high mica content. Subsoils contain 35 to 55 percent rock fragments. Soil properties vary with aspect and vegetation.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects and support cool, somewhat dry Douglas-fir forests. They occupy about 35 percent of the map unit.

Andic Cryochrepts, loamy skeletal, micaceous are on northerly slopes and support subalpine forest. They occupy about 25 percent of the map unit.

Included are up to 15 percent dissimilar soils. Aquic Cryochrepts and Cryumbepts support aspen and ABLA/CACA where spring activity is present. These soils are somewhat poorly-drained and present limitations to logging, roads, and regeneration. Rock outcrop or rubble occupies 15 to 30 percent of the unit.

Representative Profiles:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light gray gravelly sandy loams about 14 inches thick. Subsurface layers are light gray very gravelly sandy loams about 12 inches thick. Subsoils are pale brown very gravelly sandy loams and brown very gravelly silt loams about 13 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 40 inches or more.

Andic Cryochrepts, loamy skeletal, micaceous have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are yellowish brown silt loams about 9 inches thick. Subsurface layers are light gray gravelly silt loams about 9 inches thick. Subsoils are light gray and brown gravelly silt loams about 12 inches thick. Substrata are light yellowish brown very gravelly silt loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and moderate on ABLA/XETE-VAGL and PSME/VAGL-XETE. Slope steepness limits tractor operations. Timber harvest near springs will cause water table rise, limiting regeneration and increasing slope stability hazard.

Roads: Material exposed by road construction is subject to rock ravel and slumping on steep cutbanks. The lower portion of the slope carries high risk of sediment delivery to the stream system during and after construction. High hazard areas for landslides should be located through field investigation.

61SA

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides excellent deer and elk winter range. Mosaics of aspen, southerly aspects, and thermal cover create diversity needed for excellent winter, spring, and summer big game range. Timber harvest generally does not enhance habitat.

Fisheries: Perennial streams are rare due to steepness and location of this map unit. Steep valley side channels drain into major perennial channels at the base of this map unit with little buffering. Channels at the base of this map unit are high gradient, dominated by riffles, and have rocky, stable banks.

Watershed: Firelines and roads have a high erosion hazard. Slopes are very steep and sediment delivery efficiency is very high. Controlling sediment can be difficult on mid to lower slopes due to low slope and drainage storage capacity on these very steep slopes. Landslide hazard is high.

64KA

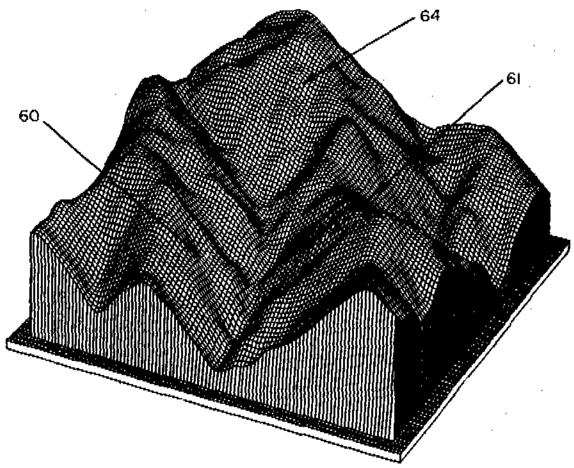
Dystric Eutrochrepts, moderately well weathered granitic substratum, steep

SUMMARY

The map unit occurs on moderately steep to steep mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests. Soils form in material from moderately well weathered or grussic granitics.

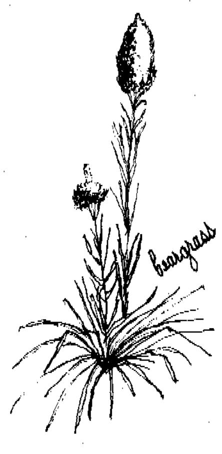
LANDFORM

The landform consists of steep, convex to straight mountain slopes. Many of these slopes have perennial streams at the base. Bedrock is relatively close to the surface. Drainageways are steep and can be incised. Drainage spacing ranges from 800 to 1500 feet.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
50-75	Variable	4000-5000	30-45	5

VEGETATION



Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine, grand fir, and western larch. The understory is dominated by beargrass, pinegrass, and blue huckleberry. Lower elevations can have ninebark.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). A similar HT, grand fir/beargrass (ABGR/XETE) occurs in some delineations on northerly slopes. These HTs occupy about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/ninebark (PSME/PHMA) occurs at the lower elevation bounds of this unit on southerly aspects. These HTs do not support lodgepole pine and are slightly warmer. Grand fir/twinflower (ABGR/LIBO) and spruce/twinflower (PICEA/LIBO) occur on northerly slopes below 5000 feet and in some moist drainageways. These HTs are more productive.

64KA

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Subsoils contain 50 to 75 percent rock fragments.

Composition:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have coarse sandy loam and loamy sand textures. Similar soils are Dystric Eutrochrepts, loamy skeletal, mixed frigid. They have sandy loam textures with a low fine fraction content. These soils occupy about 85 percent of the map unit.

Included are up to 5 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils have volcanic ash influenced loess surface layers and can be more productive.

Representative Profile:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are pale brown gravelly sandy loams about 8 inches thick. Subsurface layers are light gray gravelly sandy loams about 10 inches thick. Subsoils are pale brown very gravelly coarse sandy loams about 33 inches thick. Substrata are brownish yellow very gravelly loamy coarse sands to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Steep slopes limit tractor operations. Site productivity depends on the relatively thin topsoil and displacement of the surface layer can reduce site productivity. Regeneration is limited by moisture stress and high soil surface temperatures on southerly unshaded areas. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility and provides shade for regeneration.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and very difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and mulch can enhance the success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. Steep slopes limit access and forest understory produces limited forage.

Wildlife: This unit provides good spring and fall range for deer and elk. Primary forage value is forbs and grasses available in early successional communities and within timbered understories. Shrub forage value is low on this soil type.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is high. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

64KAb

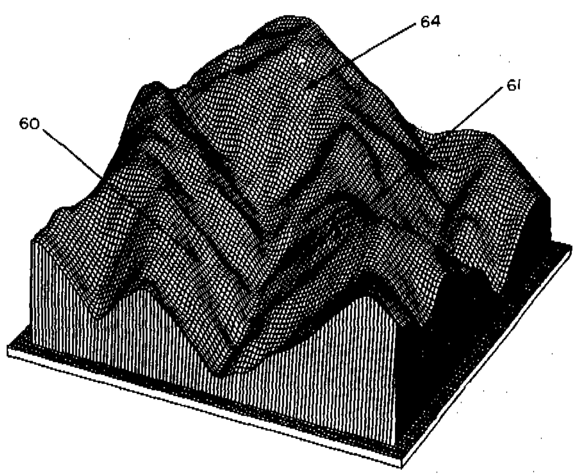
Dystric Eutrochrepts, moderately well weathered granitic substratum, steep, bouldery

SUMMARY

The map unit occurs on moderately steep to steep mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forests. Soils form in material from moderately well weathered or grussic granitics. Granitic tors and boulders are throughout this unit.

LANDFORM

The landform consists of steep, convex to straight mountain slopes. Many of these slopes have perennial streams at the base. Large granitic outcrops called tors are dispersed throughout this unit creating a complex landscape. Bedrock is relatively close to the surface. Drainageways are steep and can be incised. Drainage spacing ranges from 800 to 1500 feet.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
50-75	Variable	4000-5000	30-45	15-25

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine, grand fir, and western larch. The understory is dominated by beargrass, pinegrass, and blue huckleberry. Lower elevations can have ninebark.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT. The most common HT phase is beargrass (XETE). A similar HT, grand fir/beargrass (ABGR/XETE) occurs in some delineations on northerly slopes. These HTs occupy about 70 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/ninebark (PSME/PHMA) occurs at the lower elevation bounds of this unit on southerly aspects. These HTs do not support lodgepole pine and are slightly warmer. Grand fir/twinflower (ABGR/LIBO) and spruce/twinflower (PICEA/LIBO) occur on northerly slopes below 5000 feet and in some moist drainageways. These HTs are more productive.

64KAb

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites. Granitic tors composed of harder granite are significant features of this landscape.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Subsoils contain 50 to 75 percent rock fragments. Boulders and tors are a common feature.

Composition:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have coarse sandy loam and loamy sand textures. Similar soils are Dystric Eutrochrepts, loamy skeletal, mixed frigid. They have sandy loam textures with a low fine fraction content. These soils occupy about 75 percent of the map unit.

Included are up to 25 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils have volcanic ash influenced loess surface layers and can be more productive. Rock outcrop occupies 15 to 25 percent of this unit.

Representative Profile:
Dystric Eutrochrepts, sandy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are pale brown gravelly sandy loams about 8 inches thick. Subsurface layers are light gray gravelly sandy loams about 10 inches thick. Subsoils are pale brown very gravelly coarse sandy loams about 33 inches thick. Substrata are brownish yellow very gravelly loamy coarse sands to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. Steep slopes limit tractor operations. Granitic outcrops and boulders present limitations to logging systems. Site productivity depends on the relatively thin topsoil and displacement of the surface layer can reduce site productivity. Regeneration is limited by moisture stress and high soil surface temperatures on southerly unshaded areas. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility and provides shade for regeneration.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Hard granitic bedrock occasionally limits excavation. Material exposed by road construction is subject to ravel and very difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and mulch can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. Steep slopes limit access and forest understory produces limited forage.

Wildlife: This unit provides good spring and fall range for deer and elk. Primary forage value is forbs and grasses available in early successional communities and within timbered understories. Shrub forage value is low on this soil type.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is high. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

64KB

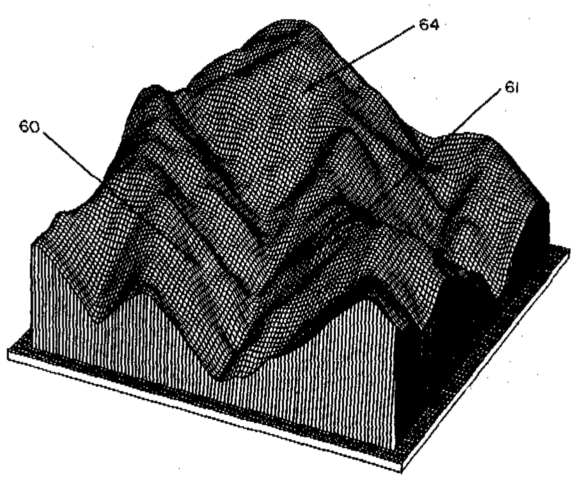
Andic Cryochrepts, moderately well weathered granitic substratum, steep

SUMMARY

The map unit occurs on moderately steep to steep mountain slopes. Vegetation is subalpine forests. Soils form in volcanic ash influenced loess overlying material from moderately well weathered granitics or grussic granites.

LANDFORM

The landform consists of steep, convex to straight mountain slopes. Many of these slopes have perennial streams at the base. Bedrock is relatively close to the surface. Drainageways are steep and can be incised. Drainage spacing ranges from 800 to 1500 feet.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
50-75	Variable	5000-6800	45-60	0-15

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and western larch with an occasional subalpine fir and Douglas-fir. The understory can be dominated by beargrass, menziesia, twinflower, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass,(ABLA/XETE) and subalpine fir/menziesia (ABLA/MEFE) are the major HTs. ABLA/XETE occurs on southerly slopes and occupies about 50 percent of the map unit. ABLA/MEFE occurs on northerly slopes. A similar HT, spruce/twinflower (PICEA/LIBO) occurs along drainageways and some gentle northerly slopes. These HTs occupy about 40 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occur at the lower elevation bounds of this map unit. This HT is less productive.

64KB

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Rock fragment content ranges from 50 to 75 percent. Surface soils are formed in volcanic ash influenced loess.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have coarse sandy loam and loamy sand textures. They have sandy loam textures with a low fine fraction content. These soils occupy 85 percent of the map unit.

Included are up to 15 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils support cool, somewhat dry Douglas-fir forests where regeneration can be limited by moisture stress.

Representative Profile:
Andic Cryoochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loam about 8 inches thick. The subsurface layers are light gray very gravelly coarse sandy loam about 10 inches thick. The subsoil is a very pale brown and yellowish brown very gravelly coarse sandy loam about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sand and coarse sandy loam to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTS and high in ABLA/MEFE HTs. Steep slopes limit tractor operations. Site productivity depends on the relatively thin, fine textured soil surface layer and displacement of the surface layer can reduce site productivity. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and much can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. Steep slopes limit access and forest understory produces limited forage.

Wildlife: This unit provides good summer range for deer and elk. Primary forage value is forbs and grasses available in fully stocked conifer stands. Forage response from treatment is minimal. Opportunities for habitat enhancement are limited.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is high. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

64KBb

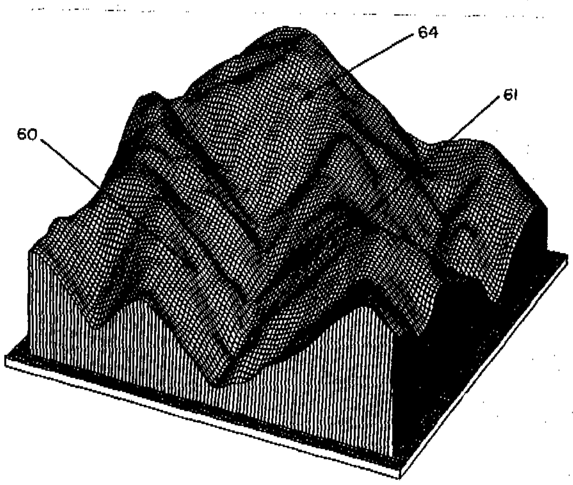
Andic Cryochrepts, moderately well weathered granitic substratum, steep, bouldery

SUMMARY

The map unit occurs on moderately steep to steep mountain slopes. Vegetation is subalpine forests. Soils form in volcanic ash influenced loess overlying material from moderately well weathered granitics or grussic granites. Granitic tors and boulders are throughout this unit.

LANDFORM

The landform consists of steep, convex to straight mountain slopes. Many of these slopes have perennial streams at the base. Large granitic outcrops called tors are dispersed throughout this unit creating complex landscapes. Bedrock is relatively close to the surface. Drainageways are steep and can be incised. Drainage spacing ranges from 800 to 1500 feet.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
50-75	Variable	5000-6800	45-60	15-25

VEGETATION

Existing: Vegetation is a mixed forest of lodgepole pine and western larch with an occasional subalpine fir and Douglas-fir. The understory can be dominated by beargrass, menziesia, twinflower, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/beargrass,(ABLA/XETE) and subalpine fir/menziesia (ABLA/MEFE) are the major HTs. ABLA/XETE occurs on southerly slopes and occupies about 50 percent of the map unit. ABLA/MEFE occurs on northerly slopes. A similar HT, spruce/twinflower (PICEA/LIBO) occurs along drainageways and some gentle northerly slopes. These HTs occupy about 40 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occurs at the lower elevation bounds of this map unit. These HTs are less productive.

GEOLOGY

The unit is underlain by large grained granites and gruss of the Idaho Batholith. This material rapidly decomposes to coarse sandy and gravelly soil material locally known as decomposed granites. Granitic tors composed of harder granite are significant features of this landscape.

SOILS

Map Unit Summary: Soils are somewhat excessively drained and coarse. Subsoils contain 50 to 75 percent rock fragments. Surface soils are formed in volcanic ash influenced loess. Boulders and tors are a common feature.

Composition:
Andic Cryochrepts, sandy skeletal, mixed have coarse sandy loam and
loamy sand textures. They have sandy loam textures with a low fine fraction content. These soils occupy about 75 percent of the map unit.

Included are up to 25 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils support cool, somewhat dry Douglas-fir forests where regeneration can be limited by moisture stress. Rock outcrop occupies 15 to 25 percent of this unit

Representative Profile:
Andic Cryochrepts, sandy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light yellowish brown loams about 8 inches thick. Subsurface layers are light gray very gravelly coarse sandy loams about 10 inches thick. Subsoils are very pale brown and yellowish brown very gravelly coarse sandy loams about 24 inches thick. Substrata are pale brown very gravelly loamy coarse sands and coarse sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate in ABLA/XETE HTs and high in ABLA/MEFE HTs. Steep slopes limit tractor operations. Granitic outcrops and boulders present limitations to logging systems. Site productivity depends on the relatively thin, fine textured soil surface layer and displacement of the surface layer can reduce site productivity. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility.

Roads: Erosion from rutting and tread wear on unsurfaced roads and along ditches can be severe on grades above 6 percent. Hard granitic bedrock occasionally limits excavation. Material exposed by road construction is subject to ravel and difficult to revegetate. Special seed mixes, use of shrubs species, several fertilizer applications, and mulch can enhance success rate in revegetating disturbed areas. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: This map unit is poorly suited to range management. Steep slopes limit access and forest understory produces limited forage.

Wildlife: This unit provides good summer range for deer and elk. Primary forage value is forbs and grasses available in fully stocked conifer stands. Forage response from treatment is minimal. Opportunities for habitat enhancement are limited.

64KBb

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Skid trails, firelines, and roads have a very high erosion hazard. Sediment delivery efficiency is high. Controlling sediment can be difficult on roads and adjacent to stream crossings under standard practice.

64MA

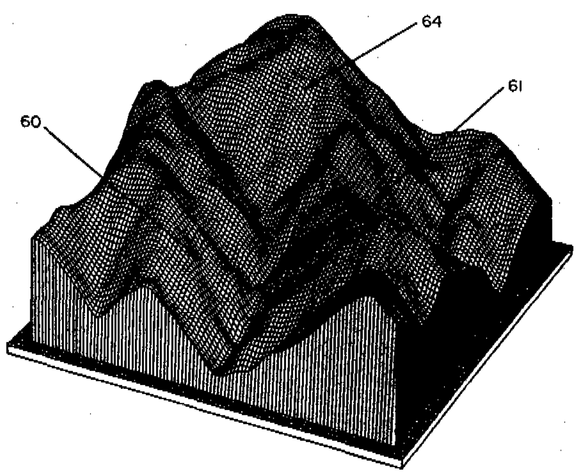
Calcixerollic Xerochrepts-Typic Haploxerolls association, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is open grown forest. Soils form in material from moderately weathered metasedimentary rocks.

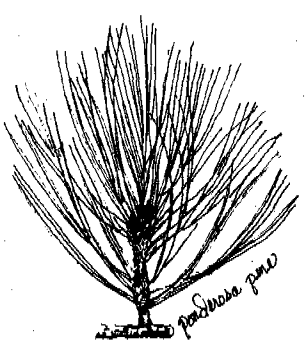
LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1500 to 2500 feet apart and drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Southerly	3200-5000	20-30	5-15

VEGETATION



Existing: Vegetation is open grown stands of ponderosa pine and Douglas-fir. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and some delineations have rough fescue. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/rough fescue (PSME/FESC), and Douglas-fir/Idaho fescue (PSME/FEID) are the major HTs. PSME/AGSP occurs on the shallower and rockier sites. PSME/FESC occurs on deeper soils and less rocky soils. A similar included habitat type is Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP) which occurs in areas where the annual precipitation is slightly higher than the average (approximately 20 to 25 inches). These habitat types occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) occur in some drainages. Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) occurs on inclusions of east and west aspects. Timber productivity is higher and there are less limitations to regeneration.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. The combination of steep slopes and southerly aspects create a very high insolation factor. Summer surface soil temperature can be quite high and soils become dry early in the growing season. Soil properties vary with degree of weathering of the underlying bedrock. They have dark colored surface horizons and subsoil clay accumulations occur in soils formed from more highly weathered bedrock. Subsoils contain 35 to 50 percent rock fragments and typically have calcium carbonate accumulations. Rock fragment durability can be quite low.

Composition:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have dark colored surface layers about 2 to 5 inches thick and carbonate accumulation in the subsoils. Similar soils lack subsoil carbonate accumulation but have similar physical properties. These soils are Typic Xerochrepts, loamy skeletal, mixed, frigid. Other similar soils form on highly weathered bedrock inclusions and have subsoil clay accumulation. They are Mollic Haploxeralfs, loamy skeletal, mixed, frigid. These soils occupy about 55 percent of the unit.

Typic Haploxerolls, loamy skeletal, mixed, frigid have dark colored surface layers about 7 to 11 inches thick and often have carbonate accumulation in the subsoils. These soils occupy about 25 percent of the unit.

Included are up to 20 percent dissimilar soils and rock outcrop. Typic Xerochrepts, loamy skeletal, mixed, frigid are formed in weakly weathered non-calcareous bedrock have hard angular rock fragments of greater than 55 percent of the subsoils and substrata, textures are moderately coarse, and subsoil clay accumulations are absent. These soils have higher bearing strength on native road surfaces. Lithic Xerochrepts, loamy skeletal, mixed, frigid are shallow with bedrock within 2 feet of the surface. They can occur along ridgenose positions and have lower productivity. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark grayish brown and dark brown loams about 13 inches thick. Upper subsoils are dark yellowish brown and yellowish brown very gravelly silt loams about 21 inches thick. Lower subsoils are pale brown gravelly loams about 9 inches thick. Substrata are light olive brown very gravelly silt loams and highly weathered calcareous argillite to a depth of 40 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

64MA

These Typic Haploxerolls, loamy skeletal, mixed, frigid have surface layers that are very dark brown gravelly silt loams about 13 inches thick. Subsoils are yellowish brown very gravelly loams about 27 inches thick. Substrata are brown extremely cobbly loams to a depth of 40 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. Slope steepness limits tractor operation. Cable systems should be considered. Competition for moisture from understory vegetation and very high insolation severely limits forest regeneration. Protection from high insolation can help improve regeneration. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings. Productivity of Douglas-fir is often affected by insect infestation.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Slope steepness increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate because of moisture stress. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access. Spotted knapweed invades forest openings in this unit.

Wildlife: This unit provides excellent deer, elk, and sheep winter range. Steep slopes and winter sun angle enhances snowmelt rates which makes winter forage more available. The primary forage is graminoids. Timber harvest is generally not beneficial to winter range maintenance. Invasion by conversion to knapweed can result in loss in forage and is a sever risk in this unit.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have a moderately low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64MB

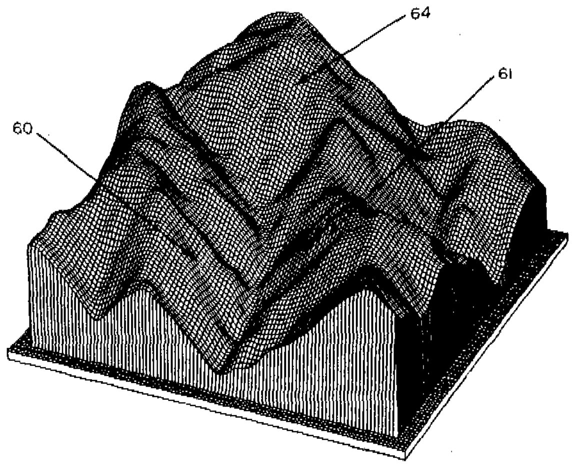
Typic Ustochrepts-Mollic Eutroboralfs complex, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is dry Douglas-fir forest. Soils form in material from moderately weathered metasedimentary rocks.

LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 2500 feet apart and drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	S,E,W	3200-5000	25-35	5-15

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry. Ceanothus is present in some openings where seed source is present.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) are the major HTs. Douglas-fir/pinegrass (PSME/CARU) occurs in some delineations and occupies less than 20 percent. These HTs occupy about 80 percent of the map unit.

Included are up to 20 percent dissimilar HTs. Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and Douglas-fir/twinflower(PSME/LIBO) are in drainageways, on toeslope positions, and on northerly aspects. Timber productivity is higher and there are fewer limitations to regeneration.

64MB

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soils become dry early in the growing season. Soil properties vary with degree of weathering of the underlying bedrock. Subsoils contain less than 50 percent rock fragments, are calcareous, and some have calcium carbonate accumulations. Subsoil clay accumulations occur in soils formed from more highly weathered bedrock. Rock fragment durability can be quite low.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have a dark colored surface layer. They can be formed in calcareous or non-calcareous bedrock. Subsoil carbonate accumulation varies according to bedrock, but all other physical properties are similar. These soils occupy about 50 percent of the unit.

Mollic Eutroboralfs, loamy skeletal, mixed, frigid are formed in material from more highly weathered metasedimentary rock. These soils have dark colored surfaces, subsoil clay accumulations, and carbonate accumulations in the lower subsoil. Rock fragment content is 35 to 45 percent. Similar soils have less than 35 percent rock fragments because of high amounts of soft crushable rock or do not have significant subsoil clay accumulation. They are Mollic Eutroboralfs, fine loamy, mixed, frigid and Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid, respectively. These soils occupy about 25 percent of the unit.

Included are up to 25 percent dissimilar soils and rock outcrop. Typic Ustochrepts, loamy skeletal, mixed, frigid formed in slightly weathered non-calcareous bedrock have greater than 55 percent hard angular rock fragments in the subsoils and substrata, textures are moderately coarse, and subsoil clay accumulation is absent. These soils have lower productivity and higher bearing strength on native road surfaces. Although these soils are taxonomically the same as the dominant soil, they have differing physical properties. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
These Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 5 inches thick. Subsoils are brown very gravelly silt loams about 19 inches thick. Substrata are brown very gravelly silt loams and moderately weathered calcareous argillite to a depth of 40 inches or more.

Mollic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Surface layers are very dark gray very gravelly silt loams about 4 inches thick. Upper subsoils are brown very gravelly loams about 9 inches thick. Middle subsoils are grayish brown very cobbly loams about 16 inches thick. Lower subsoils are olive very gravelly loams about 11 inches thick. They have few moderately thick clay films lining pores. Substrata are olive very gravelly loams to a depth of 66 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderately low. Slope steepness limits tractor operation. Cable logging systems should be considered. Regeneration limitations exist because of the long dry season in the summer and high insolation on southerly aspects. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation and root disease.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Slope steepness increases the quantity of material excavated. Material exposed by road construction is difficult to revegetate on southerly aspects because of moisture stress. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access. These areas are highly susceptible to weed invasion.

Wildlife: This unit provides good big game winter range. Young to mature stands, where associated with Map Unit 64MA provide critical winter thermal cover. Forage is available in the unit from shrubs. Timber harvest can be beneficial for winter range enhancement if confined to shrub understories and when adequate thermal cover is retained. Underburning of young to mature stands can be used to achieve moderate increase in forage at low costs.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have a moderate erosion hazard. Roads constructed on subsoils and substrata with more than 35 percent rock fragments have slightly less erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64MC

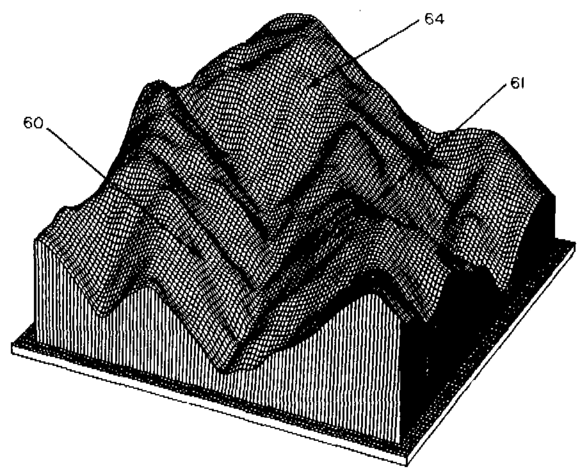
Typic Eutrochrepts and Typic Eutroboralfs and Andic Dystric Eutrochrepts, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is dry, mixed coniferous forest. Soils form in material from moderately weathered metasedimentary rocks. Some soils have a surface layer formed in volcanic ash influenced loess.

LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 1500 feet apart and drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	N,E,W	3200-5500	30-45	5-15

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, and pinegrass. The PSME/VAGL-XETE and ABGR/XETE HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima and twinflower in drainageways.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a wide climatic transition boundary within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy approximately 60 percent of the map unit. ABGR/XETE is on northerly aspects above 4600 feet and occupies less than 25 percent of the map unit. (ABGR/XETE is rare in the Rock Creek drainage.)

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4600 feet. Grand fir/twinflower (ABGR/LIBO) can occur in draws and on toeslopes. This habitat type occupies approximately 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4600 feet and occupies less than 25 percent of the map unit.

Douglas-fir/blue huckleberry (PSME/VAGL) occurs in the eastern edge of the survey area above 4500 feet and is supported by a similar environment as ABGR/XETE in this map unit. Douglas-fir/snowberry-snowberry (PSME/SYAL-SYAL) is supported by some low elevation calcareous soils and is supported by a similar environment as PSME/PHMA-PHMA.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) or Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) occur on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations. The bedrock contains moderately weathered layers of metasedimentary rock that produce soils with soft and moderately soft rock fragments and calcium carbonate accumulations. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium or moderately fine textures. Soil properties vary with degree of weathering of the underlying bedrock and aspect. Soils on northerly aspects have surface layers formed in volcanic ash influenced loess. This loess surface layer is absent or mixed with the subsoil on southerly aspects and on east and west aspects east of Superior. Soils formed from inclusions of highly weathered bedrock have subsoil clay accumulation and usually have subsoil carbonate accumulation. Subsoils contain 35 to 50 percent rock fragments. Rock fragment durability can be quite low.

Composition:
Typic Eutrochrepts, loamy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock that is calcareous and are on southerly aspects. The loess surface layer is absent or mixed. These soils are most common east of St. Regis. Subsoils have carbonate accumulations at a depth of 25 to 40 inches.

Typic Eutroboralfs, loamy skeletal, mixed, frigid form in material from moderately to more highly weathered metasedimentary rock. These soils have subsoil clay accumulations with carbonate accumulations in the lower subsoil. Loess surface layers are present on northerly aspects.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid form in material from moderately weathered metasedimentary rock that can be calcareous or non-calcareous. Calcareous soils have subsoil carbonate accumulations that are a depth greater than 40 inches. Surface layers are formed in volcanic ash influenced loess and are 8 to 13 inches thick.

64MC

Every delineation has at least one of these soils and can have all.

Included are up to 20 percent dissimilar soils and rock outcrop. Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid and Typic Xerochrepts, loamy skeletal, mixed, frigid support Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/snowberry (PSME/SYAL) on slopes that recieve high amounts of insolation. Soils have an extended dry period during the growing season and productivity is lower. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
Typic Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark grayish brown silt loams about 5 inches thick. Upper subsoils are brown and dark grayish brown gravelly silt loams about 14 inches thick. Lower subsoils are grayish brown very gravelly silt loams about 18 inches thick. Substrata are light olive brown very gravelly silt loams to a depth of 40 inches or more.

Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark grayish brown very gravelly loams about 10 inches thick. Upper subsoils are olive brown very gravelly loams about 16 inches thick. Middle subsoils are dark yellowish brown very gravelly loams about 17 inches thick. They have common moderately thick clay skins along ped faces. Lower subsoils are pale brown gravelly silt loams about 9 inches thick. Accumulations of calcium carbonate are throughout the lower subsoil. Substrata are brown very gravelly loams to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 40 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Protection from high insolation can help improve regeneration on included south aspects.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Slope steepness increases the quantity of material excavated. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit can provide excellent big game spring and fall range when openings are present. Where associated with southerly slopes, this unit provides excellent big game winter range thermal cover. Shrubs are a significant part of the stand structure and songbird populations tend to be high as a result. Timber harvest can be beneficial in enhancing big game forage or to increase the overall age class diversity.

Fisheries: Where streams occur, they are small, gradients are steep, and pool quality and quantity are low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Firelines have a moderate erosion hazard. Roads have a moderately low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64MD

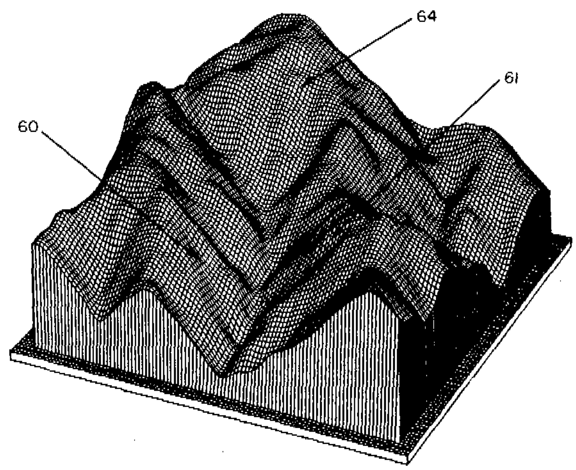
Andic Dystric Eutrochrepts and Typic Eutroboralfs, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

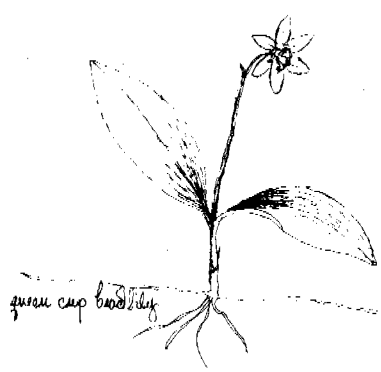
LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 1500 feet apart and drainages are ephemeral or perennial.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Northerly	3400-5800	35-55	5-15

VEGETATION



Existing: Vegetation is a mixed forest dominated by western larch, grand fir, lodgepole pine, western red cedar (in THPL/CLUN), spruce, and Douglas-fir. The understory consists of twinflower, queencup beadlily, serviceberry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Western red cedar/queencup beadlily (THPL/CLUN) and grand fir/queencup beadlily (ABGR/CLUN) are most common on northerly slopes, drainageways, benches and toeslopes. They occupy about 60 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) is mostly on east and west aspects and occupies about 30 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/menziesia (ABLA/MEFE) occurs in some cold drainageways. Timber productivity is similar but these sites present heavy brush competition to regeneration.

64MD

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium to moderately fine textures. Soils vary with degree of weathering of the bedrock. Most soils have a silty surface derived from volcanic ash influenced loess. Soils formed from highly weathered calcareous bedrock have subsoil clay and carbonate accumulation. Rock fragment durability can be low on highly weathered bedrock. Subsoils contain 35 to 50 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. Subsoils and substrata contain rock fragments of low durability. Similar soils have loess layers 14 to 16 inches thick. They occur west of St. Regis and are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid.

Typic Eutroboralfs, loamy skeletal, mixed, frigid form in material from highly weathered calcareous bedrock. These soils have subsoil clay accumulations with carbonate accumulations in the lower subsoil. Subsoils have many soft rock fragments. Loess surface layers are present on northerly aspects.

Every delineation has at least one of these soils and can have both.

Included are up to 15 percent dissimilar soils and rock outcrop. Typic Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects where loess surface layers are mixed with the subsoils or absent. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 40 inches or more. Some rock fragments can be crushed by moderate pressure by the hand.

Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 4 inches thick. Surface layers are brown very gravelly loams about 10 inches thick. Upper subsoils are yellowish brown very gravelly silt loams about 6 inches thick. Mid-subsoils are yellowish brown very gravelly clay loams about 25 inches thick with moderately thick clay skins on ped faces. Lower subsoils are pale brown gravelly silt loams about 6 inches thick. Substrata is yellowish brown silt loam to a depth of 60 inches or more. Many rock fragments can be crushed by moderate pressure by the hand.

64MD

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepness limits tractor operation. Cable systems should be considered.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Slope steepness increases the quantity of material excavated. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. The forest understory produces little forage and slope steepness limits access.

Wildlife: Early seral shrub communities provide very productive songbird habitat. Mature or old-growth forests provide good big game winter range and thermal cover. Overstocked pole community thinning and regeneration timber harvest to improve age class diversity can improve wildlife habitat.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Firelines and roads have moderately low erosion hazard. Sediment delivery efficiency is moderate except near stream crossings where deliver efficiency is high.

64ME

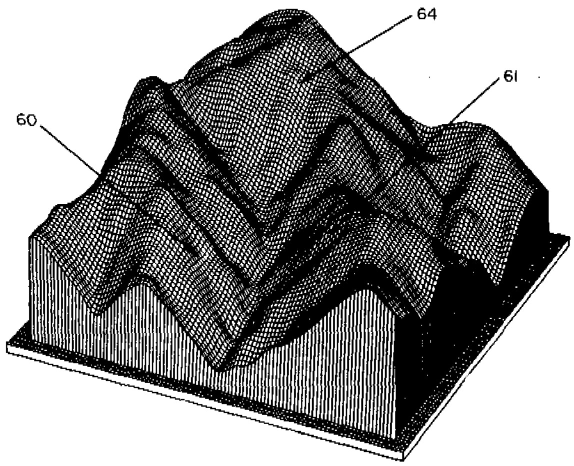
Andic Cryochrepts, steep mountain slopes

SUMMARY

This map unit occurs on steep relief mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material weathered from moderately metasedimentary rocks.

LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 800 to 1500 feet apart and drainages are ephemeral or perennial.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Variable	5000-6500	45-55	5-15

VEGETATION

Existing: Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine, spruce, some subalpine fir, and mountain hemlock (in TSME HTs). Basins have more subalpine fir, spruce and mountain hemlock than convex mountain slopes. At upper elevation limits of this map unit, western larch and Douglas-fir are less important components. The forest understory consists of beargrass, sitka alder, menziesia (in ABLA/MEFE HTs), rocky mountain maple, elderberry, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes, along drainageways, and in basins. Subalpine fir/beargrass (ABLA/XETE) is on convex upper mountain slopes and east and west aspects. Similar HTs, mountain hemlock/menziesia (TSME/MEFE) and mountain hemlock-/beargrass (TSME/XETE) occur west of Superior. These HTs occupy at least 75 percent of the map unit. Subalpine fir/sitka alder (ABLA/ALSI) is less frequent in occurrence than ABLA/MEFE and ABLA/XETE but occurs on northerly convex slopes near the ridge and as stringers within ABLA/XETE in swales. ABLA/ALSI occupies less than 20 percent of the map unit or occurs in localized areas such as the Thompson River drainage.

Included are up to 5 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on southerly inclusions below 5600 feet. Timber productivity is lower on these sites and regeneration can be prolonged by insolation.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium to moderately fine textures. These soils support subalpine forests. Surface layers are formed in volcanic ash influenced loess. Subsoils contain 35 to 55 percent rock fragments. Rock fragment durability is low on highly weathered bedrock.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 13 inches thick. Subsoils and substrata contain some rock fragments of low durability. Similar soils have loess layers 14 to 16 inches thick. They occur south and west of Superior on toeslopes and benches. They are Entic Cryandepts, medial skeletal, mixed. These soils occupy about 80 percent of the unit.

Included are up to 20 percent dissimilar soils and rock outcrop. Typic Cryochrepts, loamy skeletal, mixed, occur on southerly aspects where loess surface layers are mixed with the subsoils or absent. Rock outcrop occupies up to 15 percent of the unit.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are dark brown to strong brown silt loams about 10 inches thick. Upper subsoils are dark yellowish brown gravelly loams about 4 inches thick. Lower subsoils are yellowish brown to olive brown very gravelly loams about 27 inches thick. Substrata are yellowish brown very gravelly or very cobbly loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and ABLA/ALSI HTs. Potential annual productivity is moderate on ABLA/XETE HTs. Slope steepness limits tractor operation. Cable systems should be considered.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Slope steepness increases the quantity of material excavated. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: This unit provides good big game summer range. The highest wildlifevalue is security cover from mature conifer communities when they are available. Forage enhancement potential is low. Menziesia provides forage under fully stocked stands. Consequently, security cover takes precedent over forage enhancement for wildlife habitat needs. Partial removal harvest can be beneficial where age class diversity is severely limited.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Firelines and roads have moderately low erosion hazard. Sediment delivery efficiency is moderate except near stream crossings where deliver efficiency is high.

64MG

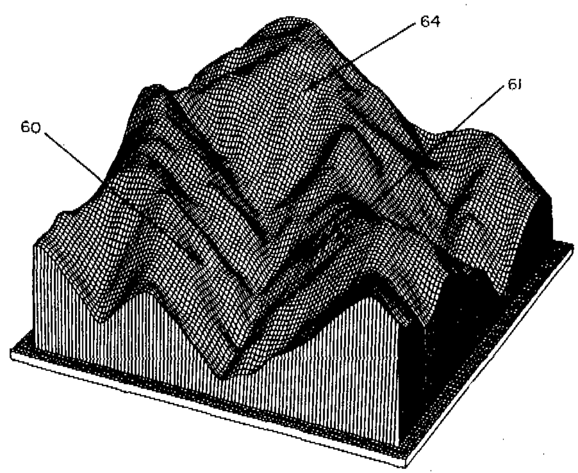
Andic Dystric Eutrochrepts complex, steep mountain slopes

SUMMARY

The map unit occurs on steep relief mountain slopes. Vegetation is cool, somewhat dry Douglas-fir forest. Soils form in volcanic ash influenced loess overlying material from moderately weathered metasedimentary rocks.

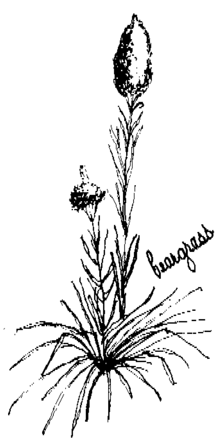
LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 1500 feet apart and drainages are ephemeral and intermittent.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Southerly	4200-5600	40-50	5-15

VEGETATION



Existing: Vegetation is a mixed forest of lodgepole pine and Douglas-fir with an occasional ponderosa pine and western larch. Grand fir occurs only in the far western portion of the survey area. The understory consists of beargrass, blue huckleberry, pinegrass, snowberry, scattered rocky mountain maple, spirea, and inclusions of bluebunch wheatgrass in openings. Ceanothus is well adapted to this site and will occur in openings where seed source is available.

Habitat Type (HT) Composition: Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) is the major HT. The most common HT phase is beargrass (-XETE). This HT occupies about 75 percent of the map unit. Douglas-fir/pinegrass (PSME/CARU) occurs in openings and on windy ridges. This HT occupies about 15 percent of the map unit. Grand fir/beargrass (ABGR/XETE) replaces PSME/VAGL-XETE in some delineations west of St. Regis and has similar responses to management.

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) occur occasionally on openings where soils are moderately shallow. These HTs are less productive timber sites. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occurs at the ridge line, on northerly inclusions, and some drainage stringers. This HT appears to have better regeneration success.

GEOLOGY

The unit is underlain by moderately weathered limestones, calcareous argillite, non-calcareous argillite, and siltite of the Belt Supergroup. Dominant formations are Wallace, Helena, and Syeh. Included as similar are Hasmark, Libby, Empire, and St. Regis formations.

The bedrock contains moderately weathered layers of metasedimentary rock that produce soft and moderately soft rock fragments. Weathering of bedrock varies with hardness of bedrock and local faulting. Highly weathered bedrock layers can be present and are generally associated with fault zones, saddles, drainages, and highly dissected slopes. Highly weathered zones of bedrock occupy 15 to 40 percent of the map unit.

Included are up to 15 percent bedrock with dissimilar properties. They are weakly weathered metasedimentary bedrock of the Belt Supergroup. Soils formed in material from this bedrock are not calcareous, are less silty, have less easily weathered rock fragments, and have a higher rock fragment content.

SOILS

Map Unit Summary: Soils are well-drained with medium textures. Surface layers are formed in volcanic ash influenced loess. Subsoils have 35 to 55 percent rock fragments. Rock fragment durability can be low from highly weathered bedrock.

Composition: Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers 8 to 13 inches thick. Similar soils have loess layers 14 to 16 inches thick. They are Typic Vitrandepts, medial-skeletal and are more common west of Superior. These soils occupy about 75 percent of the map unit.
Included are up to 25 percent dissimilar soils and rock outcrop. Andic Cryochrepts, loamy skeletal, mixed support ABLA/XETE-VAGL HT. Productivity is slightly higher on these soils because of less direct insolation. Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a surface layer formed in loess mixed with the subsoil or that is absent. They occur where vegetation cover is minimal or in areas with high ground disturbance. Rock outcrop occupies up to 15 percent of the unit.

Representative Profile:
These Andic Dystric Eutrochrepts, loamy skeletal, frigid, mixed have a soil surface covered by a layer of partially decomposed forest litter less than 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Subsoils are yellowish brown to brownish yellow very gravelly loams about 35 inches thick. Substrata are yellowish brown very gravelly loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Regeneration is limited by moisture stress and high soil surface temperatures in unshaded areas. Leaving about 15 tons per acre of larger than 3 inches diameter logging slash improves regeneration success, and helps maintain soil productivity. Protection from high insolation can also help regeneration on southerly aspects. Competition from ceanothus thickets can limit regeneration in those areas where there is a seed source.

Roads: Roads should perform well with standard location, construction, and maintenance practices on most of the unit. Native rock fragments with low durability break down over time under heavy traffic. Unsurfaced roads rut when wet in drainageways, on soils where bedrock is highly weathered, and where soils contain few rock fragments. Spot surfacing or seasonal haul restrictions will help protect the road surface.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Mature stands on southerly aspects provide good big game spring range. East and west aspects and draws provide fair big game summer range. Forage response to timber harvest is fair on south aspects and good in draws and other aspects. Openings dominated by ceanothus can provide good winter forage if snows depths are minimal.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have moderate low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64QA

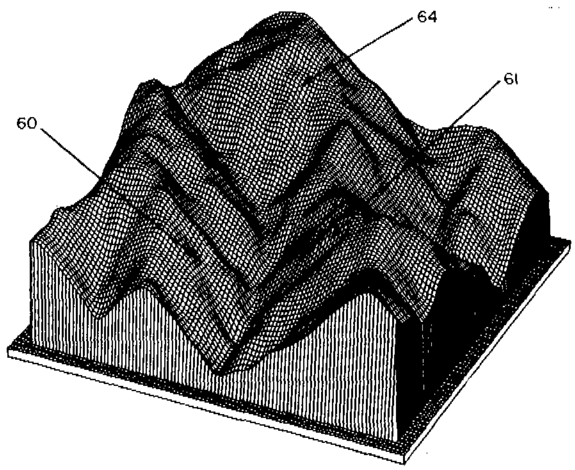
Typic Xerochrepts-Typic Haploxerolls association, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is open grown forest. Soils form in material from weakly weathered metasedimentary rocks.

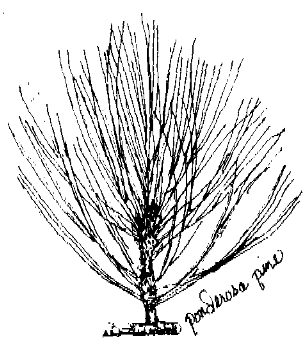
LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1500 to 2500 feet apart and drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Southerly	3000-4800	20-30	5-15

VEGETATION



Existing: Vegetation is open grown stands of ponderosa pine and Douglas-fir. Although stand structure varies by previous fire and harvest history, many delineations have old-growth ponderosa pine with a second canopy of Douglas-fir. The understory consists of bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and some delineations have rough fescue. Important shrubs scattered through the unit are wood's rose, snowberry, serviceberry, and chokecherry.

Habitat Type (HT) Composition: Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/rough fescue (PSME/FESC), and Douglas-fir/Idaho fescue (PSME/FEID) are the major HTs. PSME/AGSP occurs on the shallower and rockier sites. PSME/FESC occurs on deeper soils and less rocky soils. A similar included habitat type is Douglas-fir/pinegrass-bluebunch (PSME/CARU-AGSP) which occurs in areas where the annual precipitation is slightly higher than the average (approximately 20 to 25 inches). These habitat types occupy about 95 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occur in some drainages. Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) occurs on inclusions of east and west aspects. Timber productivity is higher and there are fewer limitations to regeneration.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained with moderately coarse textures. The combination of steep slopes and southerly aspects create a very high insolation factor. Summer surface soil temperatures can be quite high and soils become dry early in the growing season. Subsoils contain 55 to 90 percent rock fragments.

Composition:
Typic Xerochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Typic Xerochrepts, loamy skeletal, mixed, frigid. They support moderately dense forest stands. These soils occupy about 65 percent of the unit.

Typic Haploxerolls, loamy skeletal, mixed, frigid have dark colored surface layers. They support sparsely forested stands and grassy openings. They occupy about 20 percent of the unit. (A few delineations have been included in this unit that are dominated by grassland. Occurrence of these soils are about 80 percent in these delineations).

Included are up to 15 percent dissimilar soils and rock outcrop. Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA and PSME/LIBO HTs. They lack the dark colored surface layer and have lower surface soil summer temperatures. They have fewer limitations to regeneration. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
These Typic Xerochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Upper surface layers are very dark grayish brown gravelly silt loams about 5 inches thick. Lower surface layers are brown very gravelly sandy loams about 12 inches thick. Subsoils are yellowish brown extremely gravelly sandy loams about 16 inches thick. Substrata are light yellowish brown extremely gravelly coarse sandy loams to depths of 40 inches or more.

These Typic Haploxerolls, loamy skeletal, mixed, frigid have very dark brown very gravelly loam surface layers about 8 inches thick. Subsoils are dark brown and brown very gravelly and extremely gravelly sandy loams about 33 inches thick. Substrata are brown extremely gravelly sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is low. Slope steepness limits tractor operation. Competition for moisture from understory vegetation and very high insulation severely limits severely forest regeneration. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation. Rotting wood is an important nitrogen source for this unit. Leaving large diameter logging slash helps maintain fertility as well as offers shade for seedlings.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is difficult to revegetate because of moisture stress.

64QA

Range: This map unit is poorly suited to range management. Slope steepness limits access. These areas are highly susceptible to weed invasion.

Wildlife: This unit provides excellent deer, elk, and sheep winter range. Steep slopes and winter sun angle enhances snowmelt rates which makes winter forage more available. The primary forage is graminoids. Timber harvest is generally not beneficial to winter range maintenance. Invasion by and conversion to knapweed can result in loss in forage and is a severe risk in this unit.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have a low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64QB

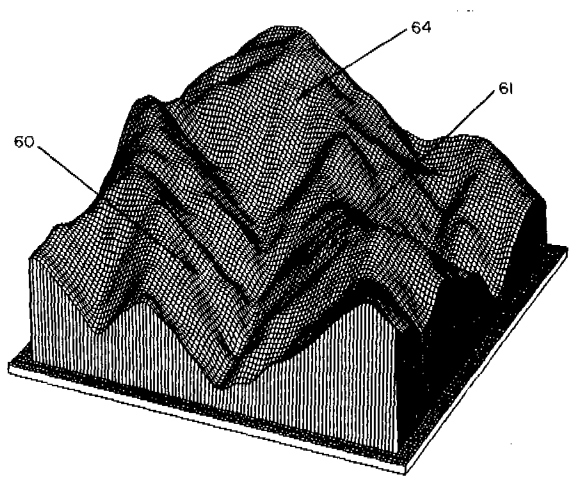
Typic Ustochrepts, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is dry Douglas-fir forest. Soils form in material weathered from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1500 to 2500 feet apart and drainages are intermittent or ephemeral.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	S,E,W	4000-5500	25-35	5-15

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir and ponderosa pine. Western larch is a rare component in timber stands except in drainageways and northerly inclusions. The understory consists of ninebark, snowberry, pinegrass, Idaho fescue, chokecherry, and serviceberry. Ceanothus is present in some openings where seed source is present.

Habitat Type (HT) Composition: Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) and Douglas-fir/pinegrass (PSME/CARU) are the major HTs. PSME/PHMA-CARU is the most common HT and occurs throughout the map unit occupying about 65 percent of the area. PSME/CARU occurs on upper elevation southerly slopes and on ridges where soils are moderately shallow. Important HT phases are ponderosa pine (-PIPO) and kinnikinnick (-ARUV). This HT occupies about 20 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Complex mountain slopes create northerly sideslope inclusions of Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA). Douglas-fir/twinflower (PSME/LIBO) occur in some northerly drainages, benches, and toeslopes. These HT are more productive timber sites with fewer regeneration limitations. Some delineations have south sideslope inclusions of Douglas-fir/

bluebunch wheatgrass (PSME/AGSP) or Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-AGSP). These HTs are less productive timber sites.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained with moderately coarse textures. Soils become dry early in the growing season. Subsoils contain 55 to 90 percent rock fragments.

Composition:
Typic Ustochrepts, loamy skeletal, mixed, frigid have light colored surface layers. Similar soils have thin dark colored surface layers less than 5 inches thick. They are also Typic Ustochrepts, loamy skeletal, mixed, frigid. These soils occupy about 85 percent of the unit.

Included are up to 15 percent dissimilar soils and rock outcrop. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid support PSME/PHMA-PHMA and PSME/LIBO HTs. They have surface layers formed in volcanic ash influenced loess and are more productive. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
These Typic Ustochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 1 inch thick. Upper surface layers are dark yellowish brown gravelly silt loams about 10 inches thick. Lower surface layers are brown very gravelly and very cobbly sandy loams about 19 inches thick. Subsoils are brown extremely cobbly sandy loams about 11 inches thick. Substrata are pale brown extremely cobbly sandy loams to depths of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderately low. Slope steepness limits tractor operation. Cable logging systems should be considered. Regeneration limitations exist because of the long dry season in the summer and high insolation. Protection from high insolation can help improve regeneration. Productivity of Douglas-fir is often affected by insect infestation.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is difficult to revegetate because of moisture stress. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. Slope steepness limits access. These areas are highly susceptable to weed invasion.

Wildlife: This unit provides good big game winter range. Young to mature stands, where associated with Map Unit 64QA provide critical winter thermal cover. Forage is available in the unit from shrubs. Timber harvest can be beneficial for winter range enhancement if confined to shrub understories and when adequate thermal cover is retained. Underburning of young to mature stands can be used to achieve moderate increases in forage at low costs.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Firelines and roads have a low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64QC

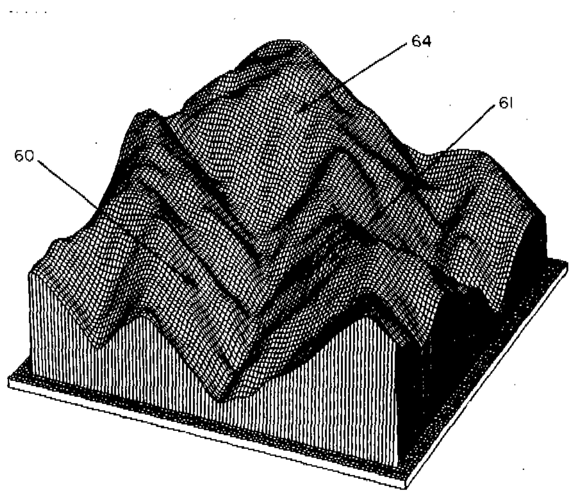
Andic Dystric Eutrochrepts and Dystric Eutrochrepts, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is dry, mixed coniferous forest. Soils form in somewhat mixed volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 2000 feet apart and drainages are intermittent, ephemeral, or perennial.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	N,E,W	3400-5500	30-45	5-15

VEGETATION

Existing: Vegetation is a mixed forest dominated by ponderosa pine, western larch, and Douglas-fir. Lodgepole pine occurs in some delineations in the western portion of the survey area. The understory in the Douglas-fir HTs is dominated by ninebark, twinflower in drainageways, serviceberry, oceanspray, snowberry, oregon grape, kinnickinick, wood's rose, and pinegrass. The PSME/VAGL-XETE and ABGR/XETE HTs support blue huckleberry, beargrass, pinegrass, rocky mountain maple, serviceberry, arnica, and pachystima.

Habitat Type (HT) Composition: Douglas-fir/ninebark-ninebark (PSME/PHMA-PHMA) and grand fir/beargrass (ABGR/XETE) are the major HTs. Occurrence and distribution of these habitat types are associated with aspect and elevation. This map unit crosses a climatic transition boundary within the survey area where PSME/PHMA-PHMA is more prevalent in the eastern portion of the survey and ABGR/XETE is more prevalent in the west.

East of Superior, PSME/PHMA-PHMA occurs below 4600 feet. Douglas-fir/twinflower (PSME/LIBO) can occur in draws and on toeslopes. These habitat types occupy approximately 55 percent of the map unit. ABGR/XETE is on northerly aspects above 4600 feet and occupies less than 25 percent of the map unit. (ABGR/XETE is rare in the Rock Creek drainage.)

West of Superior, grand fir/beargrass (ABGR/XETE) is on all aspects above 4600 feet. This habitat type occupies about 60 percent of the map unit. PSME/PHMA-PHMA occurs below 4600 feet and occupies less than 25 percent of the map unit.

A similar habitat type, Douglas-fir/blue huckleberry (PSME/VAGL) occupies up to 5 percent of the map unit. PSME/VAGL is more common in the eastern edge of the survey area and occurs above 4500 feet.

Included are up to 15 percent dissimilar HTs. Grand fir/queencup beadlily (ABGR/CLUN) can occur in moist drainageways and northerly toeslopes or benches. Timber productivity is higher in this HT. Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occurs on southerly inclusions. Timber productivity is lower and regeneration is limited by moisture and grass competition.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained with moderately coarse textures. Soil surface layers vary with aspect. Soils on northerly aspects and other aspects west of Superior have silty surface layers formed in volcanic ash influenced loess. Soils on east and west aspects have loamy surface layers formed in volcanic ash influenced loess mixed with subsoils. Subsoils contain 55 to 90 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on northerly slopes east of Alberton and on all slopes west of Superior. They have silt loam surface layers containing high amounts of volcanic ash influenced loess.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on east and west aspects, east of Alberton. They have loam surface layers containing volcanic ash influenced loess mixed with subsoil material. These soils remain moist during most of the growing season.

Every delineation has at least one of these soils and can have both.

Included are up to 20 percent dissimilar soils and rock outcrop or talus. Typic Xerochrepts, loamy skeletal, mixed, frigid are under PSME/PHMA-CARU HT on southerly aspects. Surface layers formed in volcanic ash influenced loess are absent and soils become dry early in the growing season. These soils are less productive and have limitations to regeneration. Rock outcrop or talus occupies up to 15 percent of the unit.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 4 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely cobbly sandy loams about 16 inches thick. Substrata are very pale brown extremely cobbly sandy loams to depths of 40 inches or more.

These Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 4 inches thick. Surface layers are dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inches thick. Substrata are grayish brown extremely cobbly sandy loams to a depth of 40 inches or more.

64QC

Classification Remarks: This map unit encompasses a gradation of purity of volcanic ash content in the surface soil layers. The Dystric Eutrochrept, loamy skeletal, mixed, frigid has a loam surface layer texture versus a silt loam texture of the Andic Dystric Eutrochrept, loamy skeletal, mixed, frigid. Both soils have an increased water holding capacity and similar conductivity properties over their extremely rocky substratums. Mappers felt that the "andic" influence of this Dystric Eutrochrept was important to recognize over other soils without "andic" influence. These soils are similar in regards to timber management. Thus, the undifferentiated unit was created with these two different taxonomic classes.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Protection from high insolation can help improve regeneration.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Material exposed by road construction is difficult to revegetate because of moisture stress. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. Slope steepness limits access. These areas are highly susceptible to weed invasion.

Wildlife: This unit provides good big game winter range on the low elevation east and west aspects, and good summer range elsewhere. Forage is abundant on all aspects. Timber harvest will increase forage. Big game use declines on northerly slopes with gradients greater than 65 percent. Midslope roads built with near vertical cutslopes present physical barriers to big game.

Fisheries: Where streams occur, they are small, gradients are steep, and pool quality and quantity are low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Firelines and roads have a low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64QD

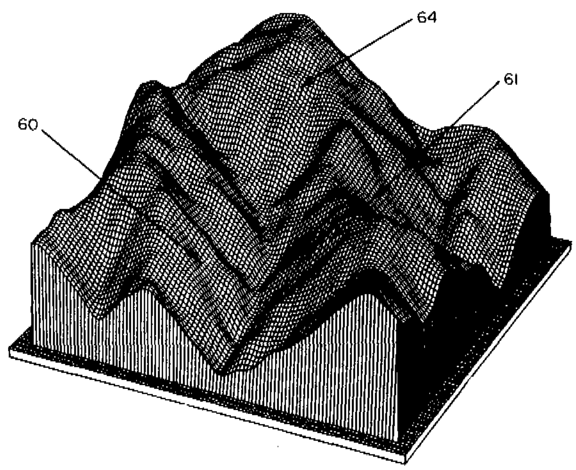
Andic Dystric Eutrochrepts, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is moist, mixed coniferous forest. Soils form in volcanic ash influenced loess overlying material from weakly weathered metasedimentary rocks.

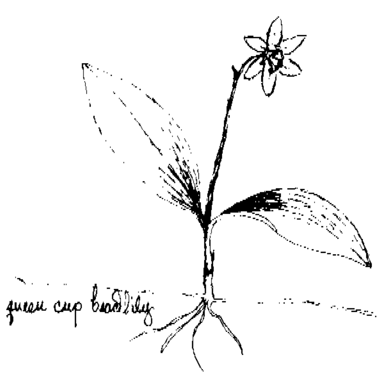
LANDFORM

The landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 1000 to 2000 feet apart and drainages are intermittent, ephemeral, and perennial.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Northerly	3400-5500	30-45	5-15

VEGETATION



Existing: Vegetation is a mixed forest of western larch, grand fir, lodgepole pine, western red cedar in more moist areas, spruce, and Douglas-fir. The forest understory consists of twinflower, queencup beadlily, serviceberry, rocky mountain maple, blue huckleberry, and beargrass.

Habitat Type (HT) Composition: Grand fir/queencup beadlily (ABGR/CLUN) and western red cedar/queencup beadlily (THPL/CLUN) are the major HTs. They are on northerly slopes, drainageways, benches and toeslopes. These HTs occupy about 60 percent of the map unit. Grand fir/twinflower (ABGR/LIBO) is on east and west aspects and occupies about 30 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on upper slopes near the ridge and on drier aspects. Timber productivity is lower on these sites. Subalpine fir/menziesia (ABLA/MEFE) occurs in some cold drainageways. These sites offer heavy brush competition to regeneration.

64QD

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained with moderately coarse textures. Soils have a silty surface derived from volcanic ash influenced loess. Subsoils contain 55 to 95 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal mixed have loess surface layers less than 14 inches thick. Similar soils have slightly deeper loess layers. They occur west of St. Regis and are Typic Vitrandepts, medial over loamy skeletal, mixed, frigid. These soils occupy about 90 percent of the map unit.

Included are up to 10 percent dissimilar soils and rock outcrop. Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on southerly aspects where the silty volcanic ash influenced loess surface is mixed with subsoils or is absent. These are less productive timber sites.

Representative Profile:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter less than 6 inches thick. Surface layers are dark brown silt loams less than 14 inches thick. Upper subsoils are light gray very gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown very gravelly sandy loams to very fine sandy loams about 16 inches thick. Substrata are very pale brown extremely cobbly sandy loams to depths of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. Slope steepness limits tractor operation. Cable systems should be considered.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Early seral shrub communities provide extremely productive songbird habitat. Mature or old growth forests provide good big game winter range and thermal cover. Overstocked pole community thinning and regeneration timber harvest to improve age class diversity can improve wildlife habitat.

Fisheries: Streams are small, high gradient, and have poor pool quality and quantity. These streams are capable of supporting small numbers of fish mostly for rearing. These streams are the major transporters of sediment to lower elevation stream channels which provide spawning habitat.

Watershed: Firelines have a moderately low erosion hazard. Roads have a low erosion hazard. Sediment delivery efficiency is moderate except near stream crossings where delivery efficiency is high.

64QE

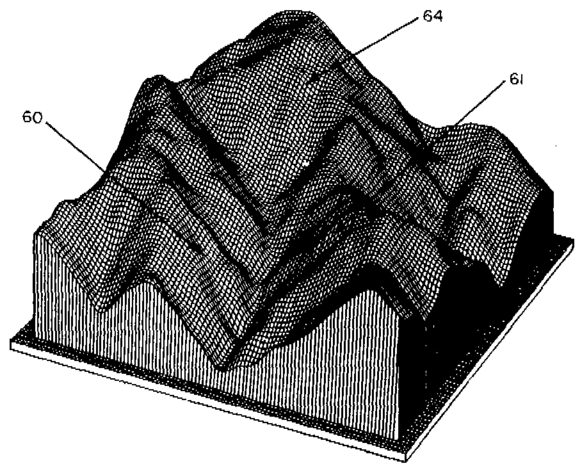
Andic Cryochrepts, steep mountain slopes

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is subalpine forest. Soils form in volcanic ash influenced loess overlying material weathered from weakly weathered metasedimentary bedrock.

LANDFORM

This landform consists of steep, complex slopes. Slope shape is often influenced by the structure of the underlying bedrock. Inclusions of slope gradients from 40 to 55 percent can result. Bedrock is close to the surface on convex ridges. Drainageways are somewhat broad and form a trellis pattern. Drainage spacings are 800 to 1500 feet apart and drainages are intermittent and perennial.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Northerly	5000-6600	45-55	5-15

VEGETATION

Existing: Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine, spruce, some subalpine fir, and mountain hemlock (in TSME HTs). Basins have more subalpine fir, spruce and mountain hemlock than convex mountain slopes in this map unit. At upper elevation limits of this map unit, western larch and Douglas-fir are a less important components. The forest understory consists of beargrass, sitka alder, menziesia (in ABLA/MEFE HTs), rocky mountain maple, elderberry, and blue huckleberry.

Habitat Type (HT) Composition: Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes, along drainageways, and in basins. Subalpine fir/beargrass (ABLA/XETE) is on convex upper mountain slopes and east and west aspects. Similar HTs, mountain hemlock/menziesia (TSME/MEFE) and mountain hemlock-/beargrass (TSME/XETE) occur west of Superior. These HTs occupy at least 75 percent of the map unit. Subalpine fir/sitka alder (ABLA/ALSI) is less frequent in occurrence than ABLA/MEFE and ABLA/XETE but occurs on northerly convex slopes near the ridge and as stringers within ABLA/XETE in swales. ABLA/ALSI occupies less than 20 percent of the map unit or occurs in localized areas such as the Thompson River drainage. These habitat types represent a cold, moist climate where moisture is rarely limiting for plant growth and growing seasons can be limited by temperature.

Included are up to 5 percent dissimilar HTs. Grand fir/beargrass (ABGR/XETE) and Douglas-fir/blue huckleberry (PSME/VAGL) can occur on southerly inclusions below 5600 feet. Timber productivity is lower on these sites and regeneration can be prolonged by insolation.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hard angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained and remain cool during the growing season. They have a silty surface derived from volcanic ash influenced loess. Subsoils are moderately coarse and contain 55-80 percent rock fragments.

Composition:
Andic Cryochrepts, loamy skeletal, mixed have loess surface layers 8 to 13 inches thick. Similar soils have slightly deeper loess layers. They occur west of St. Regis on toeslopes and benches and are Entic Cryandepts, medial over loamy skeletal, mixed. These soils occupy 80 percent of the map unit.

Included are up to 20 percent dissimilar soils and rock outcrop or rubble. Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects that support ABGR/XETE or PSME/VAGL. Soils are warmer during the growing season, growing season is longer, and productivity is moderate. Typic Cryochrepts, loamy skeletal, mixed occur on southerly aspects above 5600 feet on some slopes east of Alberton. Productivity is lower on these sites. Rock outcrop or rubble occupies up to 15 percentof the unit.

Representative Profile:
These Andic Cryochrepts, loamy skeletal, mixed have a soil surface covered by a layer of decomposed frest litter about 3 inches thick. Surface layers are dark brown silt loams about 10 to 14 inches thick. Upper subsoils are light gray extremely gravelly sandy loams to very fine sandy loams about 10 inches thick. Lower subsoils are very pale brown extremely gravelly sandy loams to very fine sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 40 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and ABLA/ALSI HTs. Potential annual productivity is moderate on ABLA/XETE HTs. Slope steepness limits tractor operation. Cable systems should be considered. Regeneration competes for light and space with understory vegetation in basins and northerly slopes supporting ABLA/MEFE and ABLA/ALSI HTs.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Native road surface can be dusty when dry.

64QG

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME/AGSP), Douglas-fir/ninebark-pinegrass (PSME/PHMA-CARU) occur occasionally on openings where soils are moderately shallow. These HTs are less productive timber sites. Subalpine fir/beargrass-blue huckleberry (ABLA/XETE-VAGL) occurs at the ridge line, on northerly inclusions, and in some drainage stringers. This HT appears to have better regeneration success.

GEOLOGY

The unit is underlain by weakly weathered quartzite, siltite, and argillite of the Belt Supergroup. The bedrock consists of weakly weathered layers of metasedimentary rock that produce hare angular rock fragments. Upper bedrock layers are usually fractured and permeable to water.

SOILS

Map Unit Summary: Soils are well-drained. Soils surface layers have varying purity of volcanic ash influenced loess. Loess surface layers vary with density of vegetation cover, degree of soil disturbance, and location within survey area. Subsoil and substratum textures are moderately coarse and have 55 to 95 percent rock fragments.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have loess surface layers less than 14 inches thick. These soils occupy 50 percent of the map unit.

Dystric Eutrochrepts, loamy skeletal, mixed, frigid have thin loess surface layers less than 8 inches thick or surface layers are formed in loess mixed with the subsoil. They are under moderate to low vegetation cover, areas where windthrow has been active, or where harvest has occurred. They occupy 30 percent of the map unit. (On Missoula and Seeley Lake Ranger Districts, soils with less volcanic ash content can occupy as much as 60 percent of the map unit.)

Included are up to 20 percent dissimilar soils and rock outcrop. Andic Cryochrepts, loamy skeletal, mixed support ABLA/XETE-VAGL HT. Productivity is slightly higher on these soils because of less direct insolation. Rock outcrop occupies up to 15 percent of the unit.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, frigid, mixed have a soil surface covered by a layer of decomposed forest litter less than 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Upper subsoils are light gray very gravelly to extremely gravelly sandy loams about 10 inches thick. Lower subsoils are very pale brown very gravelly to extremely gravelly sandy loams about 16 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 60 inches or more.

These Dystric Eutrochrepts, loamy skeletal, mixed have a soil surface covered by a layer of decomposed forest litter less than 2 inches thick. Surface layers are dark brown gravelly loams about 5 inches thick. Subsoils are brown extremely gravelly sandy loams about 25 inchest thick. Substrata are grayish brown extremely gravelly sandy loams to a depth of 60 inches or more.

Classification Remarks: This map unit occurs on high elevation southerly slopes where erosion has played a big part in mixing and displacing the volcanic ash influenced loess. Where vegetative cover has remained relatively heavy the loess "andic" surface has remained relatively unmixed. Wildfires and long regeneration periods have produced scattered areas where this loess has been mixed or partially removed from the surface.

64QG

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is moderate. Slope steepness limits tractor operation. Cable systems should be considered. Regeneration is limited by moisture stress and high soil surface temperatures in unshaded areas. Leaving about 15 tons per acre of larger than 3 inches diameter logging slash improves regeneration success, and helps maintain soil producitivity. Protection from high insolation can also help on southerly aspects. Competition from ceanothus thickets can limit regeneration in those areas where there is a seed source.

Roads: Roads should perform well with standard location, construction, and maintenance practices. Slope steepness increases the quantity of material excavated. Hard rock occasionally limits excavation. Native road surfaces can be dusty when dry.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Mature stands on southerly aspects provide good big game spring range. East and west aspects and draws provide fair big game summer range. Forage response to timber harvest is fair on south aspects and good in draws and other aspects. Openings dominated by ceanothus can provide good winter forage if snows depths are minimal.

Fisheries: Perennial streams are absent in this map unit due to dry environment or location.

Watershed: Skid trails, firelines, and roads have a low erosion hazard. Slopes are steep and sediment delivery efficiency is moderate.

64SB

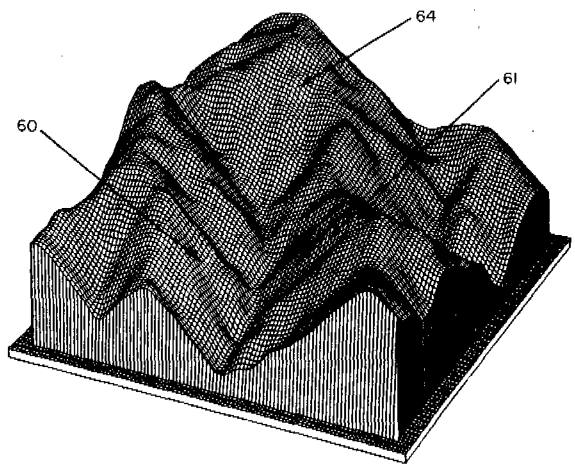
Dystric Eutrochrepts-Andic Cryochrepts association, steep mountain slopes, mica schist substratum

SUMMARY

The map unit occurs on steep mountain slopes. Vegetation is subalpine forest, dry mixed coniferous forest and cool, somewhat dry Douglas-fir forest. Soils form in material weathered from mica schist and associated rocks. Soils on northerly aspects have surface layers formed in volcanic ash influenced loess.

LANDFORM

The landform consists of steep, convex to straight mountain slopes. Many of these slopes have perennial streams at the base and springs are common along sideslopes. Bedrock is relatively close to the surface. Drainageways are steep and can be incised. Drainage spacing ranges from 800 to 1500 feet.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
55-75	Variable	3200-5600	35-55	5-15

VEGETATION

Existing: Vegetation is a mixed forest of western larch, Douglas-fir, and lodgepole pine on southerly aspects. North aspects are dominated by subalpine fir, lodgepole pine, and spruce. Springs support moist meadow openings and aspen with scattered subalpine fir and spruce. The forest understory on southerly aspects is dominated by ninebark, twinflower, pinegrass, and bluebunch wheatgrass along rock outcrops. Southerly aspect above 4800 feet and east and west aspects are dominated by beargrass, blue huckleberry, and grouse whortleberry. Northerly aspects are dominated by beargrass, menziesia, and blue huckleberry. Understories near springs are dominated by many forbs including arnica, queencup beadlily, and false hellebore.

Habitat Type (HT) Composition: HTs vary with aspect and elevation and every map unit delineation has at least one of these HTs and can have all. Douglas-fir/ninebark (PSME/PHMA) and Douglas-fir/twinflower (PSME/LIBO) are major HTs on southerly slopes below 4800 feet. Douglas-fir/blue huckleberry (PSME/VAGL) is the major HT on southerly slopes above 4800 feet and most east and west aspects. Subalpine fir/menziesia (ABLA/MEFE) and subalpine fir/twinflower (ABLA/LIBO) are the major HTs on northerly slopes.

Included are up to 10 percent dissimilar HTs. Subalpine fir/bluejoint (ABLA/CACA) and subalpine fir/queencup beadlily (ABLA/CLUN) are adjacent to springs. Timber productivity is higher. High water tables present limitations to logging, roads, and regeneration.

GEOLOGY

The unit is underlain by mica schists associated with the border zone of the Idaho Batholith. Other associated bedrock are micaceous sandstones and phyllites. Upper bedrock layers are very fractured and splay off steep roadcuts easily. Rock fragments exposed on the surface weather rapidly. Soils have a high mica content.

Included are up to 10 percent dissimilar bedrock. Gneiss is a harder, more resistant to weathering bedrock associated with the Idaho Batholith. Gneiss is recognized by a characteristic banding of light and dark colored minerals. Soils have many, hard rock fragments, roadcuts are more stable, and soils are less erosive.

SOILS

Map Unit Summary: Soils are well-drained and moderately coarse to medium textured high mica content. Subsoils contain 35 to 55 percent rock fragments. Soil properties vary with aspect. Soils on northerly aspects have a silty surface derived from volcanic ash influenced loess. This loess surface layer is absent on soils on southerly aspects.

Composition:
Dystric Eutrochrepts, loamy skeletal, mixed, frigid occur on southerly aspects. They support dry, mixed Douglas-fir and cool, somewhat dry Douglas-fir forests.

Andic Cryochrepts, loamy skeletal, micaceous are on northerly slopes and support subalpine forest.

Every delineation has at least one of these soils and can have all.

Included are up to 25 percent dissimilar soils and rock outcrop or rubble. Aquic Cryochrepts and Cryumbepts support aspen and moist forest openings where spring activity is present. These soils are somewhat poorly-drained and present limitations to logging, roads, and regeneration. Rock outcrop or rubble occupies up to 15 percent of the unit.

Representative Profiles:
These Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are light gray gravelly sandy loams about 14 inches thick. Subsurface layers are light gray very gravelly sandy loams about 12 inches thick. Subsoils are pale brown very gravelly sandy loams and brown very gravelly silt loams about 13 inches thick. Substrata are very pale brown extremely gravelly sandy loams to a depth of 40 inches or more.

These Andic Cryochrepts, loamy skeletal, micaceous have a soil surface covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are yellowish brown silt loams about 9 inches thick. Subsurface layers are light gray gravelly silt loams about 9 inches thick. Subsoils are light gray and brown gravelly silt loams about 12 inches thick. Substrata are light yellowish brown very gravelly silt loams to a depth of 40 inches or more.

64SB

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on ABLA/MEFE and ABLA/LIBO HTs and moderate on PSME HTs. Slope steepness limits tractor operation. Cable systems should be considered. Water tables will increase near springs when vegetation is removed which will limit regeneration.

Roads: Roads have a moderate potential for increasing the frequency of landslides where ground water is encountered. Slope stability should be evaluated before locating roads. Unsurfaced roads are slick and rut when wet.

Range: This map unit is poorly suited to range management. Slope steepness limits access.

Wildlife: Forage is availabe from forbs and grasses occurring beneath timber stands, and from shrubs in early successional stands. Wet areas provide excellent elk late summer range. Timber harvest can be beneficial if done to increase age class diversity when extensive conifer age class monocultures exist.

Fisheries: Where streams occur, they are small, gradients are steep, and pool quality and quantity are low. These streams are marginally capable of supporting low numbers of small fish.

Watershed: Firelines and roads have a high erosion hazard. Slopes are steep and sediment delivery efficiency is moderate. The lower third of the slope above perennial streams has a high delivery efficiency.

72BA

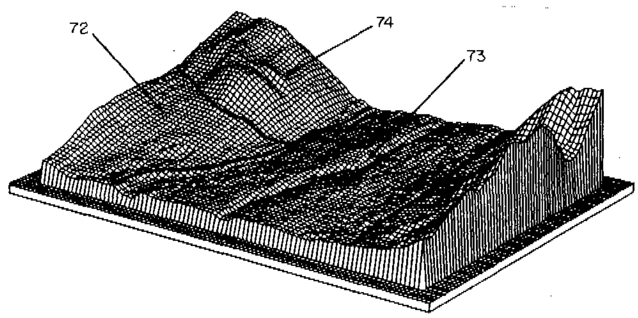
Typic Eutroboralfs-Aquepts complex, glacial till substratum

SUMMARY

This map unit occurs on gently rolling hills in large glaciated valleys. Native vegetation is moist, mixed coniferous and subalpine forest. Soils form in volcanic ash influenced loess overlying thick glacial till derived from moderately weathered metasedimentary rocks and sedimentary rocks.

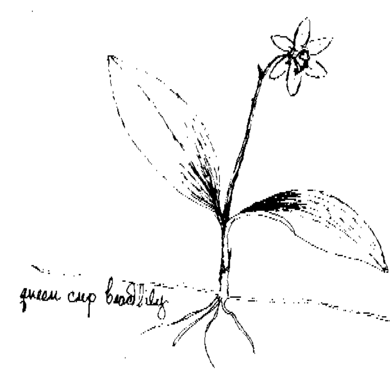
LANDFORM

The landform consists of an intricate pattern of knolls and concave depressions. Included are areas of flat plain. Relief varies over short distances from low to moderate. The drainage pattern is deranged. Streams are short and meandering. There are many bogs, marshes and wet depressions.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-35	Variable	3600-4600	25-35	0

VEGETATION



Existing: Vegetation consists of a complex of vegetation. Well-drained knolls and hillsides support grand fir, Douglas-fir, lodgepole pine, western white pine, and western larch. Some southerly aspects support ponderosa pine. In the Seeley area, grand fir and western white pine are absent. The forest understory consists of twinflower, beargrass, queencup beadlily (CLUN HTs only), blue huckleberry, rocky mountain maple, serviceberry, and elderberry. Valley bottoms support subalpine fir, Englemann spruce, and lodgepole pine. The forest understory consists of twinflower, queencup beadlily (CLUN HTs only), dwarf huckleberry, and grouse whortleberry. Poorly-drained sites support quaking aspen, black cottonwood, various willows, sedges, bluejoint, spruce, and subalpine fir.

Habitat Type (HT) Composition: This map unit consists of a complex of dissimilar habitat types and vegetation types which vary by aspect and soil drainage.

IN THE FISHTRAP DRAINAGE:

Grand fir/queencup beadlily (ABGR/CLUN), and grand fir/twinflower (ABGR/LIBO) are major HTs on rolling low relief knolls and northerly hillsides. Subalpine fir/queencup beadlily (ABLA/CLUN) and subalpine fir/twinflower (ABLA/LIBO) are similar and are most common along the valley floor and northerly aspects. These HTs occupy about 50 percent of the unit.

Subalpine fir/dwarf huckleberry (ABLA/VACA) or Douglas-fir/dwarf huckleberry (PSME/VACA) are on nearly flat or gently rolling benches where cold air drainage is prevalent and occupies approximately 15 percent of the map unit.

Wet depressions and along drainageways have riparian vegetation that has not been classified to HTs. Vegetation include cottonwoods, aspen, sedges, subalpine fir, spruce, paper birch and bluejoint. These wet vegetation types occupy about 20 percent of the map unit.

Included are up to 15 percent dissimilar HTs. Douglas-fir/blue huckleberry (PSME/VAGL), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/snowberry-pinegrass (PSME/SYAL-CARU) are on some southerly slopes. Timber productivity is lower and regeneration is limited by insolation and plant competition for moisture.

IN THE SEELEY LAKE - GOLD CREEK AREA:

Subalpine fir/queencup beadlily (ABLA/CLUN), subalpine fir/menziesia (ABLA/MEFE), and Douglas-fir/blue huckleberry (PSME/VAGL) are the major HTs. ABLA/CLUN is limited to moist valley bottom positions and occupies about 25 percent of the map unit. ABLA/MEFE is on northerly upland positions and occupies about 5 percent of the map unit. PSME/VAGL is on well-drained valley bottoms below 4500 feet and hillsides. A similar HT is subalpine fir/beargrass-huckleberry (ABLA/XETE-VAGL). These HTs occupy about 20 percent of the map unit.

Other important HTs are Douglas-fir/dwarf huckleberry (PSME/VACA) and subalpine fir/dwarf huckleberry (ABLA/VACA). They occur on nearly flat benches or plains and occupy about 15 percent of the map unit.

Wet depressions and along drainageways have riparian vegetation that has not been classified to HTs. Vegetation include cottonwoods, aspen, sedges, subalpine fir, spruce, paper birch and bluejoint. These wet vegetation types occupy about 20 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/pinegrass (PSME/CARU) and Douglas-fir/snowberry (PSME/SYAL) occur on moderately steep southerly inclusions. Timber productivity is lower and regeneration can be limited by insolation.

GEOLOGY

The unit is underlain by thick deposits of glacial till and lacustrine sediments derived in Belt Supergroup argillites and siltites or Cambrian-aged limestones and shales. These glacial deposits are the result of continental glaciation and major valley glaciation. Some of these deposits have a very dense character below the influence of existing root growth suggesting compacted till. Common bedrock under till deposits include the Wallace, Hasmark, Red Lion, and Woolsey formations.

SOILS

Map Unit Summary: Soils are well-drained, moderately well-drained, and poorly-drained. Soils vary with topographic position. Subsoils have moderately fine to fine textures. Soils on knolls, hillsides, and plains contain 35 to 50 percent subrounded rock fragments, have silty surface layers formed in volcanic ash influenced loess, and have subsoil clay accumulation. Soils in the Fishtrap Area have subsoil calcium carbonate accumulation. In the Seeley Area, only those soils containing limestone rock fragments have subsoil calcium carbonate accumulation. Soils in wet depressions have 10 to 40 percent rock fragments, have dark colored organic rich surface layers, and remain saturated throughout most years.

Composition:
Typic Eutroboralfs, clayey skeletal, mixed, frigid are well-drained and moderately well-drained soils on knolls and hillsides. Subsoils have clay contents of 34 to 50 percent and are very plastic. Similar soils have 20 to 30 percent rock fragments in the subsoil but substrata rock fragment content is similar. These soils are Typic Eutroboralfs,

fine, mixed, frigid. Other similar soils are at 4100 to 4600 feet elevation and support subalpine fir. They are Andeptic Cryoboralfs, clayey skeletal, mixed. These soils occupy about 75 percent of the unit.

Aquepts are poorly-drained soils in wet depressions, along slow moving streams, and adjacent to ponded areas. They have dark colored surface layers. Water table is within 1 to 3 feet of the surface. They support vegetation such as bluejoint, sedge, aspen, and spruce. Similar soils have thick organic surface layers and are Borosaprists. These soils occupy about 25 percent of the map unit.

Representative Profiles:
Typic Eutroboralfs, clayey skeletal, mixed, frigid have a soil surface layer covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are strong brown silt loams about 12 inches thick. Subsurface layers are brown gravelly silt loams about 5 inches thick. Subsoils are dark yellowish brown very gravelly silty clay loams and very gravelly clay loams about 24 inches thick. Lower subsoils and substrata are yellowish brown very cobbly sandy clay loams to a depth of 60 inches or more. Some subsoil layers have calcium carbonate accumulation.

Aquepts have dark brown to grayish brown silt loam surface layers about 2 inches thick. Sugsoils are dark yellowish brown silt loams about 25 inches thick. Substrata are olive to dark gray silt loams to depths of 60 inches or more. Mottles are common to many and distinct throughout.

Classification Remarks: This map unit was developed for the Fishtrap area. The Seeley-Gold area has similar till soils but have a drier climate is included in the range.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. The terrain is well suited to tractor operation. Tractor operation when soils are wet can rut, compact or puddle the soil and reduce soil productivity. Restricting harvest seasons to when soils are dry and designated skid trails that avoid wet areas will reduce potential for soil impacts. Steep southerly inclusion have limitations to regeneration because of competition for moisture with graminoids.

Roads: Unsurfaced roads rut when wet and material exposed by road construction tends to slough on high cut and fill slopes. Excavation can intercept ground water in depressions and along drainageways. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Beaver activity increases maintenance. Revegetation is limited by crusting of material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success.

Range: This map unit is moderately suited to range management. The forest understory produces fair grass forage on lowest elevation benches and footslopes. Clearings offer increased forage in the first few years after harvest.

Wildlife: This unit provides excellent habitat for many species because of the inherent diversity over short distances. Pothole lakes provide habitat for many aquatic vertebrates. Moose frequent area where wet shrubs dominate. Well-drained knolls and hillsides provide excellent big game summer range. Shrubfields provide excellent songbird habitat, especially where associated with wet depressions. Mature stands provide hiding and thermal cover. In occupied grizzly bear habitat, this unit provides a number of spring-fall bear foods. Timber harvest is beneficial to wildlife only if it isdesigned to increase the overall age class diversity. Where aspen is present, regeneration timber harvest and burning can be useful for removing encroaching conifers and stimulating aspen regrowth.

Fisheries: Stream gradients are low. Ponded water and lakes are common because of beaver activity and deranged stream patterns. Streams have a high percentage of gravels and streambank stability is inherently good.

Watershed: Skid trails and firelines a high erosion hazard. Roads have a moderate erosion hazard. Sediment delivery efficiency is low except at stream crossings where delivery efficiency is high.

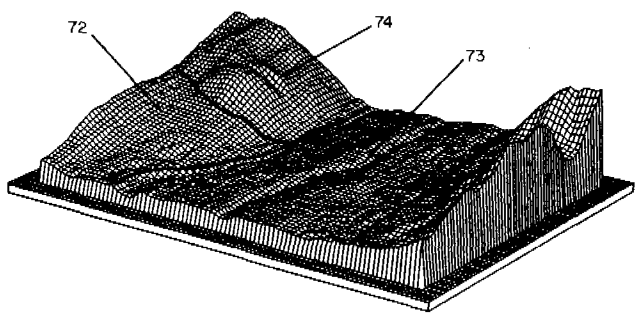
Andic Dystric Eutrochrepts-Typic Eutroboralfs-Aquepts complex, glacial till substratum

SUMMARY

The map unit occurs on gently rolling hills in large glaciated valleys. Native vegetation is moist, mixed coniferous and subalpine forest. Soils form in volcanic ash influenced loess overlying thick glacial till derived from weakly weathered metasedimentary rocks.

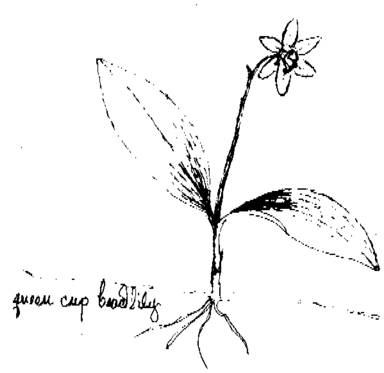
LANDFORM

The landform consists of an intricate pattern of knolls and concave depressions. Included are small areas of flat plain. Relief varies over short distances from low to moderate. The drainage pattern is deranged. Streams are short and meandering. There are many bogs, marshes and wet depressions.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-35	Variable	3600-4600	25-35	0

VEGETATION



Existing: Vegetation consists of a complex of vegetation. Well-drained knolls and hillsides support grand fir, Douglas-fir, lodgepole pine, western white pine, and western larch. Some southerly aspects support ponderosa pine. In the Seeley area, grand fir and western white pine are absent. The forest understory consists of twinflower, beargrass, queencup beadlily (CLUN HTs only), blue huckleberry, rocky mountain maple, serviceberry, and elderberry. Valley bottoms support subalpine fir, Englemann spruce, and lodgepole pine. The forest understory consists of twinflower, queencup beadlily (CLUN HTs only), dwarf huckleberry, and grouse whortleberry. Poorly-drained sites support quaking aspen, black cottonwood, various willows, sedges, bluejoint, spruce, and subalpine fir.

Habitat Type (HT) Composition: This map unit consists of a complex of dissimilar habitat types and vegetation types which vary by aspect and soil drainage.

IN THE FISHTRAP DRAINAGE:

Subalpine fir/queencup beadlily (ABLA/CLUN), grand fir/queencup beadlily (ABGR/CLUN), and grand fir/twinflower (ABGR/LIBO) are major HTs on rolling low relief knolls and northerly hillsides. ABLA/CLUN is most common on valley bottom positions. ABGR/CLUN and ABGR/LIBO are on hillside positions. These HTs occupy about 55 percent of the unit. Major HTs on southerly knolls and hillsides are grand fir/beargrass (ABGR/XETE). These HTs occupy about 10 percent of the map unit.

Subalpine fir/dwarf huckleberry (ABLA/VACA) is on nearly flat or gently rolling benches where cold air drainage is prevalent and occupies approximately 10 percent of the map unit.

Wet depressions and along drainageways have riparian vegetation that has not been classified to HTs. Vegetation include cottonwoods, aspen, sedges, subalpine fir, spruce, paper birch and bluejoint. These wet vegetation types occupy about 20 percent of the map unit.

Included are up to 5 percent dissimilar HTs. Douglas-fir/pinegrass (PSME/CARU) are on some southerly slopes. Timber productivity is lower and regeneration is limited by insolation.

IN THE SEELEY LAKE - GOLD CREEK AREA:

Subalpine fir/queencup beadlily (ABLA/CLUN), subalpine fir/menziesia (ABLA/MEFE), and Douglas-fir/blue huckleberry (PSME/VAGL) are the major HTs. ABLA/CLUN is limited to moist valley bottom positions and occupies about 25 percent of the map unit. ABLA/MEFE is on northerly upland positions and occupies about 10 percent of the map unit. PSME/VAGL is on well-drained valley bottoms below 4500 feet and hillsides. A similar HT is subalpine fir/beargrass-huckleberry (ABLA/XETE-VAGL). These HTs occupy about 20 percent of the map unit.

Other important HTs are Douglas-fir/dwarf huckleberry (PSME/VACA) and subalpine fir/dwarf huckleberry (ABLA/VACA). They occur on nearly flat benches or plains and occupy about 15 percent of the map unit.

Wet depressions and along drainageways have riparian vegetation that has not been classified to HTs. Vegetation include cottonwoods, aspen, sedges, subalpine fir, spruce, paper birch and bluejoint. These wet vegetation types occupy about 15 percent of the map unit.

Included are up to 10 percent dissimilar HTs. Douglas-fir/pinegrass (PSME/CARU) and Douglas-fir/snowberry (PSME/SYAL) occur on moderately steep southerly inclusions. Timber productivity is lower and regeneration can be limited by insolation.

GEOLOGY

The unit is underlain by thick deposits of glacial till and lacustrine sediments derived in part from Belt Supergroup argillites, siltites, and quartzites. These glacial deposits are the result of continental glaciation and major valley glaciation. Some of these deposits have a very dense character below the influence of existing root growth suggesting compacted till. Common bedrock under till deposits include the Bonner, Snowslip, Ravalli group and Prichard formations.

SOILS

Map Unit Summary: Soils are well-drained, moderately well-drained, and poorly-drained. Soils vary with topographic position. Subsoils have medium to moderately fine textures, contain 35 to 50 percent subrounded rock fragments, and some have subsoil clay accumulation. Soils on nearly flat plains have subsoils that are very dense. Soils have silty surface layers formed in volcanic ash inflenced loess.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are well-drained soils on knolls and hillsides. They have loess surface layers and support ABGR/LIBO, ABGR/CLUN, or PSME/VAGL HTs. Similar soils have a mixed loess layer and are Dystric Eutrochrepts, loamy skeletal,mixed, frigid. These soils occupy about 45 percent of the unit.

72OA

Typic Eutroboralfs, loamy skeletal, mixed, frigid are moderately well-drained soils on benches or plains, low relief hillsides, and some depressions. They support ABLA/CLUN, ABLA/VACA, ABGR/CLUN, and ABGR/LIBO. Similar soils that occur at 4100 to 4600 feet that support subalpine fir are Andeptic Cryoboralfs, loamy skeletal, mixed. These soils occupy about 35 percent of the unit.

Aquepts are poorly-drained soils in wet depressions, along slow moving streams, and adjacent to ponded areas. They have dark colored surface layers. Some subsoils exhibit thixotropic properties. Water table is within 1 to 3 feet of the surface. They support vegetation such as bluejoint, sedge, aspen, and spruce. These soils occupy about 15 percent of the map unit.

Included are up to 10 percent dissimilar soils. Dystric Eutrochrepts, loamy skeletal, mixed, frigid that support PSME/CARU or PSME/SYAL on steep southerly sideslopes. These soils are less productive and have more limitations to regeneration.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown very gravelly loams about 10 inches thick. Subsoils are brownish yellow very gravelly sandy clay loams about 12 inches thick. Substrata are brown very gravelly sandy loams to a depth of 60 inches or more. (Soils formed from till derived from the Bonner Formation have weak red colors).

These Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface layer covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are dark brown silt loams about 8 inches thick. Subsurface layers are yellowish brown sandy clay loams about 7 inches thick. Upper subsoils are yellowish brown very gravelly sandy clay loams to a depth of 40 inches or more. They have few thin clay skins to common moderately thick clay skins.

Aquepts have dark brown to grayish brown silt loam surface layers about 2 inches thick. Sugsoils are dark yellowish brown silt loams about 25 inches thick. Substrata are olive to dark gray silt loams to depths of 60 inches or more. Mottles are common to many and distinct throughout.

Classification Remarks: This map unit was developed for the Fishtrap area. Soils supporting subalpine fir in this map unit are classified in the frigid temperature regime opposed to cryic as in other map units dominated by subalpine fir. According to Hackley, P. (1982), soils supporting subalpine fir below 4100 feet in the Seeley-Swan drainage are frigid. At lower elevations, subalpine fir may be an expression of transient cold air drainage that does not affect summer soil temperatures.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high. The terrain is well suited to tractor operation. Tractor operation in moist draws and depressions can rut, compact or puddle the soil and reduce soil productivity. Designated skid trails that avoid wet areas will reduce potential for soil impacts. Steep southerly inclusion have limitations to regeneration because of competition for moisture with graminoids.

Roads: Roads should perform well with standar location, construction and maintenance on most of the unit. Excavation can intercept ground water in depressions and along drainageways. Native road surface are dusty when dry and can rut when wet. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system. Sloughing of steep cutbanks and beaver activity increases maintenance. Revegetation is limited by crusting of material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success.

Range: This map unit is moderately suited to range management. The forest understory produces fair grass forage on lowest elevation benches and footslopes. Clearings offer increased forage in the first few years after harvest.

Wildlife: This unit provides excellent habitat for many species because of the inherent diversity over short distances. Pothole lakes provide habitat for many aquatic vertebrates. Moose frequent area where wet shrubs dominate. Well-drained knolls and hillsides provide excellent big game summer range. Shrubfields provide excellent songbird habitat, especially where associated with wet depressions. Mature stands provide hiding and thermal cover. In occupied grizzly bear habitat, this unit provides a number of spring-fall bear foods. Timber harvest is beneficial to wildlife only if it isdesigned to increase the overall age class diversity. Where aspen is present, regeneration timber harvest and burning can be useful for removing encroaching conifers and stimulating aspen regrowth.

Fisheries: Stream gradients are low. Ponded water and lakes are common because of beaver activity and deranged stream patterns. Streams have a high percentage of gravels and streambank stability is inherently good.

Watershed: Skid trails, firelines, and roads have a moderate erosion hazard. Sediment delivery efficiency is low except at stream crossings where delivery efficiency is high.

73UA

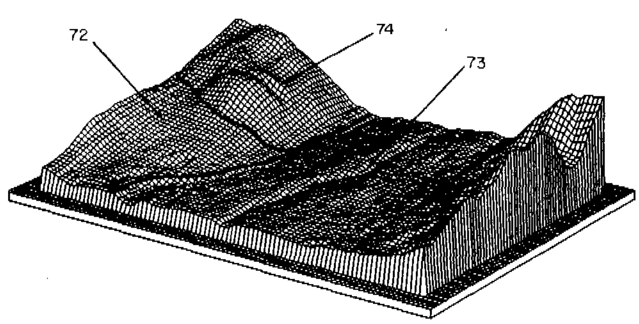
Andic Ustochrepts, glacial outwash substratum

SUMMARY

The map unit occurs on flat outwash plains associated with major valley and continental glaciation. Vegetation is dry, mixed coniferous forest. Soils form in somewhat mixed volcanic ash influenced loess overlying glacial outwash deposits.

LANDFORM

The landform consists of flat to gently rolling plains. Third order or larger streams traverse these plains in a meandering course. These streams provide for broad riparian zones within this map unit.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-20	Variable	3200-4800	25-35	0

VEGETATION

Existing: Vegetation is a mixed forest of Douglas-fir, ponderosa pine, lodgepole pine, and western larch. Grand fir, spruce, and subalpine fir can occur along riparian zones. The forest understory is can contain dwarf huckleberry, twinflower, kinnikinnick, pinegrass, beargrass, and blue huckleberry.

Habitat Type (HT) Composition: Douglas-fir/dwarf huckleberry (PSME/VACA), Douglas-fir/pinegrass (PSME/CARU), and Douglas-fir/twinflower (PSME/LIBO) are the major HTs. PSME/VACA occur on soils where surface layers are silty and occupy about 65 percent of the unit. PSME/CARU occur on southerly trending slopes and at lower elevations. Soil surface layers generally are loamy or sandy. PSME/CARU occupies about 15 percent of the unit. Douglas-fir/twinflower (PSME/LIBO) occurs near riparian zones and moist swales and occupies about 10 percent of the unit. Some units in the Seeley-Gold area have Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) occurs in some higer elevation units in the Seeley Lake and Gold Creek areas.

Included are up to 10 percent dissimilar HTs. Subalpine fir/queencup beadlily (ABLA/CLUN) and subalpine fir/bluejoint (ABLA/CACA) occur as stringers along some stream courses and are associated with the riparian zone. Timber productivity is higher on these sites.

73UA

GEOLOGY

The map unit is underlain by glacial outwash deposits. These deposits are sandy and have high amounts of rounded gravel and cobble. These outwash deposits are very thick and unconsolidated. Gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

SOILS

Map Unit Summary: Soils are excessively drained with coarse and moderately coarse subsoils textures. Surface layers have mixed volcanic ash influenced loess mixed in varying degrees with the subsoils. Subsoils have 60 to 75 percent rounded rock fragments with a large percentage greater than 3 inches in diameter.

Composition:
Andic Ustochrepts, sandy skeletal, mixed, frigid have a silty or loamy volcanic ash influenced loess layer and sandy subsoils and substrata. These soils support dry, mixed coniferous forests. Similar soils support cool, somewhat dry Douglas-fir forests and are Andic Dystric Eutrochrepts, sandy skeletal, mixed, frigid. These soils occupy about 85 percent of the unit.

Included are up to 15 percent dissimilar soils. Typic Xerochrepts, sandy skeletal, mixed, frigid and Dystric Eutrochrepts, sandy skeletal, mixed, frigid occur in disturbed areas where the surface layer has been mixed or removed. These soils are less productive and have greater limitations to regeneration.

Representative Profiles:
Andic Xerochrepts, sandy skeletal, mixed, frigid have dark brown and dark yellowish brown gravelly silt loam surface layers about 8 inches thick. Subsoils are brown very gravelly sandy loams about 6 inches thick. Substrata are grayish brown extremely gravelly coarse sandy loams to a depth of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is moderate. The terrain is well suited to tractor operation. Tractor site preparation can remove loess surface layer and expose excessively drained subsoils at the surface or mix subsoil stones and cobbles with soil surface layers. This can reduce site productivity and limit regeneration. Tree planting can be limited by increased stone and cobble at the surface. Broadcast burning will reduce risk of displacement of loess surface layers. Cold air drainage can limit regeneration of some tree species.
Roads: Roads should perform well with standard location, construction, and maintenance practices. Tread erosion on unsurfaced roads tends to remove fine material. The remaining gravel and cobble form a rough surface. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

Range: Potential forage production is moderate. The forest understory produces fair grass forage. Clearings offer increased forage in the first few years after harvest.

Wildlife: This unit provides yearlong whitetailed deer range. Forage is available from foliose lichens in timber stands. Young to mature Douglas-fir and lodgepole communities provide excellent whitetailed deer thermal cover. Often, during heavy snow years, shrub forage may be unavailable in openings. A mix of timbered and nontimbered stands managed over time will provide for diverse foraging opportunities, for lichens and shrubs.

Fisheries: Stream diversity is provided by large woody debris and bank scour, leading to excellent pool riffle ratios in many reaches. Low energy streams can store sediment to the detriment of fisheries production.

Watershed: Logging skid trails, firelines, and roads have a low erosion hazard. Sediment delivery efficiency is low. The major watershed management concern is protection of stream channels and banks included in this unit. Bridges and culverts should be carefully planned to maintain channel stability.

73UB

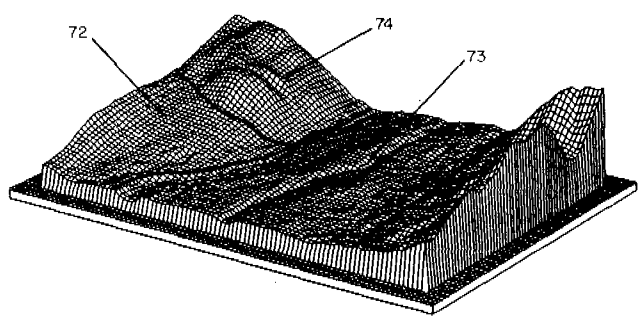
Aquepts-Aquic Cryochrepts complex, glacial outwash substratum

SUMMARY

The map unit occurs on flat glacial outwash plains with shallow water tables. Vegetation is cool forested and non-forested riparian. Soils form in silty alluvium overlying glacial outwash deposits.

LANDFORM

The landform consists of nearly flat plains. Third order or larger streams traverse these plains in a meandering course. These streams have a somewhat deranged pattern with many ponded channels. Relief is very low and water tables are near or at the ground surface.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
1-10	Variable	3200-4600	25-35	0

VEGETATION

Existing: Vegetation is a mixed forest and wet forest opening community. Forest overstories are dominated by subalpine fir, spruce, lodgepole pine, and cottonwood. Forest understories are dominated by horsetail, sweetscented bedstraw, bluejoint, queencup beadlily, false hellebore, and arnica. Shrub communities consist of red-osier dogwood, rocky mountain maple, mountain alder, twinberry, and willow. Important species in meadow openings are sedge, bluejoint, and rushes.

Habitat Type (HT) Composition: Spruce/horsetail (PICEA/EQAR), spruce/queencup (PICEA/CLUN), and subalpine fir/bluejoint (ABLA/CACA) are important HTs. These HTs occur where seasonal and somewhat persistent shallow water tables are common. A similar HT to PICEA/CLUN is subalpine fir/queencup beadlily (ABLA/CLUN). These HTs occupy about 45 percent of the map unit. Meadow openings and shrub communities are present where water tables are persistent. These communities occupy about 30 percent of the unit.

Included are up to 25 percent dissimilar HTs. Subalpine fir/dwarf huckleberry (ABLA/VACA) and subalpine fir/beargrass (ABLA/XETE) occur on the highest terraces above the influence of seasonal water tables. Limitations to timber harvest and regeneration are less on these sites.

73UB

GEOLOGY

The map unit is underlain by glacial outwash deposits. These outwash deposits are generally capped by 1 to 4 feet of recent silty alluvium from frequent stream channel changes, flooding, or past ponding. Outwash deposits are sandy and have high amounts of rounded gravel and cobble. These outwash deposits are very thick and unconsolidated. Gravels and cobbles are primarily argillites, siltites, and quartzites from the Belt Supergroup.

SOILS

Map Unit Summary: Soil drainage is influenced by persistent to fluctuating seasonal water tables. Water tables vary on the surface to within 5 feet of the surface. Subsoils are coarse to moderately coarse textures with 60-75 percent rounded rock fragments. Most surface layers have a silty surface layer from 1 to 4 feet thick.

Composition:
Aquepts are poorly to somewhat poorly-drained soils that support shrub and meadow openings and cool forest riparian HTs. They have weak subsoil development usually in the form of soil structure. Similar soils have no subsoil development or have stratified subsoils and substrata. They are Aquents and Fluvents, respectively. These soils occupy about 40 percent of the unit.

Aquic Cryochrepts are moderately well-drained soils that support cool forest riparian HTs. They have indications of seasonal water tables such as red mottling in subsoils and substrata and vegetation indicators of a wet environment. These soils occupy about 35 percent of the unit.

Included are up to 25 percent dissimilar soils. Andic Cryochrepts, loamy skeletal, mixed, support AF/VACA and AF/XETE HTs. These soils have less frequent flooding or are above the major influence of water table rise. They occur on upper terrace levels or at a distance removed from stream ground water influence. These soils have less limitations to roads and timber management.

Representative Profiles:
These Aquepts have very dark gray silt loam surface layers about 6 inches thick. Subsoils are grayish brown silt loams about 16 inches thick. Substrata are pale brown extremely gravelly caorse sandy loams and loamy sands to depths of 60 inches or more. Mottles are common to many and distinct throughout.

Aquic Cryochrepts have a soil surface covered by a layer of partially decomposed forest litter about 1 inches thick. Surface layers are dark brown gravelly silt loam about 4 inches thick. Subsoils are light brown gravelly silt loams about 12 inches thick. Substrata are brown extremely gravelly sandy loams to depths of 60 inches or more.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual production is high in forested areas. Productivity is limited by shallow water tables on poorly-drained soils and non-forested areas are poorly siuted for timber management. Tractor operation is limited by wet areas with low bearing strength. Compaction and rutting can occur. Cable or aerial logging systems, designated skid trails, and logging on deep snow or frozen ground are harvest methods that will reduce impacts. Hand piling or broadcast burning should be considered for site preparation. Harvest activity should be directed away from stream course to protect streambanks and to reduce risk of sedimentation.

Roads: Excavation can intercept large amounts of ground water and roads will require suitable subgrade material to maintain road prism. Road drainage will be difficult to maintain because of low gradients. Road surfaces will rut when wet. Frequent stream channel changes and beaver activity present problems to maintenance. Care is required when constructing roads in and near stream channels to keep sediment from entering the channel system.

73UB

Range: Potential forage production is low. The forest understory produces poor forage. Clearings offer some increased browse forage in the first few years after harvest.

Wildlife: This unit provides extremely valuable habitat for many species. Old lakes and potholes provide excellent waterfowl habitat. Shrub communities support high densities of songbirds and provide forage for big game species. Timbered stands provide cover and forage in the form of foliose lichens, shrubs, and forbs for whitetailed deer and moose. In some areas, this unit provides critical winter range for elk and deer by providing thermal cover and snow free foraging areas through snow interception. Because of the high inherent diversity, timber harvest is of questionable value for enhancing wildlife habitat except where old growth blowdown threatens animal movement. In such cases, small regeneration cuts provide for a means to rejuvenate old growth stands.

Fisheries: Small off-stream ponds can create diverse habitat for amphibians. Silty stream substrate lenses are common, which can create sediment stress both on-site and downstream. Pools are common, created by bank scour and woody debris, but fish populations are low.

Watershed: Logging skid trails, firelines, and roads have a high erosion hazard. Sediment delivery efficiency is low except immediately adjacent to streams. The major watershed management concern is protection of stream channels and banks included in this unit. Bridges and culverts should be carefully planned to maintain channel stability.

74BA

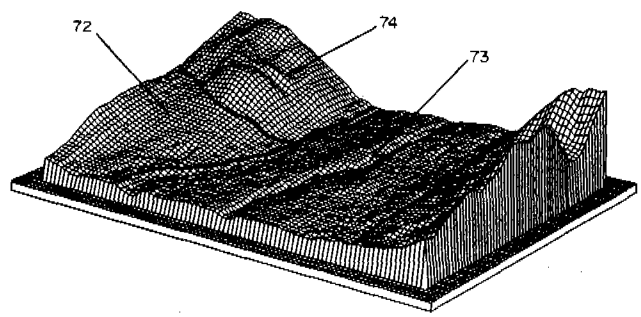
Andic Dystric Eutrochrepts-Typic Eutroboralfs-Andic Cryochrepts complex, glacial till substratum

SUMMARY

The map unit occurs on glacially scoured mountain slopes. Native vegetation is cool, somewhat dry Douglas-fir, moist mixed coniferous forest, and subalpine forest. Soils form in volcanic ash influenced loess overlying a complex of glacial till or material formed from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of complex mountain slopes with oversteepened sideslopes over short distances, closely spaced drainages, and rolling benches at mid to lower slope. Some drainageways are moderately incised. Most drainages are ephemeral and intermittent. Drainage spacing ranges from 300 to 1000 feet. Springs are encountered near slope breaks and bedrock contact with glacial till deposits.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
25-55	Variable	3200-5400	25-35	0-5

VEGETATION

Existing: Vegetation consists of a mixed forest community dominated by Douglas-fir, lodgepole pine, and western larch. Some northerly aspects support subalpine fir. In the Fishtrap Area, grand fir is also an important component. The forest understory consists of twinflower, queencup beadlily on moister sites; menziesia under subalpine fir; and pinegrass, snowberry, beargrass, and blue huckleberry on southerly aspects.

Habitat Type (HT) Composition: This map unit consists of a complex of dissimilar habitat types which vary by aspect and topographic position.

IN THE FISHTRAP DRAINAGE:

Grand fir/queencup beadlily (ABGR/CLUN) and grand fir/twinflower (ABGR/LIBO) are major HTs on rolling benches and northerly aspects. Similar HTs are subalpine fir/queencup beadlily (ABLA/CLUN) and subalpine fir/twinflower (ABLA/LIBO). Subalpine fir/menziesia (ABLA/MEFE) is on northerly slopes on soils formed from outwash or weakly weathered metasedimentary rocks. Douglas-fir/pinegrass (PSME/CARU) and Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE) are on steep southerly aspects and on moderately shallow soils. Some southerly benches on soils derived form glacial till support Douglas-fir/dwarf huckleberry (PSME/VACA).

IN THE SEELEY LAKE - GOLD CREEK AREA:

Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE), Douglas-fir/twinflower (PSME/LIBO), and Douglas-fir/pinegrass (PSME/CARU) are major HTs on southerly aspects. PSME/LIBO is most common on deeper soils on benches and toeslopes. PSME/CARU is most common on moderately shallow soils. Subalpine fir/beargrass-huckleberry (ABLA/XETE-VAGL), subalpine fir/menziesia (ABLA/MEFE), and subalpine fir/queencup beadlily (ABLA/CLUN) are major HTs on northerly aspects. ABLA/CLUN is most common on soils derived from glacial till. ABLA/MEFE is on upper moderately steep slopes.

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) occur very shallow and shallow soil inclusions. Grassy openings also are present on some very shallow soils. Timber productivity is lower and regeneration can be severely limited by insolation and moisture stress.

GEOLOGY

The unit is comprised of material left on mountain sideslopes as a result of intermittent glacial scour and deposition as a result of continental or extensive valley glaciation. Toeslopes, drainageways, and rolling mid-slope benches are underlain by moderately fine glacial till deposits derived from sedimentary and moderately weathered metasedimentary rocks. Oversteepen sideslopes have shallow to moderately shallow soil mantles derived from sedimentary and moderately weathered metasedimentary bedrock. Upper mountain slopes are underlain by sedimentary and moderately weathered metasedimentary bedrock of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are moderately well-drained and well-drained. Soils have surface layers formed in volcanic ash influenced loess about 8 to 12 inches thick. Subsoils have medium to moderately fine textures. Soils vary with topographic position and underlying material. Soil depth is moderately shallow to very deep. Soils formed in material from weakly weathered metasedimentary rocks or from thin glacial till deposits have medium textures, lack subsoil clay accumulation, and contain 45 to 65 percent rock fragments. These soils are dispersed through the unit but are most common between drainages and on mid to upper slope positions. Soils formed in deep glacial till deposits have subsoil clay accumulation, moderately fine textures, and 35 to 50 percent subrounded rock fragments. These soils tend to be on toeslopes, rolling benches, and drainageways.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are formed in sedimentary and moderately weathered metasedimentary rocks or from thin glacial till deposits. These soils support ABGR/LIBO and PSME/VAGL-XETE. These soils occupy about 45 percent of the unit.

Typic Eutroboralfs, clayey skeletal, mixed, frigid are formed in deep glacial till deposits usually on toeslopes, rolling benches, and drainageways. These soils support ABGR/CLUN, PSME/VACA, and ABGR/LIBO. Similar soils support ABLA/CLUN and ABLA/LIBO. They are Andeptic Cryoboralfs, clayey skeletal, mixed. These soils occupy about 20 percent of the unit.

Andic Cryochrepts, loamy skeletal, mixed are formed in sedimentary and moderately weathered metasedimentary rocks or from thin glacial deposits. These soils support ABLA/MEFE, ABLA/XETE, and ABLA/LIBO. These soils occupy about 15 percent of the unit.

Included are up to 20 percent dissimilar soils. Ochrepts that are very shallow to shallow are on oversteepened and smooth rounded sideslopes. Tree and shrub form, stand density and structure, and HTs change dramatically from adjacent slopes in these areas because of thin soils. Tree and shrub height is markedly less, stand density is less, and on very shallow soils, PSME/AGSP, PSME/CARU, or grassy openings are common. These soils have very low timber productivity and severe limitations to regeneration. Typic Cryochrepts, loamy skeletal, mixed and Typic Xerochrepts, loamy skeletal, mixed, frigid are on steep southerly slopes. Volcanic ash influenced loess is absent in the surface layers of these soils. Timber productivity is lower on these soils.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 9 inches thick. Subsoils are yellowish brown clay loams and gravelly loams about 13 inches thick. Substrata are light olive brown very gravelly loams to a depth of 30 inches or more.

Typic Eutroboralfs, clayey skeletal, mixed, frigid have a soil surface layer covered by a layer of partially decomposed forest litter about 2 inches thick. Surface layers are strong brown silt loams about 12 inches thick. Subsurface layers are brown gravelly silt loams about 5 inches thick. Subsoils are dark yellowish brown very gravelly silty clay loams and very gravelly clay loams about 24 inches thick. Lower subsoils and substrata are yellowish brown very cobbly sandy clay loams to a depth of 60 inches or more. Some subsoil layers have calcium carbonate accumulation.

These Andic Cryochrepts, loamy skeletal, mixed have a soil surface layer covered by a layer of partially decomposed forest litter about 3 inches thick. Surface layers are strong brown silt loams about 11 inches thick. Subsoils are yellowish brown extremely gravelly silt loams about 8 inches thick. Substrata are yellowish brown extremely gravelly silt loams to a depth of 30 inches or more.

Classification Remarks: This map unit was developed for the Fishtrap area. The Seeley-Gold area has similar till soils but have a drier climate.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on soils formed in glacial till and sites supporting queencup beadlily and twinflower. Potential annual productivity is low on very shallow to shallow soil inclusions. Potential annual productivity is moderate on other soils. Broken, dissected slopes limit tractor operation. A combination of tractor and cable systems should be considered. Tractor operation on soils formed in glacial till, can rut, compact or puddle soils when wet and reduce soil productivity. Operating when soils are dry, frozen, or snow covered helps maintain soil productivity. Oversteepened southerly slopes and moderately shallow soils have limitations to regeneration because of insolation and competition for moisture from understory vegetation. Protecting shallow soils from soil displacement and shelterwood silvicultural systems improve regeneration. Very shallow soil inclusions present severe limitations to regeneration. On-site analysis is needed to identify these sites and to prescribe mitigation.

Roads: Excavation can intercept ground water in northerly drainageways and benches. Properties of soil materials change over short distances. Moderately fine glacial till material exposed by road construction tends to slough and erode on steep cutbanks and fill slopes. Unsurfaced roads will rut when wet limiting access except on extremely gravelly soil. Revegetation is limited by surface crusts which form on substrata material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success.

Range: This map unit is moderately suited to range management. The forest understory produces fair grass forage on shallow soils and in clearings. Slope steepness limits access on a portion of the unit.

Wildlife: This unit in association with map units 72OA and 72BA provide a critical element of diversity as moose, elk, and deer winter range. Raptors often use the topographic breaks. In drier HTs, such as PSME/CARU, PSME/AGSP, and PSME/SYAL, bunchgrasses provide excellent forage for big game. In moister HTs, forbs provide forage for big game. Because of the inherent diversity of this unit and adjacent map units, opportunities for habitat enhancement through timber harvest are limited. When exceptions occur vegetation response from harvest on the different soils should be considered in design.

Fisheries: The amount of fractured bedrock near the surface and location of these lands preclude all but a few isolated streams.

Watershed: Skid trails and firelines have a high erosion hazard. Roads have a moderate erosion hazard. Sediment delivery efficiency is moderate.

74UA

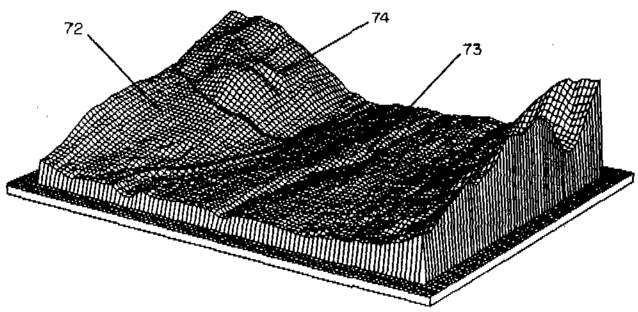
Andic Dystric Eutrochrepts-Typic Eutroboralfs association, glacial till substratum

SUMMARY

The map unit occurs on glacially scoured mountain slopes. Native vegetation is cool, somewhat dry Douglas-fir, moist mixed coniferous forest, and subalpine forest. Soils form in volcanic ash influenced loess overlying a complex of glacial till or material formed from weakly weathered metasedimentary rocks.

LANDFORM

The landform consists of complex mountain slopes with oversteepened sideslopes over short distances, closely spaced drainages, and rolling benches at mid to lower slope. Some drainageways are moderately incised. Most drainages are ephemeral and intermittent. Drainage spacing ranges from 300 to 1000 feet. Springs are encountered near slope breaks and bedrock contact with glacial till deposits.



Slope (%)	Aspect	Elevation (ft)	Precipitation (in)	Rock Outcrop (%)
25-55	Variable	3200-5400	25-35	0-5

VEGETATION

Existing: Vegetation consists of a mixed forest community dominated by Douglas-fir, lodgepole pine, and western larch. Some northerly aspects support subalpine fir. In the Fishtrap Area, grand fir is also an important component. The forest understory consists of twinflower, queencup beadlily on moister sites; and pinegrass, snowberry, beargrass, and blue huckleberry on southerly aspects.

Habitat Type (HT) Composition: This map unit consists of a complex of dissimilar habitat types which vary by aspect and topographic position.

IN THE FISHTRAP DRAINAGE:
Grand fir/queencup beadlily (ABGR/CLUN) and grand fir/twinflower (ABGR/LIBO) are major HTs on rolling benches and northerly aspects. Similar HTs are subalpine fir/queencup beadlily (ABLA/CLUN) and subalpine fir/twinflower (ABLA/LIBO). Douglas-fir/pinegrass (PSME/CARU) and Douglas-fir/snowberry (PSME/SYAL) are on steep southerly aspects and on moderately shallow soils. Some southerly benches on soils derived form glacial till support Douglas-fir/dwarf huckleberry (PSME/VACA).

IN THE SEELEY LAKE - GOLD CREEK AREA:
Douglas-fir/blue huckleberry-beargrass (PSME/VAGL-XETE), Douglas-fir/twinflower (PSME/LIBO), and Douglas-fir/pinegrass (PSME/CARU) are major HTs on southerly aspects. PSME/LIBO is most common on deeper soils on benches and toeslopes. PSME/CARU is most common on moderately shallow soils. Subalpine fir/beargrass-

huckleberry (ABLA/XETE-VAGL) and subalpine fir/queencup beadlily (ABLA/CLUN) are major HTs on northerly aspects. ABLA/CLUN are most common on soils derived from glacial till.

Included are up to 10 percent dissimilar HTs. Douglas-fir/bluebunch wheatgrass (PSME/AGSP) occur very shallow and shallow soil inclusions. Grassy openings also are present on some very shallow soils. Timber productivity is lower and regeneration can be severely limited by insolation and moisture stress.

GEOLOGY

The unit is comprised of material left on mountain sideslopes as a result of intermittent glacial scour and deposition as a result of continental or extensive valley glaciation. Toeslopes, drainageways, and rolling mid-slope benches are underlain by glacial till deposits. Oversteepen sideslopes have shallow to moderately shallow soil mantles derived from weakly weathered metasedimentary bedrock. Upper mountain slopes are underlain by weakly weathered metasedimentary bedrock of the Belt Supergroup.

SOILS

Map Unit Summary: Soils are well-drained and surface layers about 8 to 12 inches thick formed in volcanic ash influenced loess. Soil depth is shallow to very deep. Soils vary with topographic position and underlying material. Soils formed in material from weakly weathered metasedimentary rocks or from thin glacial till deposits have moderately coarse to medium textures, lack subsoil clay accumulation, and contain 45 to 75 percent rock fragments. Soils formed in deep glacial till deposits have subsoil clay accumulation and medium to moderately fine textures. Rock fragments are subrounded and contain from 35 to 50 percent. Moderately shallow soils about 30 inches deep occur on oversteepened sideslopes between drainages.

Composition:
Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are formed in weakly weathered metasedimentary rocks or from thin glacial till deposits. These soils support ABGR/LIBO, PSME/VAGL-XETE, and PSME/LIBO. Similar soils support ABLA/XETE. They are Andic Cryochrepts, loamy skeletal, mixed amd are most often in the Seeley Lake - Gold Creek area. These soils occupy about 45 percent of the unit.

Typic Eutroboralfs, loamy skeletal, mixed, frigid are formed in deep glacial till deposits usually on toeslopes, rolling benches, and drainageways. These soils support ABGR/CLUN, PSME/VACA, and ABGR/LIBO. Similar soils support ABLA/CLUN and ABLA/LIBO. They are Andeptic Cryoboralfs, loamy skeletal, mixed. These soils occupy about 20 percent of the unit.

Moderately shallow Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are on oversteepened sideslopes and are formed in weakly weathered metasedimentary rocks. These soils support PSME/CARU, PSME/VAGL-XETE (low shrub height), and PSME/SPBE. These soils occupy about 20 percent of the unit.

Included are up to 20 percent dissimilar soils. Ochrepts that are very shallow to shallow are on oversteepened and smooth rounded sideslopes. Tree and shrub form, stand density and structure, and HTs change dramatically from adjacent slopes in these areas because of thin soils. These soils support PSME/AGSP and PSME/CARU. And where subalpine fir occurs, ABLA/XETE-VAGL is common but shrub height is markedly lower than in adjacent stands. Grassy openings are present on very shallow soils. These soils have very low timber productivity and severe limitations to regeneration. Typic Cryochrepts, loamy skeletal, mixed and Typic Xerochrepts, loamy skeletal, mixed, frigid are on steep southerly slopes. Volcanic ash influenced loess is absent in the surface layers of these soils. Timber productivity is lower on these soils.

Representative Profiles:
These Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid have a soil surface covered by a layer of partially decomposed forest litter about 1 inch thick. Surface layers are dark brown silt loams about 8 inches thick. Subsoils are brown and light yellowish brown very gravelly sandy loams about 20 inches thick. Substrata are yellowish

brown very gravelly sandy loams to a depth of 60 inches or more. (Soils formed from the Bonner Formation have weak red colors).

These Typic Eutroboralfs, loamy skeletal, mixed, frigid have a soil surface layer covered by a layer of partially decomposed forest litter about 1 inches thick. Surface layers are dark yellowish brown silt loams about 8 inches thick. Subsurface layers are gray very gravelly sandy loams about 7 inches thick. Upper subsoils are light brownish gray very gravelly loams about 9 inches thick. Lower subsoils are light gray and yellowish brown very gravelly silty clay loams about 8 inches thick and have common moderately thick clay skins along ped faces. Substrata are gray very gravelly sandy loams to a depth of 60 inches or more. (Soils formed form till derived from the Bonner Formation have weak red colors.)

Moderately shallow Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid are similar to those above. Bedrock is at about 30 inches.

Classification Remarks: This map unit was developed for the Fishtrap area. The Seeley-Gold area has similar till soils but a colder, drier climate.

MANAGEMENT CONSIDERATIONS

Timber: Potential annual productivity is high on soils formed in glacial till and sites supporting queencup beadlily and twinflower. Potential annual productivity is low on very shallow to shallow soil inclusions. Potential annual productivity is moderate on other soils. Broken, dissected slopes limit tractor operation. A combination of tractor and cable systems should be considered. Tractor operation on soils formed in glacial till, can rut, compact or puddle soils when wet and reduce soil productivity. Restricted operating season and operating when soils are dry will reduce impacts. Oversteepened southerly slopes and moderately shallow soils have limitations to regeneration because of insolation and competition for moisture from understory vegetation. Protecting shallow soils from soil displacement and shelterwood silvicultural systems improve regeneration. Very shallow soil inclusions present severe limitations to regeneration. On-site analysis is needed to identify these sites and to prescribe mitigation.

Roads: Excavation can intercept ground water in northerly drainageways. Properties of soil materials change over short distances. Glacial till material exposed by road construction tends to slough and erode on steep cutbanks and fill slopes. Unsurfaced roads constructed in glacial till material will rut when wet. Revegetation is limited by surface crusts which form on substrata material exposed by construction. Seeding as soon as possible after construction helps improve revegetation success. Moderately shallow to very shallow soils occasionally limits excavation.

Range: This map unit is moderately suited to range management. The forest understory produces fair grass forage on shallow soils and in clearings. Slope steepness limits access on a portion of the unit.

Wildlife: This unit in association with map units 72OA and 72BA provide a critical element of diversity as moose, elk, and deer winter range. Raptors often use the topographic breaks. In drier HTs, such as PSME/CARU, PSME/AGSP, and PSME/SYAL, bunchgrasses provide excellent forage for big game. In moister HTs, forbs provide forage for big game. Because of the inherent diversity of this unit and adjacent map units, opportunities for habitat enhancement through timber harvest are limited. When exceptions occur vegetation response from harvest on the different soils should be considered in design.

Fisheries: The amount of fractured bedrock near the surface and location of these lands preclude all but a few isolated streams.

Watershed: Skid trails, firelines, and roads constructed on soils formed in glacial till have a moderate erosion hazard. Skid trails and firelines constructed on soils formed in weakly weathered metasedimentary rocks have a moderate erosion hazard. Roads have a low erosion hazard in these materials. Sediment delivery efficiency is moderate.

LAND SYSTEMS INVENTORY GROUPINGS

Ordered by : LSI   Date: March 18, 1993

LAND FORM	LANDFORM GROUP NAME	LTA	LSI's	VEGETATION GROUP	HABITAT GROUP	REMARKS
10-16	Floodplains, Bench, & Terrace Lands	1	13JA 13UA 14JA 14XA 15JA 15UA 16UA	Open Grown	1 & 2	13JA & 16UA South Aspects
						60% = HG1-3 & 40% = HG4
		1		Dry Douglas-fir	2 & 3	
		1		Dry Mixed Conifer	2 & 3	
		2	13JA 13UB 14JB 15JB 15UB 16UA	Moist Mixed Conifer	4	13JA & 16UA North Asects
						15JB South Aspects
		3	10UA 10UB 10UC	Warm Forest Riparian	4 & 2	60% = HG1-3 & 60% =HG4B & Cottonwoods
		3		Non-Forest Riparian		
		3		Cool Forest Riparian		
		4	13UB 15JB	Subalpine fir	4	15JB North Aspect 13UB High Eelevations
22-24	Mountain Toeslopes	5	22MA 22UA 24JA	Dry Mixed Conifer	1,2 & 4	22MA South Aspects
		5		Dry Douglas-fir	2	
		6	22MA 24JB	Moist Mixed Conifer	4	22MA North aspects

Landforms, Land System Inventory Units are described with LAND SYSTEM INVENTORY - LOLO NATIONAL FOREST (Sasich, 1989).

LSI = Land System Inventory Unit composed of landform, geology, and vegetation

LTA = Landtype Association, a grouping of similar LSI's and Habitat types.

LAND SYSTEMS INVENTORY GROUPINGS

Ordered by : **LSI** Date: **March 18, 1993**

LAND FORM	LANDFORM GROUP NAME	LTA	LSI's	VEGETATION GROUP	HABITAT GROUP	REMARKS
26, 30, 60-64	Mountain Sideslopes	7	26UA 30MA 30QA 60MA 60QA 61MC 64MA 64QA	Open Grown	1	61MC South Aspects
		8	30MB 30MC 30QB 30QC 30SA 60MB 60MC 60QB 60QC 61MC 61QC 64MB 64MC 64QB 64QC 64SB	Dry Douglas-fir	2	30SA below 4500' 61MC North Aspects 64SB below 4800' 60MC & 60QC below 4600'
		8		Dry Mixed Conifer	2 & 4D	
		9	30BB 30GA 30GB 30KA 30KAb 30KB 30KBb 30ME 30MG 30PA 30PE 30QE 30QG 30SA 30SB 60KA 60KB 60MC 60QC 61QD 61SA 64KA 64KAb 64KB 64KBb 64ME 64MG 64QE 64QG 64SB	Cool Dry Douglas-fir		60MC 60QC Above 4600' 61QD below 4800' 30BB Seeley Lake, 30AS above 4500', 64SB above 4800'
		9		Subalpine fir		
		10	30BB 30MD 30QD 60MD 60QD 61MD 61QD 64MD 64QD	Moist Mixed Conifer	3,4A & 4B	30BB, Fishtrap 61QD above 4800'
32-33	Mountain Ridgetops	11	32KA 32MA 32QA	Lower Subalpine fir	4B & 5	
		11	32QC	Cool Dry Douglas-fir	3, 4D & 5	90% = HG4D & 3, 10% = HG5
		12	33UA	Upper subalpine fir	6	33UA is unsuitable
		13	32QD	Grassy Balds	0, 1, 3 & 6	55% = HG 6, 32% = HG5, 3% = HG1 & 3, 5% = HG0 32QD unsuitable

Landforms, Land System Inventory Units are described with LAND SYSTEM INVENTORY - LOLO NATIONAL FOREST (Sasich, 1989).

LSI = Land System Inventory Unit composed of landform, geology, and vegetation

LTA = Landtype Association, a grouping of similar LSI's and Habitat types.

LAND SYSTEMS INVENTORY GROUPINGS

Ordered by : LSI Date: March 18, 1993

LAND FORM	LANDFORM GROUP NAME	LTA	LSI's	VEGETATION GROUP	HABITAT GROUP	REMARKS
38, 72, 73 & 74	Continental Glacial Till Lands and Continental Glacial Outwash Lands	14	38KA 38QA 72BA 72OA 74BA 74UA			
				Moist Mixed Conifer	4A, 4B & 4C	74BA 74UA in Fishtrap
		14		Subalpine fir	6	
		15	73UA	Dry Mixed Conifer	2,3 & 4D	
		16	73UB	Cool & Non-forest Riparian	4A & 4C	
		17	74BA 74UA	Cool/dry Douglas-fir	3 & 4A	74BA, 74UA in Seeley Lake
40, 41 & 45	Alpine Glaciated Lands	18	40KA 40QA	Upper Subalpine fir	6	
		19	41KA 41QA 41SA 45UA	Subalpine fir	4A,4B &4C	45UA unsuitable
42, 43	Glacial Cirque Basins	20	42KA 42QA 43QA 43SA	Subalpine fir and Mountain Hemlock	6,4B & 4C	
		21	43QB	Moist Forest Openings	4B & 5	
46-47	Glaciated Valley Trains	22	46KA 46OA 47KA 47OA	Subalpine fir	4B & 5	
48	Glaciated Valley Troughwalls	23	48KA 48QA	Subalpine fir	4B & 5	
		23		Moist Mixed Conifer	4B & 5	

Landforms, Land System Inventory Units are described with LAND SYSTEM INVENTORY - LOLO NATIONAL FOREST (Sasich, 1989).

LSI = Land System Inventory Unit composed of landform, geology, and vegetation

LTA = Landtype Association, a grouping of similar LSI's and Habitat types.

Chapter III: INTERPRETATIONS

ENGINEERING

Road construction is the primary engineering use of soils in forest management. About 6 to 8 miles of road are required to place a section of timber under management. Several standards of roads are constructed on the Lolo National Forest. Arterial or collector roads are normally either 16 feet wide with ditch or 14 feet wide without ditch. Local logging roads are normally drained by rolling grades, or water bars and occasionally by outsloping. They are often closed when not needed for hauling logs. Surfacing is used only for erosion control or where an all weather road surface is required on soil materials that have unsatisfactory native road surface characteristics. The majority of native road surfaces in the survey area do not require surfacing.

Data presented in this section can be used for choosing among alternative road locations and designs. Land use planners can use this data to evaluate the feasibility of allocating land to uses requiring road access. Transportation planners can use this data to evaluate alternative routes. Design engineers can use this information to plan detailed on-site investigations of soil and geology. This information does not eliminate the need for on-site investigations, testing and analysis.

Engineering Properties and Classification

Table III-1 gives estimates of the engineering properties and classifications for the soil surface, subsurface, and substratum. For the purposes of this table, the surface layer is considered to be the first 12 inches of soil. The subsurface is considered to be 12 to 36 inches deep. The substratum rating applies to the material below a depth of 3 feet. On steep slopes, road cuts and fills and native road surface are normally determined by characteristics of the soil substratum. On slopes less than 35 percent, the subsurface and surface soil characteristics can contribute to road quality. On slopes less than 10 percent, road characteristics are determined mostly by the surface soils. Soils with contrasting engineering properties between the surface and substratum can create situations that require special attention. For example, some alluvial terraces have surface and subsurface soil material that have poor suitability for native road surface. However, the substratum materials have a fair to good suitability for native road surface. Removing the surface and subsurface would expose the more suitable substratum materials for road surface preventing the need for application of gravel surfacing.

The estimates of engineering properties and classification are based on tests of materials sampled in the survey area. The estimates are not site specific and do not eliminate a need for on site materials testing during road design and construction. The estimates can be used in planning site investigations prior to design and construction.

USDA texture is defined in terms of the percentages of sand, silt, and clay in the fraction of soil that is less than 2mm in diameter. If a soil contains particles greater than 2mm in diameter, a rock fragment modifier is added to further define the amount and size of rock fragment; for example; gravelly to extremely gravelly or cobbly, etc. See Appendix C for further definition of these groups.

Unified classification identifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Classes in this system are defined in the ASTM Standards D2487-69 (reapproved 1975). Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH. Soils exhibiting engineering properties of two groups can have a dual classification; for example: SW-SM.

Average rock fragment content is an estimate of percent by volume. Fragments have been divided into two size classes; greater than 3 inches in diameter and less than 3 inches in diameter. This estimate is based on over 1300 soils observed in the survey area and is the average for the map unit.

Rock shape defines the average shape of the rock fragments contained in the soil. Rock shape can infuence native road surface smoothness, ability to compact the road prism, and cut/fill stability. Rock shape is influenced by the parent material or geologic group. Glacial till soils and alluvium will have sub-rounded to rounded rock fragments and residual soils will have angular rock fragments.

Liquid limit and **plasticity index** indicate the effect of water on the strength and consistence of soil. They are used in the unified classification and as indicators in making general predictions of soil behavior.

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
10UA	surface	sil	SM	10	5	rounded	--	NP
	intermed.	sil	SM,ML	10	5	rounded	--	NP
	substratum	excbsl	GP/GW	30	30	rounded	--	NP
10UB	surface	sil	SM/SP	0-5	0	rounded	--	NP
	intermed.	sil	SM/SP,ML	15-35	0-5	rounded	--	NP
	substratum	sil, vgsl	SM,GM	35-60	0-20	rounded	--	NP
10UC	surface	vgsil	SM,ML	0	5-15	rounded	--	NP
	intermed.	vgsil,vcbsl	SM/SP	25-35	15-50	rounded	--	NP
	substratum	vgsl,vcbsl	GW/GP	20-30	15-35	rounded	--	NP
13JA	surface	sil	ML	0-15	0	rounded	low	low
	subsurface	sicl	ML,CL	0-15	0	rounded	low	low
	substratum	vgsl,vcbsl	GM-GW	30-40	20-40	rounded	--	NP
13UA	surface	gl,gsil	ML,SM	5-15	0	rounded	--	NP
	subsurface	vgsl	GM-GW	30-45	15-20	rounded	--	NP
	substratum	vcbsl,exgsl	GM-GW	35-55	15-40	rounded	--	NP
13UB	surface	sil	ML	0-20	0	rounded	--	NP
	subsurface	exgsl,excbsl	GM-GW	30-45	25-40	rounded	--	NP
	substratum	excbsl	GM-GW	20-30	30-40	rounded	--	NP
14JA	surface	sil	ML,CL	0	0	--	high	low
	subsurface	sil,sicl	ML,CL,CH	0	0	--	high	low
	substratum	sil,sicl	ML,CL,CH	0	0	--	high	low
14JB	surface	sil	ML	0	0	--	--	NP
	subsurface	sil,sicl	ML,CL,CH	0	0	--	high	low
	substratum	sil,sicl	ML,CL,CH	0	0	--	high	low
14XA	surface	fsl	SM	0	0	--	low	NP
	subsurface	fsl	SM	0	0	--	low	NP
	substratum	gfls	SM	0	0	--	low	NP
15JA	surface	gsil	ML,CL	15-25	5-10	subrounded	low	low
	subsurface	vgsil,cbsicl	ML,CL	10-35	10-15	subrounded	high	low
	substratum	gsicl,vcbscl	ML,CL	15-35	10-35	subrounded	high	low
15JB	surface	gsil	ML	15-25	5-10	subrounded	--	NP
	subsurface	vgsil,cbsicl	ML,CL	10-35	10-15	subrounded	high	low
	substratum	gsicl,vcbscl	ML,CL	15-35	10-35	subrounded	high	low

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
15UA	surface	gl,sil	SM,GM	10-30	0-10	angular	--	NP
	subsurface	vgsl	GM	35-60	0-10	angular	--	NP
	substratum	vgsl	GM	35-60	0-10	angular	--	NP
15UB	surface	sil	ML	0-15	0	angular	--	NP
	subsurface	vgsl	GM	35-60	0-15	angular	--	NP
	substratum	vgsl	GM	35-60	0-15	angular	--	NP
16UA	surface	gsl,gsil	SM,ML	10-35	0-5	subrounded	--	NP
	subsurface	exgcosl,exgls	GM	60-75	5-10	subrounded	--	NP
	substratum	exglcos	GM	60-75	5-10	subrounded	--	NP
22MA	surface	sil,l	ML	10-15	0-5	angular	--	NP
	subsurface	gsl,vgcosl	SM,GM	25-35	0-5	angular	low	low
	substratum	bedrock	--	---	---	---	--	--
22UA	surface	gsil,gl	ML	10-20	0-10	angular	--	NP
	subsurface	exgcosl	GM	50-65	10-20	angular	--	NP
	substratum	bedrock	--	---	---	---	--	--
24JA	surface	gsil,gl	ML	15-20	0	angular	low	NP
	subsurface	gil,gicl	ML,CL	15-25	0	angular	low	low
	substratum	gsicl	ML,CL	15-30	0	angular	high	high
24JB	surface	gsil	ML	15-20	0	--	--	NP
	subsurface	gsicl	ML-CL	15-25	0	angular	high	high
	substratum	gsicl	ML-CL	15-30	0	angular	high	high
26UA	surface	exgsl	GM	55-85	36-65	angular	--	NP
	subsurface	exgsl	GM OR TALUS	45-70	25-50	angular	--	NP
	substratum	fragmental	TALUS	45-75	25-55	angular	--	NP
30BB	surface	sil	ML	0-10	0-5	angular	--	NP
	subsurface	vgsil,cl,gsicl,vgfsl	ML,CH,SM,GM	15-45	0-45	angular	high	low
	substratum	vgfsl,vgcl, vgsicl	ML,CH,GM	25-45	15-45	angular	high	low
30GA	surface	vgsl	GM	15-25	0	subangular	--	NP
	subsurface	vgsl	GM,SM	15-25	0	subangular	--	NP
	substratum	vgsl	GM,SM	15-35	0-5	subangular	--	NP
30GB	surface	sil	ML	0-15	0	subangular	--	NP
	subsurface	vgsl	GM,SM	15-25	0	subangular	--	NP
	substratum	vgsl	GM,SM	15-35	0-5	subangular	--	NP
30KA	surface	vgsl	GM	15-25	0	subangular	--	NP
	subsurface	vgcosl	GM	15-35	0	subangular	--	NP
	substratum	vglcos	GM,GP	15-35	0	subangular	--	NP
30KA*b*	surface	vgsl	GM	15-25	0	subangular	--	NP
	subsurface	vgcosl	GM	15-35	0	subangular	--	NP
	substratum	vglcos	GM,GP	15-35	0	subangular	--	NP
30KB	surface	vgsl,sil	GM,ML	15-35	0	subangular	--	NP
	subsurface	vgcosl	GM	15-35	0	subangular	--	NP
	substratum	vglcos	GM,GP	15-35	0-5	subangular	--	NP

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
30KB*b*	surface	vgsl,sil	GM,ML	15-35	0	subangular	--	NP
	subsurface	vgcosl	GM	15-35	0	subangular	--	NP
	substratum	vglcos	GM,GP	15-35	0-5	subangular	--	NP
30MA	surface	gsil, l	SM	15-25	0-5	angular	low	low
	intermed.	vgsil,gl	SM,GM	15-40	0-5	angular	low	low
	substratum	vgl	GM	35-50	5-15	angular	low	low
30MB	surface	vgsil,gl	SM	20-25	0-5	angular	low	low
	subsurface	vgsil,vgl	SM,GM	15-40	0-5	angular	low	low
	substratum	vgl	GM	35-50	5-15	angular	low	low
30MC	surface	sil	ML	10-15	0	angular	low	low
	subsurface	gl,vgl	SM	10-40	0-5	angular	low	low
	substratum	vgl,vgsil	SM,ML	15-40	0-15	angular	low	low
30MD	surface	sil,gsil	ML	0-15	0	angular	low	low
	subsurface	vgl,vgsil	SM,ML	10-40	0-5	angular	low	low
	substratum	gl,vgsil	SM,ML	10-40	0-5	angular	low	low
30ME	surface	sil	ML	0-5	0-10	angular	low	low
	subsurface	vgsil,gsil	ML,SM,GM	10-50	0-10	angular	low	low
	substratum	vgsil,vgl	ML,SM	25-50	0-10	angular	low	low
30MG	surface	sil,gsil	ML	5-25	0-5	angular	low	low
	subsurface	vgsil,vgl	ML,SM	30-50	0-5	angular	low	low
	substratum	vgsil,vgl	SM,GM	30-50	0-5	angular	low	low
30PA	surface	gl,gscl	SM,SC	10-25	0-5	angular	low	low
	subsurface	gcoscl,gscl	SM,SC	15-20	0-5	angular	low	low
	substratum	vgl,vgsl	SM,SC	35-45	0-5	angular	low	low
30PE	surface	gl	ML	10-25	0-5	angular	low	low
	subsurface	gcosl,vgl,vgscl	ML,SC	35-45	0-5	angular	low	low
	substratum	vgscl	ML,SC	25-45	0-25	angular	low	low
30QA	surface	gsl	GM	20-45	0-5	angular	--	NP
	subsurface	exgsl	GM	45-65	20-30	angular	--	NP
	substratum	exgsl	GM	45-65	20-30	angular	--	NP
30QB	surface	gl	GM	20-45	0-5	angular	--	NP
	subsurface	vgsl	GM	45-60	10-15	angular	--	NP
	substratum	exgsl	GM	55-60	20-30	angular	--	NP
30QC	surface	gl,sil	GM,ML	5-15	0-5	angular	--	NP
	subsurface	exgsl	GM	55-65	5-45	angular	--	NP
	substratum	exgsl	GM	55-65	5-45	angular	--	NP
30QD	surface	sil	ML	0-20	0-10	angular	--	NP
	subsurface	exgsl	GM	55-65	5-45	angular	--	NP
	substratum	exgsl	GM	55-65	5-45	angular	--	NP
30QE	surface	sil	ML	0-20	0-10	angular	--	NP
	subsurface	exgsl,vgsl	GM	35-55	5-10	angular	--	NP
	substratum	exgsl	GM	35-65	5-45	angular	--	NP
30QG	surface	gsil,gl	ML	0-20	0-10	angular	--	NP
	subsurface	exgsl,vgsl	GM	35-65	5-10	angular	--	NP
	substratum	exgsl	GM	55-65	5-10	angular	--	NP

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
30SA	surface subsurface substratum	gfsl,gsl gfsl,sil gfsl,gsil	SM,ML SM(micaceous) SM(micaceous)	15-35 20-45 20-55	0-5 0-5 0-5	subangular subangular subangular	low low low	NP NP NP
30SB	surface subsurface substratum	fsl,sil gfsl,sil gfsl,sil	SM,ML SM(micaceous) SM(micaceous)	0-15 0-25 0-25	0 0 0	subangular subangular subangular	-- low low	NP NP NP
32KA	surface subsurface substratum	gsil gcosl,vgsl vcbcosl	ML GM GM	15-35 15-35 15-35	0-5 10-15 10-15	angular angular angular	-- -- --	NP NP NP
32MA	surface subsurface substratum	l,vgsil vgsil,vgl exgsil	ML SM SM,GM	10-25 35-45 35-65	0-5 0-5 15-25	angular angular angular	low low low	low low low
32QA	surface subsurface substratum	sil,l vgsil,excbsl excbsl	ML GM GM	10-15 45-50 25-65	0-5 0-50 0-50	angular angular angular	-- -- --	NP NP NP
32QC	surface subsurface substratum	sil,gsil exgsl,excbsl excbsl,exgfsl	ML GM GM	10-25 35-50 45-65	0-5 15-50 15-50	angular angular angular	-- -- --	NP NP NP
32QD	surface subsurface substratum	vgl exgsl exgsl,vcbsl	ML GM GM	35-40 55-85 55-85	0-5 0-10 0-10	angular angular angular	-- -- --	NP NP NP
33UA	surface subsurface substratum	sil,l excbsl exstsl	ML GM GM	10-55 45-60 20-40	0-15 10-25 40-60	angular angular angular	-- -- --	NP NP NP
38KA	surface subsurface substratum	sil gsil,gl gsil,gl	ML ML,SM ML,SM	0-15 0-15 0-15	0 0 0	subangular subangular subangular	-- -- --	NP NP NP
38QA	surface subsurface substratum	sil,l vgfsl,vgsil vgfsl,vgsil	ML SM,ML SM,ML	0-5 30-45 30-45	0 0 0	angular angular angular	low low low	low low low
40KA	surface subsurface substratum	sil,l vgsl vgcosl	ML GM GM,GW	0-15 15-35 15-35	5-10 5-10 5-10	angular angular angular	-- -- --	NP NP NP
40QA	surface subsurface substratum	vgsil excbsl bedrock	ML ML,GM --	35-45 10-25 --	10-15 35-50 --	angular angular --	-- -- --	NP NP --
41KA	surface subsurface substratum	vgl vgcosl vgcosl	ML,GM GM GM	15-35 15-35 15-35	10-15 15-20 15-20	angular angular angular	-- -- --	NP NP NP
41QA	surface subsurface substratum	vgsil vcbl,exgsl excbsl	ML ML,GM GM	20-35 10-75 10-25	0-10 10-50 45-60	angular angular angular	-- -- --	NP NP NP
41SA	surface subsurface substratum	gsil vcbsl,vbcsli vcbsl	ML SM SM	15-35 15-35 15-35	0-10 25-30 25-30	angular angular angular	low low low	low low low

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
42KA	surface	vgl	ML,GM	15-35	10-15	angular	–	NP
	subsurface	vgcosl	GM	15-35	15-20	angular	–	NP
	substratum	vgcosl	GM	15-35	15-20	angular	–	NP
42QA	surface	sil	ML	0-15	0-5	subrounded	–	NP
	subsurface	vcbsil,vgscl	SC,GM,ML	15-35	15-35	subrounded	low	low
	substratum	vcbscl,	SC,GM	15-35	15-35	subrounded	low	low
43QA	surface	sil	ML	10-25	0-15	angular	–	NP
	subsurface	exgsil	ML,GM	10-55	35-45	angular	–	NP
	substratum	exgl	ML,GM	45-55	10-15	angular	–	NP
43QB	surface	sil	ML	0-10	0	–	–	NP
	subsurface	sil	ML,SM	0-20	0	angular	low	low
	substratum	vgl	ML,SM	25-45	0	angular	low	NP
43SA	surface	sil	ML	0-5	0	–	–	NP
	subsurface	sil,fsl	ML,SM(micaceous)	0	0	–	low	NP
	substratum	gsl	SM(micaceous)	15-25	0	angular	low	NP
45UA	surface	vstsil	ML	5-25	45-70	angular	–	NP
	subsurface	exstl	GM	5-25	45-70	angular	–	NP
	substratum	exstl	GM	5-25	55-75	angular	–	NP
46KA	surface	sil	ML	15-35	0	subrounded	–	NP
	subsurface	vcbsl	GM	15-35	5-30	subrounded	–	NP
	substratum	vcbsl,vcbls	GM,GW	15-35	5-30	subrounded	–	NP
46OA	surface	cbsil	ML	5-15	5-15	subrounded	–	NP
	subsurface	vcbfscl	SC,GM	10-35	30-45	subrounded	low	low
	substratum	vcbscl	SC,GM	10-35	30-45	subrounded	low	low
47KA	surface	sil	ML	15-35	0	subrounded	–	NP
	subsurface	vcbsl	GM	15-35	5-30	subrounded	–	NP
	substratum	vcbsl,vcbls	GM,GW	15-35	5-30	subrounded	–	NP
47OA	surface	cbsil	ML	5-25	15-35	subangular	–	NP
	subsurface	vcbsl	GM	5-25	10-55	subangular	low	low
	substratum	vstsl	GM	5-25	35-55	subangular	low	low
48KA	surface	l	ML	10-20	0	subrounded	–	NP
	subsurface	vgcosl	GM	25-35	0-5	subrounded	–	NP
	substratum	vglcos,vgcosl	GM,GW	35-55	5-15	subrounded	–	NP
48QA	surface	sil	ML	5-25	5-10	subangular	–	NP
	subsurface	gsil,vgsil	ML	15-55	15-35	subangular	–	NP
	substratum	vcbsl	GM	25-55	35-45	subangular	–	NP
60KA	surface	gsl	GM	15-35	0-5	subangular	–	NP
	subsurface	vgsl	GM	35-50	5-10	subangular	–	NP
	substratum	vgls	GM	35-50	5-15	subangular	–	NP
60KB	surface	gl	ML	15-35	0-5	subangular	–	NP
	subsurface	vgsl	GM	35-50	5-10	subangular	–	NP
	substratum	vgsl	GM	35-50	5-15	subangular	–	NP
60MA	surface	gl	ML	5-15	0-5	angular	–	NP
	subsurface	vcbl	ML,SM	35-45	5-15	angular	low	low
	substratum	vcbl	ML,SM	35-45	5-15	angular	low	low

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
60MB	surface	gsil	ML	5-15	0-5	angular	--	NP
	subsurface	vcbl	ML,SM	35-45	5-15	angular	low	low
	substratum	vcbl	ML,SM	35-45	5-15	angular	low	low
60MC	surface	cbsil	ML	0-15	10-15	angular	--	NP
	subsurface	vcbsil	SM,GM	5-40	25-40	angular	low	low
	substratum	vcbsil	SM,GM	5-40	25-40	angular	low	low
60MD	surface	cbsil	ML	0-15	10-15	angular	--	NP
	subsurface	vcbsil	SM,GM	15-35	35-45	angular	low	low
	substratum	vcbsil	SM,GM	15-35	35-45	angular	low	low
60QA	surface	vgsl	GM	35-65	5-35	angular	--	NP
	subsurface	excbsl	GM	25-45	45-65	angular	--	NP
	substratum	excbsl (shallow to bedrock)	GM	25-45	45-65	angular	--	NP
60QB	surface	vgl,vgsil	GM,SM	15-35	5-25	angular	--	NP
	subsurface	excbsl	GM	25-45	45-65	angular	--	NP
	substratum	excbsl	GM	25-45	45-65	angular	--	NP
60QC	surface	sil	ML	0-15	0-5	angular	--	NP
	subsurface	excbsl	GM	25-45	35-65	angular	--	NP
	substratum	excbsl	GM	25-45	35-65	angular	--	NP
60QD	surface	sil	ML	0-5	0-5	angular	--	NP
	subsurface	excbsl,excbfsl	GM	25-45	35-65	angular	--	NP
	substratum	excbsl	GM	25-45	35-65	angular	--	NP
61MC	surface	sil	ML	0-5	10-15	angular	low	low
	subsurface	excbl	ML,GM	25-35	35-55	angular	low	low
	substratum	excbl	ML,GM	25-35	35-55	angular	low	low
61MD	surface	sil	ML	0-5	10-15	angular	--	NP
	subsurface	excbl	ML,GM	25-35	35-55	angular	low	low
	substratum	excbl	ML,GM	25-35	35-55	angular	low	low
61QC	surface	sil,vgl	ML,SM	5-25	10-15	angular	--	NP
	subsurface	excbsl	GM	25-35	55-65	angular	--	NP
	substratum	excbsl	GM	25-35	55-65	angular	--	NP
61QD	surface	sil	ML	5-15	10-15	angular	--	NP
	subsurface	excbsl	GM	25-35	55-65	angular	--	NP
	substratum	excbsl	GM	25-35	55-65	angular	--	NP
61SA	surface	sil,gsl	ML,SM	5-25	0	angular	--	NP
	subsurface	vgsl,gsil	SM	25-40	5-10	angular	--	NP
	substratum	exgsl,vgsil	SM	25-40	5-10	angular	--	NP
64KA	surface	gsl	GM	25-35	0	subangular	--	NP
	subsurface	gsl	GM	25-35	0-5	subangular	--	NP
	substratum	vglcos	GM	35-55	5-15	subangular	--	NP
64KAb	surface	gsl	GM	25-35	0	subangular	--	NP
	subsurface	gsl	GM	25-35	0-5	subangular	--	NP
	substratum	vglcos	GM	35-55	5-15	subangular	--	NP

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
64KB	surface	gsil	ML	10-20	0	subangular	--	NP
	subsurface	gsl	GM	25-35	0-5	subangular	--	NP
	substratum	vglcos	GM	35-55	5-15	subangular	--	NP
64KB*b*	surface	gsil	ML	10-20	0	subangular	--	NP
	subsurface	gsl	GM	25-35	0-5	subangular	--	NP
	substratum	vglcos	GM	35-55	5-15	subangular	--	NP
64MA	surface	gsil	ML	20-25	0	angular	low	low
	subsurface	vgl,vgsil	SM	20-40	0-10	angular	low	low
	substratum	vgl	SM	40-55	0-10	angular	low	low
64MB	surface	vgsil,vgl	ML	35-50	0	angular	low	low
	subsurface	vgl	SM	25-40	0-15	angular	low	low
	substratum	vgl	SM	25-40	0-15	angular	low	low
64MC	surface	sil	ML	0-15	0	angular	low	low
	subsurface	vgl,vgscl	ML,SM	35-55	0-5	angular	low	low
	substratum	vgl,vgscl	ML,SM	35-55	0-5	angular	low	low
64MD	surface	sil	ML	0-10	0	angular	low	low
	subsurface	vgl,vgsil	ML,SM	35-55	0	angular	low	low
	substratum	vgl,vgsil	ML,SM	35-55	0	angular	low	low
64ME	surface	sil	ML	0-10	0	angular	low	low
	subsurface	vgl	ML,SM	35-55	0-5	angular	low	low
	substratum	vgl	ML,SM	35-55	0-5	angular	low	low
64MG	surface	sil	ML	0-10	0	angular	low	low
	subsurface	vgl	ML,SM	35-55	0-5	angular	low	low
	substratum	vgl	ML,SM	35-55	0-5	angular	low	low
64QA	surface	vgl	GM	55-55	0-10	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
64QB	surface	vgl	GM	45-55	0-10	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
64QC	surface	sil,gsil	ML	15-45	0-10	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	35-65	angular	--	NP
64QD	surface	sil,gsil	ML	15-35	5-10	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
64QE	surface	sil,gsil	ML	10-30	0-25	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
64QG	surface	gsil,vgsil	ML	10-30	0-25	angular	--	NP
	subsurface	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
	substratum	exgsl,excbsl	GM	35-65	25-45	angular	--	NP
64SB	surface	gfsl	SM(micaceous)	5-15	0-5	angular	--	NP
	subsurface	gfsl	SM(micaceous)	5-15	0-5	angular	--	NP
	substratum	vgfsl	SM	45-65	0-5	angular	--	NP

Table III-1: ENGINEERING PROPERTIES AND CLASSIFICATION (continued)

Map Unit	Soil Layer	USDA Texture	Unified Classification	% Rock <3"	% Rock >3"	Rock Shape	Liquid Limit	Plasticity Index
72BA	surface	gl,sil	ML	5-30	0-5	subrounded	--	NP
	subsurface	gsil,gsicl,vgscl	ML-CL,SC	10-25	0-5	subrounded	high	low
	substratum	vgscl,vgcl	ML-CL,SC	10-25	0-5	subrounded	high	low
72OA	surface	sil	ML	0-15	0	subrounded	--	NP
	subsurface	vgl,vgsicl,vgscl	ML,SC	35-45	0-10	subrounded	low	low
	substratum	vgl,vgscl	ML,SC	35-45	0-10	subrounded	low	low
73UA	surface	vgsil,gsl	ML,SM	5-35	0-5	rounded	--	NP
	subsurface	vgls,vgcosl	GM,GW-GM	35-65	0-40	rounded	--	NP
	substratum	exglcos	GW-GM	35-65	0-40	rounded	--	NP
73UB	surface	sil	ML,SM	0-25	0	rounded	--	NP
	subsurface	fsl,sil	ML,SM	0-25	0	rounded	--	NP
	substratum	exgcols,exgs	GW-GM	65-70	0	rounded	--	NP
74BA	surface	sil	ML	5-10	0	rounded, angular	--	NP
	subsurface	gcl,vgfsl	ML-CL,GM	5-60	0-10	rounded, angular	high	low
	substratum	gcl,exgfsl	ML-CL,GM	5-60	0-10	rounded, angular	high	low
74UA	surface	sil,gsil	ML	5-25	0	rounded, angular	--	NP
	subsurface	vgl,exgsl	GM,SM	50-60	5-10	rounded, angular	--	NP
	substratum	vgl,exgsl	GM,SM	50-60	5-10	rounded, angular	--	NP

Road Construction Limitation and Suitability Ratings

Table III-2 gives limitation and suitability ratings for five road construction and maintenance factors: excavation, cut and fill, native surface, revegetation, and aggregate source. Road construction is limited by the following properties: steep slopes, drainage channel frequency, shallow ground water, rock outcrops or rubble, broken slopes, shallow soils, and hard bedrock. These properties increase the time and expense required to construct roads. Drainage channel frequency and shallow ground water affect the amount of cross drainage needed and can require special design features to protect the road prism. Steep slopes can require full bench construction and the location of numerous fill sites. Rock outcrop and shallow soils require construction in bedrock and blasting. A *good* or *slight* rating means that soil properties are generally favorable for the rated used. A *fair* or *moderate* rating means that some map unit properties are unfavorable, but they can be overcome by commonly used practices. A *poor* or *severe* rating means that map unit properties are unfavorable. Major additional costs or special practices are required to overcome or correct the limitations. For a more complete description of limitations consult the management considerations section in the map unit descriptions.

Excavation is affected by slope steepness, depth to non-rippable bedrock and frequency of wet areas. Map units with *slight* limitations have slopes less than 55 percent, no wet areas and little or no non-rippable bedrock within the layer excavated. Map units with *moderate* limitations have common wet areas, steep slopes or some non-rippable bedrock within the layer excavated. Average slope steepness is 55 to 65 percent, but can be variable with slopes of 45 to 55 percent. Slope complexity is moderate which gives the opportunity to avoid long haul distances and major excavation when locating roads. Map units with *severe* limitations have frequent non-rippable bedrock within the area excavated and have slopes commonly greater than 65 percent or have continuous wet areas. On steep slopes, end hauling is often required and haul distances can be great.

Cut and fill maintenance is affected by shallow groundwater, flooding, avalanches, sheet and rill erosion, brush encroachment, cutslope sloughing, and cutslope raveling. Shallow ground water is intercepted by road cuts and can cause erosion and slumping. Cutslope slumping and ravelling plugs ditches and culverts which can result in erosion of road surface and fill slopes. Roads constructed on map units with *slight* limitations normally require only routine maintenance. Roads constructed on map units with *moderate* limitations occasionally require special maintenance. These practices can include removing material blocking the drainage system or road surface as a result of cutbank erosion, raveling, slumping or avalanches; or replacing culverts and fills damaged by floods. Roads constructed on map units with *severe* limitations frequently require special maintenance practices.

Native road surface is a rating of the suitability of native soil material exposed by road construction for use as a road surface. Suitability is limited by soil material which ruts or becomes slippery when wet and/or which contains large stones or many rock fragments larger than 3 inches in diameter. Map units that contain soils with different suitability are rated by the least suitable soil. Substratum soil properties determine native road surface performance on steep slopes. On gentle slopes, contrasting soil properties from the surface to substratum layers are considered. The average slope gradient of a map unit is used to determine which soil layer will be exposed on native road surfaces. Map units rated *good* contain moderately coarse grained soils that have good binding properties and few rock fragments greater than 3 inches in diameter. Map units rated *fair* either contain soils with many rock fragments over 3 inches in diameter, slighty plastic soils with low bearing strength or sandy soils with poor binding properties. Soils with poor binding properties and high in silt content can be dusty when dry. Map units rated *poor* contain slighty plastic and plastic soils with less than 15 percent gravel and soils containing mica. Native road surfaces rut severely when wet and are erodible on steeper grades.

Revegetation of disturbed sites is a rating of the suitability of the material exposed by road construction or similar construction activities for establishment of erosion control seedings. It is assumed that road cuts/fills have been constructed at a slope ratio stable enough to support vegetation. These seedings are mixtures of climatically adapted grasses and legumes. The seed is broadcast as soon as possible after construction. An application of fertilizer suited for the site is included in the seeding. An application of mulch applied to harsh sites can increase revegetation success. Suitability is affected by soil fertility, water holding capacity and climatic limitations. Map units rated *good* contain loamy or clayey material and are within the dry or moist, mixed coniferous or subalpine forests. Map units rated *fair* contain loamy or clayey material and are in the dry, Douglas-fir or cool, somewhat dry

Douglas-fir forests or include the grassy bald community type. Special practices used to overcome limitations may include a mulch treatment and/or reseeding areas to achieve successful, consistant ground cover establishment. Map units rated *poor* may contain sandy material or are in the open grown forest. Special practices can include mulch treatment, extensive reseeding, more close consideration of timinig of seeding to optimize use of seasonal moisture, a series of fertilizer applications, reduced cutslope ratios, topsoiling, and hand planting shrubs/trees.

Aggregate source is the probability for an aggregate source occurrence in a map unit. This rating is based on the observed presence of gravel and material and its ease of excavation, or the presence of rock suitable for quarry sites. Map units rated *good* contain "pit run" deposits with large volumes of less than 3 inch diameter rock and fine fraction that is limited to sand, or with only small amounts of slighty plastic silts and clays. Lenses of other less desirable material may occur, but can be easily avoided or sorted. Map units rated *fair* contain deposits of suitable material included in less suitable material. Sorting the suitable material can require specialized equipment. Also included in this rating are map units with crushable bedrocks, e.g. depth of overburden is less than 6 feet. Map units rated *poor* do not contain deposits of suitable material within 6 feet of the surface or overburden is greater than 6 feet deep.

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
10UA	moderate; wet areas	moderate; flooding	fair; bearing strength & fragments > 3"	good; --	good; --
10UB	severe; wet areas	severe; flooding	poor; flooding	good; --	poor; excessive fines
10UC	severe; wet areas	moderate; flooding	fair; fragments > 3"	good; --	good; --
13JA	slight; --	moderate; rock ravel	poor; bearing strength	fair; droughty, rocky, soils	fair; excessive fines
13UA	slight; --	moderate; rock ravel	fair; fragments > 3"	fair; droughty rocky	fair; fragments > 3"
13UB	slight; --	moderate; rock ravel	fair; fragments > 3"	good; --	fair; fragments > 3"
14JA	slight; --	moderate; cutbank erosion	poor; bearing strength	poor; droughty, cutbank erosion	poor; excessive fines
14JB	slight; --	moderate; cutbank erosion	poor; bearing strength	fair; cutbank erosion	poor; excessive fines
14XA	slight; --	moderate; cutbank erosion	poor; bearing strength	poor; droughty, cutbank erosion	poor; exccessive fines
15JA	slight; --	moderate; cutbank erosion	fair; dusty, bearing strength	fair; droughty soils	fair; inclusions of gravel sources
15JB	moderate; wet areas	moderate; cutbank erosion	fair; bearing strength	good; --	poor; excessive fines
15UA	slight; --	slight; --	good; --	fair; droughty soils	fair; excessive fines
15UB	slight; --	slight; --	good; --	good; --	poor; excessive fines
16UA	slight; --	severe; soil ravel	good; --	poor; cutbank erosion, droughty soils	good; --

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS (continued)

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
22MA	moderate; nonrippable rock	slight; --	fair; bearing strength	fair; droughty, rocky soils	poor; excessive fines
22UA	moderate; nonrippable rock	slight; --	good; --	fair; droughty, rocky soils	fair; crushable bedrock
24JA	slight; --	moderate; cutbank erosion	poor; dusty, bearing strength	fair; cutbank erosion, droughty soils	poor; excessive fines
24JB	slight; --	moderate; cutbank erosion	poor; bearing strength	good; --	poor; excessive fines
26UA	severe; nonrippable rock, steep slopes	severe; rock ravel	fair; fragments > 3" & few fines	poor; rock	fair; crushable bedrock
30BB	slight; --	moderate; slumping	poor; bearing strength	good; --	poor; excessive fines
30GA	slight; --	moderate; cutbank erosion	poor; bearing strength	fair; infertile soils	poor; soft bedrock
30GB	slight; --	moderate; slumping	poor; bearing strength	fair; infertile soils	poor; soft bedrock
30KA	slight; --	severe; soil ravel	poor; sandy	poor; infertile, droughty soil	poor; lacks binder
30KA*b*	moderate; nonrippable rock	severe; soil ravel	poor; sandy	poor; infertile, droughty soil	poor; lacks binder
30KB	slight; --	severe; soil ravel	poor; sandy	poor; infertile soils	poor; lacks binder
30KB*b*	moderate; nonrippable rock	severe; soil ravel	poor; sandy	poor; infertile soils	poor; lacks binder
30MA	moderate; nonrippable rock	slight; --	good; --	poor; droughty soils	fair; crushable bedrock
30MB	slight; --	slight; --	fair; bearing strength	fair; droughty soils	poor; some soft bedrock
30MC	slight; --	slight; --	fair; bearing strength	good; --	fair-poor; some soft bedrock
30MD	slight; --	slight; --	fair; bearing strength	good; --	fair-poor; some soft bedrock
30ME	slight; --	moderate; brush	fair; bearing strength	good; --	fair-poor; some soft bedrock
30MG	slight; --	slight; --	fair; bearing strength	good; --	fair-poor; some soft bedrock
30PA	slight; --	slight; --	poor; bearing strength	fair; droughty soils	poor; excessive fines
30PE	slight; --	moderate; slumping	poor; bearing strength	good; --	poor; excessive fines

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS (continued)

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
30QA	slight; --	slight; --	good; --	poor; droughty soils	fair; crushable bedrock
30QB	slight; --	slight; --	good; --	fair; droughty soils	fair; crushable bedrock
30QC	slight; --	slight; --	good; --	good; --	fair; crushable bedrock
30QD	slight; --	slight; --	good; --	good; --	fair; crushable bedrock
30QE	slight; --	moderate; brush	good; --	good; --	fair; crushable bedrock
30QG	slight; --	slight; --	good; --	good; --	fair; crushable bedrock
30SA	slight; --	moderate; slumping	poor; bearing strength	fair; droughty soils	poor; soft bedrock
30SB	slight; --	moderate; slumping	poor; --	good; --	poor; soft bedrock
32KA	slight; --	slight; --	fair; sandy	fair; sandy	poor; lacks binder
32MA	slight; --	slight; --	good; --	good; --	fair; some soft bedrock
32QA	slight; --	slight; --	good; --	good; --	fair; crushable bedrock
32QC	slight; --	slight; --	good; --	good; --	fair; crushable bedrock
32QD	slight; --	slight; --	good; --	fair; droughty soils	fair; crushable bedrock
33UA	slight; --	slight; --	fair; fragments > 3", few fines	fair; cold soils	fair; crushable bedrock
38KA	severe; wet areas	severe; slumping	poor; wet areas, sandy soils	fair; infertile soils	poor; soft bedrock, excessive fines
38QA	moderate; wet areas	moderate; slumping	fair; wet areas, dusty	good; --	poor; excessive fines
40KA	severe; steep slopes, nonrippable rock	severe; rock ravel	fair; few fines, sandy	poor; cutbank erosion, infertile soils	poor; lacks binder
40QA	severe, steep slopes nonrippable rock	severe; rock ravel	fair; bedrock, few fines	fair; cutbank erosion, cold soils	fair; crushable bedrock
41KA	severe; steep slopes	moderate; slumping	fair; sandy	poor; infertile soils	poor; lacks binder
41QA	moderate; nonrippable rock	moderate; brush, slumping	good; --	good; --	fair; crushable bedrock
41SA	severe; steep slopes	severe; brush, slumping	fair; bearing strength	good; --	poor; soft bedrock
42KA	moderate; wet areas	moderate; brush, slumping	fair; sandy	good; --	poor; lacks binder
42QA	moderate; wet areas	moderate; brush, slumping	fair; dusty, bearing strength	good; --	fair; access, some soft bedrock
43QA	moderate; wet areas	moderate; brush	good; --	good; --	fair; some soft bedrock

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS (continued)

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
43QB	severe; wet areas	severe; slumping, weeping cutbanks	poor; bearing strength, wet	good; --	poor; excessive fines
43SA	severe; wet areas	severe; weeping cutbanks	poor; bearing strength, wet	good; --	poor; excessive fines
45UA	moderate-severe; nonrippable rock, steep slopes	severe; avalanche	poor; fragments > 3", few fines	good; --	poor; fragments > 3"
46KA	moderate; wet areas	moderate; brush	fair; boulders, sandy	fair; infertile soils	poor; lacks binder
46OA	moderate; wet areas	moderate; brush	good; --	good; --	poor; excessive fines
47KA	moderate; wet areas	moderate; brush, weeping cutbanks	fair; sandy, fragments > 3"	fair; infertile soils	poor; excessive fines
47OA	slight; --	moderate; brush, weeping cutbanks	fair; fragments > 3"	good; --	poor; excessive fines
48KA	moderate; wet areas	moderate; slumping	fair; sandy	fair; infertile soils	poor; lacks binder
48QA	slight; --	moderate; slumping, brush	fair; bearing strength	good; --	fair; excessive fines & some bedrock
60KA	severe; steep slopes	severe; ravel soil	fair; sandy	poor; infertile soils & cutbank erosion	poor; lacks binder
60KB	severe; steep slopes	severe; ravel soil	fair; sandy	poor; infertile soils & cutbank erosion	poor; lacks binder
60MA	severe; steep slopes	moderate; rock ravel	good; --	poor; droughty soils	fair; some soft bedrock
60MB	severe; steep slopes	moderate; rock ravel	good; --	fair; droughty soils	fair; some soft bedrock
60MC	severe; steep slopes	moderate; rock ravel	good; --	good; --	fair; some soft bedrock
60MD	severe; steep slopes	moderate; rock ravel	good; --	good; --	fair; some soft bedrock
60QA	severe; steep slopes, nonrippable rock	moderate; rock ravel	good; talus stringers	poor; droughty soils	fair; crushable bedrock
60QB	severe; steep slopes, nonrippable rock	moderate; rock ravel	good-fair; talus stringers	fair; droughty soils	fair; crushable bedrock
60QC	severe; steep slopes, nonrippable rock	moderate; rock ravel	good-fair; talus stringers	good; --	fair; crushable bedrock
60QD	severe; steep slopes, nonrippable rock	moderate; rock ravel	good-fair; talus stringers	good; --	fair; crushable bedrock
61MC	severe; steep slopes	severe; rock ravel, slumping	fair; bearing strength	good; --	fair; some soft bedrock
61MD	severe; steep slopes	severe; slumping, avalanche	fair; bearing strength	good; --	fair; some soft bedrock

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS (continued)

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
61QC	severe; steep slopes, nonrippable rock	severe; rock ravel	fair; talus & fragments > 3"	good; --	fair; crushable bedrock
61QD	severe; steep slopes, nonrippable rock	severe; rock ravel	fair; talus & fragments > 3"	good; --	fair; crushable bedrock
61SA	severe; steep slopes	severe; slumping	fair; bearing strength	good; --	poor; soft bedrock
64KA	moderate; steep slopes	severe; soil ravel	fair; sandy	poor; infertile soils & cutbank erosion	poor; lacks binder
64KA*b*	moderate; steep slopes, nonrippable rock	severe; soil ravel	fair; sandy, bedrock	poor; infertile soils & cutbank erosion	poor; lacks binder
64KB	moderate; steep slopes	severe; soil ravel	fair; sandy	poor; infertile soils & cutbank erosion	poor; lacks binder
64KB*b*	moderate; steep slopes, nonrippable rock	severe; soil ravel	fair; sandy, bedrock	poor; infertile soils & cutbank erosion	poor; lacks binder
64MA	moderate; steep slopes	slight; --	good; --	poor; droughty soils	fair; some soft bedrock
64MB	moderate; steep slopes	slight; --	fair; bearing strength	fair; droughty soils	fair; some soft bedrock
64MC	moderate; steep slopes	slight; --	fair; bearing strength	good; --	fair; some soft bedrock
64MD	moderate; steep slopes	slight; --	fair; bearing strength	good; --	fair; some soft bedrock
64ME	moderate; steep slopes	moderate; brush	fair; bearing strength	good; --	fair; some soft bedrock
64MG	moderate; steep slopes	slight; --	fair; bearing strength	good; --	fair; some soft bedrock
64QA	moderate; steep slopes, nonrippable rock	slight; --	good; --	poor; droughty soils	fair; crushable bedrock
64QB	moderate; steep slopes, nonrippable rock	slight; --	good; --	fair; droughty soils	fair; crushable bedrock
64QC	moderate; steep slopes, nonrippable rock	slight; --	good; --	good; --	fair; crushable bedrock
64QD	moderate; steep slopes, nonrippable rock	slight; --	good; --	good; --	fair; crushable bedrock

Table III-2: ROAD CONSTRUCTION LIMITATION AND SUITABILITY RATINGS (continued)

Map Unit	EXCAVATION (Limits; Types)	CUT & FILL MAINTENANCE (Limits; Types)	NATIVE ROAD SURFACE (Suitability; Limits)	DISTURBED SITE REVEGETATION (Suitability; Limits)	AGGREGATE SOURCE (Suitability; Limits)
64QE	moderate; steep slopes, nonrippable rock	moderate; brush	good; --	good; --	fair; crushable bedrock
64QG	moderate; steep slopes, nonrippable rock	slight; --	good; --	good; --	fair; crushable bedrock
64SB	moderate; steep slopes	severe; slumping	poor; bearing strength	good; --	poor; soft bedrock
72BA	moderate; wet areas	moderate; slumping	poor; bearing strength	good; --	poor; excessive fines
72OA	moderate; wet areas	moderate; slumping, dusty	fair; bearing strength,	good; --	poor, excessive fines
73UA	slight; --	slight; --	good; --	fair; droughty soils	fair; fragments > 3"
73UB	severe; wet areas	severe; flooding	poor; bearing strength, flooding	good; --	poor; excessive fines
74BA	slight; --	moderate; slumping	fair; bearing strength	good; --	poor; excessive fines
74UA	slight; --	moderate; slumping	good; --	fair; droughty soils	fair; crushable bedrock

Road Location Factors

Table III-3 gives properties of map units which affect road location and construction. This information can be used by the transportation planner to evaluate alternative road locations and costs.

Average Annual Precipitation affects revegetation of road cuts and fills and can affect road drainage and design. The listed ranges of average annual precipitation were determined from local data. Map units occurring at the west end of the survey area are best described by the high end of the listed range.

Frequency of Wet Areas affects road location and cost estimates of road construction and design. Wet areas should be avoided when possible because of stability hazards, sedimentation hazards, and road drainage problems. High gradient stream channels are not included in this rating. A *low* rating indicates that wet areas occur infrequently and are easily avoided. Less than 10 percent of the map unit is occupied by wet areas. A *medium* rating indicates that wet areas occur commonly (10 to 25 percent of the area), but can normally be avoided by varying grade and alignment. A *high* rating indicates that wet areas are difficult to avoid entirely (greater than 25 percent of the area).

Percent Hard Bedrock can be used to estimate difficulty of excavating bedrock. This estimate is a measure of the frequency at which hard bedrock can be encountered in a map unit. The percentage is estimated based on observations of road cuts in the survey area and association of hard bedrock with geologic groups and landforms. *Less than 10 percent* hard bedrock is encountered in moraine, valley trains, alluvial and outwash terraces, alluvial fans, lacustrine foothills, dissected footslopes, undulating uplands. *Ten to 30 percent* hard bedrock is encountered on moderate relief mountain slopes, steep mountain slopes, broadly convex ridges, glaciated mountain slopes and at the base of cirque headwalls. *More than 50 percent* hard bedrock is encountered on stream breaklands, steep subalpine ridges and headwalls, glacial cirque headwalls, and alpine ridges.

Parent Material is the original material from which soils are formed. Soil properties are related closely to their parent materials. These relationships are often observed by local engineers and land managers. Origins, relationships to soil properties, and geologic groups of parent materials in the survey area are discussed in the Introduction under Geology.

Drainage Channels per mile is the average number of surface drainage channels which must be crossed by roads located across the map unit. It can be used to estimate the number of culverts needed. This number includes perennial, ephemeral, and intermittent stream drainages.

Avalanche Hazard is a rating of the probability of avalanches occuring in a map unit. Avalanches deposit debris on roads, can destroy road prisms, and can pose a hazard to winter use of roads. Avalanches occur most commonly on slopes steeper than 60 percent with moderate to deep snowpack (La Chapelle, 1970). High elevation non-forested slopes such as cirque headwalls and avalanche chutes are more likely to have avalanches than forested slopes. A *high* rating indicates large avalanches are probable every winter. Map units have many avalanche scars and non-forested areas on upper slopes. A *moderate* rating indicates small avalanches are probable every several years. Avalanche scars if present have revegetated to some degree but the potential remains high due to deep snowpacks and steep slopes. A *low* rating indicates avalanches are rare to nonexistent.

Slope Complexity is a rating of the frequency of slope and aspect changes. As slope complexity increases, more excavation and filling are required to maintain road grade and alignment. On complex, steep slopes greater than 60 percent, end haul deposit areas generally can be located within the map unit on a gentler inclusions. This practice reduces the required hauling distance. On non-complex, steep slopes greater than 60 percent, end haul deposit areas must be located outside the map unit. The hauling distance is increased in this situation. High slope complexity provides alternatives to road location. For example, opportunities to locate roads on benches and through less incised draw crossings may be present. Construction costs can often be reduced by careful placement of the road along slope breaks and less severe draw crossings. *Low* complexity indicates that slopes are long and smooth with slope or aspect changes more than several thousand feet apart. *Moderate* complexity indicate that slope or aspect changes occur between 800 and several thousand feet apart. *High* complexity indicate that slope or aspect changes occur between 800 and several thousand feet apart. *High* complexity indicates that slope or aspect changes occur less than 800 feet apart. Complexity ratings were obtained by an analysis of map units overlayed on topographic quadrangles. All map units were assessed for slope complexity and averaged for the survey area.

Sediment Hazard is a rating of the risk of sediment entering drainage channels as a result of erosion or mass failure by road construction. Erodibility of soil substrata exposed by excavation, landform sediment delivery efficiency, and landslide potential are considered. Map units rated *low* have low landslide potential and either low soil substratum erodibility or low or very low sediment delivery efficiency. Map units rated *moderate* have moderate sediment delivery efficiency or high substratum erodibility and low sediment delivery potential. Map units rated *high* have high sediment delivery efficiency and moderate or high erodibility. Those map units where activities near streams is difficult to avoid are included in this rating.

Table III-3: ROAD LOCATION FACTORS

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
10UA	20-30	Moderate	0	Undifferentiated -alluvium	4	None	Low	High
10UB	30-40	High	0	Undifferentiated -silty alluvium	4	None	Low	High
10UC	30-40	Moderate	0	Undifferentiated -alluvium	7	None	Low	High
13JA	20-35	Low	5	Lacustrine over alluvium	3	None	Low	High
13UA	20-30	Low	5	Undifferentiated -alluvium	4	None	Low	High
13UB	35-45	Low	5	Loess over alluvium	8	None	Low	High
14JA	18-25	Low	0	Lacustrine	4	None	Low	Moderate
14JB	30-35	Moderate	0	Lacustrine	4	None	Low	Moderate
14XA	18-25	Low	0	Sandy Lacustrine	2	None	Low	Moderate
15JA	18-25	Moderate	0	Lacustrine or valley fill	5	Low	Low	Moderate
15JB	25-35	Moderate	0	Loess over valley fill	5	Low	Low	Moderate
15UA	18-25	Low	0	Metasedimentary	5	Low	Low	Low
15UB	25-35	Low	0	Loess over meta-sedimentary	6	Low	Low-Moderate	Low
16UA	20-30	Low	0	Undifferentiated -alluvium	6	Low	Low	Moderate-High
22MA	25-35	Low	50	Moderately weathered metasedimentary and alluvium	5	Low	Low	Low

Table III-3: ROAD LOCATION FACTORS (continued)

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
22UA	25-35	Low	50	Metasedimentary and alluvium	4	Low	Low	Low
24JA	25-35	Low	0	Lacustrine; valley fill and highly weathered metased-imentary	7	Low	High	Moderate
24JB	35-45	Moderate	0	Lacustrine; valley fill and highly weathered metased-imentary	9	Low	High	Moderate
26UA	20-50	Low	90	Metasedimentary bedrock, talus	7	Moderate	Moderate	Low
30BB	20-40	Moderate	15	Sedimentary	7	Moderate	Low	Moderate
30GA	30-45	Low	5	Well weathered granitics	9	Low	Low	Moderate
30GB	45-60	Low	5	Loess over well weathered gran-itics	9	Low	Moderate	High
30KA	30-45	Low	10	Moderately well weathered granitics	8	Low	Low	Moderate
30KA*b*	30-45	Low	20	Moderately well weathered granitics and tors	8	Low	Moderate	Moderate
30KB	45-70	Low	10	Loess over moderately well weathered granitics	8	Low	Low	High
30KB*b*	45-70	Low	20	Moderately well weathered granitics and tors	8	Low	Moderate	High
30MA	20-30	Low	25	Moderately weathered metasedimentary	5	Low	Low	Low
30MB	25-35	Low	5	Moderately weathered metasedimentary	5	Low	Low	Low
30MC	30-45	Low	5	Loess over moderately weathered metased-imentary	6	Low	Low	Low
30MD	35-55	Low	5	Loess over moderately weathered metased-imentary	7	Low	Low	Low
30ME	45-55	Low	15	Loess over moderately weathered metased-imentary	8	Low	Low	Moderate

Table III-3: ROAD LOCATION FACTORS (continued)

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
30MG	35-45	Low	15	Loess over moderately weathered metased-imentary	4	Low	Low	Low
30PA	18-30	Low	15	Volcanics	6	Low	Low	Low
30PE	25-35	Moderate	10	Loess over volcanics	7	Low	Low	Moderate
30QA	20-30	Low	25	Metasedimentary	4	Low	Low	Low
30QB	25-35	Low	15	Metasedimentary	5	Low	Low	Low
30QC	30-45	Low	15	Loess over metased-imentary	6	Low	Low	Low
30QD	35-55	Low	15	Loess over metased-imentary	7	Low	Low	Low
30QE	45-55	Low	20	Loess over metased-imentary	8	Low	Low	Low
30QG	35-45	Low	20	Loess over metased-imentary	4	Low	Low	Low
30SA	30-50	Low	0	Mica schist	9	Low	Low	Moderate
30SB	50-70	Moderate	0	Loess over mica schist	9	Low	Low	High
32KA	60-80	Low	15	Loess over granitics	2	Low	Low	Low
32MA	50-65	Low	15	Loess over moderately weathered sedimentary	2	Low	Low	Low
32QA	50-65	Low	15	Loess over metased-imentary	1	Low	Low	Low
32QC	35-45	Low		Loess over metased-imentary	1	Low	Low	Low
32QD	30-40	Low	15	Metasedimentary	0	Low	Low	Low
33UA	60-70	Low	20	Loess over undiffer-entiated	0	Low	Low	Low
38KA	70-90	High	0	Loess over granitic till and residual complex	10	Low	Low	High
38QA	50-60	Moderate	5	Loess over metased-imentary	8	Low	Low	Moderate
40KA	70-100	Moderate	80	Granitics	12	High	High	High
40QA	70-100	Moderate	80	Loess over metased-imentary	12	High	Moderate	High

Table III-3: ROAD LOCATION FACTORS (continued)

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
40SA	80-100	Moderate	80	Loess over mica schist	12	High	Moderate	High
41KA	60-80	Moderate	60	Loess over granitics	10	Moderate to High	Moderate	High
41QA	55-65	Moderate	60	Loess over metased-imentary	10	Moderate to High	Moderate	High
41SA	60-80	High	60	Loess over mica schist	6	High	Moderate	High
42KA		High	20	Loess over till and residual granitic complex	6	High	Moderate	Moderate
42QA	50-80	Moderate	20	Loess over till and residual metasedimen-tary complex	6	Low	Low	Low
43QA	55-65	Moderate	10	Loess over metased-imentary	4	Low	Low	Moderate
43QB	55-65	High	0	Loess over moderately weathered metased-imentary	7	Moderate	Low	High
43SA	40-60	High	0	Loess over mica schist	6	Low	Low	High
45UA	50-80	Moderate	15	Undifferentiated -rubble	7	High	Low	High
46KA	50-70	Moderate	0	Loess over granitic glacial till	6	Low	Low	High
46OA	45-55	Moderate	0	Loess over glacial till	6	Low	Low	Moderate
47KA	50-70	Moderate	5	Loess over granitic till and residual complex	6	Low	Low	High
47OA	45-55	Moderate	5	Loess over glacial till and residual metasedimentary complex	6	Low	Low	Moderate
48KA	70-90	Moderate	25	Loess over granitic or mica schist with glacial till on lower slopes	8	High	Low	High
48QA	50-65	Moderate	15	Loess over metased-imentary with glacial till on lower slopes	8	High	Low	Moderate
60KA	25-35	Low	50	Granitics	7	Low	Low	High
60KB	35-45	Low	50	Loess over granitics	8	Moderate	Low	High

Table III-3: ROAD LOCATION FACTORS (continued)

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
60MA	20-30	Low	60	Moderately weathered metasedimentary	7	Low	Low	Moderate
60MB	25-35	Low	60	Moderately weathered metasedimentary	7	Low	Low	Moderate
60MC	30-45	Low	60	Moderately weathered metasedimentary	7	Low	Low	Moderate
60MD	45-55	Low	60	Loess over moderately weathered metased-imentary	9	Low	Low	Moderate
60QA	20-30	Low	70	Metasedimentary	6	Low	Low	Moderate
60QB		Low	70	Metasedimentary	6	Low	Low	Moderate
60QC	25-35	Low	70	Loess over metased-imentary	6	Low	Low	Moderate
60QD	30-45	Low	70	Loess over metased-imentary	7	Low	Low	Moderate
61MC	30-45	Low	70	Moderately weathered metasedimentary	10	Moderate	High	High
61MD	45-55	Low	70	Loess over moderately weathered metased-imentary	10	High	High	High
61QC	30-45	Low	70	Metasedimentary	9	Moderate	High	High
61QD	45-55	Low	70	Loess over metased-imentary	9	High	High	High
61SA	25-35	Low	50	Mica schist	6	Moderate	Moderate-High	High
64KA	30-40	Low	20	Moderately well weathered granitics	8	Low	Moderate	High
64KA*b*	30-40	Low	40	Moderately well weathered granitics and tors	8	Low	Moderate	High
64KB	35-50	Low	20	Loess over moderately well weathered granitics	8	Low	Moderate	High
64KB*b*	35-50	Low	40	Loess over moderately weathered granitics and tors	8	Low	Moderate	High
64MA	20-30	Low	30	Moderately weathered metasedimentary	6	Low	Moderate	Low

Table III-3: ROAD LOCATION FACTORS (continued)

Map Unit	Ave. Ann. Precip. (inches)	Frequency of Wet Areas	Hard Bed-rock (%)	Parent Material	Drainage Chan-nels (per mile)	Avalanche Hazard	Slope Complex-ity	Sediment Hazard
64MB	25-35	Low	25	Moderately weathered metasedimentary	6	Low	Moderate	Low
64MC	30-45	Low	25	Loess over moderately weathered metased-imentary	6	Low	Moderate	Low
64MD	35-55	Low	25	Loess over moderately weathered metased-imentary	7	Low	Moderate	Low
64ME	45-55	Low	25	Loess over moderately weathered metased-imentary	7	Low	Moderate	Low
64MG	34-45	Low	30	Loess over moderately weathered metased-imentary	4	Low	Moderate	Low
64QA	20-30	Low	30	Metasedimentary	5	Low	Moderate	Low
64QB	25-35	Low	30	Metasedimentary	5	Low	Moderate	Low
64QC	30-45	Low	30	Loess over metased-imentary	6	Low	Moderate	Low
64QD	35-55	Low	30	Loess over metased-imentary	6	Low	Moderate	Low
64QE	45-55	Low	30	Loess over metased-imentary	7	Low	Moderate	Low
64QG	40-50	Low	30	Metasedimentary	4	Low	Moderate	Low
64SB	35-55	Moderate	20	Mica schist	8	Moderate	Low	High
72BA	25-35	Moderate	5	Loess over clayey glacial till	7	Low	Low-Moderate	Moderate
72OA	25-35	Moderate	0	Loess over silty glacial till	7	Low	Low-Moderate	Low
73UA	25-35	Low	0	Undifferentiated -Glacial outwash	3	Low	Low	Low
73UB	25-35	High	0	Undifferentiated -Glacial outwash	6	Low	Low	High
74BA	20-40	Moderate	25	Loess over soft sedimentary and glacial till complex	8	Low	Moderate	Moderate
74UA	20-40	Low	40	Loess over metased-imentary and till complex	7	Low	Moderate	Low

TIMBER

Approximately 90 percent of the survey area is forested. Currently, 60 percent of the forest lands are classified as capable and available for timber management. The principal commercial species are Douglas-fir, western larch, lodgepole pine, western white pine, Engelmann spruce, ponderosa pine, grand fir, western hemlock, and western redcedar. The annual programmed sell for the Lolo National Forest as of 1989 is close to 102 million board feet.

Tables III-4 and III-5 can be used for timber sale planning and silvicultural activities.

Timber Productivity and Natural Regeneration

Habitat type(s) are vegetative groupings based on the overstory climax species of the site. The climax species is usually the most shade-tolerant species, which indicates that it is the species most adapted to that site. Where identification of climax species stops at the overstory climax species it is referred to as the series – for example, *Pseudotsuga menziesii* (Douglas-fir) or abbreviated PSME series. The second component of the habitat type is based on the dominant or characteristic undergrowth species in the climax plant community. Combining the overstory species with the understory species generates the habitat types – for example, *Pseudotsuga menziesii/ Physocarpus malvaceous* (Douglas-fir/ninebark) or abbreviated PSME/PHMA. Local use of habitat types by forest managers has developed a common network by which managers can describe certain familar site conditions and response to management. Many interpretations can be generated using habitat types.

Common trees are those tree species commonly occurring in the map unit. Yield (cubic feet/acre/year) is given for each tree species when information is available. Showing yields by tree species reflects the difference in productivity from one site to another between species. For example, ponderosa pine exists over a broad environmental range but is not uniformly as productive through that range. Douglas-fir may be more productive than ponderosa pine in one map unit and the reverse in another. This provides the user with an illustration of what species is the most productive for a particular map unit.

Yield or yield capability is the amount of wood fiber that can be produced from managed forests. Technically, yield is defined as the maximum mean annual increment attainable in a fully stocked natural stand and is expressed in cubic feet per acre per year. Yields were derived from a random sampling across the Lolo National Forest in 1978 to provide yield tables for use in the Forest Planning process. Approximately 2400 site trees were measured by increment core to determine site index and current (as of 1985) yield curves were used to determine yield capability. Habitat type transects were also collected. Soil maps were later overlayed on these sample points to identify the map units for each sample point. A yield table by tree species is found in Appendix D. Limited field verification of the 1978 site index data in representative map units reflects fairly good reliability. Because of sampling method used, these yields may not reflect actual potential yields under intensive management. However, this data illustrates relative productivity from one map unit to another and stratifies productivity by species within map units.

Standard yield capability classes have been defined by Pfister and others (1976). Yields from this data base show average yields in the survey area of less than 50 cubic feet/acre/year. Standard yield classes place yields on the Lolo National Forest, on the average, to be moderate to very low. High and very high classes were not measured on the average. To provide better stratification of productivity for the survey, new classes were developed. These classes reflect relative productivity within the survey area. These classes are defined below. When comparing productivity classes of this survey area with another survey area, one should convert these yields to Pfister's yield classes. Productivity varies between ranger districts. Missoula RD yields are in the lower end of these class ranges and Superior RD yields are on the upper end of these ranges.

LSI Yield Capability Classes:	Very low	– less than 20 cubic feet/acre/year
	Low	– 21 to 35 cubic feet/acre/year
	Moderate	– 36 to 45 cubic feet/acre/year
	High	– 46 to 60 cubic feet/acre/year
	Very high	– 60+ cubic feet/acre/year

Note: The percentage of the Lolo National Forest by Capability Class has been computed according to the original/standard classification. These figures are listed in the Lolo National Forest Plan Appendix, section C-2-1.(These standard classes will not match up with the new classes developed here.)

Natural Regeneration Suitability ratings are based on moisture stress, competition, short growing season, frost heave, and shallow, rocky soils. Every tree species has a different ability to produce and distribute seed. Seed availability is a major factor in natural regeneration. Ponderosa pine is known to have long periods of low seed production and has a large seed which is not easily transported by wind for long distances. Other tree species have characteristics that may inhibit natural regeneration, but they are more site specific or climatic and are not included in this interpretation. Ponderosa pine is included as a factor in the rating when it is a dominant component of the stand. (This assumes adequate site prep first year post harvest.)

Note: Natural Regeneration is the ability for a site to renew standing crops of trees without artificial means. This rating does not include the length of time for establishment of a commercial valued stand. Some map units have a high suitability rating for natural regeneration but the length of time for the stand to reach commercial value size can be upwards to 250 years at high elevation. Average time for stand rotation on the Lolo National Forest is 100 to 130 years. Re-establishment periods are rated in Table III-5, Timber and Silvicultural Management Limitations.

These ratings were derived from standard forest tables rated by habitat type and have been modified to reflect soil property differences that affect regeneration.

> A ***Poor*** rating indicates natural regeneration is unlikely. Moisture stress limits regeneraton on southerly aspects and in open grown, low elevation timber stands. Ponderosa pine is the major seral component. This rating is also used at high elevations where short growing season and frost heave limits regeneration. Brush and grass competition can also severely affect regeneration.
>
> A ***Fair*** rating indicates that limitations can be overcome by the use of special harvest and site preparation practices or by planting. Moisture stress on seedlings can be avoided by planting deep rooted stock to ensure available moisture to roots after the surface has dried. Providing adequate shade by leaving large fuels or shelterwood harvest will help protect from moisture stress on natural seedlings. In high elevation basins, competition for light will inhibit seedling germination and competition for space will inhibit seedling dispersal. Frequently, only shade tolerant seedlings and residuals are regenerated in these basins unless special practices are undertaken. Brush removal and planting older stock soon after harvest will increase chances of establishing a fully stocked stand of commercially desirable species.
>
> A ***Good*** rating indicates that the site is very suitable for natural regeneration, providing seed source is available. Moisture and length of growing season are adequate. Brush and grass competition is not a major problem on these sites.

Limitations to Natural Regeneration are noted where applicable. "No limitations" is noted with a dashed line.

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
10UA	PSME Series	DF	high	fair; grass competition wet areas
10UB	SALIX-CAREX	--	----	poor; high water table
10UC	ABLA/MEFE THPL/CLUN	DF WL LPP	very high	fair; frost pockets wet areas
13JA	ABGR/CLUN PSME/SYAL	DF PP WL	moderate/very high	fair; grass competition
13UA	PSME/VACA PSME/PHMA	DF PP WL	high	fair; grass competition
13UB	THPL/CLUN ABLA/VACA ABLA/XETE	DF WL LPP	high	good
14JA	PSME/LIBO PSME/PHMA	DF PP WL	moderate	fair; grass competition
14JB	ABGR/LIBO	DF WL LPP	very high	good
14XA	PSME/FESC PSME/SYAL	DF PP	moderate/high	fair; moisture
15JA	PSME/VACA PSME/LIBO PSME/PHMA	DF PP WL	moderate	fair; grass competition
15JB	ABLA/LIBO ABGR/CLUN PIEN/LIBO	DF WL LPP	moderate/high	good
15UA	PSME/CARU PSME/PHMA	DF PP WL	moderate	fair; grass competition
15UB	PSME/LIBO ABGR/LIBO	DF WL LPP	high	good
16UA	PSME/CARU PSME/PHMA ABGR/LIBO	DF-s PP-s WL-e,w,n	low to high	fair; moisture (south aspects only) good
22MA	PSME/PHMA ABGR/LIBO	DF-s DF-e,w,n PP-s WL-e,w,n	moderate/high	fair; moisture (south aspect only) shallow soils

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
22UA	PSME/CARU PSME/PHMA ABGR/LIBO	DF-s PP-s WL-e,w,n	moderate/high	fair; moisture (south aspects only), shallow soils
24JA	PSME/PHMA	DF PP	high	fair; grass competition
24JB	ABGR/CLUN THPL/CLUN	DF WL LPP	very high	good
26UA	PSME/AGSP ROCK	DF	low	poor; rock, moisture
30BB	ABLA/CLUN ABGR/LIBO	DF WL LPP	moderate	good
30GA	PSME/VAGL	DF PP	moderate	fair; grass competition
30GB	ABLA/LIBO ABLA/MEFE	DF WL LPP	moderate/high	good
30KA	PSME/VAGL	DF WL LPP	moderate	fair; moisture, fertility
30KA*b*	PSME/VAGL	DF WL LPP	moderate	fair; moisture, fertility
30KB	ABLA/XETE ABLA/MEFE	WL LPP	moderate/high	good
30KB*b*	ABLA/XETE ABLA/MEFE	WL LPP	moderate/high	good
30MA	PSME/FESC PSME/AGSP	PP	low	poor; moisture, seed source
30MB	PSME/PHMA-CARU	DF PP	moderate	fair; moisture, grass competition
30MC	PSME/PHMA-PHMA ABGR/XETE	DF PP WL	high	good
30MD	ABGR/CLUN THPL/CLUN	DF WL LPP	very high	good
30ME	ABLA/MEFE ABLA/XETE TSME/MEFE	DF WL LPP	moderate/high	good; competition for light/space in basins
30MG	PSME/VAGL-XETE	DF LPP	moderate	fair; grass competition

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
30PA	PSME/CARU PSME/SYAL	DF PP	moderate	fair; moisture, grass competition
30PE	ABLA/MEFE	WL LPP	high	good
30QA	PSME/AGSP PSME/CARU-AGSP	PP	low	poor; moisture, grass competition
30QB	PSME/PHMA-CARU	DF PP	low/moderate	fair; moisture, grass competition
30QC	PSME/PHMA-PHMA ABGR/XETE	DF PP WL	moderate	good
30QD	ABGR/CLUN THPL/CLUN	DF WL LPP	high	good
30QE	ABLA/MEFE ABLA/XETE TSME/MEFE	DF WL LPP	moderate/high	good; competition for light/space in basins
30QG	PSME/VAGL-XETE	DF LPP	moderate	fair; grass competition
30SA	PSME/VAGL-XETE PSME/PHMA	DF WL LPP	moderate	fair; grass competition
30SB	ABLA/XETE ABLA/LIBO ABLA/MEFE	WL LPP	high	good
32KA	ABLA/XETE-VAGL	LPP	moderate	good
32MA	ABLA/MEFE ABLA/XETE-VAGL TSME/MEFE	LPP	moderate	good
32QA	ABLA/MEFE ABLA/XETE-VAGL TSME/MEFE	LPP	moderate	good
32QC	ABGR/XETE PSME/XETE-VAGL	DF LPP	moderate	fair; shallow, rocky subsoils
32QD	GRASSY BALDS PSME/CAGE	DF	very low	poor; moisture, grass competition
33UA	ABLA/LUHI ABLA/XETE TSME/MEFE	LPP	very low/low	good; see re-establishment period
38KA	ABLA/CACA ABLA/MEFE	LPP S	moderate/high	fair; poorly-drained areas

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
38QA	ABLA/ALSI ABLA/CLUN	WL LPP	moderate/high	fair; poorly-drained areas
40KA	ABLA/LUHI	LPP	very low	poor; shallow, cold soils
40QA	ABLA/LUHI	LPP	very low	poor; shallow, cold soils
41KA	ABLA/MEFE	LPP WL	moderate	
41QA	ABLA/MEFE	WL LPP	high	good
41SA	ABLA/MEFE	LPP	high	good
42KA	ABLA/MEFE ABLA/LUHI TSME/MEFE	LPP S	low/moderate	fair; shallow soils, poorly-drained areas
42QA	ABLA/MEFE ABLA/LUHI ABLA/CACA TSME/MEFE	LPP S	moderate/high	fair; shallow soils, poorly-drained areas
43QA	ABLA/MEFE TSME/MEFE	LPP S, DF	very high	fair; competition for light/space
43QB	FORBFIELDS	--	very high	poor; soil drainage, competition
43SA	ABLA/CACA	S	very high	poor; soil drainage, competition
45UA	-- --	--	----	poor; avalanche path
46KA	ABLA/CLUN ABLA/MEFE	DF WL LPP	high	good; frost pockets
46OA	ABLA/CLUN ABLA/MEFE TSME/MEFE	DF WL LPP WP	high/very high	good; frost pockets
47KA	ABLA/MEFE	LPP	high	good
47OA	ABLA/METE ABLA/MEFE	DF WL LPP	high/very high	good
48KA	ABLA/MEFE ABLA/CLUN	LPP S	high	good
48QA	ABLA/MEFE ABLA/XETE ABLA/CLUN	DF WL LPP	high/very high	good
60KA	PSME/VAGL PSME/CARU	DF PP	moderate	fair; moisture, fertility

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
60KB	ABLA/XETE-VAGL ABGR/LIBO	DF WL LPP	high	fair; fertility
60MA	PSME/FEID PSME/AGSP	PP	low	poor; moisture, rocky soils
60MB	PSME/PHMA-CARU	DF PP	moderate	fair; moisture, grass competition
60MC	PSME/PHMA-PHMA	DF PP WL	high	fair; rocky soils
60MD	ABGR/LIBO THPL/CLUN	DF WL LPP WP	high	good
60QA	PSME/AGSP PSME/CARU-AGSP	PP	low	poor; moisture, rocky soils
60QB	PSME/PHMA-CARU	DF PP	moderate	fair; moisture, grass competition
60QC	PSME/PHMA-PHMA PSME/VAGL ABGR/XETE	DF WL LPP	moderate	fair; rocky soils
60QD	ABGR/LIBO THPL/CLUN	DF WL LPP WP	high	good
61MC	PSME/PHMA PSME/LIBO ABGR/XETE	DF WL LPP	low/moderate	fair; rocky soils
61MD	THPL/CLUN ABGR/LIBO ABLA/CLUN	DF WL LPP	moderate	fair; rocky soils
61QC	PSME/PHMA ABGR/XETE	DF PP WL	moderate	fair; rocky soils
61QD	THPL/CLUN ABGR/LIBO ABLA/CLUN	DF WL LPP	moderate	fair; rocky soils
61SA	PSME/VAGL ABLA/MEFE	DF PP LPP	moderate	fair; grass competition
64KA	PSME/VAGL PSME/CARU	DF PP WL LPP	moderate	fair; moisture, grass competition

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
64KA*b*	PSME/VAGL PSME/CARU	DF WL LPP	moderate	fair; moisture, grass competition
64KB	ABLA/XETE ABLA/MEFE	LPP S	moderate/high	good; infertile subsoils
64KB*b*	ABLA/XETE ABLA/MEFE	LPP S	moderate/high	good; infertile subsoils
64MA	PSME/FESC	PP	low	poor; moisture, grass competition
64MB	PSME/PHMA-CARU	DF PP	moderate	fair; moisture, grass competition
64MC	PSME/PHMA-PHMA ABGR/XETE	DF PP- WL	high	good
64MD	ABGR/LIBO ABGR/CLUN	DF WL LPP	high	good
64ME	ABLA/XETE ABLA/MEFE TSME/MEFE	DF WL LPP	moderate/high	good
64MG	PSME/VAGL ABGR/XETE	DF LPP	moderate	fair; grass competition
64QA	PSME/AGSP PSMF/FEID	PP	low	poor; moisture, grass competition
64QB	PSME/PHMA-CARU	DF PP	moderate	fair; moisture, grass competition
64QC	PSME/PHMA-PHMA ABGR/XETE	DF PP WL	moderate	good
64QD	ABGR/CLUN ABGR/LIBO THPL/CLUN	DF WL LPP	high	good
64QE	ABLA/MEFE ABLA/XETE TSME/MEFE	LPP	moderate/high	good
64QG	PSME/VAGL ABGR/XETE	DF LPP	moderate	fair; grass competition
64SB	ABLA/XETE ABLA/ALSI	WL LPP	moderate/high	good
72BA	ABLA/LIBO PSME/VACA ABGR/CLUN	WL LPP S	moderate/high	fair; grass competition, frost

Table III-4: TIMBER PRODUCTIVITY AND NATURAL REGENERATION (continued)

Map Unit	Representative Habitat Type(s)	Common Trees -(aspect)	Yield (cu.ft/ac/yr)	Natural Regeneration (suitablity;limitations)
72OA	ABLA/VACA ABGR/LIBO ABGR/CLUN	WL LPP S	high	fair; grass competition, frost
73UA	PSME/VAGL PSME/CARU	DF WL LPP	high	fair; grass competition
73UB	PIEL/EQAR ABLA/VACA	LPP S	very high	poor; drainage
74BA	ABLA/CLUN ABGR/LIBO	DF WL LPP	moderate/high	fair; grass competition (southerly aspects only)
74UA	ABLA/XETE ABGR/LIBO PSME/CARU	DF WL LPP	moderate	fair; grass competition (southerly aspects only)

Timber and Silvicultural Management Limitations

Plant competition is the degree of competion from plants on the standing crop of trees intended for management. There are three categories of competition that can affect tree production; competition for moisture, competition for light, and competition for growing space. The ratings in the Table III-5 reflect the degree of competion and whether it can be reduced or controlled through management.

A ***severe*** rating indicates that plant competition is difficult to overcome even after scarification and temporary removal of plant materials prior to planting. Production will be affected by this competition. Sites where moisture is inherently limiting and trees are not as well adapted to the site competition from grasses for moisture and sometimes space severely limits stocking and survival. Sod forming grasses are highly resilient and grow back readily after site preparation efforts.

A ***moderate*** rating indicates that plant competition can be overcome with site preparation techniques such as scarification or prescribed burning. High elevation moist basins produce prolific shrub cover after harvest which produces competition for light and space for tree seedlings. These shrubs can be retarded by scarification long enough for tree seedlings to established. Competition is no longer a factor once the trees have grown over the shrub layer.

A ***slight*** rating indicates that plant competition rarely affects production of the standing crop. Shrub cover after harvest rarely presents competition for light or space. In addition, moisture is not a limiting factor to growth.

Stand Re-establishment Period is the length of time for a standing crop to reach 18 inches high and/or the crop is free growing; unimpeded by competition or severe climate. Rotation periods for regenerated stands vary across the forest from 80 to 200 years. Stand establishment is often included in regeneration interpretations. This rating is made exclusive of regeneration to highlight those map units in which *natural regeneration* is high but the length of time for the stand to become established is a very long time. The re-establishment period often affects rotation periods. Stands on high elevation ridgetops and cirque basins supporting subalpine fir/wood-rush and other, near timberline habitat types may take as long as 50 years to become established.

A ***poor*** potential for stand establishment indicates that the stand becomes established after 25 years. Short growing seasons, wind dessication, high insolation, moisture stress, frost damage, and heavy accumulations of snow are factors that can contribute to long periods for stand establishment.

A ***fair*** potential for stand establishment indicates that the stand becomes established in 6 to 24 years. Limitation factors listed above may be present, but timing of planting, harvest method, and/or tree species selection can offer solutions to these limitations.

A ***good*** potential for stand establishment indicates that the stand becomes established within a 5 year period. Limiting factors are minor and do not affect the stand.

Sensitivity to Displacement rates the degree of sensitivity to reduction of soil productivity by removal or movement of the surface soil. When surface soils are displaced, important organic matter and nutrient sources are removed and total productivity can be reduced. Volcanic ash influenced loess surface soils common to the survey area have higher nutrients levels, lower bulk densities which enhance ease of root penetrability, and higher water holding capacities than those surface soils derived from residual parent materials. The majority of soils in the survey area have relatively infertile subsoils compared to the surface soil. Depth of surface soils, inherent productivity of surface soils, and relative infertility of subsoils are factors in rating soil sensitivity to displacement.

A ***high*** sensitivity rating indicates that productivity will be adversely affected by removal of 50 percent or more of the duff layer and surface soils. These landtypes have shallow volcanic ash influenced loess surface soils of less than 8 inches and/or alluvial or granitic subsoils.

A ***moderate*** sensitivity rating indicates that adverse affects on productivity can be avoided or the landtype is not permanently affected by displacement. Volcanic ash influenced loess surface soils are greater than 18 inches or surface soils are derived from the same parent material as the subsoil or fertility of subsoils is relatively high.

A ***low*** rating indicates that soil productivity is not affected by a 50 percent removal or movement of topsoil.

Equipment Use rates the limitation to the use of crawler tractors, rubber tired skidders or mechanized harvesters. Limiting factors are slope steepness, occurrence of rock outcrop, surface layers which rut and compact when operated on under normal moisture conditions, occurrence of wet sites, and thin surface layers that highly important to site productivity which may be disturbed by equipment operation. Only the most restrictive limitations are listed.

A ***severe*** rating indicates that limitations are generally too restrictive for equipment use. The limitation cannot be overcome by managing the use of equipment. The expected performance of this equipment is very poor. Aerial or cable systems can overcome this limitation.

A ***moderate*** rating indicates that limitations do not prevent equipment use. Limitations can be overcome by controlling the time, location, or intensity of equipment operation. The expected performance of equipment is fair to good.

A ***slight*** rating indicates that limitations do not restrict equipment use. The expected performance of equipment is good.

Windthrow Hazard rates the potential for trees to blow over after a harvest entry in an old growth stand. The rating can be used to determine where cutting unit design and the selection of silvicultural systems may have to be modified to reduce windthrow mortality in the remaining stand. The rating considers soil properties such as soils with high water tables, shallow soils, coarse soil textures, or soils with layers that are restrictive to tree roots and affect how firmly roots are held. Topographic position of the stand affects exposure of the stand to the wind.

A ***high*** rating indicates soil properties that are favorable for windthrow. Mortality is probable even after careful cutting unit design has been applied to these areas.

A ***moderate*** rating indicates that some areas in the map unit are susceptible to windthrow. Design of cutting units around the problem soil areas can lower windthrow problems.

A ***low*** rating indicates that soil conditions do not make the trees susceptable to windthrow and special cutting unit design is not needed on these soils.

Table III-5: TIMBER AND SILVICULTURAL MANAGEMENT LIMITATIONS

Map Unit	Plant Competition	Displacement Sensitivity	Equipment Use	Stand Establishment Potential	Windthrow Hazard
10UA	moderate; moisture	moderate	moderate; riparian	fair	moderate
10UB	high; space/light	moderate	severe; riparian	poor	high
10UC	slight	moderate	moderate; riparian	good	high
13JA	moderate; moisture	low	moderate; compaction	good	low
13UA	moderate; moisture	high	slight	good	low
13UB	slight	high	moderate; compaction	good	moderate
14JA	moderate; moisture	low	moderate; compaction	fair	low
14JB	slight	moderate	moderate; compaction	good	low
14XA	high; moisture	high	slight	fair	low
15JA	moderate; moisture	moderate	moderate; compaction	fair	low
15JB	slight	moderate	moderate; compaction	good	moderate
15UA	moderate; moisture	moderate	slight	fair	low
15UB	slight	high	moderate; compaction	good	low
16UA	slight-north aspects moderate; moisture	high	moderate; compaction slight; south aspects	fair-south aspects good	low
22MA	slight-north aspects moderate; moisture	high	slight	fair-south aspects good	low
22UA	slight-north aspects moderate; moisture	high	slight	fair-south aspects good	low
24JA	moderate; moisture	moderate	moderate; compaction	good	low
24JB	slight	moderate	moderate; compaction	good	low
26UA	moderate; moisture	high	severe; slope	poor	high
30BB	slight	moderate	moderate; slope	good	low
30GA	moderate; moisture	high	moderate; slope	good	low
30GB	slight	high	moderate; slope	good	low
30KA	moderate; moisture	high	moderate; slope	good	low
30KA*b*	moderate; moisture	high	severe; boulders	good	low
30KB	slight	high	moderate; slope	good	low
30KB*b*	slight	high	severe; boulders	good	low
30MA	severe; moisture	moderate	moderate; slope	poor	low
30MB	moderate; moisture	moderate	moderate; slope	fair	low

Table III-5: TIMBER AND SILVICULTURAL MANAGEMENT LIMITATIONS (continued)

Map Unit	Plant Competition	Displacement Sensitivity	Equipment Use	Stand Establishment Potential	Windthrow Hazard
30MC	slight	moderate	moderate; slope	good	low
30MD	slight	moderate	moderate; slope	good	low
30ME	moderate; space/light	moderate	moderate; slope	good	low
30MG	moderate; moisture	moderate	moderate; slope	good	low
30PA	moderate; moisture	moderate	moderate; compaction, slope	fair	low
30PE	moderate; space/light	moderate	moderate; compaction, slope	good	low
30QA	severe; moisture	moderate	moderate; slope	poor	low
30QB	moderate; moisture	moderate	moderate; slope	fair	low
30QC	slight	moderate	moderate; slope	good	low
30QD	slight	moderate	moderate; slope	good	low
30QE	moderate; space/light	moderate	moderate; slope	good	low
30QG	moderate; moisture	moderate	moderate; slope	good	low
30SA	slight	moderate	slight	good	low
30SB	slight	moderate	moderate; compaction	good	moderate
32KA	slight	moderate	moderate; compaction	good	low
32MA	slight	moderate	moderate; compaction	good	low
32QA	slight	moderate	moderate; compaction	good	low
32QC	slight	moderate	moderate; compaction	fair	low
32QD	severe; moisture	severe	moderate; slope	poor	low
33UA	slight	moderate	moderate; compaction	poor	low
38KA	moderate; space/light	moderate	moderate; compaction, wet areas	fair	high
38QA	moderate; space/light	moderate	moderate; compaction, wet areas	good	moderate
40KA	severe; space/light	severe	severe; slope	poor	low
40QA	severe; space/light	severe	severe; slope	poor	low
41KA	moderate; space/light	severe	severe; slope	fair	moderate
41QA	moderate; space/light	severe	severe; slope	fair	moderate
41SA	moderate; space/light	severe	severe; slope	fair	moderate

Table III-5: TIMBER AND SILVICULTURAL MANAGEMENT LIMITATIONS (continued)

Map Unit	Plant Competition	Displacement Sensitivity	Equipment Use	Stand Establishment Potential	Windthrow Hazard
42KA	moderate; space/light	moderate	moderate; compaction, wet areas	fair	moderate
42QA	moderate; space/light	moderate	moderate; compaction, wet areas	fair	moderate
43KA	moderate; space/light	severe	moderate; compaction	good	low
43QA	moderate; space/light	moderate	moderate; compaction	good	low
43QB	severe; space/light	severe	severe; wet areas	poor	severe
43SA	moderate; space/light	severe	severe; wet areas	poor	severe
45UA	moderate; space/light	moderate	severe; slope	poor	low
46KA	moderate; space/light	severe	moderate; compaction	fair	moderate
46OA	moderate; space/light	moderate	moderate; compaction	good	moderate
47KA	moderate; space/light	severe	severe; slope	fair	low
47OA	moderate; space/light	moderate	severe; slope	good	low
48KA	moderate; space/light	severe	severe; slope	fair	moderate
48QA	moderate; space/light	moderate	severe; slope	good	moderate
60KA	moderate; moisture	high	severe; slope	fair	low
60KB	slight	high	severe; slope	good	low
60MA	severe; moisture	moderate	severe; slope	poor	low
60MB	moderate; moisture	moderate	severe; slope	fair	low
60MC	slight	moderate	severe; slope	good	low
60MD	slight	moderate	severe; slope	good	low
60QA	severe; moisture	moderate	severe; slope	poor	low
60QB	moderate; moisture	moderate	severe; slope	fair	low
60QC	slight	moderate	severe; slope	good	low
60QD	slight	moderate	severe; slope	good	low
61MC	moderate; moisture	moderate	severe; slope	good	low
61MD	slight	moderate	severe; slope	good	low
61QC	slight	moderate	severe; slope	good	low
61QD	slight	moderate	severe; slope	good	low
61SA	slight	moderate	severe; slope	good	low
64KA	moderate; moisture	severe	severe; slope	good	low

Table III-5: TIMBER AND SILVICULTURAL MANAGEMENT LIMITATIONS (continued)

Map Unit	Plant Competition	Displacement Sensitivity	Equipment Use	Stand Establishment Potential	Windthrow Hazard
64KA*b*	moderate; moisture	severe	severe; slope, boulders	good	low
64KB	slight	severe	severe; slope	good	low
64KB*b*	slight	severe	severe; slope, boulders	good	low
64MA	severe; moisture	moderate	severe; slope	poor	low
64MB	moderate; moisture	moderate	severe; slope	fair	low
64MC	slight	moderate	severe; slope	good	low
64MD	slight	moderate	severe; slope	good	low
64ME	slight	moderate	severe; slope	good	low
64MG	moderate; moisture	moderate	severe; slope	good	low
64QA	severe; moisture	moderate	severe; slope	poor	low
64QB	moderate; moisture	moderate	severe; slope	fair	low
64QC	slight	moderate	severe; slope	good	low
64QD	slight	moderate	severe; slope	good	low
64QE	slight	moderate	severe; slope	good	low
64QG	moderate; moisture	moderate	severe; slope	good	low
64SB	slight	moderate	severe; slope	good	moderate
72BA	moderate; space	moderate	moderate; compaction	good	moderate
72OA	moderate; space	moderate	moderate; compaction	good	moderate
73UA	moderate; moisture	severe	slight	good	moderate
73UB	severe; space/light	--	severe; wet areas	fair-poor	high
74BA	moderate; moisture	severe	moderate; slope, compaction	good	low
74UA	moderate; moisture	severe	moderate; slope	good	low

WATERSHED

The majority of sediment introduced into the stream channel comes directly from erosion of the bank. Timber harvest and road building have the potential to increase water yield and therefore erosion of stream banks. In addition, removal of the surface litter, surface soil, and compaction create the potential for surface runoff and erosion. Sediment transport in stream systems normally occurs during the period of spring and early summer snowmelt and during rainfall events. Under natural conditions, it has been estimated that streams on the Lolo Forest produce from 3 up to 30 tons per mile of sediment annually.

Certain characteristics of map units can be used to separate areas that are very susceptible to erosion and sedimentation from those that are less susceptable. Soils formed in valley fill material, granite, and schist have the highest potential for erosion on the Lolo Forest. Clayey (continental) glacial till/valley fill deposits, volcanics, alpine glacial till have a relatively moderate erosion potential. Soils formed in weakly weathered and moderately weathered Belt metasedimentary rocks are the most stable. Volcanic ash influenced loess which occurs as a mantle on soils mostly west of Missoula, on northerly and westerly slopes at higher elevations has a low bulk density and a relatively high rate of infiltration. This loess layer has a low to moderate potential for erosion. In addition, slope steepness, complexity, drainage spacing, and vegetation can be used to determine potential for erosion and subsequent sediment introduction into streams.

Properties Affecting Sediment Yield

Table III-6 rates the relative erosion hazard, sediment delivery efficiency and landslide potential of map units. These ratings can be used in computer models that predict sediment yield or to identify areas which require on-site evaluation of needed soil and water conservation practices during project planning.

Erodibility is a rating of the relative susceptibility of exposed soil to erosion. The ratings are based on observations of erosion in the survey area and its occurrence on varied soil and slope combinations. Surface and substrata soil have been rated separately as they commonly have differing physical properties due to weathering or stratification of contrasting parent materials. The ratings can be used to compare the relative probability of erosion occurring on alternative areas. This probability should be considered when locating and designing projects so that areas that require on-site evaluation for erosion hazard can be identified.

Surface erodibility can be used to evaluate the erosion hazard for practices which result in baring the soil surface or exposure of soil layers within 24 inches of the surface. Logging skid trails, prescribed fire, and low standard roads are examples of this exposure.

Map units rated *low* have sufficient rock fragments to armor the surface of bared soil and do not require erosion control treatment when exposed. Soil parent materials are derived from alluvial or weakly and moderately weathered metasedimentary bedrock.

Map units rated *moderate* have fine or medium soil textures and contain a moderate volume of coarse fragments. Some erosion control treatment is normally required to control erosion of bared soil. The erosion hazard of these soils will vary with the nature of soil disturbance, the predicted effectiveness of planned erosion control practices, and other site conditions such as slope. Soil parent materials are derived from all bedrock or deposits not listed under the high rating, below.

Map units rated *high* have fine soil texture and very low coarse fragments. They are formed in valley fill deposits, alluvium overlain by silt deposits, volcanic, most micaceous schist bedrock, and some fine glacial till depostits.

Substratum erodibility assumes conditions on unsurfaced roads and constructed skid trails. Road construction normally exposes substratum material. This rating includes that excavation below 24 inches of the surface. Road cut and fill slopes are an example of this excavation. Interception of shallow groundwater within the excavated depth affects substratum erodibility as well as properties of the material. Intercepted groundwater enters the road drainage system and causes ditch erosion.

Map units rated *low* have substrata formed in materials resistant to erosion. These materials have high bearing strength and a high volume of coarse fragments that are larger than gravel in size. Soil parent materials are derived from weakly and moderately weathered, metasedimentary bedrock, alluvial deposits, and coarse glacial till deposits.

Map units rated *moderate* have one of the following sets of properties: 1) Substrata contain both erosion resistant and susceptible components. Mixing these components during road construction results in material with an intermediate hazard. 2) Substratum material has low bearing strength and tends to rut when used as native road surface. Concentration of drainage water in ruts causes erosion of the road surface. Soil parent materials are derived from moderately weathered metasedimentary, less deep valley fill or lacustrine deposits, some weakly weathered granitics.

Map units rated *high* have substrata formed in materials susceptible to erosion or where large amounts of groundwater are normally encountered during excavation. These erosive materials have low volume of coarse fragments larger than gravel size and fine soil texture. Soil parent materials are derived from volcanic, micaceous schist, moderately weathered granitic, and soft sedimentary bedrocks and deep valley fill or lacustrine deposits.

Map units rated *very high* have substrata formed in highly weathered granitic bedrock or "grus". This material rapidly weathers to a highly erodible mixture of pea-sized gravel and coarse sand when exposed. Field observations indicate this material is much more erodible than any other in the survey area.

Landform sediment delivery efficiency is a rating of the relative probability of eroded soil reaching a stream channel and becoming sediment. When combined with erosion and landslides, it can be used in evaluating the hazard to water quality from erosion. Overland transport of eroded soil is a complex process affected by many properties which must be evaluated onsite. These ratings consider properties of landforms which affect sediment delivery. Slope steepness, slope shape, and drainage density were the most important properties used to make these ratings.

Map units rated *low* have relatively gentle slopes which average less than 35 percent and have wide drainage spacings. Low relief restricts transport of sediment. Consequently, most eroded soil is stabilized before it reaches a stream channel. Onsite evaluation of erosion and sediment hazard is generally not required unless soil disturbance in or adjacent to a drainage is planned.

Map units rated *moderate* have average slopes between 35 and 60 percent with drainage spacings that are from 800 to 2,500 feet apart. Slope steepness is great enough to transport eroded soil, but these units are farther removed from active stream channels or have features that slow velocity and allow settling out of sediment before it reaches active channels. Onsite evaluation of erosion and sediment hazard should be considered.

Map units rated *high* have average slopes greater than 60 percent with drainage spacings that are from 800 to 1,500 feet apart. These steep slopes are located directly above streams and have slopes that are straight or complex. Valley bottom map units on and adjacent to active stream channels are also rated high. All soil disturbance within these map units occurs near enough to channels to be a potential sediment hazard. On-site evaluation of erosion and sediment hazards should be considered when planning soil disturbing activities. Some short-term increase in sediment is probably unavoidable.

Map units rated *very high* have average slopes greater than 65 percent with drainage spacings less than 800 feet and are adjacent to active stream channels.

Potential for Landslides is a rating of the relative probability of downslope movement of masses of soil and rock material under natural or non-managed conditions. The most common kinds of landslides which occur on the Lolo Forest are debris slides, rotational slumps, and landflows. Landslides occur infrequently on this forest. They are usually associated with concentrations of groundwater above a soil layer with restricted permeability. The ratings can be used to compare the relative probability of landslides occurring on alternative areas being considered in plans and for determining which areas should have on-site evaluation of slope stability when designing a project. The ratings are based on observations of landslides in the survey area and their association with combinations of observable properties of map units. Slope steepness, indicators of groundwater concentrations such as seeps and water loving vegetation, bedrock properties, and evidence of landslides occurring in the past such as cracks, leaning trees and hummocky topography were properties used to make these ratings.

Map units rated *low* have no properties associated with landslide activity or 20 percent of the area can be easily avoided. Landslide hazards will not normally affect the location of design of projects.

Map units rated *moderate* exhibit several properties associated with landslides. Road location or design can be constructed effectively to reduce risks without loosing feasibility.

Map units rated *high* exhibit all of the properties associated with landslides. It is difficult to avoid locating roads near high risk areas. Road designs which reduce risks are very costly.

Map units rated moderate or high may require that landslide hazards be evaluated onsite before locating roads or projects.

Table III-6: PROPERTIES AFFECTING SEDIMENT YIELD

Map Unit	Surface Erodibility	Substrata Erodibility	Landform Sediment Delivery Efficiency	Landslide Potential
10UA	moderate	low	high	low
10UB	high	low	high	low
10UC	moderate	moderate	high	low
13JA	high	low	high (escarpment) low (surface)	moderate
13UA	low	low	high (escarpment) low (surface)	moderate
13UB	low	low	high (escarpment) low (surface)	moderate
14JA	high	high	low	low
14JB	moderate	high	low	low
14XA	high	high	low	low

Table III-6: PROPERTIES AFFECTING SEDIMENT YIELD (continued)

Map Unit	Surface Erodibility	Substrata Erodibility	Landform Sediment Delivery Efficiency	Landslide Potential
15JA	high	moderate	low	low
15JB	high	moderate	low	moderate
15UA	moderate	moderate	low	low
15UB	moderate	moderate	low	low-moderate
16UA	moderate	moderate	high (escarpment) low (surface)	high (escarp) low (surface)
22MA	low	moderate	low	low
22UA	low (inclusions of moderate)	low	low	low
24JA	high	moderate	low	low
24JB	moderate	moderate	low	low
26UA	low	low	high	high
30BB	moderate	high	low	moderate
30GA	moderate	high	low	low
30GB	moderate	high	low	low
30KA	moderate	very high	low	low
30KA*b*	moderate	very high	low	low
30KB	moderate	very high	low	low
30KB*b*	moderate	very high	low	low
30MA	low	low-moderate	low	low
30MB	moderate	moderate	low	low
30MC	moderate	low-moderate	low	low
30MD	moderate	low-moderate	low	low
30ME	moderate	low-moderate	moderate	low
30MG	moderate	low-moderate	low	low

Table III-6: PROPERTIES AFFECTING SEDIMENT YIELD (continued)

Map Unit	Surface Erodibility	Substrata Erodibility	Landform Sediment Delivery Efficiency	Landslide Potential
30PA	high	high	low	low
30PE	high	high	moderate	low
30QA	low	low	low	low
30QB	low	low	low	low
30QC	low	low	low	low
30QD	moderate	low	low	low
30QE	moderate	low	moderate	low
30QG	moderate	low	low	low
30SA	high	high	low	moderate
30SB	high	high	moderate	moderate
32KA	moderate	moderate	low	low
32MA	moderate	low	low	low
32QA	moderate	low	low	low
32QC	moderate	low	low	low
32QD	low	low	low	low
33UA	moderate	moderate	low	low
38KA	moderate	high	moderate	low
38QA	moderate	moderate	moderate	low
40KA	moderate	moderate	very high	high
40QA	moderate	moderate	very high	high
41KA	moderate	high	high	high
41QA	moderate	low	high	moderate-high
41SA	moderate	high	high	very high
42KA	moderate	very high	low	low
42QA	moderate	moderate	low	low

Table III-6: PROPERTIES AFFECTING SEDIMENT YIELD (continued)

Map Unit	Surface Erodibility	Substrata Erodibility	Landform Sediment Delivery Efficiency	Landslide Potential
43QA	moderate	low	moderate	low
43QB	high	moderate	moderate	high
43SA	high	high	moderate	high
45UA	low	low	very high	moderate-high
46KA	moderate	high	low	low
46OA	moderate	moderate	low	low
47KA	moderate	high	moderate	low
47OA	moderate	low	moderate	moderate
48KA	moderate	moderate	high	high
48QA	moderate	low	high	moderate
60KA	moderate	moderate	high	moderate
60KB	moderate	moderate	high	moderate
60MA	low	low	high	low
60MB	low	low	high	low
60MC	low-moderate	low	high	low
60MD	moderate	low	high	low
60QA	low	low	high	low
60QB	low	low	high	low
60QC	low-moderate	low	high	low
60QD	moderate	low	high	low
61MC	moderate	low	very high	moderate
61MD	moderate	low	very high	moderate-high
61QC	moderate	low	very high	low-moderate
61QD	moderate	low	very high	low-moderate
61SA	high	high	very high	high

Table III-6: PROPERTIES AFFECTING SEDIMENT YIELD (continued)

Map Unit	Surface Erodibility	Substrata Erodibility	Landform Sediment Delivery Efficiency	Landslide Potential
64KA*b*	moderate	moderate	moderate	low
64KB	moderate	moderate	moderate	low
64KB*b*	moderate	moderate	moderate	low
64MA	low	low	moderate	low
64MB	low	low	moderate	low
64MC	low-moderate	low	moderate	low
64MD	moderate	low	moderate	low
64ME	moderate	low	moderate	low
64MG	moderate	low	moderate	low
64QA	low	low	moderate	low
64QB	low	low	moderate	low
64QC	low-moderate	low	moderate	low
64QD	moderate	low	moderate	low
64QE	moderate	low	moderate	low
64QG	moderate	low	moderate	low
64SB	high	high	moderate	moderate
72BA	high	moderate	low	low
72OA	moderate	moderate	low	low
73UA	low	low	low	low
73UB	moderate	moderate-high	low	low
74BA	moderate	high	moderate	low
74UA	moderate	low-moderate	moderate	low

Chapter IV: TAXONOMY

SOIL FORMATION

There are five principal factors of soil formation: parent material, topography, biological activity, climate, and time. The soil-forming factors are interdependent, each modifying the effects of the others.

Soil is the result of the combined effects of these five factors, and soil differences are due principally to the relative importance or strength of the various factors. In mountainous areas such as the Lolo National Forest, changes in one or more soil-forming factors occur within relatively short distances. The many micro-climates that result from change in elevation, air drainage, topography, slope gradient, and aspect strongly influence soil formation. Complexity of parent material, topography, and time also influence the kinds of soil in the area. The relative effects of each soil-forming factor in determining soil characteristics at any particular site are difficult to evaluate.

There are some obvious relationships between soil properties and parent material within this survey area. Most soils have a surface layer of volcanic ash influenced loess. Most of the volcanic ash came from the 6700 B.P. (Before Present) eruption of Mt. Mazama (now Crater Lake, Oregon). Volcanic ash from other sources, such as Glacier Peak and several eruptions of Mt. St. Helens, have been identified in the area. The volume of material deposited from these other sources seems to have been much less because the identifiable material is usually found in relatively thin layers or as localized deposts.

The depth and character of loess surface layers is partially correlated with landscape position. Loess surface layers tend to be thicker on northerly aspects and vary to undetectable on southerly aspects. The loess surface is often diluted by mixing with subsoil materials on high ridges and lower elevation steep slopes, and can form a thicker surface layer in some concave slope positions and upper elevation steep slopes. The loess has weathered to a dark brown to reddish brown in color in freely drained slope positions but can be very dark brown to black in concave slope positions which are periodically saturated with water. The darker color is often associated with forest openings dominated by alder and fern, aspen, or spruce communities.

Most parent materials are weathered from local bedrocks or surficial deposits derived from local bedrocks. Some parent materials produce unique soil characteristics. Soils weathered from granite are moderately coarse to coarse textured and are highly erosive due to their uncohesive nature. Metasedimentary Belt argillites, siltites, and quartzites produce subsoils that are moderately coarse textured and have many rock fragments. Soils weathered from calcareous metasedimentary Belt argillites and siltites are moderately coarse to medium textured, have a subsoil accumulation of calcium carbonate, and have varying amounts of rock fragments. Highly weathered zones of this parent material produce soils with few rock fragments. Soils weathered from lacustrine sediments originating from Glacial Lake Missoula are moderately fine textured and have no rock fragments. Soils weathered from valley fill materials are moderately fine textured and a poorly sorted distribution of cobbles.

Properties of soils formed in glacial till vary depending on the extent of local glaciation. Soils formed in till or drift from alpine glaciation of valley trains and troughwalls are moderately coarse and contain more than 40 percent rock fragments. Soils formed in parent materials resulting from alpine glaciation confined to ice caps on low relief ridetops and basins have dense subsoils which produce perched and elevated water tables. These soils are of local extent occurring high in the Lolo Creek Divide, the Rattlesnake headwaters, and the Reservation Divide north of Plains.

Subsoils formed in alluvium are quite variable. Past stream position and flow rate have caused intense spatial variability of parent materials. Soils on flood plains and terraces are often coarse textured because of the frequent occurrence of stream deposited sand and gravel in these positions. Alluvial terraces high above the Clark Fork River are older than terraces only 20 to 80 feet above; soils on these high terraces exhibit partial consolidation and iron/manganese accumulation deep in the substratum. These older soils have been buried by more recent alluvium and soil taxonomy does not reflect their existence in this survey area. They are of interest only as remnants of a past warmer climate. Soils in upland meadow and willow bottom positions adjacent to meandering streams are often medium textured because of the relatively slow flow rate of the stream during deposition. These soils transmit groundwater more slowly and are often poorly-drained. Some alluvial materials occur in complex patterns with till and outwash materials in glacial trough bottoms.

Increasing elevation and apparent exposure to either past or present colder climates results in an increase in angularity and size of rock fragments in the subsoil. At one extreme, high elevation ridgetops have rock fragments that are frost churned to the surface and subsoils are nearly fragmental with angular rock fragments dominating the soil profile. This suggests more physical and less chemical weathering influence on soil formation.

Relationships between soil properties and topography are apparent in the survey area. Soils on very steep slopes adjacent to perennial streams are very rocky and shallow. Soils on moderately steep mountain slopes are deep and may be very rocky or moderately rocky depending on parent material.

SOIL CLASSIFICATION

General Classification System

This survey uses the National Cooperative Soil Survey (NCSS) classification system (Soil Survey Staff 1975). The NCSS system is hierarchical in nature (similar to biological taxonomy) with the following six levels:

Order: Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in "sol". Four soil orders occur in the survey area: Inceptisol, Entisol, Mollisol, and Alfisol.

Suborder: Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept "ochr", meaning a surface horizon that is either light in color or low in organic matter, or both, plus "ept", from the order of Inceptisol.

Great Group: Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Cryochrept "cry" meaning cold annual and summer soil temperatures, plus "ochrept" the suborder of the Inceptisols that have light-colored, low in organic matter surfaces.

Subgroup: Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group, but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective "Typic" identifies the subgroup that typifies the great group. An example is Typic Cryochrept. An example of an extragrade is Andic Cryochrept, meaning those Cryochrepts that differ from "Typic" by having a surface that has a composition influenced by fine pyroclastic materials or volcanic ash.

Family: Families are established within a subgroup on the basis of physical and chemical properties that affect management. The properties are mostly those of horizons where there is much biological activity below plow depth. Among the properties considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistency, moisture equivalent, slopes, and presence of permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the properties used as family differentia. An example is Andic Cryochrepts, loamy skeletal, mixed. "Loamy skeletal" refers to those soils that have loamy textures with less than 35 percent clay and that have greater than 35 percent rock fragments by volume. "Mixed" refers to a mixed mineralogy.

Series: The series level of soil classification was not used in this survey because survey objectives did not require this amount of detail.

Lolo National Forest Classification Remarks

Criteria for classification often require laboratory data or observations not available when classification decisions are made. This is particularly true of classes dependent on temperature, moisture, and chemical data (for chemical lab data, see "Summary of Soil Chemical and Physical Analysis Data," Lolo National Forest, 4/87). The following assumptions were made in classifying the soils in this survey area.

Soils in the survey area are in either cryic or frigid temperature regimes and both are present. The boundary between these two classes is assumed to be the lower subalpine fir climax forest boundary or an equivalent elevation- aspect combination. Little local data is available, but the data for much of the Northern Rocky Mountains suggest this is a close, though imperfect, approximation. Exceptions do occur where subalpine fir climax forest exists below 4400 feet. Data from the Swan Valley suggest that where these lower valley subalpine fir types occur as inclusions among grand fir or Douglas-fir forests they have frigid soil regimes and are subjected to cold air drainage (Hackley 1982). Lower subalpine climax forests occur below 4400 feet in the Fishtrap and Seeley areas, and this is assumed to be the cryic/frigid boundary. Northerly inclusions within these valleys may be cryic due to aspect. Soils supporting these lower elevation subalpine fir forests in the Fishtrap and Seeley valleys are classified as frigid, but cryic soils are recognized as a possible mosaic in the area. These soils are similar for management considerations.

Moisture regimes for soils in the survey area are expected to be either udic, ustic, or xeric. The survey area is in a transition zone between the more maritime climate of Idaho and the continental climate of eastern Montana. East of the survey area, the moisture regime is ustic, and localized ustic regimes may occur within the survey area. Two years of data taken in the survey area suggest that steep south facing slopes and dry-end Douglas-fir habitat series are correlated with soils in the xeric regime. These sites will continue to be monitored for several years after the survey is completed. Adjacent surveys in northern Idaho and northern Montana have also recognized xeric regimes under similar conditions. Other soils are assumed to be in the udic moisture regime, although transitions must be noted. The Douglas-fir/ninebark (*Pseudotsuga menziesii/Physocarpus malvaceous*) habitat type (and possibly some drier grand fir/beargrass (*Abies grandis/Xerophyllum tenax*) and Douglas-fir/blue huckleberry (*Pseudotsuga menziesii/Vaccinium globulare*) habitat types) is on the dry end of udic. These types are less productive and have drier conditions for regeneration than the typical udic type (e.g., grand fir/queencup beadlily (*Abies grandis/ Clintonia uniflora*)).

An assumption concerning subsoil base saturation is required to classify many Inceptisols in the survey area (Dystrochrepts versus Eutrochrepts). Dystrochrepts must be less than 60 percent base saturated between the depths of 10-30 inches to be classified correctly. Laboratory data from the area soils below 5000 feet have subsoils that are 60 to 80 percent base saturated. Soils formed in parent materials derived from the Wallace Formation (calcareous argillites and siltites) are 100 percent base saturated except at elevations above 5500 feet where carbonates have been leached from the profile and base saturation is below 60 percent. Soils above 5000 feet have subsoil base saturation percents ranging from 7 to 50 percent.

Most soils in the survey area have volcanic ash influenced loess surface layers. Soil samples taken from western Montana and northern Idaho vary in composition from 25-80 percent volcanic glass shards in the silt and very fine sand particle size fraction. The mean is near 60 percent and the mode seems to be near 70 percent. The -15 bar water retention of these materials is near 15 percent by weight. It is slightly thixotropic but this property is not strongly expressed, possibly because textures are consistently silt loam with little clay. Clay percentages range from 4 to 8 percent. Soils in the frigid temperature regime that have ash influenced surface layers greater than 14 inches thick are called Vitrandepts because they are expected to hold less than

20 percent water at -15 bars of soil moisture tension. They are called medial at the family taxonomic level in spite of having more than 60 percent glass shards. This is done because the material feels loamy, not sandy, after prolonged rubbing.

MAJOR SOILS ON THE LOLO NATIONAL FOREST

The following 30 soil taxa have been identified for the Lolo National Forest in this survey. For the purposes of this survey, dominant soils (those that occur over large acreages) and less dominant soils which exhibit important managerial properties were selected. The general properties of these soils are described in the following section. Detailed soil descriptions are provided at the end of this section.

Table IV-1: TAXA INDEX

ORDER	SUBORDER	GREAT GROUP	SUBGROUP & FAMILY	SOIL DESC. #	Page
Alfisols	Boralfs	Cryoboralfs	Andeptic Cryoboralfs, loamy skeletal, mixed	1	15
			Typic Cryoboralfs	2	17
		Eutroboralfs	Mollic Eutroboralfs, loamy skeletal, mixed, frigid	3	18
			Typic Eutroboralfs, clayey skeletal, mixed, frigid	4	19
			Typic Eutroboralfs, fine loamy, mixed, frigid	5	21
			Typic Eutroboralfs, fine silty, mixed, frigid	6	22
			Typic Eutroboralfs, loamy skeletal, mixed, frigid	7	24
Entisols	Orthents	Udorthents	Andeptic Udorthents, sandy skeletal, mixed, frigid	8	25
		Ustorthents	Lithic Ustorthents, loamy skeletal, mixed, frigid	9	26
		Xerorthents	Typic Xerorthents, sandy skeletal, mixed, frigid	10	27
	Psamments	Ustipsamments	Alfic Ustipsamments, coarse loamy, mixed, frigid	11	28
Inceptisols	Andepts	Cryandepts	Entic Cryandepts, medial skeletal, mixed	12	29
			Entic Cryandepts, medial/loamy skeletal, mixed	13	30
			Lithic Cryandepts, medial skeletal, mixed	14	31
		Vitrandepts	Typic Vitrandepts, medial/loamy skeletal, mixed, frigid	15	32
	Aquepts	. . . .	. . . .	16	33
	Ochrepts	Cryochrepts	Andic Cryochrepts, loamy skeletal, mixed	17	34
			Aquic Cryochrepts	18	36
			Typic Cryochrepts, loamy skeletal, mixed	19	37
		Eutrochrepts	Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid	20	38
			Dystric Eutrochrepts, loamy skeletal, mixed, frigid	21	39
			Typic Eutrochrepts, loamy skeletal, mixed, frigid	22	40
		Ustochrepts	Andic Ustochrepts, sandy skeletal, mixed, frigid	23	41
			Typic Ustochrepts, loamy skeletal, mixed, frigid	24,25	42,43
			Typic Ustochrepts, coarse silty, mixed, frigid	26	44
		Xerochrepts	Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid	27	45
			Typic Xerochrepts, loamy skeletal, mixed, frigid	28	46
	Umbrepts	Cryumbrepts	Andic Cryumbrepts	29	47
Mollisols	Xerolls	Haploxerolls	Typic Haploxerolls, loamy skeletal, mixed, frigid	30	48

NOTE: Two soil descriptions are provided for the Typic Ustochrepts, loamy skeletal family due to recent amendments in *Soil Taxonomy* (Soil Survey Staff 1975).

GENERAL PROPERTIES OF THE LOLO NATIONAL FOREST SOIL TAXA

This section describes the general properties of the major soils as well as characteristics specific to these soils on the Lolo National Forest.

ALFISOLS

BORALFS

In this survey area, Boralfs are cool and cold soils with subsoil clay accumulation. The argillic horizons contain approximately 20 to 50 percent clay. These soils formed from a great variety of parent materials including soft sedimentary, moderately weathered metasedimentary, and volcanic bedrock; and lacustrine, valley fill, and glacial till deposits.

CRYOBORALFS

These are the cold Boralfs. This survey assumes that the cryic temperature regime is limited to landscapes dominated by subalpine fir or colder habitat series.

Andeptic Cryoboralfs, loamy skeletal, mixed-

These Cryoboralfs formed in an 8 to 13 inch thick volcanic ash influenced loess overlaying material derived from soft sedimentary bedrock and glacial till derived from metasedimentary bedrock. The loess horizon is more fertile, has a lower bulk density, and higher water holding capacity than its substratum (see Andepts for specific lab data). These soils occur on moderate relief mountain slopes, glacial morraine, and glacially scoured mountain slopes. They support subalpine fir forests from 3,200 to 5,400 feet of elevation and receive from 20 to 35 inches of average annual precipitation. This soil family is noted as similar to Typic Eutroboralfs in four map units. See soil description **#1**.

Typic Cryoboralfs-

These Cryoboralfs formed in material derived from volcanic bedrock. They occur on moderate relief mountain slopes. They support subalpine fir forests, range from 5,000 to 6,500 feet of elevation, and receive from 25 to 40 inches of average annual precipitation. They are named as a major soil only in map unit 30PE. See soil description **#2**.

EUTROBORALFS

These are the cool Boralfs. They support a variety of conifer forests.

Mollic Eutroboralfs, loamy skeletal, mixed, frigid-

These are the Eutroboralfs with thick, dark surface horizons. They formed in material derived from highly and moderately weathered metasedimentary bedrock. They occur on moderate relief to steep mountain slopes, and support dry Douglas-fir forests associated with marginally moist/dry moisture regimes. They occur from 3,000 to 5,000 feet of elevation and receive 20 to 35 inches of average annual precipitation. Mollic Eutroboralfs are named as major soils only in map units 30MB and 64MB. These soils occur in complex with Ustochrepts in two map units. See soil description **#3**.

Typic Eutroboralfs, clayey skeletal, mixed, frigid-
These soils formed in volcanic ash influenced loess overlaying thick glacial till derived from valley fill, moderately weathered metasedimentary bedrock, and sedimentary bedrock. Lower substrata in some soils formed in glacial outwash. These soils support dry Douglas-fir; moist, mixed coniferous; and cool, somewhat dry Douglas-fir forest; as well as subalpine forests in some colder drainageways below 4,800 feet. They range in elevation from 3,200 to 5,400 feet and receive 20 to 35 inches of average annual precipitation. These soils are named as major soils in map units 30Bβ, 72BA, and 74BA. These Typic Eutroboralfs occur in complex with Cryochrepts, Eutrochrepts, and Aquepts in a limited number of map units. See soil description **#4.**

Typic Eutroboralfs, fine loamy, mixed, frigid-
These soils formed in material derived from highly weathered metasedimentary bedrock and in valley fill deposits. They occur on toeslopes, alluvial fans, dissected footslopes, and moderate relief mountain slopes. Both dry/marginally moist and moist moisture regimes are observed. They support dry Douglas-fir; dry, mixed coniferous; and moist, mixed coniferous forest. These soils range in elevation from 3,000 to 5,500 feet and receive 25 to 45 inches of average annual precipitation. These Typic Eutroboralfs are named as a major soil in map units 15JA, 15JB, 30PA, 24JA, and 24JB. They occur in complex with Eutroboralfs in two other map units. See soil description **#5.**

Typic Eutroboralfs, fine silty, mixed, frigid-
These soils formed in lacustrine deposits, and many are under cultivation. They occur on river terraces, benches, and dissected footslopes. Both dry/marginally moist and moist moisture regimes are observed. They support dry Douglas-fir, and dry and moist, mixed coniferous forest. They range in elevation from 2,800 to 4,400 feet and receive 15 to 35 inches of average annual precipitation. These Typic Eutroboralfs are named as major soils in map units 13JA, 14JA, and 14JB. See soil description **#6.**

Typic Eutroboralfs, loamy skeletal, mixed, frigid-
These soils formed in material derived from moderately weathered metasedimentary bedrock, valley fill deposits, or glacial till deposits. Some are overlaid with volcanic ash influenced loess. Horizon characteristics vary due to differing parent materials. These soils occur on river terraces, moderate relief to steep mountain slopes and stream breaklands, glacial morraine, and glacially scoured footslopes. They support dry, mixed coniferous; moist, mixed coniferous; and cool, somewhat dry Douglas-fir forests. These soils are named as major soils in several map units. These Typic Eutroboralfs occur in association or complex with Eutrochrepts in several map units, and with Aquepts in one map unit. See soil description **#7.**

ENTISOLS

ORTHENTS

In this survey area, Orthents are cool, dry to moist soils with minimal subsoil development. These soils formed in undifferentiated alluvial and some colluvial deposits. Soils are somewhat excessively to excessively drained except where proximity to streams creates a shallow water table.

UDORTHENTS
These are the cool, moist Orthents.

Andeptic Udorthents, sandy skeletal, mixed, frigid-
These soils formed in an 8 to 14 inch thick volcanic ash influenced loess overlaying alluvial deposits, predominantly of sand and gravel. These soils are excessively drained. They occur on rolling foothills and terraces and flood scoured footslopes. They support dry, mixed and moist, mixed coniferous forests. These soils range in elevation from 2,800 to 4,500 feet of elevation and recieve 20 to 35 inches of average annual precipitation. They are named as a major soil in map units 16UA and 22UA. See soil description **#8**.

USTORTHENTS
These are the cool, moderately moist/dry Orthents.

Lithic Ustorthents, loamy skeletal, mixed, frigid-
These soils formed in alluvial deposits and material derived from weakly and moderately weathered metasedimentary bedrock. Soils are shallow and bedrock occurs within 20 inches. These soils occur on low to moderate relief footslopes, terraces, benches, and broad drainages and they support dry Douglas -fir and dry, mixed coniferous forests. These soils range in elevation from 3,200 to 4,500 feet and receive 25 to 35 inches average annual precipitation. They are named as major soils in map units 22MA and 22UA. See soil description **#9**.

XERORTHENTS
These are the dry Orthents.

Typic Xerorthents, sandy skeletal, mixed, frigid-
These soils formed in alluvial deposits, predominantly of sand and gravel, and are excessively drained. They occur on rolling foothills and terraces, and support open grown and dry Douglas-fir forests. These soils range in elevation from 2,800 to 4,400 feet and receive 20 to 30 inches of average annual precipitation. These soils are named as a major soil only in map unit 16UA. See soil description **#10**.

PSAMMENTS
In this survey area, these soils formed in sandy lacustrine deposits and have very minimal subsoil development.

USTIPSAMMENTS
These are the marginally moist/dry Psamments.

Alfic Ustipsamments, coarse loamy, mixed, frigid-
These soils have thin clay lamellae in the subsoil and formed in material derived from sandy lacustrine deposits. They have less than 35 percent coarse fragments below 10 inches and loamy fine and very fine sand textures. They support dry Douglas-fir forests. Annual productivity is low, and moisture stress and competition from grass can limit regeneration. These soils occur on rolling

foothills and benches, at elevations from 2,800 to 4,400 feet, and receive 15 to 25 inches of average annual precipitation. These soils are isolated and have only been identified in map unit 14XA. See soil description **#11**.

INCEPTISOLS

ANDEPTS

In this survey area, Andepts are relatively fertile, cool and cold forest soils. These soils have thick volcanic ash rich loess surface layers overlaying rocky, coarse textured substratum materials derived from moderately and weakly weathered metasedimentary bedrock. The volcanic ash rich surface contributes the major portion of fertility to soils by its higher cation exchange, easier root penetration due to lower bulk density, and higher water holding capacity than the coarser substratum. Andepts have surface layers greater than 14 inches thick and have bulk densities from 0.65-0.85 g/cm3. In this survey area, cation exchange capacity averages 20 meq/100 gms soil, available water holding capacity averages 35 percent at 1/3 bar for the surface layers. In comparison, Belt metasedimentary substratum cation exchange capacity ranges from 6 meq/100 gms soil to 12 meq/100 gms soil, and available water holding capacity ranges from 8 to 22 percent at 1/3 bar. Laboratory data indicates these loess layers contain 60 to 70 percent glass shards in the fine sand and silt particle-size fractions. Most of the shards seem to be from the 6,700 BP eruption of Mt. Mazama (Crater Lake) in southwestern Oregon. The loess is silt loam in texture and is 60 to 80 percent silt. It is not strongly thixotropic but does have some properties suggestive of thixotropy. X-ray refraction data indicates large amounts of amorphous material in the clay particle-size fraction.

Andepts are more common in the western portion of the survey area and on north aspects and at higher elevations.

CRYANDEPTS

Cryandepts are the cold Andepts. The Cryic temperature regime under forest vegetation is assumed to be limited to landscapes dominated by subalpine fir or colder habitat series.

Entic Cryandepts, medial skeletal, mixed-

These soils formed in a 14 to 33 inch thick volcanic ash influenced loess overlaying material derived from moderately and weakly weathered metasedimentary bedrock. They occur on steep glaciated mountain slopes and troughwalls, and support subalpine forests. They range in elevation from 4,400 to 7,500 feet and receive 55 to 90 inches of average annual precipitation. These soils are named as major soils in map units 41QA and 48QA. They occur in complex with Cryandepts in one other map unit. See soil description **#12**.

Entic Cryandepts, medial/loamy skeletal, mixed-

These soils formed in a 14 to 20 inch thick volcanic ash influenced loess overlaying material derived from moderately and weakly weathered metasedimentary bedrock and glacial till deposits. They occur in cirque and nivational basins and glacial valleys, and support subalpine and upper subalpine forests. They range in elevation from 4,800 to 6,700 feet and receive 45 to 80 inches of average annual precipitation. These soils are named as major soils in map units 42QA, 43QA, 46OA, and 47OA. See soil description **#13**.

Lithic Cryandepts, medial skeletal, mixed-

These soils formed in a 6 to 16 inch thick volcanic ash influenced loess overlaying weakly weathered metasedimentary bedrock. These soils occur on steep glaciated mountain slopes and support subalpine and upper subalpine forests. They range in elevation from 4,400 to 6,600 feet and receive

55 to 65 inches of average annual precipitation. These soils are named as major soils only in map unit 41QA. They occur in complex with Entic Cryandepts in that map unit. See soil description **#14**.

VITRANDEPTS

These are the cool Andepts. They are dominated by grand fir habitat types.

Typic Vitrandepts, medial/loamy skeletal, mixed, frigid-

These soils formed in 14 to 25 inch thick volcanic ash influenced loess overlaying material derived from moderately and weakly weathered metasedimentary bedrock. They occur on steep, dissected stream breaklands and glacial troughwalls, and support moist, mixed coniferous forests. They range in elevation from 3,600 to 6,500 and receive 45 to 65 inches of average annual precipitation. They are named as major soils in map units 48QA, 60MD, 60QD, 61MD, and 61QD. See soil description **#15.**

AQUEPTS

In this survey area, these are cool to cold, wet soils. They formed in alluvial deposits and volcanic influenced loess over glacial till deposits. These soils are poorly-drained and have year-round water tables and mottles throughout the profile.

Soils formed in alluvial deposits in stream bottoms support warm and cool forested riparian communities. Elevation ranges from 2,800 feet to 5,400 feet and precipitation ranges from 20 to 40 inches annually, with colder vegetal communities and higher precipitation occuring at the higher elevations.

Soils formed in glacial till occur along slow moving streams, near ponded areas, and in the concave depressions of rolling hills in wide glaciated valleys. These soils support wet vegetation including bluejoint, sedge, aspen, and spruce. They occur at elevations from 3,600 to 4,600 feet and receive 25 to 35 inches of average annual precipitation.

Aquepts are named as major soils in map units 10UA, 10UB, 10UC, 72BA, and 72OA. They occur in complex with Eutrochrepts, Cryochrepts, and Eutroboralfs in three map units. See soil description **#16**.

OCHREPTS

In this survey area, these are cool to cold, dry to wet soils. They have moderate subsoil developement, and formed in every parent material present within the survey area except volcanic bedrock.

CRYOCHREPTS

These are the cold Ochrepts. The Cryic temperature regime is assumed to be limited to landscapes dominated by subalpine fir or colder habitat series.

Andic Cryochrepts, loamy skeletal, mixed-

These soils formed in a 7 to 14 inch thick volcanic ash influenced loess overlaying glacial till deposits or material derived from slightly or moderately weathered metasedimentary bedrock. These soils occur on a number of landforms including stream terraces, moderate relief mountain slopes, frost-churned ridgetops, glacial landforms, and steep dissected stream breaklands. Soils on frost-churned ridgetops have coarse fragment contents that occupy the higher end of the range for this class, and may have fragmental layers. These soils support subalpine and upper subalpine forests, occur at elevations from 2,800 to 7,800 feet, and receive 20 to 80 inches of average annual precipitation. They are named as major soils in many map units. These Cryochrepts occur in association with other Cryochrepts and Eutrochrepts, and in complex with Cryumbrepts, Eutroboralfs, other Cryochrepts, and Eutrochrepts in several additional map units. See soil description **#17.**

Aquic Cryochrepts-
These soils formed in glacial till deposits. These soils are seasonally saturated but lack the gray colors (gleying) indicative of wet conditions. It is thought that the typical reducing environment common in wet soils is not present because of highly aerated water passing through these soils. Red mottles are present in the B and C horizons. These soils occur on high elevation undulating uplands and on flat glacial outwash plains. They support moist forest openings and cool forested riparian community types. They range in elevation from 3,200 to 6,800 feet and receive 25 to 60 inches of average annual precipitation. These soils are named as major soils in map units 38QA and 73UB. These Cryochrepts occur in complex with Andic Cryochrepts and Aquepts. See soil description **#18.**

Typic Cryochrepts, loamy skeletal, mixed-
These soils formed in material derived from moderately and weakly weathered metasedimentary bedrock. These soils occur on frost-churned ridgetops, and support grassy balds and some subalpine fir forest in the eastern portion of the survey area. These soils range in elevation from 5,800 to 7,000 feet and receive 40 to 65 inches of average annual precipitation. They are named as a major soil in map unit 32QD. See soil description **#19.**

EUTROCHREPTS
These are the cool Ochrepts.

Andic Dystric Eutrochrepts, loamy skeletal, mixed, frigid-
These soils formed in a 7 to 14 inch thick volcanic ash influenced loess overlaying material derived from moderately weathered and weakly weathered metasedimentary bedrock. They support dry, mixed coniferous; moist, mixed coniferous; and cool, somewhat dry Douglas-fir forests. These soils are named as major soils in many map units. They occur in association with Cryochrepts, Ustochrepts, and Eutroboralfs; and in complex with Xerochrepts, Eutroboralfs, Eutrochrepts, Cryochrepts, and Aquepts. See soil description **#20.**

Dystric Eutrochrepts, loamy skeletal, mixed, frigid-
These soils formed in material derived from moderately weathered metasedimentary and weakly weathered metasedimentary bedrock. The surface to approximately an 8-inch depth can contain slightly ash influenced loess. Ash content is too impure for Andic classification. These soils occur on moderate relief mountain slopes and steep dissected stream breaklands; and support dry, mixed coniferous; moist, mixed coniferous; and cool, somewhat dry Douglas-fir forests. They are predominately on southerly aspects. These soils range in elevation from 4,000 to 6,000 feet and receive 25 to 50 inches of average annual precipitation. They are named as major soils in many map units. They occur in association with Cryochrepts and in complex with Eutrochrepts in several map units. See soil description **#21.**

Typic Eutrochrepts, loamy skeletal, mixed, frigid-
These soils formed in material derived from moderately weathered metasedimentary and sedimentary bedrock. They are associated with calcareous argillite, limestones, and dolomites. These soils occur on moderate relief and steep mountain slopes; and support dry, mixed coniferous forests as well as some moist, mixed coniferous forests. They range in elevation from 3,800 to 5,500 feet and receive 20 to 45 inches of average annual precipitation. These soils are named as major soils in map

units 30Bβ, 30MC, and 64MC. They occur in complex with Eutrochrepts and Eutroboralfs in two map units. See soil description **#22**.

USTOCHREPTS
These are the cool, marginally moist/dry Ochrepts.

Andic Ustochrepts, sandy skeletal, mixed, frigid-
These soils formed in a 8 to 14 inch thick volcanic ash influenced loess overlaying alluvial deposits, or in material derived from moderately and weakly weathered metasedimentary bedrock. They occur on stream terraces and glacial outwash plains, and support dry Douglas-fir forests. These soils range in elevation from 2,800 to 4,800 feet and receive 20 to 35 inches of average annual precipitation. They are identified as major soils in map units 13UA and 73UA. See soil description **#23**.

Typic Ustochrepts, loamy skeletal, mixed, frigid-
These soils formed in material derived from weakly and moderately weathered metasedimentary bedrock. Some of these soils have surface horizons that are mixed with volcanic ash influenced loess. Many of these soils have calcic horizons within 45 inches of the soil surface. These soils occur on a variety of landforms including stream terraces, dissected footslopes, moderate relief mountain slopes, and steep stream breaklands. They support dry Douglas-fir forests. These soils range in elevation from 2,800 to 5,000 feet and receive 20 to 35 inches of average annual precipitation. These soils are named as major soils in many map units. They occur in complex with other Ustochrepts, Eutroboralfs, Udorthents, and Xerochrepts. They also occur in association with Eutrochrepts. See soil descriptionS **#24** and **#25**.

NOTE: Soils that were originally classified as Udic Ustochrepts have been combined with these Typic Ustochrepts due to recent changes in Soil Taxonomy (Soil Survey Staff 1975). Two soil descriptions are provided because profiles in this combined class can have two distinct appearances. The major difference is the presence or absence of carbonate accumulation. The calcic property (carbonate accumulation) that was used to identify Udic Ustochrepts has been replaced with temperature regime characteristics that do not occur on the Lolo National Forest.

Typic Ustochrepts, coarse silty, mixed, frigid-
These soils formed in material derived from fine sandy to silty lacustrine deposits originating from Glacial Lake Missoula. They occur on benches and rolling foothills near the Clark Fork River, and support dry Douglas-fir forests and dry, mixed coniferous forests. These soils range in elevation from 2,800 to 4,400 feet and receive 15 to 25 inches of average annual precipitation. They are isolated soils and occur only in map unit 14XA. See soil description **#26**.

XEROCHREPTS
These are the cool, dry Ochrepts.

Calcixerollic Xerochrepts, loamy skeletal, mixed, frigid-
These soils formed in material derived from moderately weathered metasedimentary bedrock, and are associated with calcareous argillite and limestones. They occur on moderate relief mountain slopes and steep, dissected stream breaklands, and support open-grown forests. These soils range in elevation from 3,000 to 5,000 feet and receive 15 to 30 inches of average annaul precipitation. They are named as major soils in map units 30MA, 60MA, 61MC, and 64MA. They occur in association with Haploxerolls and in complex with Xerochrepts. See soil description **#27**.

Typic Xerochrepts, loamy skeletal, mixed, frigid-
These soils formed in material derived from weakly and moderately weathered metasedimentary bedrock. Some of these soils have surface horizons that are mixed with volcanic ash influenced loess. These mixed surface horizons have silt loam textures and 5 to 15 percent coarse fragments. These soils occur on moderate relief to steep mountain slopes and stream breaklands, and support open-grown forests and dry Douglas-fir forests. These soils range in elevation from 3,000 to 4,800 feet and receive 20 to 30 inches of average annual precipitation. They are named as major soils in map units 30QA, 60MA, 60QA, and 64QA. These soils occur in association with Haploxerolls and in complex with Xerochrepts in two map units. See soil description **#28**.

UMBREPTS

In this survey area, these are cold, moist soils. They formed in weakly weathered metasedimentary, moderately weathered granitic, and mica schist bedrock. The umbric horizons in these soils have 9 to 15 percent organic matter content, an average cation exchange capacity (CEC) of 35 meq/100 gms. of soil, and an average water holding capacity of 47 percent at 1/3 bar. In comparison, the subsoils have a CEC range of 6 to 8 meq/100 gms of soil and a range of water holding capacity from 8 to 14 percent at 1/3 bar.

CRYUMBREPTS

These are the cold Umbrepts. The cryic temperature regime is assumed to be limited to landscapes dominated by subalpine fir or colder habitat series. These soils support subalpine fir forests.

Andic Cryumbrepts-
These soils formed in an organic matter rich, volcanic ash influenced loess overlaying material derived from glacial till deposits, or in moderately or weakly weathered metasedimentary bedrock. Moderately coarse textures are most common in soils from weakly weathered metasedimentary bedrock. Organic matter ranges from 8 to 15 percent in the umbric epipedon. These soils occur on high elevation undulating uplands, and glacial and nivational basins, and they support moist forest openings in a mosaic of subalpine fir forests. These soils range in elevation from 4,500 to 6,800 feet and receive 55 to 90 inches of average annual precipitation. They are named as major soils in map units 38KA, 42QA, 43QB, and 43SA. These soils occur in complex with Cryochrepts in two map units. See soil description **#29**.

MOLLISOLS

XEROLLS

In this survey area, Xerolls are cool, dry soils. They formed in moderately to weakly weathered metasedimentary and moderately weathered granitic bedrock. They have mollic surface horizons with 4 to 14 percent organic matter content, an average CEC of 20 meq/gms of soil, and an average water holding capacity of 29 percent at 1/3 bar. In comparison, the subsoils have a CEC range of 6 to 12 meq/100 gms of soil and a range of water holding capacity from 8 to 22 percent at 1/3 bar.

HAPLOXEROLLS
These are Xerolls without calcic, clay accumulated, or hardpan horizons.

Typic Haploxerolls, loamy skeletal, mixed, frigid-
These soils have dark, mixed organic surface horizons that are 5 to 17 inches thick. They formed in material derived from weakly and moderately weathered metasedimentary bedrock. These soils occur on moderate relief to steep mountain slopes and support open grown forests and grasslands. They range in elevation from 3,000 to 5,000 feet and receive 20 to 30 inches of annual precipitation. These soils are named as major soils in map units 30QA, 64MA, and 64QA. They occur in association with Xerochrepts in two map units. See soil description **#30.**

SOIL DESCRIPTIONS FOR THE LOLO NATIONAL FOREST

Soils occur in nature as a continuum. Therefore, soils with the same taxonomic classification vary from site to site due to small or large differences in soil forming processes. This is particularly true in mountainous terrain. In this survey, soils have been classified down to the family level only where soil properties differ significantly. The following descriptions are provided as examples of the central concept for each major soil.

Each of the following soil descriptions includes a reference pedon, location and setting discussion, and specific horizon characteristics. Reference pedons exemplify the central concept of the major soils. A range of characteristics are included to illustrate deviations that have been described in similar reference soils. Horizon characteristics give detailed descriptions of physical and chemical properties for the soil pedon.

These soil descriptions are provided to give the LSI user more specific information than was provided in the General Properties section. Primary descriptive properties are defined below as an aid to using these profiles. See Appendix C for additional soil property information. (These soils are described according to standards set by the Soil Conservation Service.)

Horizon: A soil profile appears as a series of layers or horizons. These descriptions are written to standards defined by the Soil Conservation Service. Horizons represent varying soil developement activity throughout the profile. Each horizon is represented by a letter which indicates a specific developement process. Some letters are preceeded or followed by a number, occur in combination with another letter, or are followed by a small case letter. Respectively, this indicates multiple similar horizons, a change of parent material, a horizon with similar properties to the overlying and underlying horizons, and special characteristics of that horizon. The primary horizon designations in the following soil descriptions are O, A, E, Bo, Bw, Bg, Bt, Bk, C, and Cr or combinations of these. The following is an abbreviated listing of these horizons and their general features.

O This is always a surface horizon composed of organic matter in stages of decomposition.

A This is typically a surface horizon. It has organic matter encorporated into it giving it a dark color (also a crumb-like texture). It differs from the O in that it is a mineral soil horizon.

E This is frequently a surface horizon in forest soils. It is light colored due to leaching out of organic matter, minerals, and clays.

Bo This is often a surface horizon and represents Mt. Mazama ash (Volcanic influenced loess).It sometimes has and A or E horizon developed above it. When unmixed with subsoil, it has a very distinctive light texture, reddish color when wet, and silty loam texture.

Bw This is a subsoil horizon which has no outstanding characteristic.

Bg This is a subsoil horizon which has standing water during part or all of the year. It has reddish or bluish "mottles" due to decomposition or oxidation of iron.

Bt This is a subsoil horizon which has accumulation of clay particles.

Bk This is a subsoil horizon which has accumulation of carbonates. The carbonates appear as white layers in the soil and/or as a white crust on the underside of coarse fragments.

C This is weathered bedrock with no apparent soil development.

Cr This is highly weathered bedrock with no apparent soil developement.

Texture: Soil occurs as a combination of fine particles(under 2mm) and coarse fragments (over 2mm). The fine portion of the soil is divided into clay, silt, and snad with respect to particle size just as coarse fragments are divided into gravel, cobble, stone, and boulder according to size. The combination of "fines" is described by adjectives such as loam, silt loam, sandy loam etc. (see the Textural Triangle in Appendix C). If coarse fragments are present in a horizon a descriptive term such as gravelly or cobbly is added to describe the dominant size by volume (see the Rock Fragment Size Classes and Content by Volume tables in Appendix C). Soil texture indicates the relative combination of soil, air, and in turn-water within the horizon.

Structure: This property indicates different developement, chemical characteristics, and in surface horizons-affects of activity within the soil profile. It is described by terms such as granular, subangular blocky, and prismatic.

Consistence: This property is sufficiently complex not to be described here other than to mention that is is described in terms such as friable, slightly sticky, and plastic.

Color, Ph, Roots, Boundary: These special characteristics are self-explanitory.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #1 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDEPTIC CRYOBORALFS
Loamy Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

E 0-2 inches - Brown (7.5YR 5/3) silt loam, pinkish gray (7.5YR 7/2) dry; moderate very fine granular structure; very friable, nonsticky and nonplastic; common fine and medium roots; abrupt discontinuous boundary.

Bo 2-8 inches - Dark brown (7.5YR 4/4) silt loam, reddish yellow (7.5YR 6/6) dry; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many fine and very fine, common medium roots; abrupt smooth boundary.

2E1 8-10 inches - Yellowish brown (10YR 5/4) loam, very pale brown (10YR 7/3) dry; moderate very fine subangular blocky structure; hard, nonsticky and slightly plastic; common very fine and fine, few medium roots; 15 percent gravel; neutral; clear smooth boundary.

2E2 10-12 inches - Brownish yellow (10YR 6/6) gravelly loam, very pale brown (10YR 7/4) dry; moderate fine subangular blocky structure; very hard, slightly sticky and slightly plastic; few very fine and fine roots; 25 percent gravel, 10 percent cobble; neutral; clear irregular boundary.

2E/B 12-20 inches - Brownish yellow (10YR 6/6) very gravelly loam, yellowish brown (10YR 5/6) dry, mixed colors; massive structure; extremely hard, sticky and slightly plastic; common thin clay films lining pores; 35 percent gravel; neutral; gradual smooth boundary.

2Bt1 20-31 inches - Yellowish brown (10YR 5/8) very gravelly silty clay loam, brownish yellow (10YR 6/6) dry; massive structure; extremely hard, very sticky and plastic; many moderately thick clay films lining pores and common thick clay films on ped faces; 35 percent gravel; slightly acid; clear smooth boundary.

3BC 31-60 inches - Brownish yellow (10YR 6/6) extremely gravelly fine sandy loam, yellow (10YR 7/6) dry; massive and single grained structure; hard, slightly sticky and nonplastic; few moderately thick clay films lining pores; few medium and fine roots; 45 percent gravel, 15 percent cobble; neutral; gradial irregular boundary.

3C 60-67 inches - Yellowish brown (10YR 5/8) very gravelly coarse sandy loam, brownish yellow (10YR 6/6) dry; single grain structure; friable to hard, nonsticky and nonplastic; 40 percent gravel, 15 percent cobble; neutral.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; Upper Fishtrap area; NW1/4 NE1/4 sec. 14, T. 25 N., R. 28 W.; map unit 72OA. This soil formed in volcanic ash influenced loess overlaying material derived from glacial till deposits. The slope gradient is 5 percent on a north aspect at 4,000 feet of elevation. The habitat type is subalpine fir/dwarf huckleberry.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizon has a silt loam texture, 6 to 12 percent clay, and 0 to 20 coarse fragments. This horizon has another moist color of 10YR 4/4. Some soils have a thin and often discontinuous E horizon.

The 2E horizon has a loam to silt loam texture, 12 to 20 percent clay, and 15 to 45 percent coarse fragments. This horizon has other moist colors such as 10YR 4/3 and 10YR 6/3. Some soils have 2Bw or 2E/B horizons underlying the 2E horizon.

The 2E/Bt horizon has a loam to sandy loam texture, 16 to 23 percent clay, and 35 to 55 percent coarse fragments. This horizon has few to common thin to moderately thick clay films lining pores and on ped faces. The 2E&Bt horizon has other moist mixed color such as 7.5YR 5/6.

The 2Bt horizon has a sandy clay loam to silty clay loam texture, 22 to 29 percent clay, and 35 to 45 percent coarse fragments. This horizon has few to many moderately thick to thick clay films lining pores and on ped faces. The Bt horizon is 7 to 40 inches thick and 20 to 30 inches deep. This horizon has other moist colors such as 7.5YR 4/4 and 10YR 5/6. Some soils have 2BC horizons underlying the 2Bt horizon.

The 2C or 3C horizon has a loam to coarse sandy loam texture in material derived from glacial till deposits or metasedimentary bedrock. This horizon has a silt loam texture in material derived from soft sedimentary bedrock. The 2C horizon has 12 to 30 percent clay. Soils formed from soft sedimentary bedrock occupy the higher end of the textural range. This horizon has 55 to 65 percent coarse fragments. This horizon has other moist colors such as 7.5YR 5/4 and 10YR 4/4.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #2 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC CRYOBORALFS

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 3-0 inches - Partially decomposed forest litter.

Bw1 0-11 inches - Dark brown (7.5YR 4/4) loam, light brown (7.5YR 6/4) dry; weak fine and moderate subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium, few coarse roots; 5 percent gravel; strongly acid; clear smooth boundary.

Bw2 11-21 inches - Light olive brown (2.5Y 5/4) sandy loam, light yellowish brown (2.5Y 6/4) dry; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few fine and coarse roots; 5 percent gravel; moderately acid; gradual wavy boundary.

Bt1 21-32 inches - Light olive brown (2.5Y 5/4) and dark yellowish brown (10YR 4/4) coarse sandy loam, light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few thin clay films bridging grains; common fine, few medium roots; 20 percent gravel; neutral; gradual wavy boundary.

Bt2 32-41 inches - Olive brown (2.5Y 4/4) coarse sandy clay loam, light yellowish brown (2.5Y 6/4) dry; weak fine subangular blocky structure; firm, slightly sticky and slightly plastic; few thin clay films bridging grains; few fine roots; 20 percent gravel; neutral; clear smooth boundary.

C 41-50 inches - Olive brown (2.5Y 4/4) very gravelly sandy loam, light yellowish brown (2.5Y 6/4) dry; massive structure; nonsticky and nonplastic; 40 percent gravel; mildly alkaline.

LOCATION AND SETTING: West-central Montana; Ninemile/Reservation Divide; Mill Creek; SE1/4 NW1/4 sec. 31, T. 15 .N, R. 22 W.; map unit 30PE. This soil formed in material derived from gabbroic bedrock. The slope gradient is 35 percent on a north aspect at 5,120 feet of elevation. The habitat type is subalpine fir/fool's huckleberry.

RANGE OF HORIZON CHARACTERISTICS: The Bw horizons have a loam to sandy loam texture, 8 to 20 percent clay, and 5 to 60 percent coarse fragments. These horizons have other moist colors such as 10YR 5/4 and 10YR 4/4. Some soils have an E or shallow A horizon.

The Bt horizons have loam, clay loam, and sandy clay loam textures, 20 to 37 percent clay, and 20 to 50 percent coarse fragments. These horizons have few thin to many moderately thick clay films lining pores, on ped faces, and bridging grainches These horizons have another moist color of 10YR 5/4.

The C horizon has a loam to sandy loam texture and 45 to 75 percent coarse fragments. This horizon has another moist color of 10YR 5/6. Depth to this horizon is 40 to 60 inches.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #3 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

MOLLIC EUTROBORALFS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

A 0-4 inches - Very dark gray (10YR 3/1) very gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; nonsticky and slightly plastic; many fine and medium roots; 50 percent gravel; moderately alkaline; clear smooth boundary.

E1 4-13 inches - Brown (10YR 5/3) very gravelly loam, light gray (10YR 7/2) dry; moderate fine subangular blocky structure; slightly sticky and slightly plastic; many fine and medium and few coarse roots; 45 percent gravel; mildly alkaline; clear smooth boundary.

E2 13-29 inches - Grayish brown (2.5Y 5/2) very cobbly loam, light gray (2.5Y 7/2) dry; weak fine subangular blocky structure; slightly sticky and slightly plastic; common fine and medium roots; 25 percent gravel, 30 percent cobble; mildly alkaline; diffuse irregular boundary.

E/Bt 29-40 inches - Olive (5Y 5/3) very gravelly loam, pale yellow (5Y 7/3) dry; weak fine subangular blocky structure; slightly sticky and slightly plastic; few fine roots; few moderately thick clay films lining pores; 40 percent gravel, 5 percent cobble; neutral; clear wavy boundary.

C 40-66 inches - Olive (5Y 5/3) very gravelly loam, pale yellow (5Y 7/3) dry; weak fine subangular structure; slightly sticky and slightly plastic; 40 percent gravel; 5 percent cobble; slightly acid.

R 66 inches - Non-calcareous argillite bedrock.

LOCATION AND SETTING: West-central Montana; Coeur D'Alene Mountains; West Fork Swamp Creek drainage; NW1/4 SW1/4 sec. 22, T. 20 N., R. 27 W.; map unit 64MB. This soil formed in material derived from moderately weathered metasedimenttary bedrock from the Wallace formation. The slope gradient is 55 percent on a south aspect at 3,680 feet of elevation. The habitat type is Douglas-fir/ninebark-pinegrass.

RANGE OF HORIZON CHARACTERISTICS: The A horizon is 4 inches thick or greater. This horizon has a silt loam to loam texture, 10 to 22 percent clay, and 20 to 50 percent coarse fragments. The A horizon has other moist colors such as 10YR 3/2 and 10YR 2/1. Mixed soil colors to 7 inches are typically 10YR 3/3 moist and 10YR 5/3 dry.

The E and Bw horizons have silt loam to loam textures, 13 to 20 percent clay, and 40 to 55 percent coarse fragments. These horizons have other moist colors such as 7.5YR 5/3 and 10YR 4/3.

The Bt horizon has a silty clay loam to loam texture, 22 to 28 percent clay, and 40 to 75 percent coarse fragments. These horizons have clay lamellae to few moderately thick clay films lining pores and on ped faces. This horizon has other moist colors such as 7.5YR 6/4 and 10YR 4/3. Some soils have a an E/Bt horizon above or in place of the Bt horizon.

The C horizon has a loam texture, 15 to 18 percent clay, and 30 to 80 percent coarse fragments. Depth to bedrock is 3 to 5 feet.

~~~~~~~~~~~ SOIL DESCRIPTION #4 ~~~~~~~~~~~

TYPIC EUTROBORALFS
Clayey Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

Bo 0-12 inches - Strong brown (7.5YR 4/6) silt loam, dark brown (7.5YR 4/4) dry; weak medium subangular blocky structure; very friable, nonsticky and slightly plastic; many fine and medium, common coarse roots; neutral; abrupt smooth boundary.

2E 12-17 inches - Brown (7.5YR 5/3) gravelly silt loam, pink (7.5YR 7/4) dry; weak fine subangular blocky structure; hard, slightly sticky and slightly plastic; common medium, few fine roots; 20 percent gravel; neutral; abrupt irregular boundary.

2Bt1 17-33 inches - Dark yellowish brown (10YR 4/4) very gravelly silty clay loam, yellowish brown (10YR 5/4) dry; moderate fine prism structure; extremely hard, sticky and plastic; common fine and medium roots; many thin clay films on ped faces and lining pores; 30 percent gravel, 5 percent cobble; mildly alkaline; gradual wavy boundary.

2Bt2 33-41 inches - Dark yellowish brown (10YR 4/4) very gravelly clay loam, yellowish brown (10YR 5/4) dry; massive structure; extremely hard, sticky and plastic; common medium, few fine roots; few thin clay films lining pores; 40 percent gravel, 5 percent cobble; moderately alkaline; clear smooth boundary.

2BkC 41-75 inches - Yellowish brown (10YR 5/4) very gravelly sandy clay loam, light yellowish brown (10YR 6/4) dry; massive structure; extremely hard, slightly sticky and slightly plastic; few fine roots; slightly effervescent; 45 percent gravel, 10 percent cobble; moderately alkaline; abrupt wavy boundary.

2R 75 inches - Limestone bedrock.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; Fishtrap Creek drainage; NW1/4 SW1/4 sec. 27, T. 25 N., R. 28 W.; map unit 72BA. This soil formed in volcanic ash influenced loess over thick glacial till derived from sedimentary bedrock. The slope gradient is 35 percent on an east aspect at 4,080 feet of elevation. The habitat type is grand fir/twinflower-beargrass.

These soils formed in volcanic ash influenced loess overlaying thick glacial till derived from valley fill, moderately weathered metasedimentary bedrock, and sedimentary bedrock. Lower substrata in some soils formed in glacial outwash. These soils support moist, mixed coniferous forests; cool, somewhat dry Douglas-fir forests; and sub-alpine forests below 4,800 feet.

RANGE OF HORIZON CHARACTERISTICS: Most soils have a Bo horizon which is up to 13 inches thick. This horizon has a silt loam texture, 8 to 11 percent clay, and 0 to 5 percent coarse fragments.

The 2E horizon has a silt loam to loam texture, 18 to 25 percent clay, and 15 to 35 percent coarse fragments. This horizon has other moist colors such as 10YR 4/3 and 10YR 4/4. E horizons occur where volcanic ash influenced loess is mixed into the surface horizon.

The 2Bt horizons have silty clay, silty clay loam, and sandy clay textures. The 2Bt horizons average 34 to 45 percent clay with some thin horizons having 25 to 34 percent clay. These horizons have 35 to 65 coarse fragments. The Bt horizons are 6 to 12 inches thick and 14 to 18 inches deep. Clay films are few to many and thin to moderately thick on ped faces and lining pores. Where multiple Bt horizons occur, the lower horizon may have less clay and is slightly to strongly effervescent.

2BkC horizons formed in glacial till derived from limestone bedrock have clay loam or sandy clay loam textures and 23 to 30 percent clay. 2BkC horizons formed in glacial outwash have loamy sand and sandy loam textures with 4 to 10 percent clay. The 2BkC horizons have 35 to 70 percent coarse fragments and are slightly to violently effervescent. These horizons have another moist color of 10YR 4/3. 2BkC horizons do not occur in glacial till from noncalcareous red shales, argillites, and siltites.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #5 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC EUTROBORALFS
Fine Loamy, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

0 — 1-0 inches - Partially decomposed forest litter.

E — 0-11 inches - Brown (10YR 5/3) gravelly silt loam, light gray (10YR 7/2) dry; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; 10 percent gravel, 5 percent cobble; moderately acid; abrupt wavy boundary.

E/Bt — 11-19 inches - Brown (10YR 5/3) and pale brown (10YR 6/3) gravelly very fine sandy loam, light gray (10YR 7/2) and very pale brown (10YR 7/3) dry; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common medium, fine, and very fine, few coarse roots; few thin clay films on ped faces; 10 percent gravel, 5 percent cobble; moderately acid; clear wavy boundary.

Bt1 — 19-32 inches - Pale brown (10YR 6/3) gravelly silty clay loam, very pale brown (10YR 7/3) dry; strong medium angular blocky to weak fine prism structure; slightly hard, friable, sticky and plastic; common fine and medium, few coarse roots; few thin clay films on ped faces and lining pores; 15 percent gravel, 10 percent cobble; moderately acid; gradual wavy boundary.

Bt2 — 32-48 inches - Brownish yellow (10YR 6/6) cobbly silty clay loam, very pale brown (10YR 7/4) dry; strong fine and medium angular blocky structure; firm, sticky and plastic; few very fine, fine, and medium roots; common thin clay films on ped faces and lining pores; 15 percent gravel, 20 percent cobble; strongly acid.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; Cabin Creek drainage; SW1/4 SW1/4 sec. 5, T. 22 N., R. 25 W.; map unit 15JA. This soil formed in valley fill deposits. The slope gradient is 21 percent on a west aspect at 4,440 feet of elevation. The habitat type is Douglas-fir/twinflower-pinegrass.

RANGE OF HORIZON CHARACTERISTICS: The E horizon has a silt loam to sandy clay loam texture, 10 to 21 percent clay, and 5 to 30 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 4/4. Some soils have E horizons that are mixed with volcanic ash influenced loess. These soils represent the lower range of clay percent. Some soils on northerly slopes have a more pure volcanic ash influenced loess layer which is up to 10 inches thick and designated as a Bo horizon.

The E/Bt horizons have a sandy loam to silty clay loam texture, 15 to 30 percent clay, and 10 to 25 coarse fragments. Some of these horizons have few to many, thin to moderately thick clay films on ped faces. Other moist colors for this horizon are 10YR 5/5 for the E and 10YR 5/4 for the Bt.

The Bt horizons have sandy clay loam to silt loam textures, 20 to 34 percent clay, and 5 to 35 percent coarse fragments. This horizon has other moist colors such as 10YR 5/6 and 10YR 6/5. The Bt horizon is 19 to 36 inches deep and 8 to 29 inches thick. Clay films range from few and thin to many and thick on ped faces and lining pores.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #6 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC EUTROBORALFS
Fine Silty, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

0 1-0 inches - Partially decomposed forest litter.

E1 0-3 inches - Dark brown (7.5YR 4/2) silt loam, pinkish gray (7.5YR 6/2) dry; weak fine granular structure; very friable, nonsticky and slightly plastic; few medium and fine roots; moderately acid; abrupt smooth boundary.

E2 3-9 inches - Dark brown (7.5YR 4/2) silt loam, pinkish gray (7.5YR 6/2) dry; strong fine and medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; common medium, few coarse and fine roots; slightly acid; abrupt wavy boundary.

E/Bt 9-16 inches - Light brown (7.5YR 6/3) and brown (7.5YR 5/3) silt loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) dry; moderate fine angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and fine roots; few to common thin clay films lining pores; slightly acid; abrupt wavy boundary.

Bt/E 16-26 inches - Brown (7.5YR 5/3) and dark brown (7.5YR 4/4) silt loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) dry; moderate fine and medium prism to strong fine angular blocky structure; hard, firm, sticky and plastic; few medium roots; many thick clay films on ped faces; neutral; clear wavy boundary.

Bt 26-32 inches - Dark brown (7.5YR 4/4) silty clay loam, light brown (7.5 6/3) dry; strong fine prism structure; very hard, very firm, very sticky and plastic; few medium and fine roots; many thick clay films on ped faces and lining pores; moderately alkaline; abrupt smooth boundary.

C 32-44 inches - Brown (7.5YR 5/4) silt loam, light brown (7.5YR 6/4) dry; massive structure; soft, friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

LOCATION AND SETTING: West-central Montana; Bitteroot Mountains; tributary to Clark Fork River, Cold Creek drainage; NE1/4 SW1/4 sec. 5, T. 17 N., R. 27 W.; map unit 14JB. This soil formed in lacustrine deposits. The slope gradient is 5 percent on a north aspect at 2,800 feet of elevation. The habitat type is grand fir/queencup beadlily.

RANGE OF HORIZON CHARACTERISTICS: The E horizon has a silt loam to loam texture and 10 to 18 percent clay. This horizon has other moist colors such as 10YR 6/3 and 10YR 5/4. Some soils have A horizons.

The E/Bt horizon has a loam to silty clay loam texture and 20 to 40 percent clay. This horizon has other moist colors such as 10YR 7/2 for the E and 10YR 5/4 for the Bt. This horizon has few to common, thin to moderately thick clay films on ped faces and lining pores.

The Bt/E horizon has a silt loam to silty clay loam texture and 20 to 36 percent clay. Other moist colors such as 10YR 5/4 for the Bt and 10YR 6/4 do occur for the E horizon. This horizon has common to many, moderately thick to thick clay films lining pores. Some soils do not have this horizon.

The Bt horizon has a silt loam to silty clay loam texture, 23 to 36 percent clay, and 0 to 5 percent coarse fragments. This horizon has other moist colors such as 10YR 6/4 and 7.5YR 5/4. The Bt horizon is 14 to 37 inches deep and 6 to 12 inches thick. Clay films range from few and thin to many and thick on ped faces and lining pores.

The C horizon has a silt loam texture, 22 to 25 percent clay, and 0 to 5 percent coarse fragments. This horizon has other moist colors such as 7.5YR 5/6 and 7.5YR 6/6. Depth is 26 to 59 inches. Some soils have C horizons that are strongly to violently effervescent.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #7 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC EUTROBORALFS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

E — 0-10 inches - Dark yellowish brown (10YR 4/4) very gravelly silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine, common medium roots; 35 percent gravel; abrupt wavy boundary.

Bt — 10-30 inches - Yellowish brown (10YR 5/6) very gravelly silt loam, yellow (10YR 7/6) dry; moderate medium subangular blocky structure; friable, sticky and slightly plastic; common fine, few coarse roots; common thin clay films lining pores; 40 percent gravel; abrupt wavy boundary.

Bk — 30-48 inches - Brown (10YR 5/3) gravelly silt loam, light gray (10YR 7/2) dry; massive structure; friable, slightly sticky and slightly plastic; violently effervescent; 30 percent gravel; clear wavy boundary.

Cr — 48 inches - Very gravelly silt loam; massive structure; firm, slightly sticky and slightly plastic; violently effervescent; 40 percent gravel.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Flat Creek drainage; SW1/4 SE1/4 sec. 18, T. 17 N., R. 25 W., map unit 64MC. This soil formed in moderately weathered metasedimentary bedrock. The slope gradient is 65 percent on a west aspect at 5,120 feet of elevation. The habitat type is Douglas-fir/ninebark-ninebark.

RANGE OF HORIZON CHARACTERISTICS: Some soils on northerly aspects or undulating terrain have Bo horizons. The Bo may be up to 14 inches thick with thin A or E horizon development. Thicker Bo horizons occur in western portions of the survey area.

The E or 2E horizon has a silt loam to loam texture, 10 to 22 percent clay, and 20 to 40 percent coarse fragments. This horizon has other moist colors such as 10YR 3/6 and 10YR 5/4. Some soils have E/Bt horizons underlying the E horizon.

The Bt horizon has sandy clay loam, silt loam, and silty clay loam textures, 20 to 27 percent clay, and 35 to 40 percent gravel. Bt horizons formed in glacial till deposits also have 5 to 10 percent cobble and are in the upper end of the percent-clay range. Bt horizons formed in valley fill deposits have 15 to 40 percent gravel with 20 to 60 percent cobble.

Many soils derived from moderately weathered metasedimentary bedrock have Bk or BkC horizons underlying the Bt horizon. These horizons have loam to silt loam textures, 14 to 20 percent clay, and 20 to 40 percent coarse fragments. These horizons are slightly to violently effervescent. Soils formed in valley fill or glacial till lack this horizon.

Cr horizons formed from highly weathered bedrock. This horizon is absent in soils derived from valley fill or glacial till.

BC and C horizons from valley fill and glacial till deposits have 60 to 80 percent coarse fragments. BC and C horizons derived from moderately weathered metasedimentary bedrock have 35 to 55 percent coarse fragments. These horizons have loam to clay loam textures and 16 to 28 percent clay.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #8 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDEPTIC UDORTHENTS
Sandy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 2-0 inches - Partially decomposed forest litter.

Bo 0-9 inches - Dark yellowish brown (10YR 4/4) very gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; nonsticky and nonplastic; many very fine, fine, and medium roots; 25 percent gravel, 10 percent cobble; abrupt smooth boundary.

2C1 9-18 inches - Brown (10YR 5/3) extremely gravelly coarse sandy loam, pale brown (10YR 6/3) dry; single grain structure; loose, nonsticky and nonplastic; many very fine, common fine roots; 55 percent gravel, 5 percent cobble; abrupt smooth boundary.

2C2 18-48 inches - Yellowish brown (10YR 5/4) extremely gravelly coarse loamy sand, light yellowish brown (10YR 6/4) dry; single grain structure; loose, nonsticky and nonplastic; few fine roots; 60 percent gravel, 25 percent cobble; clear smooth boundary.

2C3 48 inches - Brown (10YR 5/3) extremely gravelly coarse loamy sand, pale brown (10YR 6/3) dry; single grain structure; loose, nonsticky and non plastic; 40 percent gravel, 10 percent cobble, 20 percent stone.

LOCATION AND SETTING: West-central Montana; tributary to Clark Fork River, Eddy Creek; center S1/2 sec. 1, T. 20 N., R. 28 W.; map unit 16UA. This soil formed in volcanic ash influenced loess overlaying sandy alluvial deposits. The slope gradient is 10 percent on a west aspect at 3,000 feet of elevation. The habitat type is grand fir/twinflower.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizon has a silt loam texture, 6 to 8 percent clay, and 10 to 25 percent coarse fragments. The Bo horizon has other moist colors such as 10YR 3/6 and 7.5YR 3/4. Some soils have a shallow A horizon which is similar to the Bo horizon in texture, coarse fragments, and percent clay content.

The C1 horizon has a sandy loam texture, 2 to 10 percent clay, and 40 to 60 percent coarse fragments. This horizon has other moist colors such as 10YR 5/2 and 10YR 5/4.

Lower C horizons have coarse sandy loam to sand textures, 1 to 8 percent clay, and 60 to 90 percent coarse fragments. This horizon has other moist colors such as 10YR 4/4 and 2.5Y 5/2 with variably colored sand grainches Depth to these horizons is 18 to 22 inches.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #9 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

LITHIC USTORTHENTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A — 0-3 inches - Very dark gray (10YR 3/1) very gravelly loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; very friable, slightly sticky and slightly plastic; many very fine and fine roots; 55 percent gravel; abrupt smooth boundary.

Bw — 3-10 inches - Brown (10YR 5/3) extremely gravelly sandy loam, very pale brown (10YR 7/3) dry; single grain structure; friable, nonsticky and nonplastic; many very fine and fine roots; 70 percent gravel; clear smooth boundary.

Cr — 10-14 inches - Highly fractured quartzite rock; fragmental.

R — 14 inches - Bedrock.

LOCATION AND SETTING: West-central Montana; tributary to Clark Fork River, Trout Creek; SE1/4 NE1/4 sec. 14, T. 16 N., R. 26 W.; map unit 22UA. This soil formed in material derived from weakly weathered metasedimentary bedrock. The slope gradient is 15 percent on a southeast aspect at 3,600 feet of elevation. The habitat type is Douglas-fir/pinegrass.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam to sandy loam texture, 10 to 14 percent clay, and 30 to 85 percent coarse fragments. This horizon has other moist colors such as 10YR 3/2 and 10YR 3/3. The A horizon is less than 6 inches thick.

The Bw horizon has a silt loam to sandy loam texture, 8 to 14 percent clay, and 55 to 90 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 6/4.

The C horizon has a silt loam to sandy loam texture, less than 14 percent clay, and 60 to 95 percent coarse fragments. This horizon has moist colors similar to the Bw horizon. Depth to this horizon is from 9 to 14 inches. Some soils do not have C horizons. Depth to bedrock is from 12 to 20 inches.

~~~~~~~~~~ SOIL DESCRIPTION #10 ~~~~~~~~~~

TYPIC XERORTHENTS
Sandy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A 0-4 inches - Very dark gray (10YR 3/1) sandy loam, light gray (10YR 7/2) dry; moderate fine subangular blocky structure; friable, nonsticky and nonplastic; common fine, few medium roots; 10 percent gravel; neutral; abrupt smooth boundary.

C1 4-8 inches - Brown (10YR 5/3) gravelly sandy loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; loose, nonsticky and nonplastic; few fine roots; 15 percent gravel; neutral; clear smooth boundary.

C2 8-20 inches - Yellowish brown (10YR 5/4) extremely gravelly loamy sand, light yellowish brown (10YR 6/4) dry; single grained structure; loose, nonsticky and nonplastic; many coarse, common fine roots; 65 percent gravel; slightly acid; clear smooth boundary.

C3 20-30 inches - Variably colored sand grains; extremely gravelly sand; single grained structure; loose, nonsticky and nonplastic; few very fine roots; 65 percent gravel; slightly acid; clear smooth boundary.

C4 30-44 inches - Variably colored sand grains; extremely gravelly sand; single grained structure; loose, nonsticky and nonplastic; 65 percent gravel; slightly acid.

LOCATION AND SETTING: West-central Montana; tributary to Clark Fork River, Sloway Gulch; center S1/2 sec. 2, T. 17 N., R. 27 W.; map unit 16UA. This soil formed in sandy alluvial deposits. The slope gradient is 30 percent on a south aspect at 3,440 feet of elevation. The habitat type is Douglas-fir/rough fescue.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a sandy loam texture, 6 to 10 percent clay, and 10 to 50 percent coarse fragments. This horizon has other moist colors such as 10YR 3/3 and 10YR 4/3.

The C horizons have sandy loam to sand textures, less than 8 percent clay, and 15 to 70 percent coarse fragments. These horizons have other moist colors such as 10YR 4/3 and 10YR 6/3. Colors become variable as textures change from sandy loam to sand. Depth to the C horizon is 4 to 11 inches.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #11 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ALFIC USTIPSAMMENTS
Coarse Loamy, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - leaf litter and organic matter.

E1 0-9 inches -Dark brown (10YR 4/3) loamy fine sand, light brownish gray (10YR 6/2) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

E2 9-24 inches - Brown (10YR 5/3) loamy fine sand, light gray (10YR 7/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and coarse roots; few fine and medium tubular pores; 3 1/2" thick lamellae; clear sand grains; slightly acid; clear smooth boundary.

E3 24-36 inches - Pale brown (10YR 6/3) loamy fine sand, light gray (10YR 7/2) dry; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine and medium tubular pores; 4 1/2" thick lamellae; clear sand grains; slightly acid; clear wavy boundary.

E&B 36-66 inches - Pale brown (10YR 6/3) and brown (10YR 5/3) loamy fine sand with fine sandy loam bands in a 1/2" to 2" thick wavy pattern, light gray (10YR 7/2) and brown (10YR 5/3) dry; massive; soft, very friable, nonsticky and nonplastic; few medium and fine roots with branching above laminae; few fine tubular pores in coherent fine sandy loam bands; common clay bridging of sand grains in bands; neutral.

LOCATION AND SETTING: West-central Montana; Clark Fork River floodplain; NW1/4 NW1/4 sec. 16, T. 17 N., R. 27 W.; map unit 14XA. This soil formed in material derived from sandy lacustrine deposits. The slope gradient is flat at 3,000 feet of elevation. The habitat type is open ponderosa pine.

RANGE OF HORIZON CHARACTERISTICS: Map unit 14XA occurs in a concentrated area mostly on private land. Alfic Ustipsamments are restricted to this map unit and were not sufficiently documented to provide a reliable range of characteristics.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #12 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ENTIC CRYANDEPTS
Medial Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

Bo1 0-8 inches - Dark brown (7.5YR 4/4) very cobbly silt loam, brown (7.5YR 5/4) dry; weak fine and medium subangular blocky structure; very friable, nonsticky and nonplastic; 15 percent gravel, 30 percent cobble; neutral.

Bo2 8-33 inches - Yellowish red (5YR 4/6) extremely cobbly silt loam, weak medium subangular blocky structure; friable, nonsticky and nonplastic; 10 percent gravel, 30 percent cobble, 25 percent stone; neutral.

2Bw 33-40 inches - Brown (10YR 5/3) extremely cobbly sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 20 percent gravel, 30 percent cobble, 25 percent stone; slightly acid.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; Corona Creek drainage; center sec. 30, T. 22 N., R. 25 W.; map unit 48QA. This soil formed in volcanic ash influenced loess overlaying material derived from Belt metasedimentary bedrock. The slope gradient is 62 percent on a northeast aspect at 5,480 feet of elevation. The habitat type is subalpine fir/fool's huckleberry.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizons have silt loam textures, 6 to 8 percent clay, and 45 to 65 percent coarse fragments. This horizon has another moist color of 10YR 4/4. Some soils have a thin A horizon.

The 2Bw horizon has a loam to sandy loam texture, 8 to 12 percent clay, and 65 to 80 percent coarse fragments. This horizon has other moist colors such as 10YR 5/3 and 2.5Y 5/4.

The 2C horizon has a sandy loam texture, 8 to 12 percent clay, and 70 to 95 percent coarse fragments. This horizon has another moist color of 2.5Y 5/4. Depth to the 2C horizon is 21 to 44 inches. Depth to bedrock is 2 to 5 feet.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #13 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ENTIC CRYANDEPTS
Medial/Loamy Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A 0-2 inches - Dark brown (7.5YR 4/3) cobbly silt loam, light brown (7.5YR 6/4) dry; weak thin platy structure; nonsticky and nonplastic; many fine, medium, and coarse roots; 15 percent cobble.

Bo1 2-9 inches - Dark brown (7.5YR 4/4) silt loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure; nonsticky and nonplastic; many very fine, fine roots.

Bo2 9-15 inches - Dark brown (7.5YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; nonsticky and nonplastic; many very fine, fine roots; 30 percent gravel.

2E 15-18 inches - Light brownish gray (10YR 6/2) extremely cobbly fine sandy loam, light gray (10YR 7/2) dry; single grain structure; nonsticky and nonplastic; few fine roots; 35 percent gravel, 40 percent cobble.

2Bw 18-35 inches - Light yellowish brown (10YR 6/4) extremely cobbly silt loam, very pale brown (10YR 7/3) dry; moderate fine subangular blocky structure; slightly sticky and slightly plastic; few fine, medium roots; 20 percent gravel, 45 percent cobble.

2C 35 inches - fractured Siltite.

LOCATION AND SETTING: West-central Montana; Coeur D'Alene Mountains; Cherry Creek drainage; SE1/4 NE1/4 sec. 33, T. 20 N., R. 28 W.; map unit 43QA. This soil formed in volcanic ash influenced loess overlaying material derived from metasedimentary bedrock. The slope gradient is 15 percent on a west aspect at 5,560 feet of elevation. The habitat type is subalpine fir/beargrass-grouse whortleberry.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizons have silt loam textures, 6 to 10 percent clay, and 0 to 30 percent coarse fragments. This horizon has other moist colors such as 10YR 5/5 and 10YR 4/4. Some soils have a shallow E horizon.

The 2E horizon has a loam to sandy loam texture, 8 to 14 percent clay, and 35 to 75 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 6/3. Some soils have 2E/B or 2B/E horizons underlying the 2E horizon.

The 2Bw horizons have silt loam to sandy loam textures, 8 to 22 percent clay, and 35 to 75 percent coarse fragments. These horizons have other moist colors such as 10YR 5/6 and 2.5Y 4/4.

~~~~~~~~~~~ SOIL DESCRIPTION #14 ~~~~~~~~~~~

LITHIC CRYANDEPTS
Medial Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

A 0-5 inches - Dark brown (7.5YR 3/3) very gravelly silt loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; nonsticky and nonplastic; many very fine and fine roots; 35 percent gravel; neutral; abrupt smooth boundary.

Bo 5-16 inches - Dark brown (7.5YR 4/4) very cobbly silt loam, light brown (7.5YR 6/4) dry; weak medium subangular blocky structure; nonsticky and nonplastic; common fine and medium roots; 5 percent gravel, 50 percent cobble; neutral; clear wavy boundary.

2BC 16-18 inches - Yellowish brown (10YR 5/4) extremely cobbly sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; nonsticky and nonplastic; common medium, few fine roots; 10 percent gravel, 60 percent cobble, 10 percent stone; slightly acid; abrupt irregular boundary.

R 18 inches - Argillite bedrock.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; tributary to Thompson River, Dearborn Creek drainage; center NW1/4 sec. 26, T. 23 N., R. 28 W.; map unit 41QA. This soil formed in volcanic ash influenced loess overlaying material derived from weakly weathered metasedimentary bedrock. The slope gradient is 75 percent on an east aspect at 5,200 feet of elevation. The habitat type is subalpine fir/sitka alder.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam texture, 6 to 8 percent clay, and 15 to 45 percent coarse fragments. This horizon has other moist colors such as 7.5YR 4/4 and 10YR 4/3. Some soils do not have an A horizon.

The Bo horizon has a silt loam texture, 6 to 8 percent clay, and 45 to 80 percent coarse fragments. This horizon has other moist colors such as 10YR 4/4 and 7.5YR 4/6. A few soils have shallow Bw horizons underlying the Bo horizon.

The 2BC or 2C horizon has a sandy loam texture, 8 to 12 percent clay, and 55 to 90 percent coarse fragments. This horizon has another moist color, 10YR 5/6.

Depth to bedrock is 10 to 23 inches.

~~~~~~~~~~~ SOIL DESCRIPTION #15 ~~~~~~~~~~~

TYPIC VITRANDEPTS
Medial/Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 3-0 inches - Partially decomposed forest litter.

A 0-4 inches - Very dark grayish brown (10YR 3/2) very gravelly sandy loam, brown (10YR 5/3) dry; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, common medium, few coarse roots; 50 percent gravel; moderately acid; abrupt smooth boundary.

Bo1 4-21 inches - Dark brown (10YR 4/3) extremely cobbly silt loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium, few coarse roots; 20 percent gravel, 45 percent cobble; neutral; abrupt smooth boundary.

Bo2 21-28 inches - Dark yellowish brown (10YR 4/4) very gravelly silt loam, very pale brown (10YR 7/4) dry; moderate fine and medium subangular blocky structure; soft, firm, nonsticky and nonplastic; common fine, few medium roots; 30 percent gravel, 5 percent cobble; moderately acid; gradual smooth boundary.

2E 28-35 inches - Yellowish brown (10YR 5/4) extremely gravelly silt loam, very pale brown (10YR 8/3) dry; weak fine subangular blocky to single grain structure; slightly hard, very friable, nonsticky and slightly plastic; few fine and coarse roots; 60 percent gravel, 5 percent cobble; slightly acid; clear smooth boundary.

2Bw 35-47 inches - Yellowish brown (10YR 5/4) extremely gravelly loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; few fine and medium roots; 65 percent gravel, 5 percent cobble; moderately acid.

LOCATION AND SETTING: West-central Montana; Bitteroot Range; tributary to Clark Fork River, Cedar Creek drainage; SE1/4 NE1/4 sec. 33, T. 16 N., R. 27 W.; map unit 60MD. This soil formed in volcanic ash influenced loess overlaying material derived from moderately weathered metasedimentary bedrock. The slope gradient is 70 percent on a west aspect at 4,000 feet of elevation. The habitat type is grand fir/twinflower-beargrass.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizon has a loam to silt loam texture, 6 to 12 percent clay, and 35 to 65 percent coarse fragments. This horizon has other moist colors such as 10YR 4/4 and 7.5YR 4/4. Some soils have 4 to 8 inch thick A horizons.

The 2E horizon has loam to sandy loam textures, 12 to 16 percent clay, and 45 to 65 percent coarse fragments. These horizons have other moist colors such as 10YR 5/3 and 10YR 5/6.

The 2Bw horizon has a loam to sandy loam texture, 8 to 12 percent clay, and 65 to 85 percent coarse fragments. This horizon has other moist colors such as 10YR 5/3 and 10YR 5/6.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #16 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

AQUEPTS

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

A 0-1 inches - Dark brown (10YR 3/3) silt loam, brown (10YR 4/3) dry; weak thin platy structure; friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; strongly acid; clear smooth boundary.

Bw 1-2 inches - Dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; strongly acid; abrupt smooth boundary.

Bg 2-9 inches - Dark grayish brown (2.5Y 4/2) silty clay loam, common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; common medium and fine roots; strongly acid, abrupt wavy boundary.

Cg1 9-22 inches - Dark brown (10YR 3/3) very fine sandy clay loam, common medium distinct dark yellowish brown (10YR 4/4) and weak red (2.5YR 5/2) mottles; weak medium to fine and medium subangular blocky structure; friable, sticky and plastic; moderately acid; gradual irregular boundary.

Cg2 22-27 inches - Dark gray (5Y 4/1) sandy clay, common medium distinct yellowish brown (10YR 5/8) mottles; massive structure; friable, sticky and plastic; 30 percent gravel and cobble; moderately acid; gradual irregular boundary.

Cg3 27-38 inches - Gray (5Y 5/1), yellowish brown (10YR 5/8) mottles; massive to single grain structure; 80 percent gravel and cobble; slightly acid.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Soldier Creek drainage; SE1/4 NW1/4 sec. 26, T. 17 N., R. 23 W.; map unit 10UA. This soil formed in alluvial deposits. This soil is a Typic Haplaquept, fine loamy, mixed, frigid. The slope gradient is 3 percent on a southwest aspect at 3,900 feet of elevation. The community type is a wet meadow.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a loam to silt loam texture and 12 to 23 percent clay. This horizon has other moist colors such as 10YR 3/2 and 10YR 3/1. Some soils have chromas greater than 2 within 20 inches of the surface. These soils have been classified on the basis of an elevated water table. The chromas can be higher on these wet mountain soils due to cold oxygenated water.

The Bw horizons has silt loam to loam textures and 10 to 25 percent clay. This horizon has other moist colors such as 10YR 4/3 and 10YR 5/3. Some soils have a Bg horizon in place of, or in addition to, the Bw horizon.

Cg horizons formed in material derived from glacial till or outwash have sandy loam to loamy sand textures. Cg horizons formed in material derived from fine alluvial deposits have silt loam to sandy clay textures. These horizons have other moist colors such as 7.5YR 5/6 and 7.5YR 4/4. The Cg horizons have few fine faint to many large prominent mottles.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #17 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDIC CRYOCHREPTS
Loamy Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

Bo 0-8 inches - Dark yellowish brown (10YR 4/6) silt loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; very friable, nonsticky and slightly plastic; common very fine, few fine and medium roots; common fine irregular pores; 5 to 10 percent gravel; abrupt smooth boundary.

Bw/Bo 8-17 inches - Yellowish brown (10YR 5/4) very gravelly silt loam, light yellowish brown (10YR 6/4) dry; weak and moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine, few medium roots; 45 percent gravel; abrupt smooth boundary.

2E 17-23 inches - Light brownish gray (10YR 6/2) extremely gravelly silt loam, very pale brown (10YR 8/3) dry; single grain structure; loose, slightly sticky and slightly plastic; few very fine and fine roots; many medium and coarse irregular pores; 85 percent gravel; clear smooth boundary.

2Bw 23-28 inches - Light yellowish brown (10YR 6/4) extremely gravelly silt loam, white (10YR 8/2) dry; weak very fine and fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine tubular and irregular pores; 60 percent gravel; 5 percent cobble; gradual smooth boundary.

2C 28-51 inches - Pale brown (10YR 6/3) extremely gravelly fine sandy loam, very pale brown (10YR 8/3) dry; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; few medium roots; few very fine irregular pores; 55 percent gravel; 10 percent cobble.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; Thompson Pass; NE1/4 SW1/4 sec. 16, T. 21 N., R. 32 W., map unit 32QA. This soil formed in volcanic ash influenced loess overlaying material derived from weakly weathered metasedimentary bedrock. The slope gradient is 35 percent on a southwest aspect at 5,760 feet of elevation. The habitat type is mountain hemlock/beargrass.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizon has a silt loam texture, 5 to 8 percent clay, and 5 to 20 percent coarse fragments. This horizon has other moist colors such as 7.5YR 4/4, 10YR 4/4, and 7.5YR 3/4.

Bw/Bo horizons occur is some soils. They consist of loess mixed with the underlying material.

The 2E horizon is similar in texture, clay percent, and coarse fragments to the 2Bw horizon. This horizon has other moist colors such as 10YR 5/3 and 10YR 6/3. 2E horizons derived from moderately weathered bedrock have moist colors such as 7.5YR 7/8 and 10YR 5/4.

2Bw horizons formed in moderately weathered metasedimentary bedrock have silt loam to loam textures, 12 to 20 percent clay, and 35 to 50 percent coarse fragments. These horizons have other moist colors such as 7.5YR 6/8, 2.5Y 5/4, and 10YR 5/6.

2Bw horizons derived from weakly weathered metasedimentary bedrock have loam to sandy loam textures, 8 to 12 percent clay, and 55 to 85 percent gravel. These horizons have other moist colors such as 10YR 5/4 and 2.5Y 5/3.

2Bt horizons occur in some glacial till soils, but lack sufficient clay increase for argillic classification.

2C horizons formed in moderately weathered metasedimentary bedrock have 35 to 50 percent coarse fragments. 2C horizons formed in weakly weathered metasedimentary bedrock have 60 to 90 percent coarse fragments. Soils formed in glacial till have up to 50 percent stones in this horizon. 2C horizons have other moist colors such as 10YR 5/6 and 10YR 6/4.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #18 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

AQUIC CRYOCHREPTS

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

0 1-0 inches - Partially decomposed forest litter.

A 0-4 inches - Dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; strong very fine granular structure; firm, slightly sticky and slightly plastic; many very fine and fine roots; strongly acid; abrupt clear boundary.

Bw 4-16 inches - Light brown (7.5YR 6/3) gravelly silty clay loam; many large distinct strong brown (7.5YR 5/6) mottles; strong medium and coarse angular blocky structure; extremely firm, slightly sticky and plastic; few very fine and fine roots; 25 percent gravel; strongly acid; clear wavy boundary.

C 16-30 inches - Brown (7.5YR 5/3) gravelly loam; many large distinct mottles; massive structure; firm, nonsticky and slightly plastic; 25 percent gravel; moderately acid.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Mill Creek; NE1/4 SE1/4 sec. 20, T. 16 N., R. 20 W.; map unit 38QA. This soil formed in glacial till deposits, and is somewhat poorly-drained. The water table occurs at a depth of 4 to 5 feet. The slope gradient is 10 percent on a northwest aspect at 5,000 feet of elevation. The habitat type is subalpine fir/bluejoint.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam to loam texture and 5 to 25 percent coarse fragments. This horizon is less than 6 inches thick or can be absent in some soils.

Some soils have Bo overlaying Bw horizons. The Bo horizons have silt loam textures, 8 to 10 percent clay content, and 5 to 15 percent coarse fragments.

The Bw horizon has silty clay loam to sandy loam textures, up to 35 percent clay, with 15 to 85 percent coarse fragments. This horizon has common medium distinct to many large prominant mottles. This horizon has other moist colors such as 10YR 4/3 and 10YR 5/3.

The C horizon has silty clay loam to loam textures, up to 35 percent clay content, 15 to 85 percent coarse fragments, and mottles.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #19 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC CRYOCHREPTS
Loamy Skeletal, Mixed

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

Bw1 0-8 inches - Dark grayish brown (10YR 4/2) very gravelly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many fine, common very fine and medium roots; 40 percent gravel; moderately acid; gradual wavy boundary.

Bw2 8-16 inches - Dark grayish brown (10YR 4/2) extremely gravelly loam, brown (10YR 5/3) dry; weak fine subangular blocky to single grain structure; friable, nonsticky and nonplastic; common coarse and fine roots; 35 percent gravel, 30 percent cobble; moderately acid; clear wavy boundary.

C 16-40 inches - Grayish brown (10YR 5/2) very gravelly fine sandy loam, light gray (10YR 7/2) dry; single grain structure; nonsticky and nonplastic; common fine, few medium roots; 30 percent gravel, 25 percent cobble; strongly acid.

LOCATION AND SETTING: West-central Montana; Bitteroot Mountains; Deer Peak; NE1/4 SE1/4 sec. 1, T. 13 N., R. 24 W.; map unit 32QD. This soil formed in material derived from weakly weathered metasedimentary bedrock. The slope gradient is 50 percent on a south aspect at 6,400 feet of elevation. The habitat type is Douglas-fir/blue huckleberry-beargrass.

RANGE OF HORIZON CHARACTERISTICS: Some soils have shallow A horizons.

Bw horizons that formed in moderately weathered metasedimentary material have loam to sandy loam textures. Bw horizons that formed in moderately weathered metasedimentary material have silt loam to loam textures. These horizons have 8 to 16 percent clay and 40 to 75 percent coarse fragments. Some of these horizons are mixed with volcanic ash influenced loess. These horizons have other moist colors such as 10YR 4/4 and 10YR 5/4.

The C horizon has a loam to sandy loam texture, 8 to 14 percent clay, and 55 to 85 percent coarse fragments. These horizons have other moist colors such as 10YR 5/4 and 10YR 5/6.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #20 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDIC DYSTRIC EUTROCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 6-0 inches - Partially decomposed forest litter.

Bo 0-8 inches - Dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; nonsticky and nonplastic; many medium, few fine and coarse roots; 10 percent cobble; medium acid; clear wavy boundary.

2E 8-14 inches - Light gray (10YR 7/1) gravelly fine sandy loam; weak medium subangular blocky structure; nonsticky and nonplastic; few fine and medium roots; 10 percent gravel, 5 percent cobble; neutral; clear wavy boundary.

2E/B 14-29 inches - Light gray (10YR 7/1), very pale brown (10YR 7/3) very gravelly sandy loam; weak medium subangular blocky structure; nonsticky and nonplastic; few fine and medium roots; 35 percent gravel; 5 percent cobble; neutral; gradial irregular boundary.

2Bw 29-44 inches - Very pale brown (10YR 7/3) very gravelly sandy loam; weak fine subangular blocky structure; nonsticky and nonplastic; few medium and coarse roots; 45 percent gravel; 5 percent cobble; neutral.

LOCATION AND SETTING: West-central Montana; Cabinet Mountains; tributary to Thompson River, North Fork Murr Creek drainage; E1/2 SE1/4 sec. 35, T. 26 N., R. 26 W.; map unit 30QD. This soil formed in a volcanic ash influenced loess overlaying material derived from weakly weathered metasedimentary bedrock. The slope gradient is 37 percent on a northwest aspect at 4,600 feet elevation. The habitat type is grand fir/queen cup beadlily.

RANGE OF HORIZON CHARACTERISTICS: The Bo horizon has a silt loam texture, 5 to 8 percent clay, and 5 to 20 percent coarse fragments. This horizon has other moist colors such as 7.5YR 4/4 and 10YR 4/4.

The 2E horizon has a sandy loam to silt loam texture, 4 to 17 percent clay, and 15 to 65 percent coarse fragments. This horizon has other moist colors such as 7.5YR 4/4 and 10YR 4/4. The wide range of characteristics of this horizon reflects influences from both loess and the underlying horizon. A few soils have 2E/B horizons underlying the 2E.

2Bw horizons formed in moderately weathered metasedimentary bedrock have silt loam to loam textures, 14 to 20 percent clay, and 35 to 45 percent coarse fragments. 2Bw horizons formed in weakly weathered metasedimentary bedrock have sandy loam textures, 8 to 12 percent clay, and 45 to 95 percent coarse fragments. These horizons have other moist colors such as 10YR 5/3, 10YR 6/4, and 2.5Y 5/4.

2Bk horizons occur in soils formed in calcareous metasedimentary bedrock. Calcium carbonate accumulation can occur at depths greater than 60 inches in these soils.

2BC and C horizons have been observed at depths greater than 40 inches. These horizons have moist colors such as 2.5Y 4/4 and 10YR 5/4.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #21 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

DYSTRIC EUTROCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches- Partially decomposed forest litter.

E 0-2 inches - Dark yellowish brown (10YR 3/6) sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; very friable to loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 15 percent gravel; moderately acid; clear smooth boundary.

Bw1 2-6 inches - Dark yellowish brown (10YR 4/4) sandy loam, yellowish brown (10YR 5/8) dry; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 25 percent gravel; slightly acid; clear smooth boundary.

Bw2 6-13 inches - Dark yellowish brown (10YR 4/4) gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; very friable to loose, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 25 percent gravel; slightly acid; clear wavy boundary.

Bw3 14-27 inches - Brown (10YR 5/3) very gravelly sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; firm, slightly sticky and nonplastic; common very fine, fine and few medium roots; 40 percent gravel; 10 percent cobble; moderately acid; clear wavy boundary.

C 27-40 inches - Light brownish gray (2.5Y 6/2) extremely cobbly sandly loam, light gray (10YR 7/2) dry; weak fine subangular blocky to granular structure; friable, slightly sticky and slightly plastic; few medium roots; 25 percent gravel, 40 percent cobble, 20 percent stone.

LOCATION AND SETTING: West-central Montana; Bitteroot Mountains; Silver Creek drainage; SE1/4 SE1/4 sec. 15, T. 19 N., R. 31 W.; map unit 60QC. This soil formed from weakly weathered metasedimentary bedrock. The slope gradient is 40 percent on a southwest aspect at 3,970 feet of elevation. The habitat type is Douglas-fir/blue huckleberry-elk sedge.

RANGE OF HORIZON CHARACTERISTICS: The E horizon has a silt loam to sandy loam texture, 6 to 19 percent clay, and 10 to 35 percent coarse fragments. This horizon has other moist colors such as 10YR 4/3 and 10YR 5/3. Some E horizons are mixed with volcanic ash influenced loess. These highly mixed horizons have a silt loam texture and 10 to 14 percent clay.

Bw horizons formed in moderately weathered metasedimentary bedrock have silt loam to loam textures, 14 to 20 percent clay, and 35 to 80 percent coarse fragments. Bw horizons formed in weakly weathered metasedimentary bedrock have loam to sandy loam textures, 8 to 12 percent clay, and 50 to 85 percent coarse fragments. These horizons have other moist colors such as 10YR 5/3 and 10YR 3/4.

The C horizon have 65 to 90 percent coarse fragments.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #22 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC EUTROCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A — 0-5 inches - Dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable, slightly and slightly plastic; many very fine and fine, few medium roots; less than 5 percent gravel; mildly alkaline; abrupt wavy boundary.

Bw1 — 5-9 inches - Brown (10YR 5/3) gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine, few medium roots; 25 percent gravel; mildly alkaline; clear wavy boundary.

Bw2 — 9-19 inches - Dark grayish brown (2.5Y 4/3) gravelly silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots; strongly effervescent; 25 percent gravel; mildly alkaline; gradual wavy boundary.

Bk — 19-37 inches - Grayish brown (2.5Y 5/2) gravelly silt loam, light gray (2.5Y 7/2) dry; massive structure; firm, slightly sticky and slightly plastic; violently effervescent with disseminated lime; 30 percent gravel, 5 percent cobble; moderately alkaline; gradual wavy boundary.

Cr — 37-47 inches - Light olive brown (2.5Y 5/4) very gravelly silt loam, light gray (2.5Y 7/2) dry; massive structure; firm, slightly sticky and nonplastic; violently effervescent; 25 percent gravel; 25 percent cobble; moderately alkaline.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Houle Creek; SE1/4 NE1/4 sec. 8, T. 15 N., R. 21 W.; map unit 30MC. This soil formed in material derived from moderately weathered metasedimentary bedrock. The slope gradient is 45 percent on a southwest aspect at 4,940 feet elevation. The habitat type is Douglas-fir/ninebark-ninebark.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has either a moist value of 3 or 4, a moist chroma of 1 or 2, or a thickness less than 7 inches. These horizons have a silt loam to loam texture and 12 to 14 percent clay. Soils that include volcanic ash influenced loess have a Bo over an E horizon rather than an A horizon. These Bo horizons are too impure or thin for andic classification. The Bo horizon often has a moist color of 7.5YR 4/6 or 10YR 4/4. The E horizon often has a moist color of 10YR 6/3 or 10YR 4/3.

The Bw horizons have silt loam to loam textures, 13 to 18 percent clay, and 25 to 60 percent coarse fragments. These horizons have a neutral to moderately alkaline reaction and other moist colors such as 10YR 5/3 and 10YR 6/3.

The Bk horizon occurs at depths from 9 to 35 inches, has a moderately alkaline reaction, and is violently effervescent. This horizon has a silt loam to loam texture, 12 to 18 percent clay, and 35 to 60 percent coarse fragments. The Bk horizon has other moist colors such as 10YR 5/3 or 10YR 5/4.

The Cr or C horizon occurs at depths from 32 to 40 inches. Cr horizons are less common but occur on highly weathered calcareous argillite substrates. C horizons are underlain by hard, slightly weathered limestones or dolomites.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #23 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDIC USTOCHREPTS
Sandy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - dry moss and grasses.

A 0-5 inches - Dark brown (10 YR 3/3) gravelly silt loam, brown (10 YR 5/3) dry; weak fine granular structure; very friable, nonsticky and nonplastic; common fine and very fine, few medium and coarse roots; 25 percent gravel; slightly acid; clear smooth boundary.

Bo 5-8 inches - Dark yellowish brown (10YR 4/4) gravelly silt loam, brownish yellow (10YR 6/6) dry; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common fine, few medium roots; 25 percent gravel; slightly acid; clear smooth boundary.

2Bw 8-14 inches - Brown (10YR 5/3) very gravelly sandy loam, light gray (10YR 7/2) dry, with variable sand grains; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; 45 percent gravel; 10 percent cobble; moderately acid; clear smooth boundary.

2C 14-45 inches - Grayish brown (10YR 5/2) extremely gravelly coarse sandy loam, light gray (10YR 7/1) dry, with variable sand grains; single grained structure; loose, nonsticky and nonplastic; common fine and very fine roots; 55 percent gravel; 25 percent cobble; moderately acid.

LOCATION AND SETTING: West-central Montana; Bitterroot Mountains; tributary to the Clark Fork River, West Fork Fish Creek; SE1/4 SE1/4 sec. 26, T. 14 N., R. 25 W.; map unit 13UA. This soil formed in a volcanic ash influenced loess overlaying alluvial deposits. It occurs on a flat terrace at 3,280 feet of elevation. The habitat type is Douglas-fir/dwarf huckleberry-kinnikinnick.

RANGE OF HORIZON CHARACTERISTICS: Some soils have an A horizon with a silt loam texture, 6 to 8 percent clay, and 5 to 15 percent gravel. This horizon has other moist colors such as 10YR 3/4 and 7/5YR 3/2.

The Bo horizon has a silt loam texture, 6 to 8 percent clay, and 15 to 40 percent coarse fragments. This horizon has other moist colors such as 10YR 4/3 and 7.5YR 4/4.

Soils formed in material derived from moderately or weakly weathered metasedimentary bedrock have 2E and 2Bw horizons.

The 2C horizon formed in alluvial deposits, has sandy loam textures, 3 to 10 percent clay, and 45 to 75 percent gravel with 10 to 25 percent rounded cobble. This horizon has other moist colors such as 10YR 5/4 and 10YR 5/6 with variably colored sand grains.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #24 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

(See also soil description #25)

TYPIC USTOCHREPTS
Loamy Skeletal, Mixed, Frigid
(These soils were previously classified as Udic Ustochrepts.)

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Forest litter.

A 0-9 inches - Dark grayish brown (10YR 4/2) gravelly silt loam, light brownish gray (10YR 6/2) dry; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine, few medium and coarse roots; 20 percent gravel; neutral; abrupt smooth boundary.

Bw1 9-19 inches - Dark grayish brown (2.5Y 4/2) very gravelly silt loam, light brownish gray (2.5Y 6/2) dry; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common medium, few coarse roots; 50 percent gravel; neutral; clear smooth boundary.

Bw2 19-28 inches - Very dark grayish brown (2.5Y 3/2) extremely gravelly silt loam, grayish brown (2.5Y 5/2) dry; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; 40 percent gravel, 20 percent cobble; moderately alkaline; clear smooth boundary.

Bk 28-40 inches - Grayish brown (2.5Y 5/2) extremely gravelly silt loam, light gray (10YR 7/1) dry; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few, medium and fine roots; violently effervescent; 40 percent gravel, 20 percent cobble; moderately alkaline.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Houle Creek; SW1/4 NW1/4 sec. 8, T. 15 N., R. 21 W.; map unit 30MB. This soil formed in material derived from moderately weathered metasedimentary bedrock. The slope gradient is 50 percent on a southwest aspect at 4,800 feet of elevation. The habitat type is Douglas-fir/ninebark-pinegrass.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam to loam texture, 15 to 20 percent clay, and 10 to 30 percent coarse fragments. This horizon has other moist colors such as 10YR 3/2 and 10YR 4/4. The A horizon is 2 to 10 inches thick.

The Bw horizon has a silt loam to loam texture, 18 to 23 percent clay, and 20 to 60 percent coarse fragments. This horizon has other moist colors such as 10YR 4/3 and 10YR 5/4. Some Bw horizons are strongly effervescent.

The Bk horizon has a silt loam to loam texture, 15 to 20 percent clay, and 25 to 70 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 6/3. The Bk horizon occurs at depths from 10 to 40 inches and is violently effervescent.

The C or Cr horizon has a silt loam texture, 12 to 20 percent clay, and 60 to 80 percent coarse fragments. This horizon has moist colors such as 10YR 5/1 and 10YR 4/4. The C horizon occurs at depths from 23 to 53 inches and is violently effervescent.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #25 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

(See also soil description #24)

TYPIC USTOCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 2-0 inches - Forest litter.

Bw 0-10 inches - Dark yellowish brown (10YR 3/4) gravelly silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky to moderate very fine granular structure; friable, nonsticky and nonplastic; many very fine, fine,and medium, few coarse roots; 15 percent gravel; clear smooth boundary.

E1 10-17 inches - Dark brown (10YR 4/3) very gravelly sandy loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many very fine, fine, and medium, few coarse roots; 35 percent gravel; clear smooth boundary.

E2 17-29 inches - Brown (10YR 5/3) very cobbly sandy loam, light gray (10YR 7/2) dry; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and medium, few coarse roots; 15 percent gravel, 35 percent cobble; clear smooth boundary.

Bw 29-40 inches - Brown (10YR 5/3) extremely cobbly fine sandy loam, very pale brown (10YR 7/3) dry; massive structure; friable, nonsticky and nonplastic; 10 percent gravel, 50 percent cobble, 20 percent stone.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; tributary to Clark Fork River, Second Creek; NW1/4 NE1/4 sec. 7, T. 16 N., R. 25 W.; map unit 64QB. This soil formed in material derived from weakly weathered metasedimentary bedrock. The slope gradient is 58 percent on a southwest aspect at 4,720 feet of elevation. The habitat type is Douglas-fir/ninebark- pinegrass.

RANGE OF HORIZON CHARACTERISTICS: The E or 2E horizon has a silt loam to sandy loam texture, 8 to 14 percent clay, and 25 to 50 percent coarse fragments. This horizon has other moist colors such as 10YR 6/3 and 7.5YR 4/2.

Bw or 2Bw horizons formed in material derived from weakly weathered metasedimentary material have sandy loam textures and 10 to 14 percent clay. Bw or 2Bw horizons formed in material derived from moderately weathered metasedimentary material have silt loam to loam textures and 17 to 25 percent clay. These horizons have 50 to 90 percent coarse fragments. The upper end of the range of coarse fragments represents soils that occur on steep slopes. The Bw horizon has other moist colors such as 2.5YR 5/4 and 10YR 5/4.

The C or 2C horizon occurs at depths of 21 to 45 inches. Some soils have B/C horizons. Bedrock is 3 to 5 feet deep in these soils.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #26 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC USTOCHREPTS
Coarse Silty, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Forest litter.

A1 0-3 inches - Very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and many medium roots; moderately acid; clear smooth boundary.

A2 3-8 inches - Brown (5/2 and 4/2) silt loam, pinkish gray (7.5YR 7/2) and light yellowish brown (10YR 6/4) dry; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; neutral; clear irregular boundary.

A/B 8-12 inches - Brown (7.5Y 4/2) silt loam, pinkish gray (7.5Y 7/2) dry; mixed bands up to 1 inch thick are brown (7.5YR 4/4) heavy silt loam, light brown (7.5YR 6/4) dry; massive; hard, very friable, nonsticky and slightly sticky, nonplastic and slightly plastic; common very fine, fine, and medium roots; neutral, clear broken boundary.

C1 12-28 inches - Brown (7.5Y 4/3) silt loam, pinkish gray (7.5YR 7/3) dry; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately alkaline; gradual smooth boundary.

C2 28-45 inches - Yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/3) dry; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; moderately alkaline; clear wavy boundary.

C3 45-60 inches - Yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/3) dry; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; weakly effervescent; moderately alkaline.

LOCATION AND SETTING: West-central Montana; Clark Fork River drainage; SW1/4 SW1/4 sec. 19, T. 17 N., R. 26 W.; map unit 14XA. This soil formed in material derived from silty lacustrine deposits. The slope gradient is 20 percent on a SW aspect at 2900 feet of elevation. The habitat type is Douglas-fir/snowberry.

RANGE OF HORIZON CHARACTERISTICS: These soils have very fine sandy loam to silt loam textures with 5 to 12 percent clay.

The A horizons are typically thin with silt loam textures.

The Bw horizon is typically less that 5 inches thick.

The C horizons are relatively shallow at 10 to 20 inches deep. Depth to a weakly or strongly calcareous substratum is usually greater than 40 inches.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #27 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

CALCIXEROLLIC XEROCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A 0-4 inches - Dark grayish brown (10YR 4/2) gravelly silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; very friable, slightly sticky and slightly plastic; common fine, few medium roots; 30 percent gravel; moderately alkaline; clear smooth boundary.

Bw1 4-13 inches - Grayish brown (10YR 5/2) gravelly silt loam, light gray (10YR 7/2) dry; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common medium, few coarse roots; 30 percent gravel; mildly alkaline; gradual smooth boundary.

Bw2 13-20 inches - Grayish brown (2.5Y 5/2) very gravelly silt loam, light gray (2.5Y 7/2) dry; massive structure; friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; 25 percent gravel, 15 percent cobble; neutral; clear smooth boundary.

Bw3 20-29 inches - Olive brown (2.5Y 4/4) gravelly silt loam, light yellowish brown (2.5Y 6/4) dry; massive structure; friable, slightly sticky and slightly plastic; few very fine, medium, and coarse roots; 30 percent gravel; neutral; clear smooth boundary.

Bk 29-40 inches - Olive brown (2.5Y 4/4) very gravelly silt loam, light yellowish brown (2.5Y 6/4) dry; massive structure; firm, nonsticky and nonplastic; few medium and coarse roots; violently effervescent with disseminated lime; 30 percent gravel; 10 percent cobble; moderately alkaline.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Houle Creek; NW1/4 NE1/4 sec. 7, T. 15 N., R. 21 W.; map unit 60MA. This soil formed material in derived from moderately weathered metasedimentary bedrock. The slope gradient is 75 percent on a west aspect at 4,400 feet elevation. The habitat type is Douglas-fir/ Idaho fescue.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam to loam texture, 12 to 16 percent clay, and 10 to 45 percent coarse fragments This horizon has other moist colors such as 10YR 3/2 and 10YR 4/4. This horizon is 4 to 9 inches thick when present, but does not meet mollic epipedon requirements.

The Bw horizons have silt loam to loam textures, 14 to 24 percent clay, and 30 to 60 percent gravel. These horizons have other moist colors such as 10YR 4/2 and 5YR 3/4. The Bw horizons are mildly to strongly effervescent and may have carbonate accumulation on coarse fragments.

The Bk horizon is violently effervescent with moderately alkaline reaction. Depth to this horizon is typically 20 to 36 inches. This horizon has silt loam to loam textures, 12 to 18 percent clay, and 40 to 65 percent gravel with up to 20 percent cobble. The Bk horizon has other moist colors such as 10YR 4/3 and 10YR 5/2.

~~~~~~~~~~~ SOIL DESCRIPTION #28 ~~~~~~~~~~~

TYPIC XEROCHREPTS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Grass, forest litter.

A 0-8 inches - Dark brown (10YR 3/3) very gravelly loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable, slightly sticky and slightly plastic; many very fine and fine, few medium roots; 50 percent gravel; neutral; clear wavy boundary.

E 8-18 inches - Yellowish brown (10YR 5/4) extremely gravelly loam, very pale brown (10YR 7/3) dry; single grain structure; friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; 75 percent gravel, 5 percent cobble; slightly acid; clear wavy boundary.

Bw 18-30 inches - Brown (10YR 5/3) extremely gravelly sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common very fine and fine, few coarse and medium roots; 50 percent gravel, 15 percent cobble; neutral; gradual wavy boundary.

C 30-60 inches - Pale brown (10YR 6/3) extremely cobbly fine sandy loam, white (10YR 8/2) dry; massive structure; firm, nonsticky and nonplastic; 20 percent gravel, 50 percent cobble; neutral.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; tributary to Clark Fork River, Fourmile Creek; NW1/4 SW1/4 sec. 25, T. 18 N., R. 27 W.; map unit 60QA. This soil formed in material derived from weakly weathered metasedimentary bedrock. The slope gradient is 65 percent on a southwest aspect at 4,640 feet elevation. The habitat type is Douglas-fir/rough fescue.

RANGE OF HORIZON CHARACTERISTICS: The A horizon has a silt loam to loam texture, 8 to 16 percent clay, and 20 to 55 percent coarse fragments. This horizon has other moist colors such as 10YR 3/3 and 7.5YR 3/2.

Some soils have an E horizon with clay percents and textures similar to the underlying horizon. This horizon has 25 to 85 percent coarse fragments. The upper end of this range represents soils that occur on steep slopes. This horizon has other moist colors such as 10YR 4/3 and 10YR 6/3.

Bw horizons formed in material derived from weakly weathered metasedimentary material have sandy loam textures, 8 to 14 percent clay, and 45 to 60 percent gravel with 10 to 30 percent cobble. The Bw horizons formed in material derived from moderately weathered metasedimentary material have silt loam to loam textures, 14 to 20 percent clay, and 45 to 65 percent gravel with up to 10 percent cobble. The upper end of the range of coarse fragments represents soils that occur on steep slopes. The Bw horizon has other moist colors such as 10YR 6/4 and 10YR 5/4.

The C horizon is similar in color and texture to the overlaying horizon. This horizon has 10 to 15 percent more cobble than the Bw horizon. Depth to this horizon is from 24 to 57 inches. Bedrock is 3 to 5 feet deep in these soils.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #29 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

ANDIC CRYUMBREPTS

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

A1 — 0-6 inches - Dark brown (7.5YR 3/1) silt loam, dark brown (10YR 3/3) dry; moderate medium granular and subangular blocky structure; soft, nonsticky and nonplastic; many fine and coarse, few medium roots; 5 percent gravel; moderately acid; clear smooth boundary.

A2 — 6-14 inches - Dark brown(7.5YR 3/2) silt loam, yellowish brown (10YR 5/5) dry; moderate fine and medium subangular blocky; slightly hard, nonsticky and slightly plastic; common fine and medium, few coarse roots; 10 percent gravel; slightly acid; abrupt broken boundary.

Bw — 14-32 inches - Dark yellowish brown (10YR 4/4) very cobbly silt loam, light yellowish brown (10YR 6/4) dry; moderate medium to strong fine subangular blocky structure; hard, slightly sticky and slightly plastic; few medium and fine roots; 15 percent gravel, 25 percent cobble; neutral; clear smooth boundary.

C — 32-47 inches - Yellowish brown (10YR 5/6) very gravelly silt loam, yellow (10YR 5/6) dry; massive structure; hard, slightly sticky and slightly plastic; no roots; 30 percent gravel, 15 percent cobble; neutral.

LOCATION AND SETTING: West-central Montana; Bitteroot Mountains; Elizabeth Creek; NW1/4 SW1/4 sec. 7, T. 15 N., R. 27 W.; map unit 43QB. This soil formed in an organic matter rich, volcanic ash influenced loess overlaying material derived from moderately weathered metasedimentary bedrock. This soil has a base saturation of less than 50 percent in the umbric epipedon. The slope gradient is 10 percent on an east aspect at 5,400 feet of elevation. The habitat type is a moist forest opening with false helebore, western coneflower, and bracken fern.

RANGE OF HORIZON CHARACTERISTICS: The A horizon is 6 to 13 inches thick. This horizon has a silt loam to loam texture, 6 to 12 percent clay, and 5 to 20 percent coarse fragments. This horizon has other moist colors such as 7.5YR 3/4 and 10YR 3/2.

The Bw horizon has a silt loam to sandy loam texture and 35 to 65 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 5/6.

The C has a silt loam to sandy loam texture and 45 to 85 percent coarse fragments.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ SOIL DESCRIPTION #30 ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

TYPIC HAPLOXEROLLS
Loamy Skeletal, Mixed, Frigid

REFERENCE PEDON: Colors are for moist soil unless otherwise indicated.

O 1-0 inches - Partially decomposed forest litter.

A1 0-6 inches - Very dark brown (10YR 2/2) gravelly loam, dark brown (10YR 4/3) dry; weak medium granular structure; very friable, nonsticky and slightly plastic; many very fine and fine, common medium roots; 30 percent gravel; neutral; clear smooth boundary.

A2 6-8 inches - Dark brown (10YR 3/3) very gravelly loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; 30 percent gravel, 5 percent cobble; slightly acid; clear smooth boundary.

Bw1 8-20 inches - Light brownish gray (10YR 6/2) very gravelly sandy loam, light gray (10YR 7/1) dry; weak fine subangular blocky structure; firm, nonsticky and nonplastic; common medium, few fine roots; 40 percent gravel, 10 percent cobble; neutral; clear smooth boundary.

Bw2 20-48 inches - Light gray (10YR 7/2) very gravelly sandy loam, white (10YR 8/1) dry; moderate fine angular blocky structure; very firm, nonsticky and nonplastic; few fine and medium roots; 40 percent gravel, 15 percent cobble; slightly acid; clear smooth boundary.

C 48-60 inches - Light gray (10YR 7/2) extremely gravelly sandy loam, white (10YR 8/1) dry; single grained structure; nonsticky and nonplastic; 55 percent gravel, 15 percent cobble; slightly acid.

LOCATION AND SETTING: West-central Montana; Ninemile Divide; Sixmile Creek; SW1/4 SW1/4 sec. 35, T. 16 N., R. 22 W., map unit 30QA. This soil formed in material derived from weakly weathered metasedimentary bedrock. The slope gradient is 40 percent on a south aspect at 4,640 feet of elevation. The habitat type is Douglas-fir/pinegrass-bluebunch wheatgrass.

RANGE OF HORIZON CHARACTERISTICS: The A horizon is 5 to 17 inches thick. This horizon has a silt loam to loam texture, 10 to 14 percent clay, and 20 to 40 percent coarse fragments. This horizon has other colors such as 10YR 3/2 and 10YR 3/3 moist, and 10YR 5/3 dry.

The Bw horizons have loam to sandy loam textures, 9 to 14 percent clay, and 40 to 60 percent coarse fragments. These horizons have other moist colors such as 10YR 5/3 and 10YR 4/3.

The C horizon has a loam to sandy loam texture, 6 to 12 percent clay, and 65 to 90 percent coarse fragments. This horizon has other moist colors such as 10YR 5/4 and 10YR 6/3. Depth to this horizon is 22 to 49 inches.

Appendix A: MAP UNIT SYMBOL LIST

10UA	13JA	14JA	15JA	16UA	22MA	24JA	26UA	30BB	32KA	33UA	38KA	40KA
10UB	13UA	14JB	15JB		22UA	24JB		30GA	32MA		38KA	40QA
10UC	13UB	14XA	15UA					30GB	32QA			
			15UB					30KA	32QC			
								30KA*b*	32QD			
								30KB				
								30KB*b*				
								30MA				
								30MB				
								30MC				
								30MD				
								30ME				
								30MG				
								30PA				
								30PE				
								30QA				
								30QB				
								30QC				
								30QD				
								30QE				
								30QG				
								30SA				
								30SB				

41KA	42KA	43QA	45UA	46KA	47KA	48KA	60KA	61MC	64KA	72BA	73UA	74BA
41QA	42QA	43QB		46OA	47OA	48QA	60KB	61MD	64KA*b*	72OA	73UB	74UA
41SA		43SA					60MA	61QC	64KB			
							60MB	61QD	64KB*b*			
							60MC	61SA	64MA			
							60MD		64MB			
							60QA		64MC			
							60QB		64MD			
							60QC		64ME			
							60QD		64MG			
									64QA			
									64QB			
									64QC			
									64QD			
									64QE			
									64QG			
									64SB			

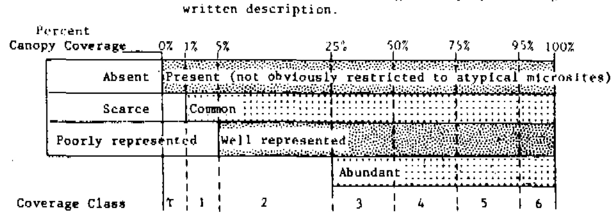
Appendix B: HABITAT TYPE KEY

(From Pfister and others (1977), pages 19-22)

Figure 7. — Key to climax series, habitat types, and phases.

READ THESE INSTRUCTIONS FIRST!

1. Use this key for stands with a mature tree canopy that are not severely disturbed by grazing, logging, forest fire, etc. (If the stand is severely disturbed or in an early successional stage, the habitat type can best be determined by extrapolating from the nearest *mature stand occupying a similar site*.)
2. Accurately identify and record canopy coverages for all indicator species (appendix F).
3. Check plot data in the field to verify that the plot is representative of the stand as a whole. If not, take another plot.
4. Identify the correct potential climax tree species in the SERIES key. (Generally, a tree species is considered reproducing successfully if 10 or more individuals per acre occupy or will occupy the site.)
5. Within the appropriate series, key to HABITAT TYPE by following the key literally. Determine PHASE by matching the stand conditions with the phase descriptions for the type. (The first phase description that fits the stand is the correct one.)
6. Use the definitions diagramed below for canopy coverage terms in the key. If you have difficulty deciding between types, refer to constancy and coverage data (appendix C-1) and the habitat type descriptions.
7. In stands where undergrowth is obviously depauperate (unusually sparse) because of dense shading or duff accumulations, adjust the above definitions to the next lower coverage class (e.g., well represented >1%, common >0%).
8. Remember, the key is NOT the classification! Validate the determination made using the key by checking the written description.



KEY TO CLIMAX SERIES

(DO NOT PROCEED UNTIL YOU HAVE READ THE INSTRUCTIONS!)

1. Habitats on steep slopes (30°) composed primarily of unstable fine rock; undergrowth sparse, poorly developed and quite variable. . . . SCREE (p. 121)
1. Habitats on sites with some soil development and stability; undergrowth rather well developed and somewhat uniform. 2
   2. Tsuga heterophylla present and reproducing successfully . . . . TSUGA HETEROPHYLLA SERIES (item G)
   2. Tsuga heterophylla not the indicated climax 3
3. Thuja plicata present and reproducing successfully. . . . . THUJA PLICATA SERIES (item F)
3. Thuja plicata not the indicated climax. 4
   4. Abies grandis present and reproducing more successfully than Abies lasiocarpa. . . . . ABIES GRANDIS SERIES (item E)
   4. Abies grandis not the indicated climax. 5
5. Abies lasiocarpa, Tsuga mertensiana, or Larix lyallii present and reproducing successfully, or Pinus albicaulis the dominant tree . . . . . ABIES LASIOCARPA SERIES (item I)
5. Not as above. 6
   6. Picea present and reproducing successfully. . . . . PICEA SERIES (item D)
   6. Picea not the indicated climax. 7
7. Pinus flexilis a successfully reproducing dominant; often sharing that status with Pseudotsuga . . . . PINUS FLEXILIS SERIES (item A)
7. Pinus flexilis absent or clearly seral. 8
   8. Pseudotsuga menziesii present and reproducing successfully. . . . . . PSEUDOTSUGA MENZIESII SERIES (item C)
   8. Pseudotsuga menziesii not the indicated climax. 9
9. Pure Pinus contorta stands, with little evidence as to potential climax. . . . . PINUS CONTORTA SERIES (item H)
9. Pinus contorta absent; Pinus ponderosa the indicated climax . . . . PINUS PONDEROSA SERIES (item B)

A. Key to Pinus flexilis Habitat Types

1. Festuca idahoensis well represented or F. scabrella common. . . . . PINUS FLEXILIS/FESTUCA IDAHOENSIS h.t. (p. 25)
   a. Festuca scabrella common. . . . . FESTUCA SCABRELLA phase
   b. F. scabrella scarce . . . . FESTUCA IDAHOENSIS phase
1. F. idahoensis poorly represented and F. scabrella scarce. 2
   2. Agropyron spicatum well represented . . . . PINUS FLEXILIS/AGROPYRON SPICATUM h.t. (p. 24)
   2. A. spicatum poorly represented; Juniperus communis (or J. horizontalis) well represented . . . . .PINUS FLEXILIS/JUNIPERUS COMMUNIS h.t. (p. 26)

B. Key to *Pinus ponderosa* Habitat Types

1. *Prunus virginiana* well represented; only in southeastern Montana	PINUS PONDEROSA/PRUNUS VIRGINIANA h.t. (p. 34)
a. *Shepherdia canadensis* well represented	SHEPHERDIA CANADENSIS phase
b. *Shepherdia* poorly represented	PRUNUS VIRGINIANA phase
1. *P. virginiana* poorly represented	2
2. *Symphoricarpos albus* well represented	PINUS PONDEROSA/SYMPHORICARPOS ALBUS h.t. (p. 33)
a. *Berberis repens* common	BERBERIS REPENS phase
b. *Berberis* scarce	SYMPHORICARPOS ALBUS phase
2. *S. albus* poorly represented	3
3. *Purshia tridentata* well represented	PINUS PONDEROSA/PURSHIA TRIDENTATA h.t. (p. 32)
a. *Festuca idahoensis* well represented or *F. scabrella* common	FESTUCA IDAHOENSIS phase
b. *F. idahoensis* poorly represented and *F. scabrella* scarce	AGROPYRON SPICATUM phase
3. *Purshia* poorly represented	4
4. *Festuca idahoensis* well represented or *F. scabrella* common	PINUS PONDEROSA/FESTUCA IDAHOENSIS h.t. (p. 31)
a. *Festuca scabrella* common	FESTUCA SCABRELLA phase
b. *F. scabrella* scarce	FESTUCA IDAHOENSIS phase
4. *F. idahoensis* poorly represented and *F. scabrella* scarce	5
5. *Agropyron spicatum* well represented	PINUS PONDEROSA/AGROPYRON SPICATUM h.t. (p. 30)
5. *A. spicatum* poorly represented; *Andropogon* spp. well represented	PINUS PONDEROSA/ANDROPOGON h.t. (p. 30)

C. Key to *Pseudotsuga menziesii* Habitat Types

1. *Vaccinium caespitosum* present	PSEUDOTSUGA MENZIESII/VACCINIUM CAESPITOSUM h.t. (p. 39)
1. *V. caespitosum* absent	2
2. *Physocarpus malvaceus* or *Holodiscus discolor* well represented	PSEUDOTSUGA MENZIESII/PHYSOCARPUS MALVACEUS h.t. (p. 41)
a. *Calamagrostis rubescens* and/or *Carex geyeri* are the dominant undergrowth	CALAMAGROSTIS RUBESCENS phase
b. *Physocarpus* and/or *Holodiscus* dominate the undergrowth	PHYSOCARPUS MALVACEUS phase
2. *Physocarpus* and *Holodiscus* poorly represented	3
3. *Linnaea borealis* common	PSEUDOTSUGA MENZIESII/LINNAEA BOREALIS h.t. (p. 44)
a. *Symphoricarpos albus* well represented	SYMPHORICARPOS ALBUS phase
b. *Vaccinium globulare* well represented	VACCINIUM GLOBULARE phase
c. Not as above	CALAMAGROSTIS RUBESCENS phase
3. *Linnaea* scarce	4
4. *Vaccinium globulare* or *Xerophyllum tenax* well represented	PSEUDOTSUGA MENZIESII/VACCINIUM GLOBULARE h.t. (p. 43)
a. *Arctostaphylos uva-ursi* and *Pinus ponderosa* common	ARCTOSTAPHYLOS UVA-URSI phase
b. *Xerophyllum* common	XEROPHYLLUM TENAX phase
c. Not as above	VACCINIUM GLOBULARE phase
4. *Vaccinium globulare* and *Xerophyllum tenax* poorly represented	5
5. *Symphoricarpos albus* well represented	PSEUDOTSUGA MENZIESII/SYMPHORICARPOS ALBUS h.t. (p. 45)
a. Bunchgrasses well represented in old-growth stands	AGROPYRON SPICATUM phase
b. *Calamagrostis rubescens* well represented	CALAMAGROSTIS RUBESCENS phase
c. Not as above	SYMPHORICARPOS ALBUS phase
5. *S. albus* poorly represented	6
6. *Calamagrostis rubescens* well represented	PSEUDOTSUGA MENZIESII/CALAMAGROSTIS RUBESCENS h.t. (p. 47)
a. Bunchgrasses well represented in old-growth stands	AGROPYRON SPICATUM phase
b. *Arctostaphylos uva-ursi* common; sites capable of supporting *Pinus ponderosa* and not too dry for *Pinus contorta* (or *Larix occidentalis*)	ARCTOSTAPHYLOS UVA-URSI phase
c. *Pinus ponderosa* common	PINUS PONDEROSA phase
d. Not as above	CALAMAGROSTIS RUBESCENS phase
6. *C. rubescens* poorly represented	7
7. *Carex geyeri* well represented	PSEUDOTSUGA MENZIESII/CAREX GEYERI h.t. (p. 51)
7. *C. geyeri* poorly represented	8
8. *Arctostaphylos uva-ursi* well represented and *Pinus ponderosa* present	PSEUDOTSUGA MENZIESII/ARCTOSTAPHYLOS UVA-URSI h.t. (p. 52)
8. *Arctostaphylos* poorly represented or stands above elevational limits of *Pinus ponderosa*	9
9. *Juniperus communis* (or *J. horizontalis*) dominates the undergrowth	PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS h.t. (p. 53)
9. *J. communis* not the dominant undergrowth plant	10
10. *Spiraea betulifolia* well represented	PSEUDOTSUGA MENZIESII/SPIRAEA BETULIFOLIA h.t. (p. 52)
10. *S. betulifolia* poorly represented	11
11. *Arnica cordifolia* or *Antennaria racemosa* the dominant undergrowth	PSEUDOTSUGA MENZIESII/ARNICA CORDIFOLIA h.t. (p. 54)
11. *A. cordifolia* and *A. racemosa* not the dominant undergrowth	12
12. *Festuca scabrella* common	PSEUDOTSUGA MENZIESII/FESTUCA SCABRELLA h.t. (p. 38)
12. *F. scabrella* scarce	13
13. *Symphoricarpos oreophilus* well represented and *Festuca idahoensis* scarce	PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS h.t. (p. 55)
13. Not as above	14
14. *Festuca idahoensis* common; *Pinus ponderosa* scarce	PSEUDOTSUGA MENZIESII/FESTUCA IDAHOENSIS h.t. (p. 38)
14. *F. idahoensis* usually scarce; *Agropyron spicatum* well represented; *Pinus ponderosa* usually common	PSEUDOTSUGA MENZIESII/AGROPYRON SPICATUM h.t. (p. 37)

D. Key to Picea Habitat Types

1. Equisetum spp. abundant	PICEA/EQUISETUM ARVENSE h.t. (p. 58)
Equisetum spp. not abundant	2
2. Clintonia uniflora, Cornus canadensis, or Aralia nudicaulis present (sites in northwestern Montana)	PICEA/CLINTONIA UNIFLORA h.t. (p. 59)
a. Vaccinium caespitosum present	VACCINIUM CAESPITOSUM phase
b. V. caespitosum absent	CLINTONIA UNIFLORA phase
2. Not as above	3
3. Physocarpus malvaceus well represented	PICEA/PHYSOCARPUS MALVACEUS h.t. (p. 61)
3. Physocarpus poorly represented	4
4. Two of these moist-site forbs present: Galium triflorum, Streptopus amplexifolius, Actaea rubra	PICEA/GALIUM TRIFLORUM h.t. (p. 62)
4. Not as above	5
5. Vaccinium caespitosum present	PICEA/VACCINIUM CAESPITOSUM h.t. (p. 62)
5. V. caespitosum absent	6
6. Linnaea borealis common	PICEA/LINNAEA BOREALIS h.t. (p. 64)
6. Linnaea scarce	7
7. Smilacina stellata or Thalictrum occidentale present	PICEA/SMILACINA STELLATA h.t. (p. 65)
7. Not as above; Senecio streptanthifolius present; undergrowth depauperate	PICEA/SENECIO STREPTANTHIFOLIUS h.t. (p. 65)
a. Pseudotsuga menziesii common	PSEUDOTSUGA MENZIESII phase
b. Pseudotsuga scarce (stands above its elevational limits)	PICEA phase

E. Key to Abies grandis Habitat Types

1. Clintonia uniflora present	ABIES GRANDIS/CLINTONIA UNIFLORA h.t. (p. 67)
a. Aralia nudicaulis, Gymnocarpium dryopteris, or Athyrium filix-femina common	ARALIA NUDICAULIS phase
b. Xerophyllum tenax well represented	XEROPHYLLUM TENAX phase
c. Not as above	CLINTONIA UNIFLORA phase
1. Clintonia absent	2
2. Linnaea borealis common	ABIES GRANDIS/LINNAEA BOREALIS h.t. (p. 69)
a. Xerophyllum tenax well represented	XEROPHYLLUM TENAX phase
b. Xerophyllum poorly represented	LINNAEA BOREALIS phase
2. Linnaea scarce; Xerophyllum common	ABIES GRANDIS/XEROPHYLLUM TENAX h.t. (p. 69)

F. & G. Key to Thuja and Tsuga heterophylla Habitat Types

1. Oplopanax horridum well represented	THUJA PLICATA/OPLOPANAX HORRIDUM h.t. (p. 73)
1. Oplopanax poorly represented	2
2. Tsuga heterophylla present and reproducing successfully	TSUGA HETEROPHYLLA/CLINTONIA UNIFLORA h.t. (p. 74)
a. Aralia nudicaulis, Gymnocarpium dryopteris, or Athyrium filix-femina common	ARALIA NUDICAULIS phase
b. Not as above	CLINTONIA UNIFLORA phase
2. Tsuga heterophylla absent or not reproducing successfully	THUJA PLICATA/CLINTONIA UNIFLORA h.t. (p. 71)
a. Aralia nudicaulis, Gymnocarpium dryopteris, or Athyrium filix-femina common	ARALIA NUDICAULIS phase
b. Menziesia ferruginea common	MENZIESIA FERRUGINEA phase
c. Not as above	CLINTONIA UNIFLORA phase

H. Key for Pinus contorta Communities

1. Clintonia uniflora present	ABIES LASIOCARPA/CLINTONIA UNIFLORA h.t. (p. 82)
1. Clintonia absent	2
2. Two of these moist-site forbs present: Galium triflorum, Actaea rubra, Streptopus amplexifolius	ABIES LASIOCARPA/GALIUM TRIFLORUM h.t. (p. 86)
2. Not as above	3
3. Calamagrostis canadensis well represented	ABIES LASIOCARPA/CALAMAGROSTIS CANADENSIS h.t. (p. 88)
3. C. canadensis poorly represented	4
4. Vaccinium caespitosum present	PINUS CONTORTA/VACCINIUM CAESPITOSUM comm. type (p. 118)
4. V. caespitosum absent	5
5. Linnaea borealis common	PINUS CONTORTA/LINNAEA BOREALIS comm. type (p. 119)
5. Linnaea scarce	6
6. Xerophyllum tenax common	ABIES LASIOCARPA/XEROPHYLLUM TENAX h.t. (p. 94)
6. Xerophyllum scarce	7
7. Vaccinium globulare well represented	ABIES LASIOCARPA/VACCINIUM GLOBULARE h.t. (p. 97)
7. V. globulare poorly represented	8
8. Vaccinium scoparium well represented	PINUS CONTORTA/VACCINIUM SCOPARIUM comm. type (p. 119)
8. V. scoparium poorly represented	9
9. Calamagrostis rubescens well represented	PINUS CONTORTA/CALAMAGROSTIS RUBESCENS comm. type (p. 120)
9. C. rubescens poorly represented	10
10. Carex geyeri well represented	ABIES LASIOCARPA/CAREX GEYERI h.t. (p. 105)
10. C. geyeri poorly represented	11
11. Juniperus communis (or J. horizontalis) the major undergrowth	PSEUDOTSUGA MENZIESII/JUNIPERUS COMMUNIS h.t. (p. 53)
11. Not as above; Purshia tridentata present	PINUS CONTORTA/PURSHIA TRIDENTATA h.t. (p. 117)

1. Key to Abies lasiocarpa Habitat Types

A. Sites at or above the cold limits of Pseudotsuga and also meeting one of the following criteria:
(a) Pinus albicaulis well represented;
(b) Luzula hitchcockii present;
(c) Ribes montigenum present;
(d) Stands at upper timberline
UPPER SUBALPINE AND TIMBERLINE h.t.s. 17

A. Not as above
LOWER SUBALPINE h.t.s. 1

1. Oplopanax horridum well represented. . . . . ABIES LASIOCARPA/OPLOPANAX HORRIDUM h.t. (p. 81)
1. Oplopanax poorly represented 2

2. Clintonia uniflora present . . . . ABIES LASIOCARPA/CLINTONIA UNIFLORA h.t.(p. 82)
   a. Aralia nudicaulis, Gymnocarpium dryopteris, or Athyrium filix-femina common . . . . ARALIA NUDICAULIS phase
   b. Menziesia ferruginea well represented . . . . MENZIESIA FERRUGINEA phase
   c. Vaccinium caespitosum or Arctostaphylos uva-ursi common . . . . VACCINIUM CAESPITOSUM phase
   d. Xerophyllum tenax well represented . . . . XEROPHYLLUM TENAX phase
   e. Not as above. . . . . CLINTONIA UNIFLORA phase
2. Clintonia absent 3

3. Menziesia ferruginea well represented. 4
3. Menziesia poorly represented 5

4. Tsuga mertensiana well represented . . . . TSUGA MERTENSIANA/MENZIESIA FERRUGINEA h.t.(p. 94)
4. Tsuga mertensiana poorly represented . . . . ABIES LASIOCARPA/MENZIESIA FERRUGINEA h.t.(p. 92)

5. Calamagrostis canadensis, Senecio triangularis, or Ledum glandulosum well represented . . . . ABIES LASIOCARPA/CALAMAGROSTIS CANADENSIS h.t.(p. 88)
   a. Galium triflorum or Actaea rubra present. . . . . GALIUM TRIFLORUM phase
   b. Vaccinium caespitosum present . . . . VACCINIUM CAESPITOSUM phase
   c. Not as above. . . . . CALAMAGROSTIS CANADENSIS phase
5. C. canadensis, S. triangularis, and Ledum poorly represented 6

6. Two of these moist-site forbs present: Galium triflorum, Actaea rubra, Streptopus amplexifolius . . . . ABIES LASIOCARPA/GALIUM TRIFLORUM h.t.(p. 86)
6. Not as above 7

7. Vaccinium caespitosum present. . . . . ABIES LASIOCARPA/VACCINIUM CAESPITOSUM h.t.(p. 87)
7. V. caespitosum absent. 8

8. Linnaea borealis common . . . . ABIES LASIOCARPA/LINNAEA BOREALIS h.t.(p. 90)
   a. Xerophyllum tenax well represented. . . . . XEROPHYLLUM TENAX phase
   b. Vaccinium scoparium well represented. . . . . VACCINIUM SCOPARIUM phase
   c. Not as above. . . . . LINNAEA BOREALIS phase
8. Linnaea scarce 9

9. Alnus sinuata well represented . . . . ABIES LASIOCARPA/ALNUS SINUATA h.t.(p. 100)
9. A. sinuata poorly represented 10

10. Xerophyllum tenax common 11
10. Xerophyllum scarce 12

11. Tsuga mertensiana well represented . . . . TSUGA MERTENSIANA/XEROPHYLLUM TENAX h.t.(p. 97)
11. Tsuga mertensiana poorly represented . . . . ABIES LASIOCARPA/XEROPHYLLUM TENAX h.t (p. 94)
   a. Vaccinium globulare poorly represented and V. scoparium abundant . . . . VACCINIUM SCOPARIUM phase
   b. Not as above. . . . . VACCINIUM GLOBULARE phase

12. Vaccinium globulare well represented . . . . ABIES LASIOCARPA/VACCINIUM GLOBULARE h.t.(p. 97)
12. V. globulare poorly represented. 13

13. Vaccinium scoparium (including V. myrtillus) well represented . . . . ABIES LASIOCARPA/VACCINIUM SCOPARIUM h.t.(p. 98)
   a. Calamagrostis rubescens common and Arctostaphylos uva ursi or Berberis repens present . . . . CALAMAGROSTIS RUBESCENS phase
   b. Thalictrum occidentale common or Viola orbiculata or Valeriana sitchensis present . . . . THALICTRUM OCCIDENTALE phase
   c. Not as above. . . . . VACCINIUM SCOPARIUM phase
13. V. scoparium poorly represented. 14

14. Clematis pseudoalpina (including C. tenuiloba) present or Pinus flexilis common. (Sites usually on calcareous substrates.) . . . . ABIES LASIOCARPA/CLEMATIS PSEUDOALPINA h.t.(p. 102)
14. C. pseudoalpina absent and Pinus flexilis scarce 15

15. Calamagrostis rubescens well represented . . . . ABIES LASIOCARPA/CALAMAGROSTIS RUBESCENS h.t.(p. 101)
15. C. rubescens poorly represented. 16

16. Carex geyeri well represented under well-developed forest canopies . . . . ABIES LASIOCARPA/CAREX GEYERI h.t.(p. 105)
   a. Pseudotsuga well represented; Carex geyeri sharing dominance in the undergrowth with forbs such as Thalictrum. . . . . PSEUDOTSUGA MENZIESII phase
   b. Pseudotsuga poorly represented; undergrowth dominated by C. geyeri alone. . . . . CAREX GEYERI phase
16. C. geyeri poorly represented . . . . ABIES LASIOCARPA/ARNICA CORDIFOLIA h.t.(p. 103)

17. Abies lasiocarpa and Picea engelmannii scarce and Pinus albicaulis the indicated climax. . . . . PINUS ALBICAULIS h.t.s.(p. 114)
17. Not as above 18

18. Timberline habitats; Abies lasiocarpa stunted; Pinus contorta and Menziesia ferruginea absent 19
18. Forest habitats, Abies lasiocarpa tall (generally 50 feet or more at maturity) 20

19. Larix lyallii present. . . . . LARIX LYALLII-ABIES LASIOCARPA h.t.s.(p. 112)
19. Larix lyallii absent . . . . PINUS ALBICAULIS-ABIES LASIOCARPA h.t.s (p. 111)

20. Calamagrostis canadensis, Senecio triangularis, or Ledum glandulosum well represented . . . . ABIES LASIOCARPA/CALAMAGROSTIS CANADENSIS h.t (p. 88)
20. C. canadensis, S. triangularis, and Ledum poorly represented 21

21. Luzula hitchcockii present or Menziesia ferruginea well represented 22
21. L. hitchcockii absent and Menziesia poorly represented . . . 23

22. Tsuga mertensiana well represented . . . . TSUGA MERTENSIANA/LUZULA HITCHCOCKII h.t.(p. 110)
   a. Menziesia ferruginea well presented . . . . MENZIESIA FERRUGINEA phase
   b. Menziesia poorly represented . . . . VACCINIUM SCOPARIUM phase
22. Tsuga mertensiana poorly represented . . . . ABIES LASIOCARPA/LUZULA HITCHCOCKII h.t.(p. 108)
   a. Menziesia ferruginea well represented . . . . MENZIESIA FERRUGINEA phase
   b. Menziesia poorly represented. . . . . VACCINIUM SCOPARIUM phase

23. Vaccinium scoparium (including V. myrtillus) Carex geyeri well represented . . . . ABIES LASIOCARPA-PINUS ALBICAULIS/VACCINIUM SCOPARIUM h.t.(p. 107)
23. Not as above; Ribes montigenum present . . . . ABIES LASIOCARPA/RIBES MONTIGENUM h.t.(p. 106)

Appendix C: SOIL PROPERTIES

USDA ROCK FRAGMENT SIZE CLASSES:

Class	*Size*
Gravel	2 mm – 3 in.
Cobble	3 in. – 10 in.
Stone	10 in. – 24 in.
Boulder	24 + in.

ROCK FRAGMENT CONTENT BY VOLUME:

Modifier Name	*Percent by Volume*	*Example Name*
No modifier	0 – 15	sandy loam
"ly" on end of size class	15 – 35	"gravelly" sandy loam
"very"	35 – 60	"very gravelly" sandy loam
"extremely"	60 – 95	"extremely" sandy loam
"fragmental"	95 +	fragmental

SOIL DRAINAGE CLASSES:

The following definitions are for drainage classes shown in the Soils section of the indivudual Map Unit Descriptions in Chapter II. These classes are relatively standard nationwide. They are provided to give insight to soil drainage properties that need to be considered in road construction and timber regeneration.

Poorly-drained – Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year. Poorly-drained conditions are casued by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these conditions.

Somewhat poorly-drained – Water is removed from the soil slowly enough to keep it wet for significant periods but not all the time. Somewhat poorly-drained soils commonly have a layer with low hydraulic conductivity, wet state high in the profile, additions of water through seepage, or a combination of these conditions. Wet periods usually occur during spring and early summer.

Moderately well-drained – Soil is wet for a small but significant part of the time (seasonally), usually because of a slowly permeable layer due to clayey or compacted soils and/or a relatively high or intermittently high water table. These soils have short periods of time where poor aeration will impede plant growth.

Well-drained – Soils of this class are freely drained and have intermediate water holding capacity. They retain optimum amounts of moisture, but drain readily so saturated conditions rarely occur except immediately after snowmelt or large duration storm.

Somewhat excessively-drained – Water is removed from these soils rapidly. Soils may be very shallow or shallow, and high rock fragment content makes these soils porous. These soils are droughty.

Excessively-drained – These soils are sandy and have high amounts of rock fragments in the profile which gives the soil a very high hydraulic conductivity and low water holding capacity. Water is removed very rapidly from the soil profile making soils very droughty. High elevation soils may be excessively-drained due to high amounts of rock fragments but storm events are frequent enough to support alpine vegetation.

SOIL TEXTURE:

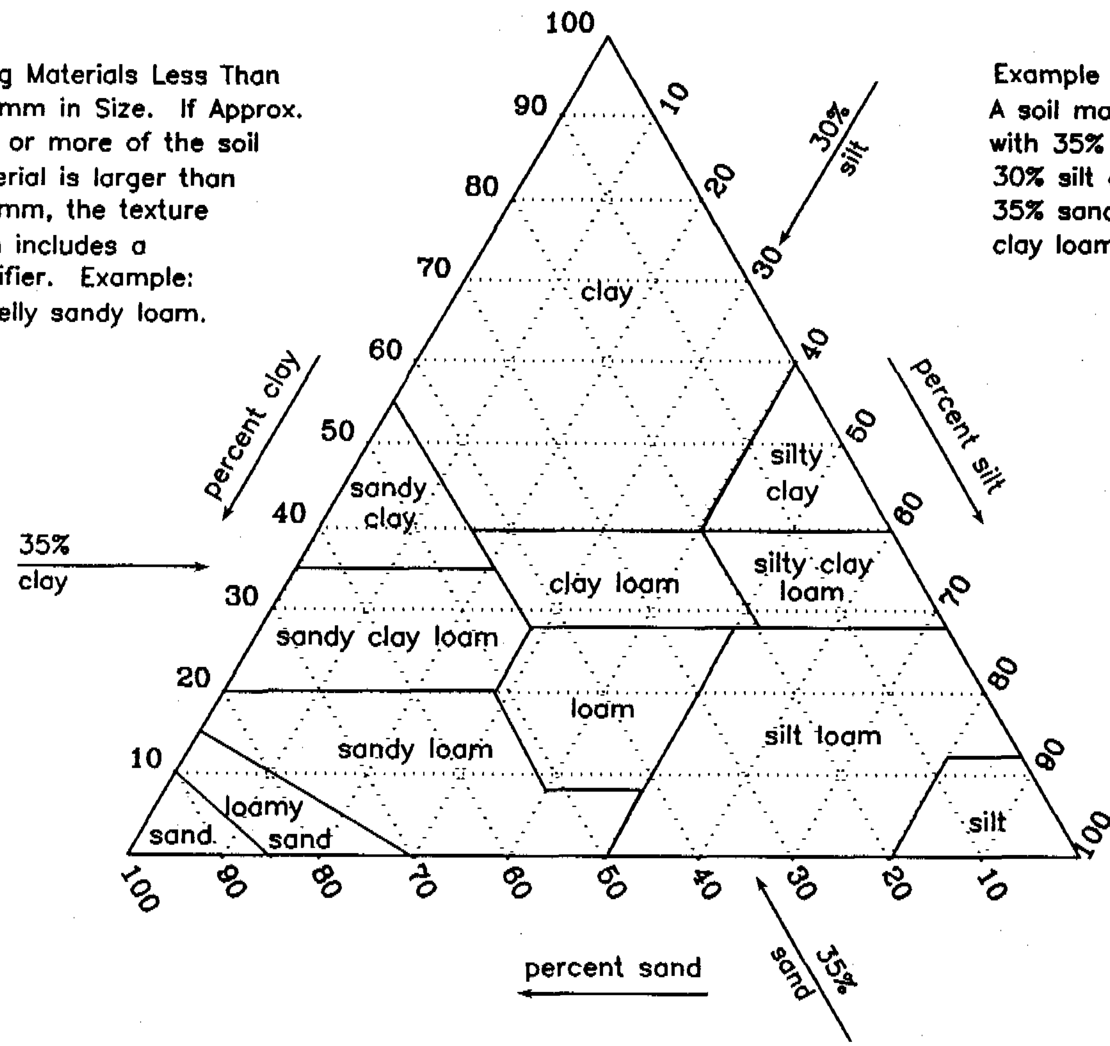
The Land Systems Inventory uses the USDA textural classification system. We find that this classification system allows us to make a greater range of interpretations from soil texture for plant growth properties and engineering soil properties. Table III-1 (Engineering Properties) gives the USDA textural classification for each map unit. Since the Unified classification system is more familiar to engineers; Table III-1 also shows the Unified Classification for each map unit.

TEXTURAL TRIANGLE:

GUIDE FOR USDA SOIL TEXTURAL CLASSIFICATION

Using Materials Less Than 2.0 mm in Size. If Approx. 20% or more of the soil material is larger than 2.0 mm, the texture term includes a modifier. Example: gravelly sandy loam.

Example of Use: A soil material with 35% clay, 30% silt and 35% sand is a clay loam.



Appendix D: POTENTIAL YIELD CAPABILITY

POTENTIAL YIELD CAPABLITY[1]
By Map Unit and Tree Species
(cubic feet/acre/year)

MAP UNIT	Douglas-fir	grand fir	lodgepole pine	western larch	ponderosa pine	whitebark pine	TOTAL
10UA	65 (1)	60 (2)	63 (2)				62 (5)
10UC			73 (2)	69 (2)			71 (4)
13UB	33 (5)		58 (3)	60 (5)	64 (1)		46 (10)
15JB	21 (2)		55 (1)	36 (5)			29 (8)
15UB	17 (3)		58 (24)	49 (9)			52 (36)
15UC	44 (7)		40 (5)	46 (6)			44 (18)
16UA	30 (15)			69 (6)	58 (18)		49 (39)
22UA	29 (28)		39 (4)	47 (13)	54 (10)		38 (55)
26UA	26 (28)			40 (7)	46 (13)		33 (48)
30BB	23 (1)						23 (1)
30MC	42 (86)		60 (24)	56 (30)	64 (7)		47 (147)
30MD	45 (25)		59 (14)	49 (16)			50 (55)
30ME	35 (31)		54 (35)	54 (4)			50 (80)
30PA	36 (7)		53 (1)				42 (8)
30PE	36 (18)				45 (2)		38 (20)
30QA	34 (3)				33 (4)		33 (7)
30QB	33 (58)				47 (12)		39 (70)
30QC	34 (73)		56 (4)	47 (14)	57 (20)	80 (1)	41 (112)
30QD	39 (13)		53 (12)	53 (12)			50 (55)
30QE	35 (48)		49 (59)	47 (33)			46 (140)
30QG	29 (42)		36 (6)	27 (4)			30 (52)

[1]Yield estimates are based on site trees sampled in each map unit. The number of site trees sampled is shown in parenthesis next to the yield estimate.

POTENTIAL YIELD CAPABLITY[1]--*(Continued)*

MAP UNIT	Douglas-fir	grand fir	lodgepole pine	western larch	ponderosa pine	whitebark pine	TOTAL
30SA			45 (1)	40 (2)			43 (3)
30SB			46 (9)	34 (9)			40 (28)
32MA	28 (53)		49 (36)	56 (24)			44 (113)
32QA	20 (34)		42 (98)	43 (15)			37 (147)
32QD	17 (1)						17 (1)
33UA			21 (15)				21 (15)
38QA	21 (6)		55 (1)				38 (7)
40QA			27 (3)				27 (3)
41KA			36 (22)				36 (22)
41QA	39 (11)		47 (15)	67 (5)			48 (31)
42QA			61 (2)				61 (2)
43QA	42 (6)	64 (1)	43 (7)	52 (1)		68 (1)	44 (16)
45UA	00 (1)						00 (1)
46KA	7 (2)		37 (11)				33 (13)
460A	69 (4)		48 (40)	50 (7)			56 (151)
470A	50 (8)		75 (1)				60 (9)
48QA	43 (10)		83 (1)	87 (3)			56 (14)
60MC	35 (10)		75 (1)	51 (3)	59 (7)		47 (21)
60QC	36 (12)		37 (7)	32 (6)			36 (25)
60QD	54 (7)		70 (1)		51 (3)		55 (11)
64MA	24 (1)						24 (1)
64MC	40 (46)		76 (2)	62 (10)	63 (9)	2 (1)	46 (68)
64MD	52 (12)		47 (6)	52 (4)			49 (22)

[1]Yield estimates are based on site trees sampled in each map unit. The number of site trees sampled is shown in parenthesis next to the yield estimate.

POTENTIAL YIELD CAPABLITY[1]--*(Continued)*

MAP UNIT	Douglas-fir	grand fir	lodgepole pine	western larch	ponderosa pine	whitebark pine	TOTAL
64MG	33 (19)		60 (3)				36 (22)
64QA	30 (14)				45 (1)		31 (15)
64QC	34 (57)	30 (2)	36 (3)	50 (9)	55 (6)		38 (77)
64QD	31 (1)		41 (21)	46 (6)			46 (29)
64QE			38 (2)	46 (4)	40 (4)		29 (32)
64SB	39 (3)		43 (1)	54 (2)			45 (6)
72BA	26 (2)		63 (11)	49 (3)	22 (1)		40 (17)
73UA				56 (2)			56 (2)
74BA	53 (2)		63 (11)	49 (3)	22 (1)		57 (17)

[1]Yield estimates are based on site trees sampled in each map unit. The number of site trees sampled is shown in parenthesis next to the yield estimate.

Appendix E: MAP UNIT ACRES

	MAP UNIT	ACRES	PERCENT
1	10UA	27,127	1.02
2	10UB	9,557	.36
3	10UC	13,825	.52
4	13JA	4,559	.17
5	13UA	38,426	1.44
6	13UB	30,732	1.15
7	14JA	15,722	.59
8	14JB	2,364	.09
9	14XA	5,090	.19
10	15JA	31,898	1.20
11	15JB	27,550	1.04
12	15UA	5,731	.22
13	15UB	18,357	.69
14	16UA	20 405	.77
15	22MA	8,189	.31
16	22UA	26,667	1.00
17	24JA	3,141	.12
18	24JB	6,039	.23
19	26UA	100,894	3.79
20	30BB	11,060	.42
21	30GA	4,893	.18
22	30KA	3,376	.13
23	30KB	8,942	.34
24	30MA	11,233	.42
25	30MB	17,536	.66
26	30MC	47,979	1.80
27	30MD	36,093	1.36
28	30ME	34,586	1.30
29	30MG	15,828	.59
30	30PA	7,089	.27
31	30PE	1,599	.06
32	30QA	25,933	.97
33	30QB	36,244	1.36
34	30QC	77,197	2.90
35	30QD	61,232	2.30
36	30QE	103,257	3.88
37	30QG	57,239	2.15
38	30SA	3,034	.11
39	30SB	4,282	.16
40	32KA	3,441	.13
41	32MA	28,613	1.07
42	32QA	126,564	4.75
43	32QC	25,543	.96
44	32QD	9,298	.35
45	33UA	84,040	3.16
46	38QA	20,237	.76
47	40KA	12,258	.46
48	40QA	148,442	5.58
49	41KA	3,631	.14
50	41QA	66,557	2.50

	MAP UNIT	ACRES	PERCENT
51	41SA	1,627	.06
52	42KA	3,027	.11
53	42QA	61,851	2.32
54	43QA	17,371	.65
55	43QB	9,266	.35
56	43SA	711	.03
57	45UA	17,067	.64
58	46KA	4,986	.19
59	46OA	65,061	2.44
60	47KA	1,372	.05
61	47OA	26,984	1.01
62	48KA	6,048	.23
63	48QA	101,512	3.81
64	60KA	1,098	.04
65	60KB	562	.02
66	60MA	11,133	.42
67	60MB	18,419	.69
68	60MC	28,616	1.08
69	60MD	17,192	.65
70	60QA	56,627	2.13
71	60QB	32,396	1.22
72	60QC	56,946	2.14
73	60QD	25,680	.96
74	61MC	7,458	.28
75	61MD	8,400	.32
76	61QC	25,526	.96
77	61QD	13,251	.50
78	61SA	2,143	.08
79	64KA	1,927	.07
80	64KB	5,809	.22
81	64MA	10,572	.40
82	64MB	13,731	.52
83	64MC	35,061	1.32
84	64MD	18,322	.69
85	64ME	10,816	.41
86	64MG	4,366	.16
87	64QA	48,189	1.81
88	64QB	44,712	1.98
89	64QC	79,491	2.99
90	64QD	27,325	1.03
91	64QE	49,254	1.85
92	64QG	29,408	1.10
93	64SB	606	.02
94	72BA	23,859	.90
95	72OA	55,909	2.10
96	73UA	12,119	.46
97	73UB	8,411	.32
98	74BA	4,351	.16
99	74UA	46,219	1.74
	TOTAL	**2,661,748**	**100**

NOTE: Private land in the Ninemile, Clark Fork River, Clearwater River drainages is included.

Appendix F: GLOSSARY

Alluvium	Material, such as sand, silt, or clay, deposited on land by streams.
Alpine	Characteristic of high mountains, especially ones modified by intense glacial erosion. Implies high elevation and cold climate.
Aquic moisture regime	A reducing regime that is virtually free of dissolved oxygen because the soil is saturated by ground water.
Argillite	A compact rock derived from mudstone or shale composed primarily of clay-sized particles.
Argillic horizon	A diagnostic illuvial subsurface horizon characterized by an accumulation of silicate clays.
Arterial road	Forest roads that service large land areas and usually connect with public highways. They are designed for maximum mobility and travel efficiency.
Avalanche chute	The central channel-like corridor along which an avalanche has moved; it may take the form of an open path in a forest, with bent and broken trees, or an eroded surface marked by pits, scratches, and grooves.
Basalt	An extrusive igneous rock composed primarily of calcic plagioclase and pyroxene, with or without olivine.
Base saturation	The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.
Basin	A depressed area with no or limited outlet.
Bedrock	The solid material that underlies the soil and other unconsolidated material or that is exposed at the surface.
Boulders	Rock fragments larger than 2 feet in diameter.
Breaklands	The steep to very steep broken land at the border of an upland that is dissected by ravines or canyons.
Bulk density	The mass of dry soil per unit volume, expressed in grams per cubic centimeter.
Cable logging	A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable logging systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.
Cambic horizon	A horizon which has been altered or changed by soil forming processes, usually occurring below a diagnostic surface horizon.
Canopy	The leafy crown of trees or shrubs. (See ***crown***.)

Cation	An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
Cation-exchange capacity	The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value.
Channel	The bed of single or braided watercourse that commonly is barren of vegetation and is formed of modern alluvium.
Cirque	Semicircular, concave, bowllike areas that have steep faces primarily resulting from glacial ice and snow abrasion.
Clay	The mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay film	A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonymous with clay skin.
Climax vegetation	The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
Coarse fragments	Mineral or rock particles larger than 2 millimeters in diameter.
Coarse textured soil	Sand or loamy sand.
Cobble	Rock 3 to 10 inches in diameter.
Cobbly soil	Material that is 15 to 35 percent, by volume, rock fragments 3 to 10 inches in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.
Collector road	Forest roads that connect to arterial roads and serve smaller land areas. Their design is influenced by the transportation needs of the land they serve.
Colluvium	Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
Compaction	The packing together of soil particles by forces exerted at the soil surface, resulting in increased solid density.
Complex slope	Irregular or variable slope.
Complex, soil	A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small an area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
Consistence, soil	The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence at various soil moisture contents are:

Wet soil	nonsticky, slightly sticky, sticky, very sticky, nonplastic, slightly plastic, plastic, very plastic.
Moist soil	loose, very friable, friable, firm, very firm, extremely firm.
Dry soil	Loose, soft, slightly hard, hard, very hard, extremely hard.

Crown The upper part of a tree or shrub, including the living branches and their foliage.

Cryic Soil temperature regime in which the mean annual soil temperature at 20 inches depth is higher than 0° C but lower than 8° C and the mean summer soil temperature is lower than 8° C if an O horizon is present.

Cutbanks, road The steep slope above a road from which material has been excavated during construction.

Delineation A single enclosed area within a drawn boundary line on a map. A single occurrence of a map unit.

Dendritic drainage pattern A drainage pattern characterized by a treelike branching pattern in which the tributaries join the main stream from all directions and at almost any angle.

Deposition The laying down of potential rock-forming materials; sedimentation.

Deranged A poorly integrated drainage system resulting from a relatively young landform having a flat or undulating topographic surface. These forms occur on moraines in the survey area.

Displacement Repositioning or removal of the surface soil layers by mechanical action.

Dissected slopes A slope with deeply cut drainages at frequent intervals. The slope is dominantly low order drainage valley sideslopes with narrow spur ridges.

Drainage pattern The spatial relationships among streams or rivers, including geographic orientation and angles of intersection of streams. These are influenced by topographic relief, parent rock and soil materials.

Draw A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Droughty An area or soil that characteristically has either a prolonged or chronic lack of available water.

Erodibility The tendency of a soil to be detached and carried away.

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

Erosion hazard An interpretation of the risk of erosion associated with a specified management practice.

Fan, alluvial A low, outspread, gently sloping mass of loose rock material shaped like an open fan or a segment of a cone, deposited by a stream.

Fan, colluvial	A gently-inclined surface at the base of a mountain slope that grades to a valley floor.
Fault	A surface or zone of rock fracture along which there has been displacement.
Fertility, soil	The quality that enables a soil to provide plant nutrients, in adequate amounts and in the proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
Fill, road	A structure, often composed largely of borrowed soil and rock materials, which forms the foundation upon which a road surface is constructed.
Fill slope	A sloping surface consisting of excavated soil material from a road cut. It is commonly is on the downhill side of a road.
Fine textured soil	Sandy clay, silty clay, and clay.
Flood plain	A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially. It is usually a landform built of sediment deposited during overflow and lateral migration of the stream.
Forb	Any herbaceous plant not a grass or a sedge.
Forest cover	All trees and other woody plants covering the ground in a forest.
Frigid	A soil temperature regime in which the soil at 20 inches depth has a mean temperature of 0° C to 8° C, and mean summer soil temperatures equal to or greater than 8°.
Frost pocket	Accumulation of cold air in a topographic low or depression leading to unseasonal occurrence of frost.
Gabbro	A group of dark-colored, basic intrusive igneous rocks. They are the approximate intrusive equivalent of basalt.
Glacial	Of or relating to the presence and activities of ice and glaciers, as glacial erosion. Pertaining to distinctive features and materials produced by or derived from glaciers and ice sheets, as glacial lakes. Pertaining to an ice age or region of glaciation.
Glacial till	Unsorted and unstratified glacial drift, generally unconsolidated, deposited directly by a glacier without subsequent reworking by water from the glacier, and consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Glaciation	The formation, movement and recession of glaciers or ice sheets. A collective term for the geologic processes of glacial activity, including erosion and deposition, and the resulting effects of such action on the earth's surface.
Granite	A plutonic rock in which quartz constitutes 10 to 50 percent of the felsic components and in which alkali feldspar constitutes 65 to 90 percent of total feldspar.
Granitic	A class of igneous rocks in which the constituent crystals are visible to the unaided eye, non-glassy in appearance and approximately of the same size.
Gravel	Rounded or angular fragments of rock up to 3 inches in diameter. An individual piece is a pebble.

Gravelly soil material Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches in diameter. Material with 35 to 60 percent of these rock fragments is very gravelly and over 60 percent is extremely gravelly.

Ground water All subsurface water, excluding internal water in the interior of the earth below the zone of saturation, as distinct from surface water.

Habitat type All land areas potentially capable of producing similar plant communities at climax. Habitat types are named by the climax tree species in the first part of the name and a dominant undergrowth species in the second part of the name.

Headwall The steep slope at the head of a valley; especially the rock cliff at the back of a cirque.

Herbage The total production of grasses, forbs and shrubs available to livestock.

Hill A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline.

Horizon, soil A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil norizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

- **O horizon** An organic layer of fresh and decaying plant residue.
- **A horizon** The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.
- **B horizon** The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
- **E horizon** The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- **C horizon** The mineral horizon, or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.
- **R layer** Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummock A rounded or conical mound or knoll, hillock or other small elevation. Also, a slight rise of ground above a level surface.

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

Inclusion	Soil or vegetative bodies found within a map unit not extensive enough to be mapped separately or as part of a complex.
Intrusive	Denoting igneous rocks derived from molten matter (magmas) which invaded pre-existing rocks and cooled below the surface of the earth.
Landform	Any physical, recognizable form or feature of the earth's surface, having a characteristic shape and produced by natural causes. Landforms used in this survey are described in the Physiography section.
Landscape	All the natural features, such as fields, hills, forests, and water, that distinguish one part of the earth's surface from another part. Also, the distinct association of landforms, especially as modified by geologic forces, that can be seen in a single view.
Landslide	A mass-wasting process, and the landform produced, involving moderately rapid to rapid (greater than one foot per year) downslope transport, by means of gravitational stresses, of a mass of rock and regolith that may or may not be water saturated.
Landtype	Unit of land with similar designated soil, vegetation, geology, topography, climate, and drainage.
Leaching	The removal of soluble material from soil or other material by percolating water.
Limestone	A sedimentary rock consisting cheifly (more than 50%) of calcium carbonate, primarily in the form of calcite.
Liquid limit	The moisture content at which the soil passes from a plastic to a liquid state.
Lithologic	Pertaining to the physical character of a rock.
Loam	Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.
Local road	Forest roads that connect terminal facilities to collector and arterial roads or public highways. Their design is controlled by a specific project transportation need. They are often closed to use when the project is complete.
Loess	Fine grained material, dominantly of silt-sized particles, deposited by wind.
Low soil strength	The soil is not strong enough to support loads.
Map unit	The set of areas delineated on a map considered similar to all other members of the set (delineations) with respect to the selected properties used to define the set.
Mean annual increment	The annual increase per acre in the volume of a stand. Computed by dividing the total volume of a stand by its age. Abbreviated MAI.
Meander	One of a series of sinuous loops, with sine-wave form, in the course of a stream channel. Meandering streams commonly have cross sections with low width to depth ratios, fine-grained, cohesive bank material, and low gradient.

Medium textured soil	Very fine sandy loam, loam, silt loam, or silt.
Metasedimentary rock	A sedimentary rock which shows evidence of having been subject to metamorphism.
Mineral soil	Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Moderately coarse textured soil	Sandy loam, and fine sandy loam.
Moderately fine textured soil	Clay loam, sandy clay loam, and silty clay loam.
Moraine	An accumulation of unsorted earth and rock deposited by a glacier.
Morphology, soil	The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil	Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms describe abundance, size and contrast.
Mountain	A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.
Munsell notation	A designation of color by degrees of the three simple variables: hue, value and chroma.
Neutral soil	A soil having a pH value between 6.6 and 7.3.
Nutrient, plant	Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
Organic matter	Plant and animal residue in the soil in various stages of decomposition.
Outcrop	That part of a geologic formation or structure that appears at the surface of the earth.
Outsloping	A road drainage practice in which the road surface is sloped away from the cutslope and drainage water is discharged on the fill slope.
Outwash	Stratified detritus (chiefly sand and gravel) deposited in front of a glacier by meltwater.
Parallel drainage pattern	In the survey area, a local drainage pattern in which tributaries are parallel to one another and join the mainstream at right angles, characteristic of steeply sloping landforms and high energy streams.
Parent material	The unconsolidated organic and mineral matter in which soil forms.

Pedon	The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet, depending on the variability of the soil.
Permeability	The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil.
Plasticity index	The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.
Plastic limit	The moisture content at which a soil changes from semisolid to plastic.
Pleistocene	The first epoch of the Quaternary Period of geologic time, following the Tertiary Pliocence Epoch and preceding the Holocence (approximately from 2 million to 10 thousand years ago).
Precambrian	First era of geologic time (approximately 600 to 4,700 million years ago.)
Productivity, soil	The capability of a soil for producing a specified plant or sequence of plants under specific management.
Profile, soil	The vertical section of the soil extending through all its horizons and into the parent material.
Puddling	Destruction natural soil structure by agitation with water.
Quartzite	Relatively hard rocks derived from metamorphosed sandstone.
Quaternary	The second period of the Cenozoic Era of geologic time, extending from the end of the Tertiary Period (about 2 million years age) to the present and comprising two epochs, the Pleistocene (Ice Age) and Holocene (Recent).
Ravel	The movement of individual soil or gravel particles down a slope by gravitational force.
Reaction, soil	A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as:

Extremely acid	Below 4.5.
Very strongly acid	4.5 to 5.0.
Strongly acid	5.1 to 5.5.
Medium acid	5.6 to 6.0.
Slightly acid	6.1 to 6.5.
Neutral	6.6 to 7.3.
Mildly alkaline	7.4 to 7.8.
Moderately alkaline	7.9 to 8.4.

Strongly alkaline	8.5 to 9.0.
Very strongly alkaline	9.1 and higher.

Regeneration The renewal of a tree crop by natural or artificial means.

Relief The elevations or inequalities of a land surface, considered collectively.

Resident Term describing fish species in the survey area that spend their entire life cycle in local stream systems.

Residuum Unconsolidated, weathered, or partly weathered mineral material that only accumulates by disintegration of bedrock in place.

Ridge A long narrow elevation of the land surface, usually sharp crested with steep sides and forming an extended upland between valleys.

Rippable A material, usually bedrock, which can be mechanically dislodged using machines without resorting to the use of explosives.

Road cut The sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fall Fall of cobble size and larger rocks from steep cutslopes onto the road surface.

Rock fragments Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop Barren exposures of hard bedrock that is fractured in places. Some soil material is in cracks and crevices. In this survey area the rock is mostly metasedimentary rocks. When rock outcrop is on steep slopes it normally includes small areas of loose stones, cobble or gravel.

Rock weathering Transformation of rock by physical and chemical processes associated with the environment at the earth's surface.

Rolling grade A road drainage practice in which the road grade is designed to provide low points at intervals to allow drainage water to escape.

Root zone The part of the soil that can be penetrated by plant roots.

Runoff The precipitation discharged into stream channels from an area. The water that *flows off the surface of an area* without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Rutting Furrows made in roads surfaces by the passage of wheeled vehicles over wet and plastic materials.

Sand A soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Scour The powerful and concentrated clearing and digging action of flowing air, water, or ice.

Sediment	Solid clastic material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, ice or mass-wasting and has come to rest on the earth's surface either above or below sea level.
Sediment delivery efficiency	The relative ease with which sediment produced in a landscape reaches stream channels within the same landscape. This is the qualitative equivalent of the sediment delivery ratio which is the ratio of the sediment reaching streams to the amount eroded within a drainage area.
Seral	A plant species or community that is replaced by another species or community as succession progresses.
Silt	As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.
Siltite	An indurated or somewhat indurated rock composed primarily of silt-sized particles.
Site Index	A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.
Slope	The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.
Slough	Small landslides involving less than 10 cubic yards of material which detach from road cut slopes and fall on the road ditch and on the running surface.
Soil	A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.
Soil separates	Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows;

Very coarse sand	2.0 to 1.0 millimmeters.
Coarse sand	1.0 to 0.5 mm.
Medium sand	0.5 to 0.25 mm.
Fine sand	0.25 to 0.10 mm.
Very fine sand	0.10 to 0.05 mm.
Silt	0.05 to 0.002 mm.
Clay	Less than 0.002 mm.

Solar insolation	Sum total of all long and short wave radiation intercepted by a slope.
Solum	The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.
Stones	Rock fragments 10 to 24 inches in diameter if rounded or 6 to 15 inches in length if flat.
Stratified	Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.
Stream order	In a drainage basin network, the smallest unbranched tributaries are designated stream order 1; the confluence of two first-order streams produces a stream segment of order 2; the junction of two second-order streams produces a stream segment of order 3; etc. The order of a drainage basin is determined by the highest integer.
Stream terrace	See terrace, stream.
Structure, soil	The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy	Laminated.
Prismatic	Vertical axis of aggregates longer than horizontal.
Columnar	Prisms with rounded tops.
Blocky	Angular or subangular.
Granular	Rounded.
Structureless	Soils are either single grained or massive.

Subgrade	The upper part of a road fill upon which the road surfacing components are placed.
Subsoil	Technically, the B horizon; roughly, the part of the solum below the surface soil.
Substratum	The part of the soil below the solum; the C horizon.
Surface layer	The uppermost layer in the soil, usually ranging in depth from 4 to 10 inches.
Taxonomic unit	A defined class at any categorical level in the soil classification system. The soil names for map units refer to taxonomic units.
Terrace, stream	A step-like surface, bordering a valley floor or shoreline, that represents the former position of an alluvial plain, fan, or lake or seashore. The term is usually applied to both the relatively flat summit surface (platform, tread), cut or built by stream or wave action and the steeper descending slope (scarp, riser), graded to a lower base level of erosion.

Texture, soil The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay and clay. The sand, loamy sand and sandy loam classes may be further divided by specifying coarse, fine or very fine.

Till, glacial See glacial till.

Topography The relative position and elevations of the natural or manmade features of an area that describe the configurations of its surface.

Transitory range Livestock forage available from typically forested lands during the period of seral grass, forb and shrub growth following timber harvest or fire.

Trough wall Sideslopes of elongate, U-shaped valleys produced by glacial activity.

Truncated spur A ridge that formerly projected into a preglacial valley ridge and that was partially worn away or beveled by a moving glacier that widened and straightened the valley.

Udic Soil moisture regime in which the soil moisture control section is not dry in any part for as long as 90 days, or 45 consecutive days in the growing season.

Upland The elevated land above the low areas along streams or between hills; land above the footslope zone of the hillslope continuance.

Ustic A soil moisture regime in which the moisture control section is dry for 90 or more days, but is not dry more than half the time the soil temperature is above 50 degrees centigrade at 20 inches.

Valley An elongate, relatively large, externally-drained depression of the earth's surface that is primarily developed by stream erosion.

Volcanic Pertaining to (1) the deep-seated (igneous) processes by which magma and associated gases rise through the crust and are extruded onto the earth's surface and into the atmosphere, and (2) the structure, rocks, and landforms produced.

Water bar A shallow ditch excavated diagonally across a road surface to provide cross drainage.

Weathering All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Windthrow The action of uprooting and tipping over trees by the wind.

Appendix G: REFERENCES

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Appendix H: QUAD INDEX

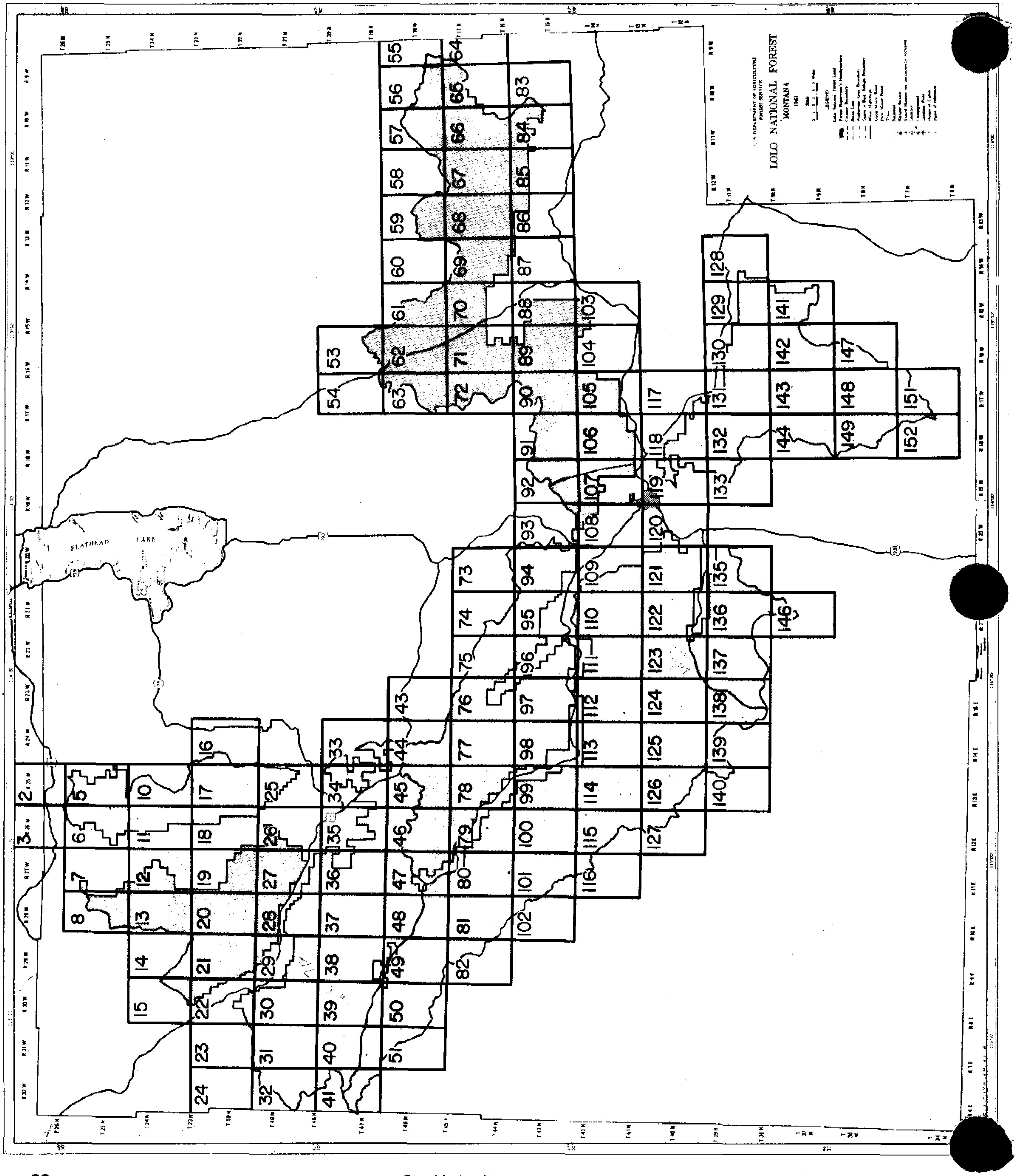
LNF No.	Quad Name	Northern Region No.
2	McGregor Peak	814-3-3-4
3	Meadow Peak	814-3-3-3
5	Murr Peak	714-2-2-1
6	Schroder Creek	714-2-2-2
7	Bend	715-1-1-1
8	Mantrap	715-1-1-2
9	Mill Pocket	714-2-1-3
10	Bazzoo Peak	714-2-2-4
11	Cook Mountain	714-2-2-3
12	Richards Peak	715-1-1-4
13	Fishtrap Lake	715-1-1-3
14	Vermillion Peak	715-1-2-4
15	Seven Point Mountain	715-1-2-3
16	Lonepine	714-2-4-2
17	Coney Peak	714-2-3-1
18	Loneman	714-2-3-2
19	Calico Creek	715-1-4-1
20	Priscilla Peak	715-1-4-2
21	Thompson Falls NE	715-1-3-1
22	Thompson Falls NW	715-1-3-2
23	Cooper Gulch NE	715-2-4-1
24	Cooper Gulch NW	715-2-4-2
25	Baldy Lake	714-2-3-4
26	Weeksville	714-2-3-3
27	Big Hole	715-1-4-4
28	Eddy Mountain	715-1-4-3
29	Thompson Falls SE	715-1-3-4
30	Thompson Falls SW	715-1-3-3
31	Cooper Gulch SE	715-2-4-4
32	Cooper Gulch SW	715-2-4-3
33	Perma NW	714-3-1-2
34	Plains NE	714-3-2-1
35	Plains NW	714-3-2-2
36	St. Regis NE	715-4-1-1
37	St. Regis NW	715-4-1-2
38	Haugan NE	715-4-2-1
39	Haugen NW	715-4-2-2
40	Saltese NE	715-3-1-1
41	Saltese NW	715-3-1-2
42	Wallace NE	715-3-2-1
43	Perma SE	714-3-1-4
44	Perma SW	714-3-1-3
45	Plains SE	714-3-2-4
46	Plains SW	714-3-2-3

LNF No.	Quad Name	Northern Region No.
47	St. Regis SE	715-4-1-4
48	St. Regis SW	715-4-1-3
49	Haugan SE	715-4-2-4
50	Haugen SW	715-4-2-3
51	Saltese SE	715-3-1-4
53	Holland Lake	713-3-1-1
54	Cygnet Lake	713-3-1-2
55	Jakie Lake	712-3-1-3
56	Scapegoat Mountain	712-3-2-4
57	Flint Mountain	712-3-2-3
58	Danaher Mountain	713-4-1-4
59	Hahn Creek Pass	713-4-1-3
60	Crimson Peak	713-4-2-4
61	Morrell Lake	713-4-2-3
62	Lake Inez	713-3-1-4
63	Lake Marshall	713-3-1-3
64	Heart Lake	712-3-4-2
65	Olson Peak	712-3-3-1
66	Lake Mountain	712-3-3-2
67	Spread Mountain	713-4-4-1
68	Dunham Point	713-4-4-2
69	Morrell Mountain	713-4-3-1
70	Seeley Lake East	713-4-3-2
71	Seeley Lake West	713-3-4-1
72	Upper Jocko Lake	713-3-4-2
73	Arlee NW	714-4-4-2
74	Alberton NE	714-4-3-1
75	Alberton NW	714-4-3-2
76	Tarkio NE	714-3-4-1
77	Tarkio NW	714-3-4-2
78	Superior NE	714-3-3-1
79	Superior NW	714-3-3-2
80	Illinois Peak NE	715-4-4-1
81	Illinois Peak NW	715-4-4-2
82	Simmons Peak NE	715-4-3-1
83	Arrastra Mountain	712-3-3-4
84	Coopers Lake	712-3-3-3
85	Ovando Mountain	713-4-4-4
86	Ovando	713-4-4-3
87	Woodworth	713-4-3-4
88	Salmon Lake	713-4-3-3
89	Belmont Point	713-3-4-4
90	Gold Creek Peak	713-3-4-3
91	Wapiti Lake	713-3-3-4

LNF No.	Quad Name	Northern Region No.
92	Stuart Peak	713-3-3-3
93	Arlee SE	714-4-4-4
94	Arlee SW	714-4-4-3
95	Alberton SE	714-4-3-4
96	Alberton SW	714-4-3-3
97	Tarkio SE	714-3-4-4
98	Tarkio SW	714-3-4-3
99	Superior SE	714-3-3-4
100	Superior SW	714-3-3-3
101	Illinois Peak SE	715-4-4-4
102	Illinois Peak SW	715-4-4-3
103	Greenough	613-1-2-2
104	Potomac	613-2-1-1
105	Sunflower Mountain	613-2-1-2
106	Blue Point	613-2-2-1
107	Missoula NE	613-2-2-2
108	Missoula NW	614-1-1-1
109	Primrose	614-1-1-2
110	Diamond Point	614-1-2-1
111	Petty Mountain	614-1-2-2
112	Deer Peak	614-2-1-1
113	Williams Peak	614-2-1-2
114	Straight Peak NE	614-2-2-1
115	Straight Peak NW	614-2-2-2
116	Hoodoo	615-1-1-1
117	Clinton	613-2-1-3
118	Bonner	613-2-2-4
119	Missoula SE	613-2-2-3
120	Missoula SW	614-1-1-4
121	Blue Mountain	614-1-1-3

LNF No.	Quad Name	Northern Region No.
122	Camp Creek	614-1-2-4
123	Garden Point	614-1-2-3
124	Lupine Creek	614-2-1-4
125	White Mtn.	614-2-1-3
126	Straight Pk. SE	614-2-2-4
127	Straight Pk. SW	614-2-2-3
128	Bearmouth NE	613-1-3-1
129	Bearmouth NW	613-1-3-2
130	Ravenna NE	613-2-4-1
131	Iris Point	613-2-4-2
132	Elk Mountain	613-2-3-1
133	Davis Point	613-2-3-2
135	Carlton Lake	614-1-4-2
136	Dick Creek	614-1-3-1
137	West Fork Butte	614-1-3-2
138	Lolo Hot Springs	614-2-4-1
139	Granite Pass	614-2-4-2
140	Rhodes Peak	614-2-3-1
141	Bearmouth SW	613-1-3-3
142	Ravenna SE	613-2-4-4
143	Grizzly Point	613-2-4-3
144	Cleveland Mtn. SE	613-2-3-4
145	Gray Horse Creek	613-2-3-3
146	St. Joseph Peak	614-1-3-4
147	Alder Gulch	613-3-1-1
148	Quigg Peak	613-3-1-2
149	Sawmill Saddle	613-3-2-1
151	Stony Creek	613-3-1-3
152	Burnt Fork Lake	613-3-2-4

Appendix I: QUAD INDEX MAP

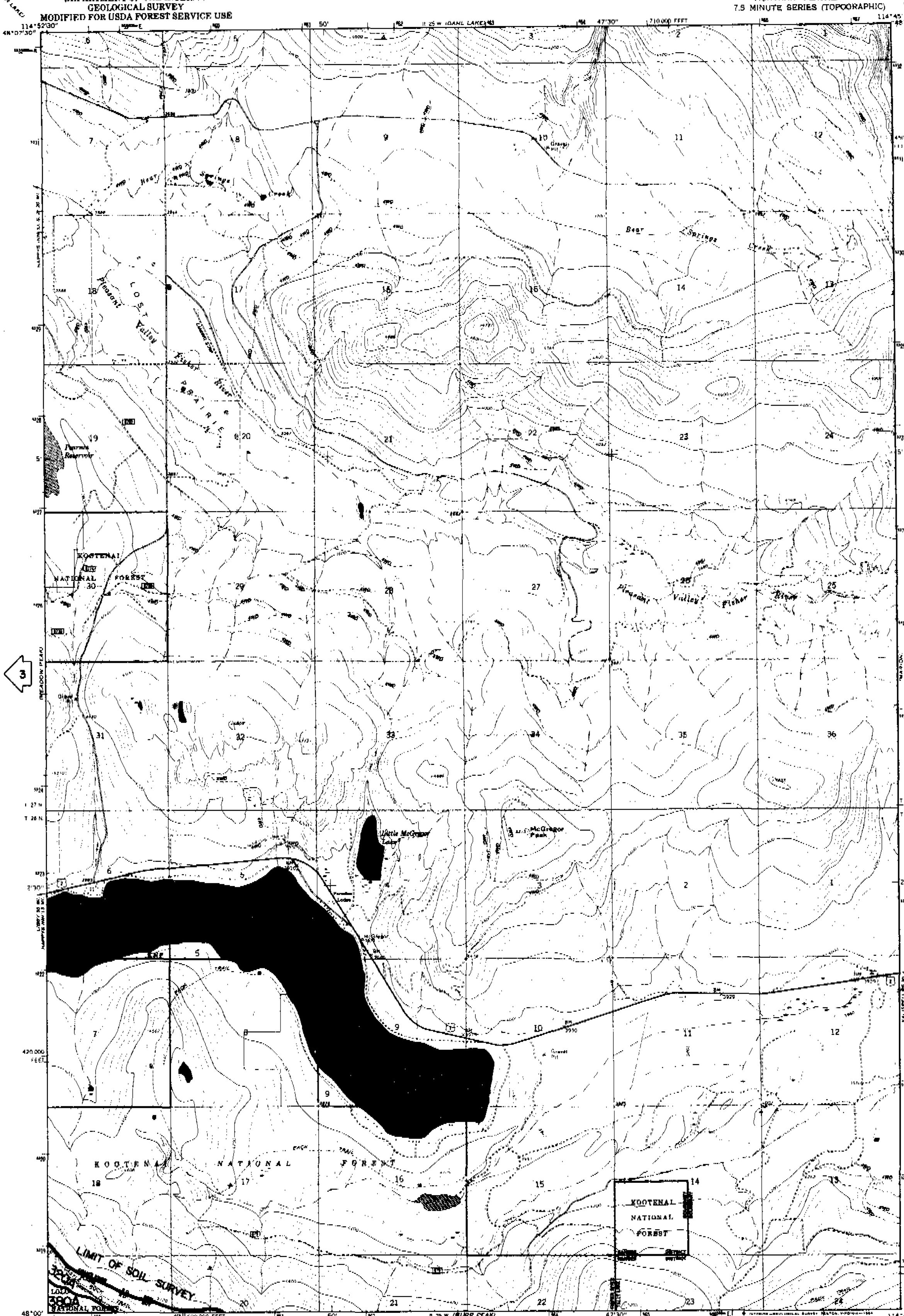


LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MC GREGOR PEAK QUADRANGLE
MONTANA – FLATHEAD CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, BLM Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- U.S. Highway
- State Highway
- County Highway
- Forest Road
- Forest Trail

KOOTENAI NATIONAL FOREST QUADRANGLE LOCATION DIAGRAM

2

MC GREGOR PEAK, MONT.
48114 A7 TF-024
1964
PHOTOREVISED 1983

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MEADOW PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

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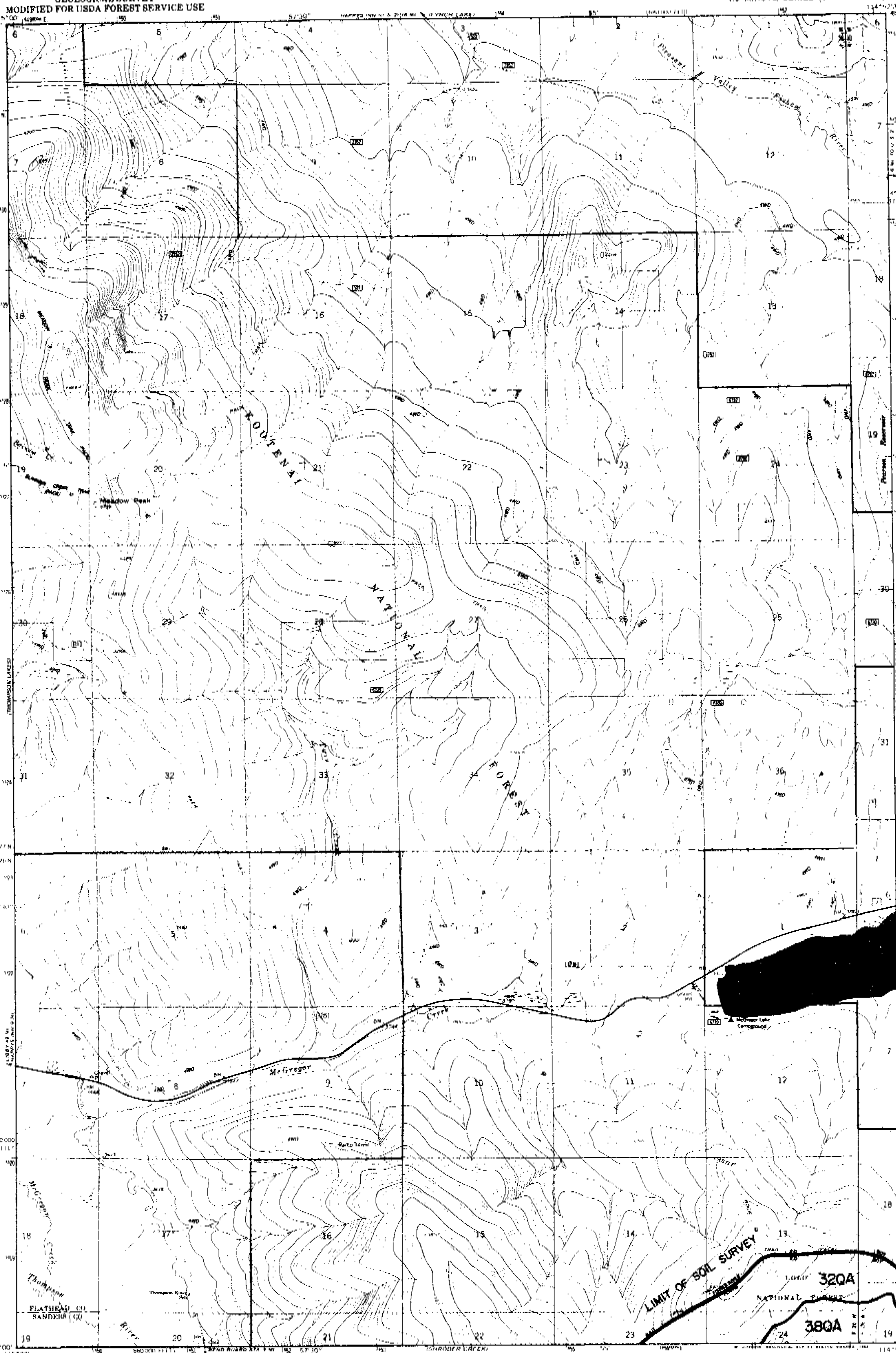


SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

KOOTENAI NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

3

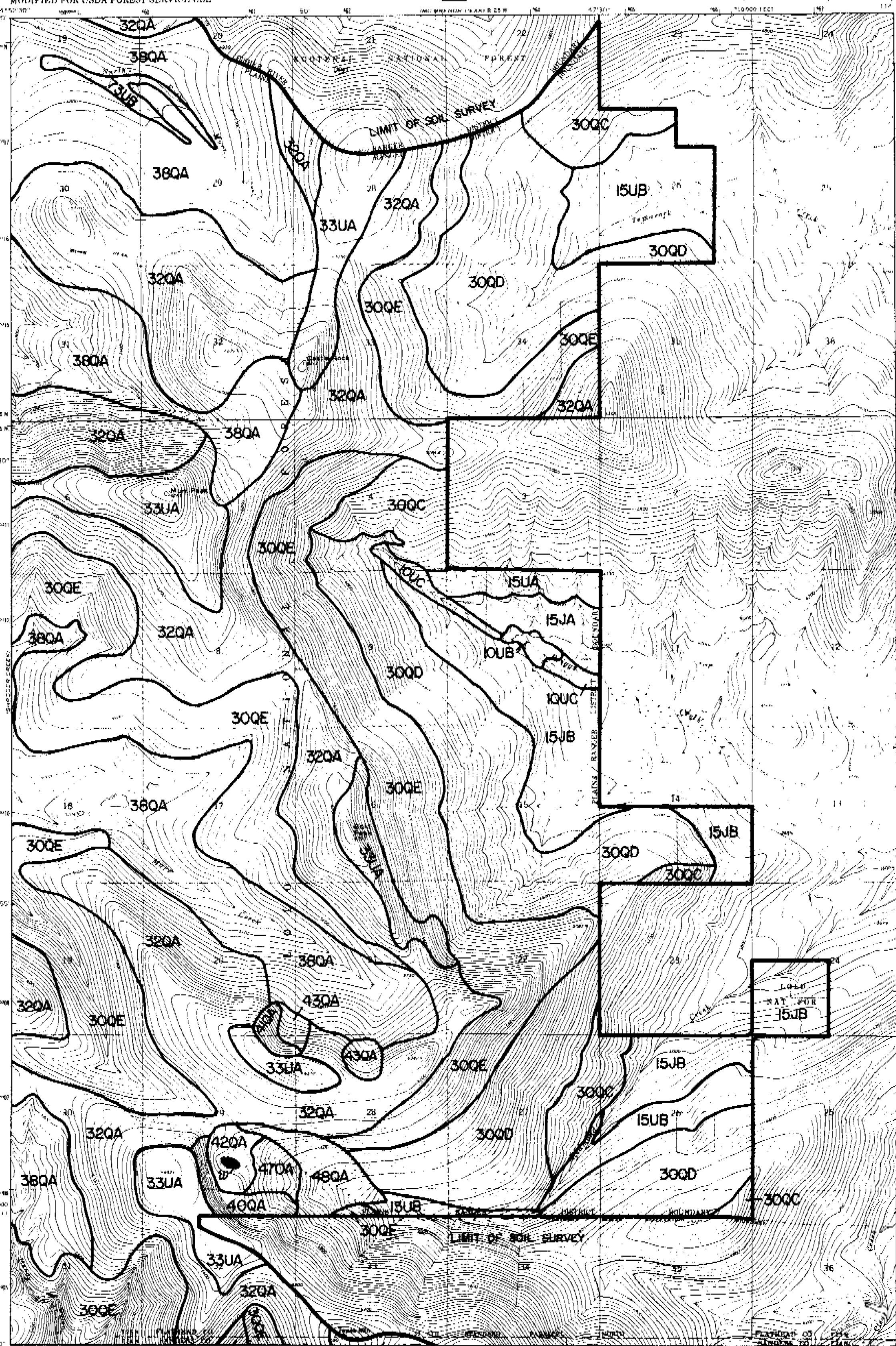
MEADOW PEAK, MONT.
48114-A8-TF-024
1964
PHOTOREVISED 1983

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MURR PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

5

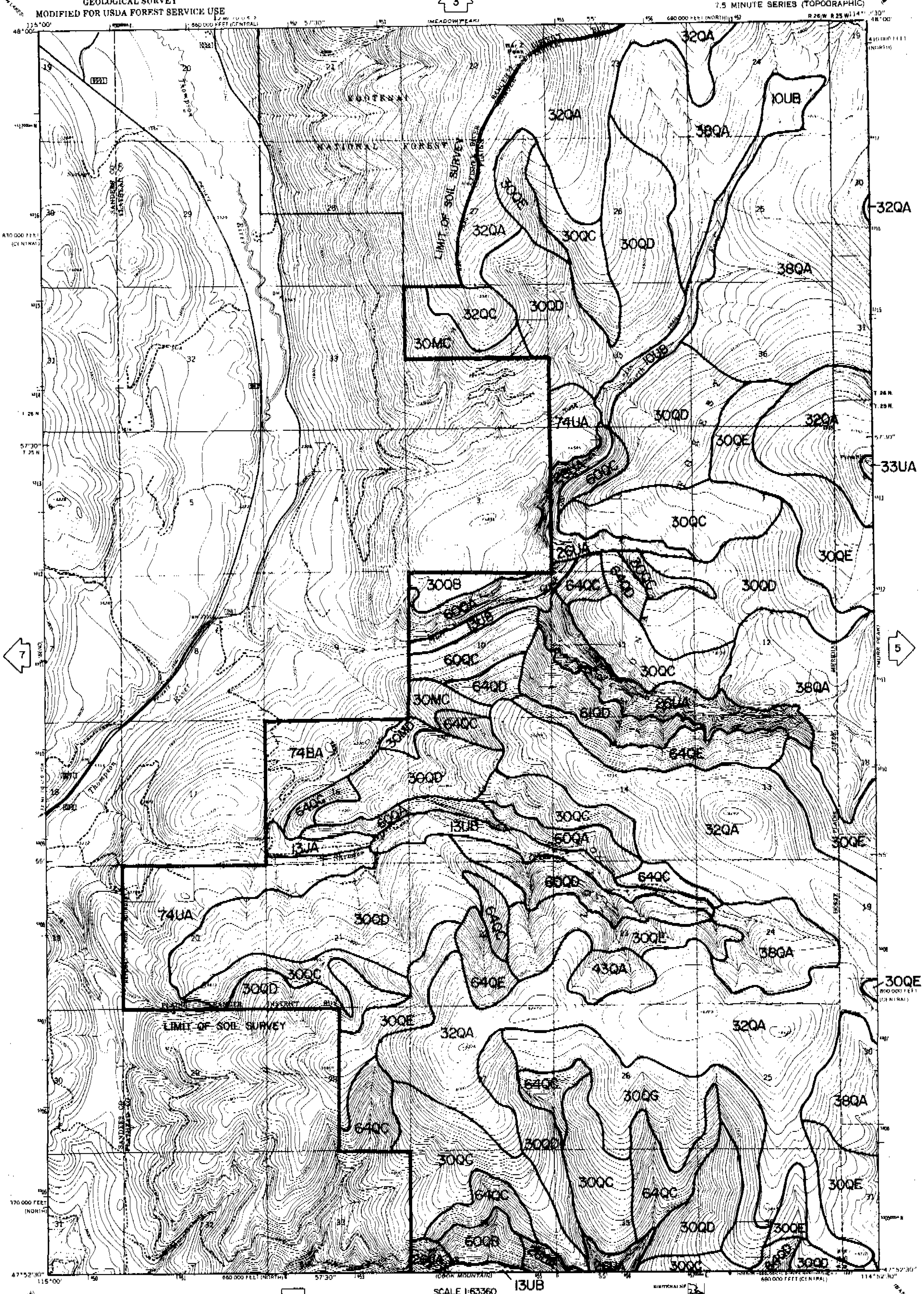
MURR PEAK, MONT.
N4752.5—W11445/7.5
1964
DMA 3079 IV NE—SERIES V894

LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SHRODER CREEK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *W* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

UTM GRID AND 1963 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LOLO NATIONAL FOREST
CENTRAL

6

SHRODER CREEK, MONT.
N4752.5—W11452.5/7.5
1964
DMA 3079 IV NW—SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BEND QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

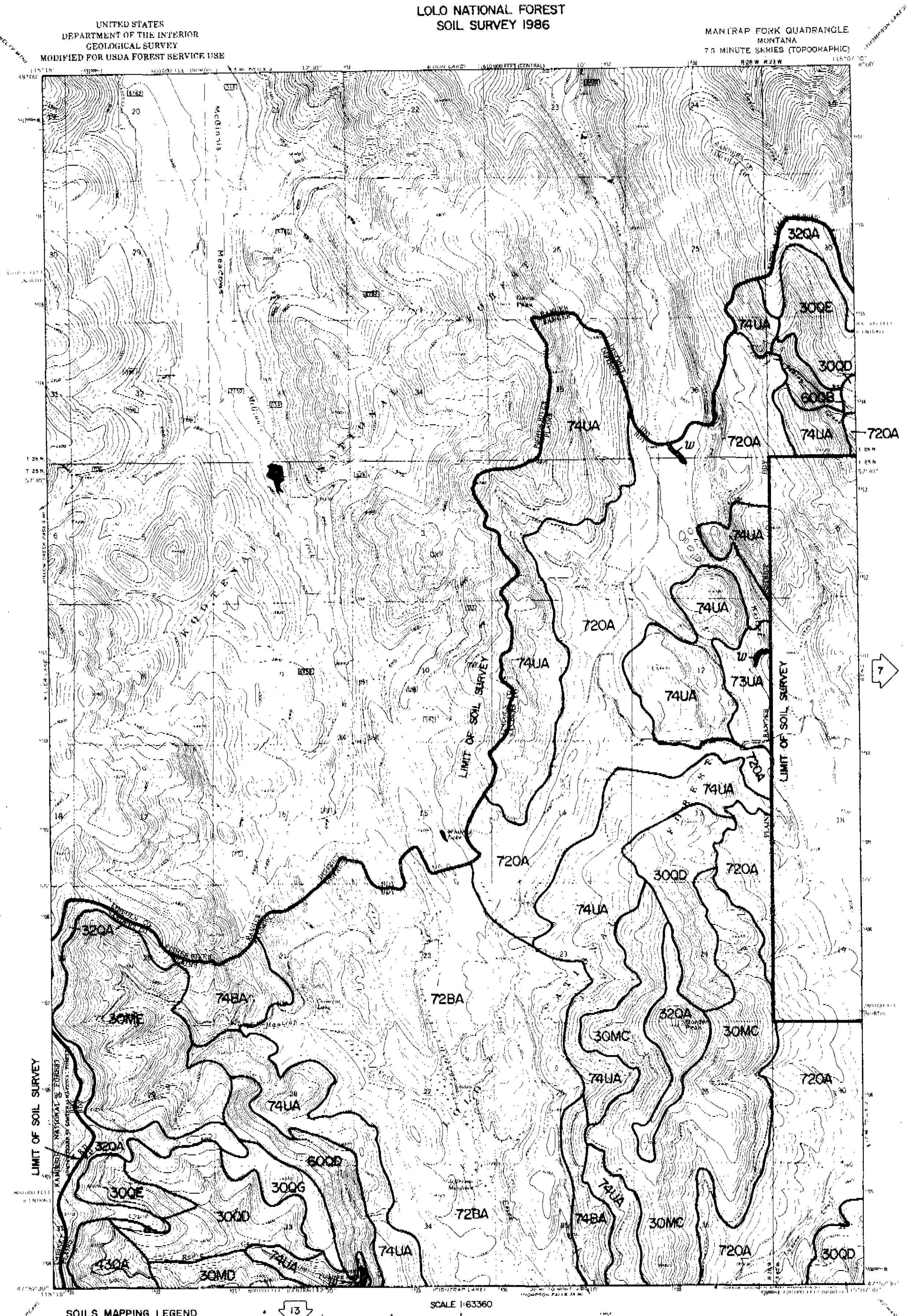
LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST WEST

7

BEND, MONT.
N4752.5 — W11500/7.5
1966
AMS 2979 I NE—SERIES V894



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

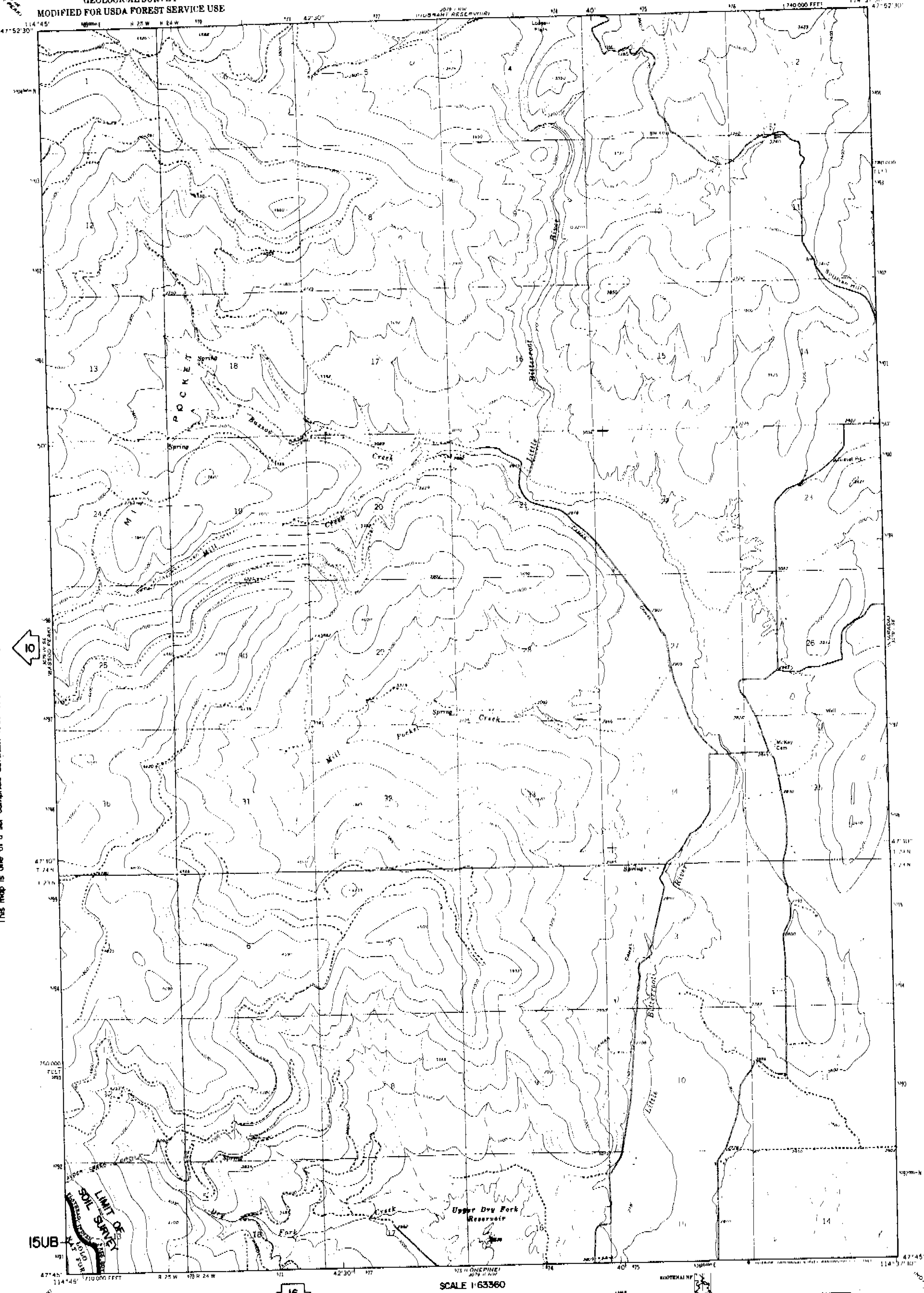
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MILL POCKET CREEK QUADRANGLE
MONTANA—SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

16

9

MILL POCKET CREEK, MONT.
N4745—W11437.5/7.5
1964
DMA 3079 I SW—SERIES V894

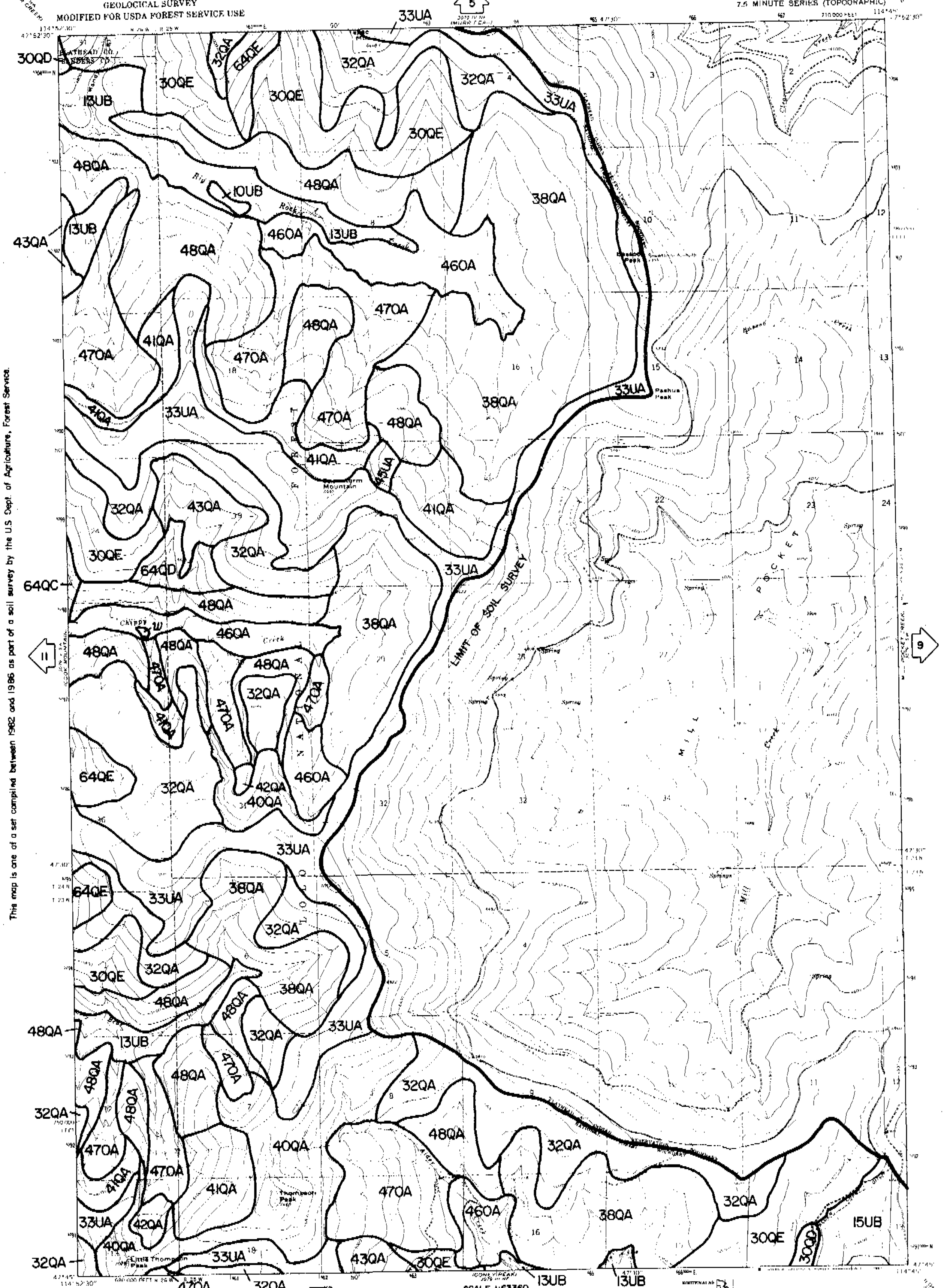
LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BASSOO PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1962 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



10

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- (125) Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

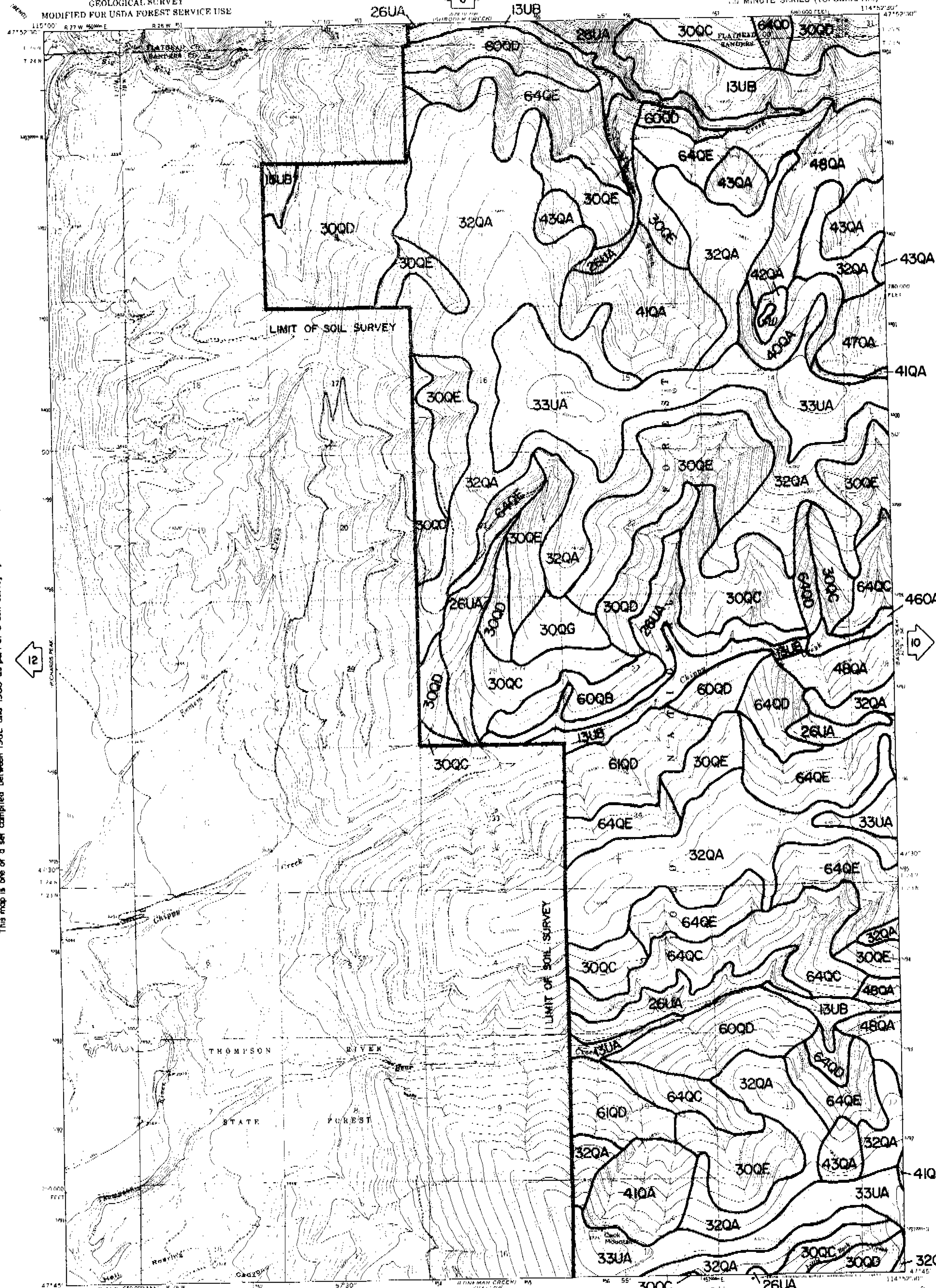
LOLO NATIONAL FOREST
CENTRAL

BASSOO PEAK, MONT.
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

COOK MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

11

COOK MOUNTAIN, MONT.
1964

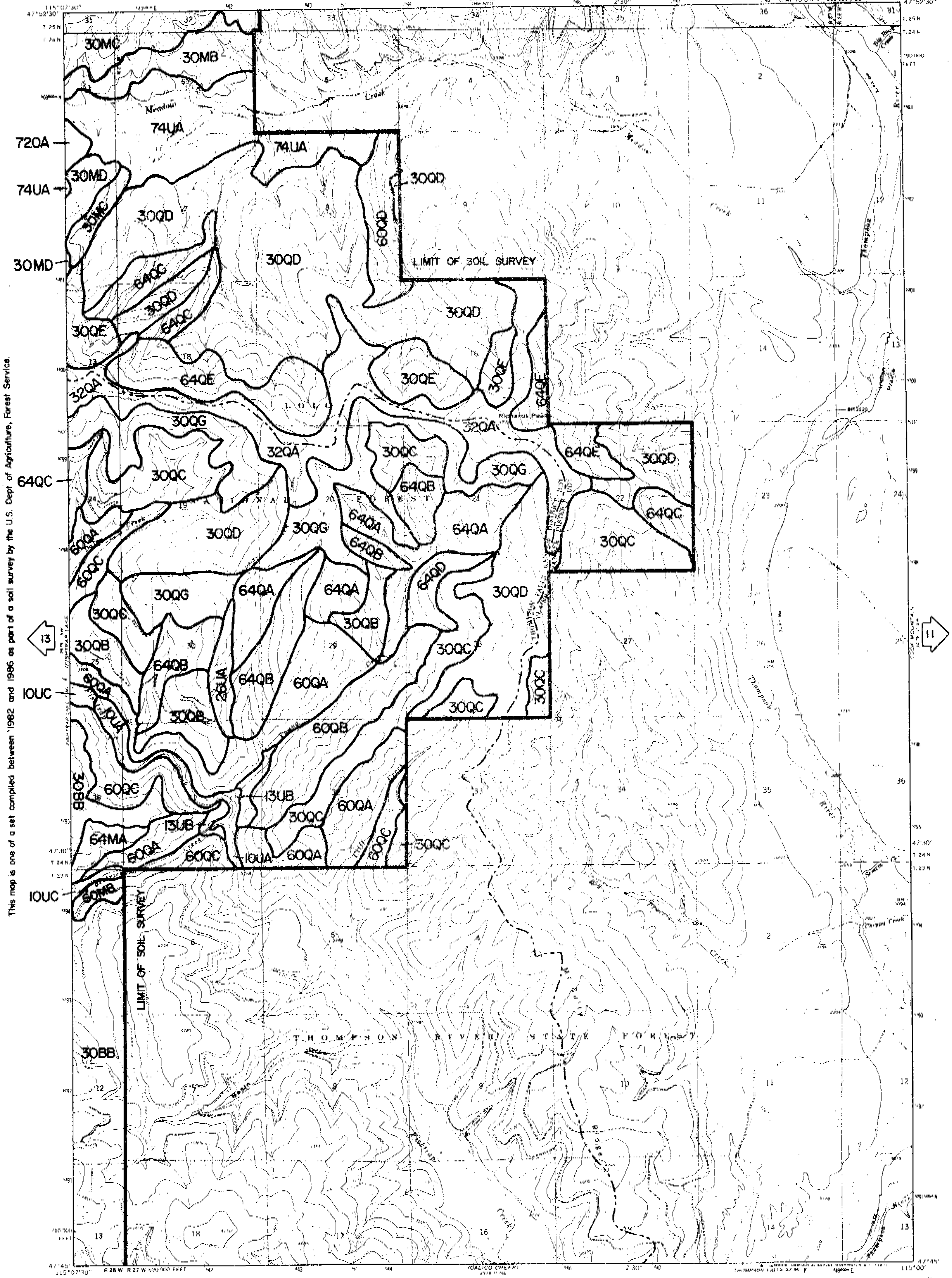
LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

RICHARDS PEAK QUADRANGLE
MONTANA—SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

12

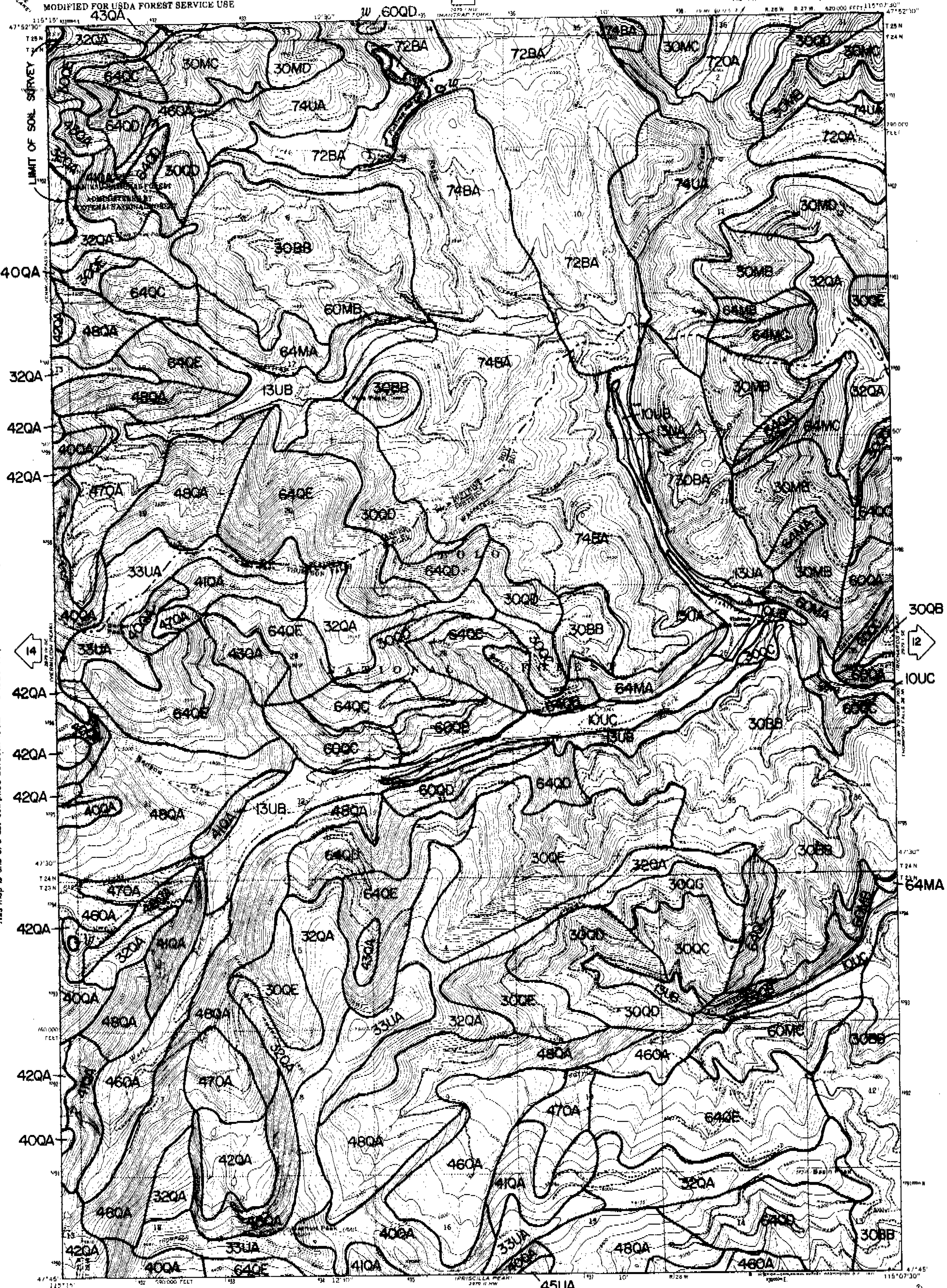
RICHARDS PEAK, MONT.
N4745—W11500/7.5

1966

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

FISHTRAP LAKE QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

20

SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

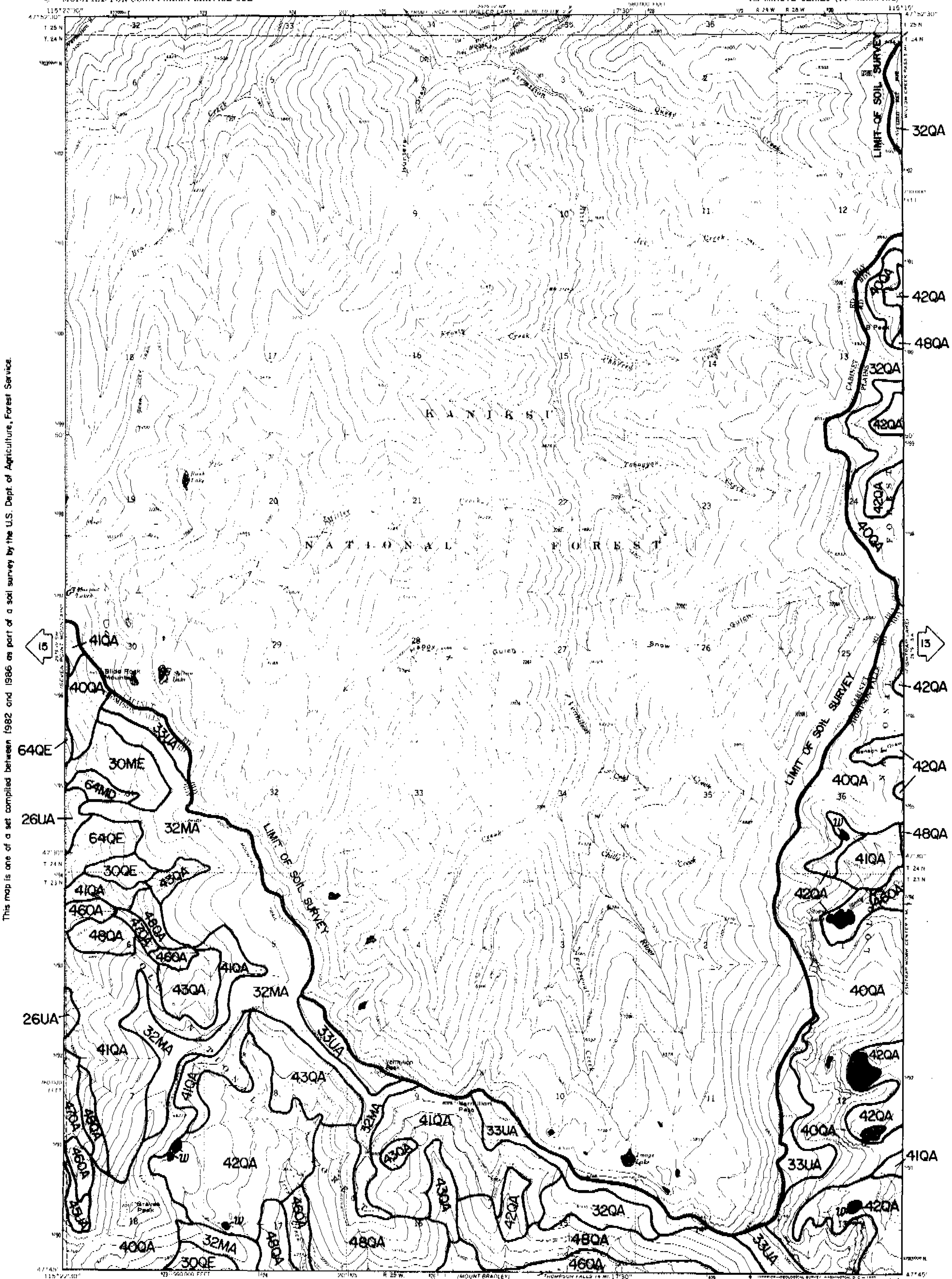
13

FISHTRAP LAKE, MONT.
N4745—W11507.5/7.5
1966
AMS 2375 I SW—SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

VERMILION PEAK QUADRANGLE
MONTANA - SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

21

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

14

VERMILION PEAK, MONT.

1966

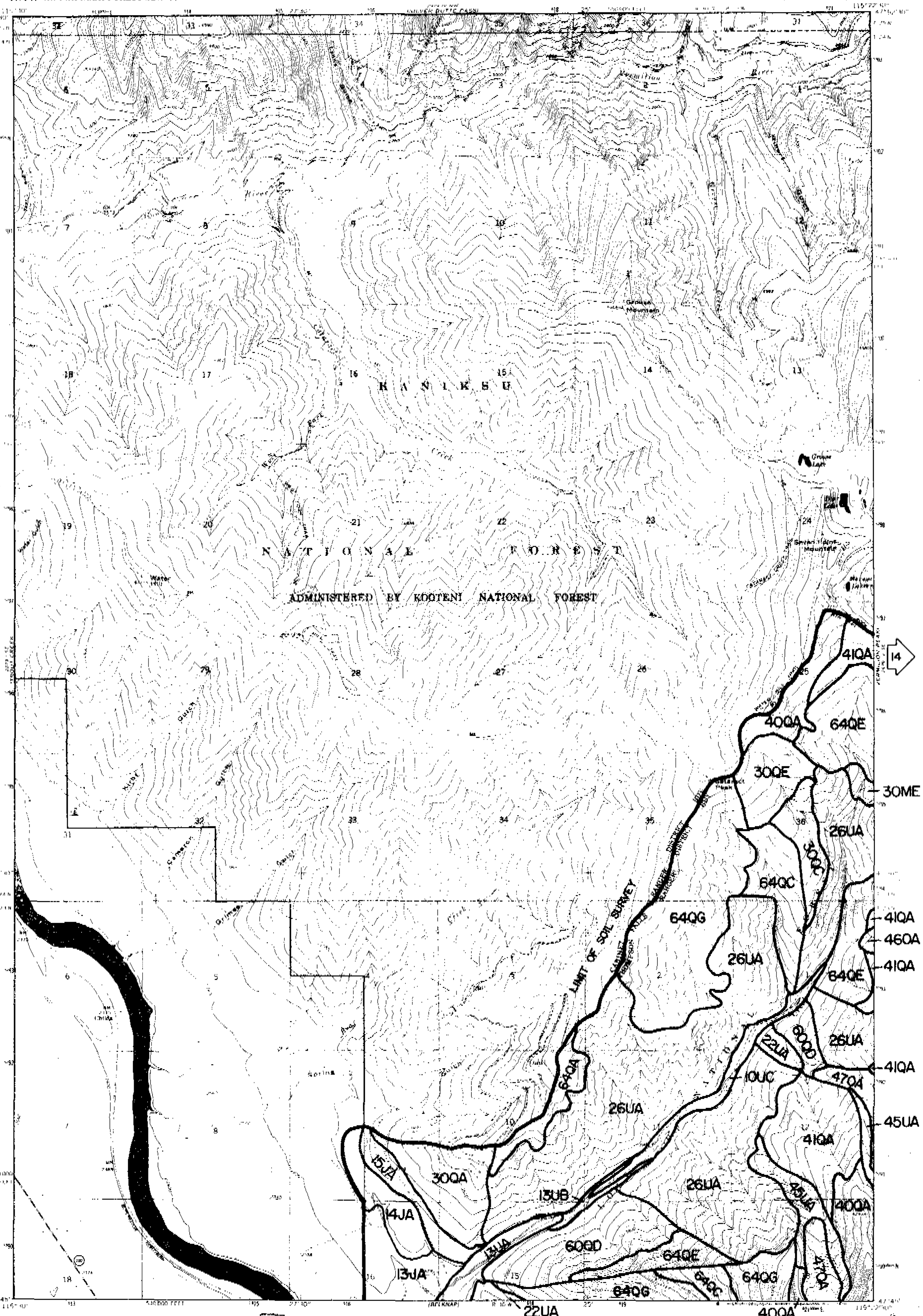
LOLO NATIONAL FOREST WEST

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SEVEN POINT MOUNTAIN QUADRANGLE
MONTANA - SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1962 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

15

SEVEN POINT MOUNTAIN, MONT.

1966

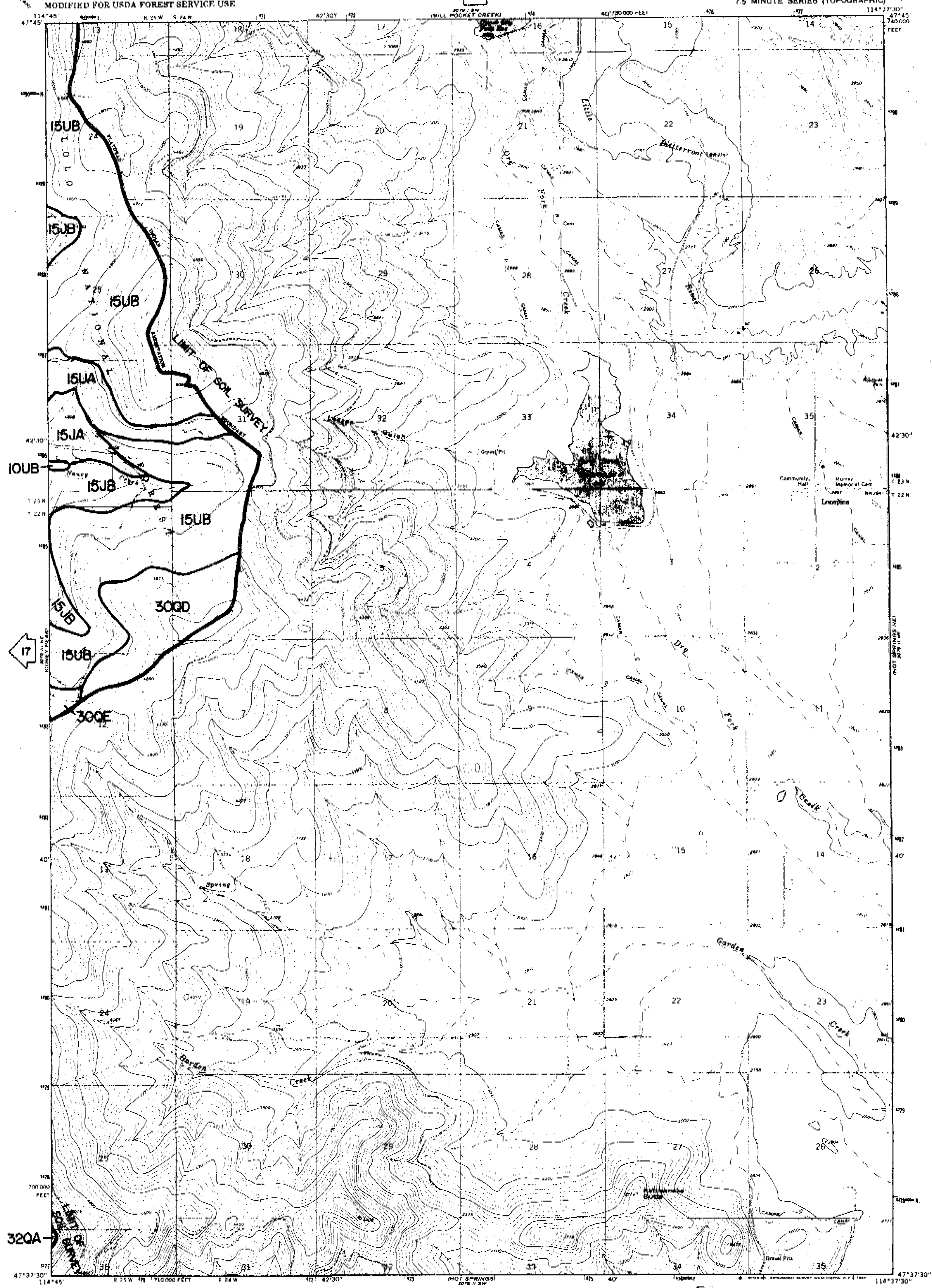
LOLO NATIONAL FOREST WEST

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LONEPINE QUADRANGLE
MONTANA – SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
CENTRAL

16

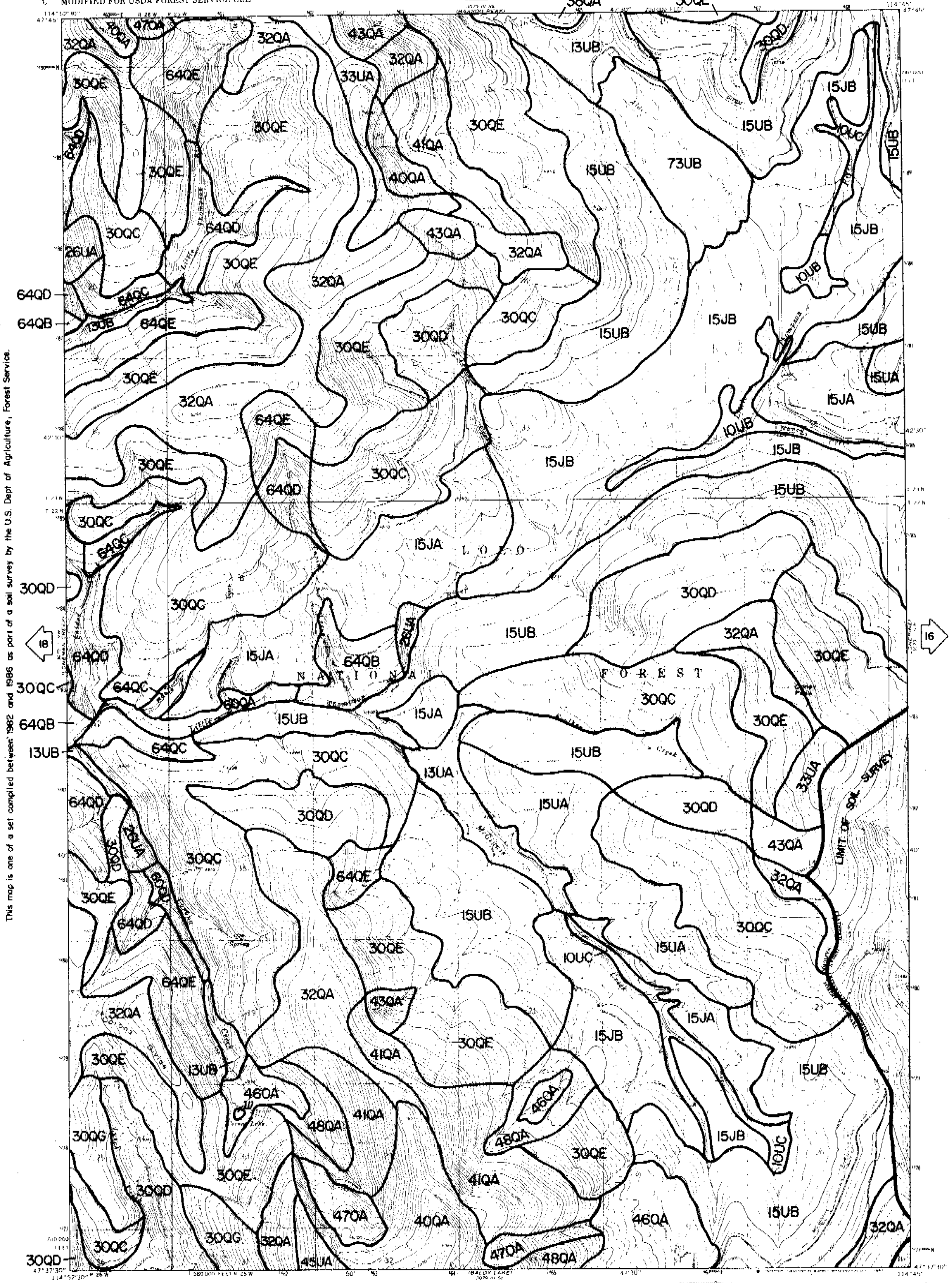
LONEPINE, MONT.
N4737.5 – W11437.5/7.5
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CONEY PEAK QUADRANGLE
MONTANA - SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

17

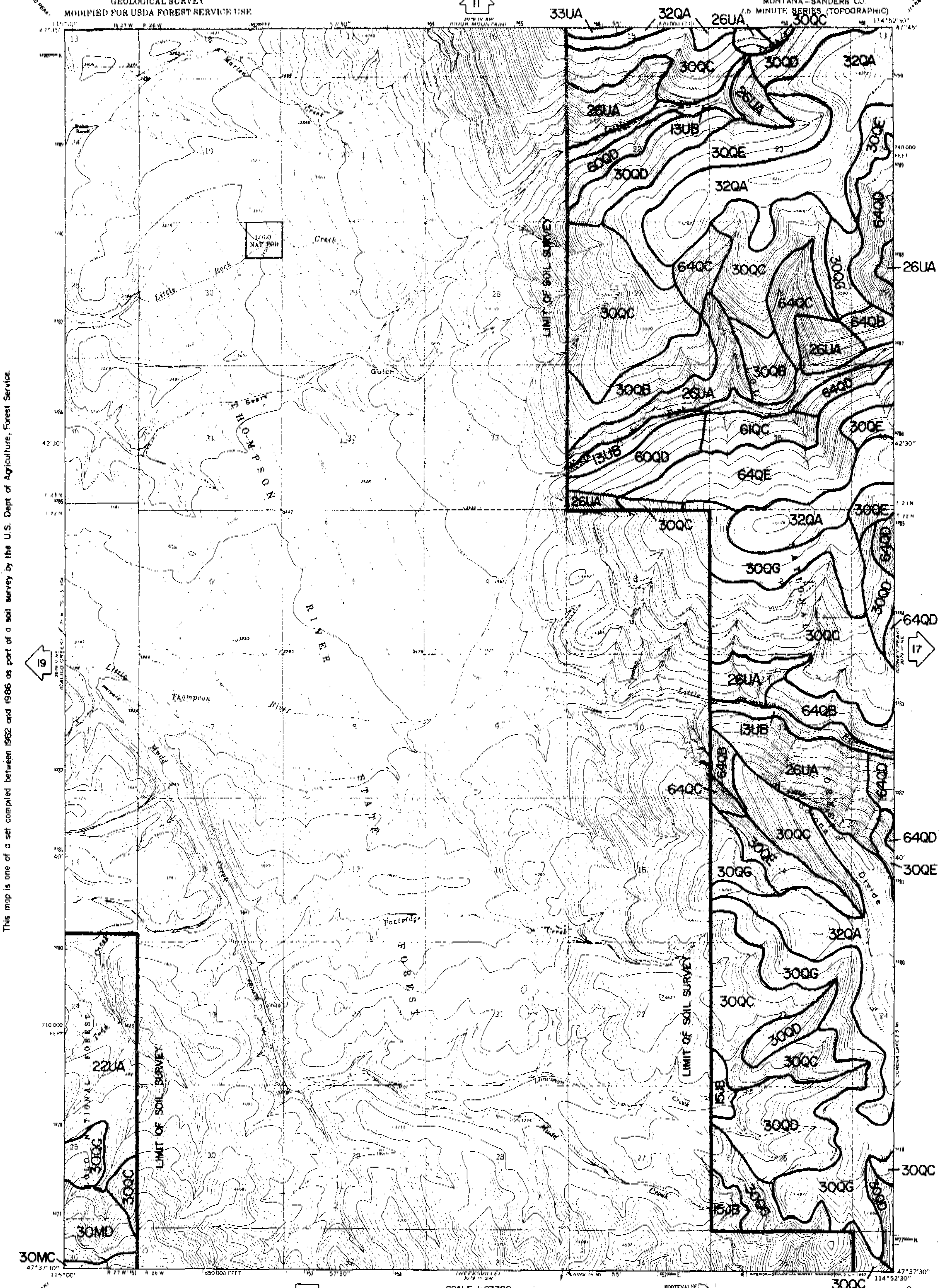
CONEY PEAK, MONT.

1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LONEMAN CREEK QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

18

LONEMAN CREEK, MONT.
N4737.5– W11452.5/7.5

1984

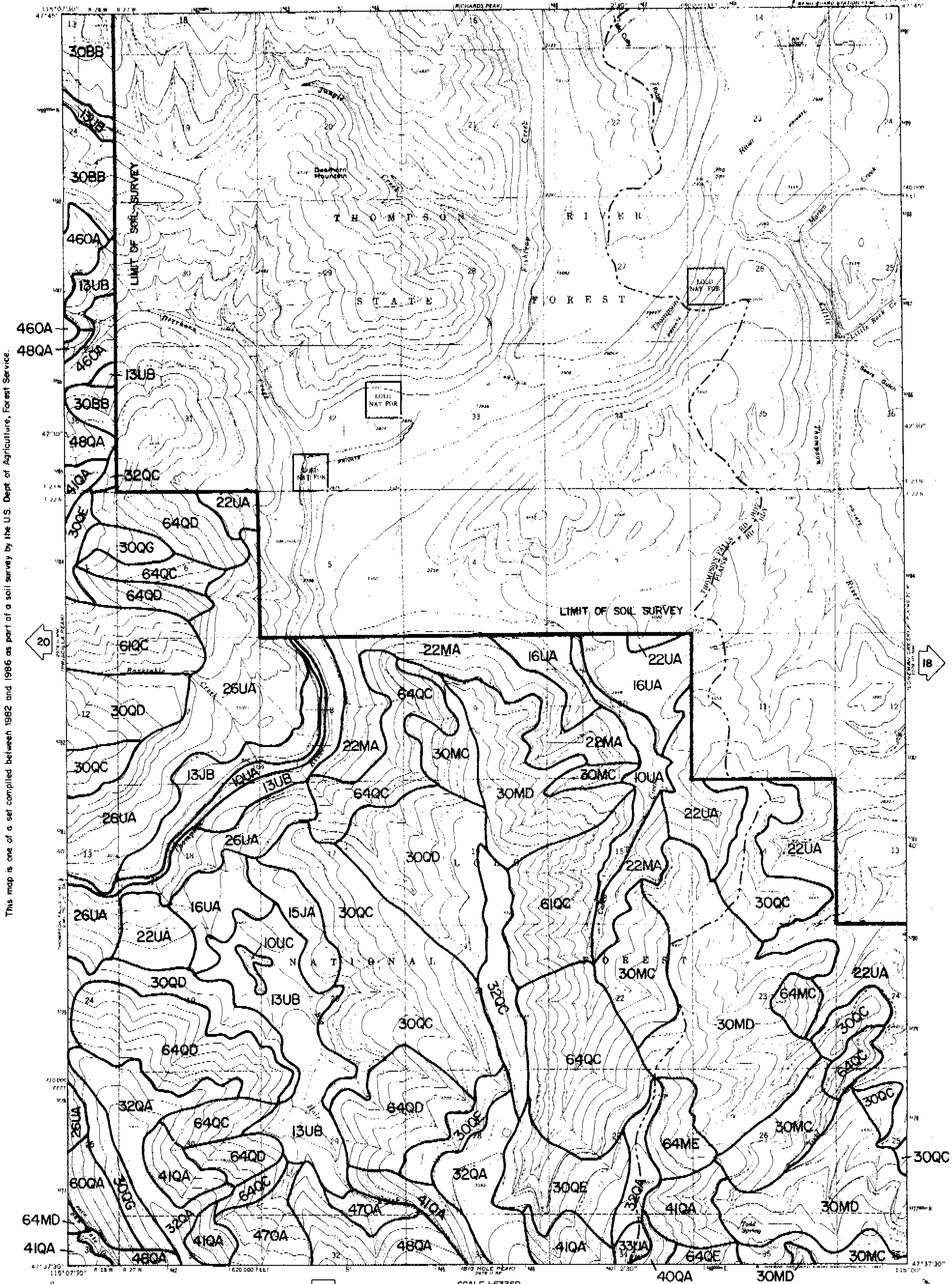
LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CALICO CREEK QUADRANGLE
MONTANA SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

LEGEND

19

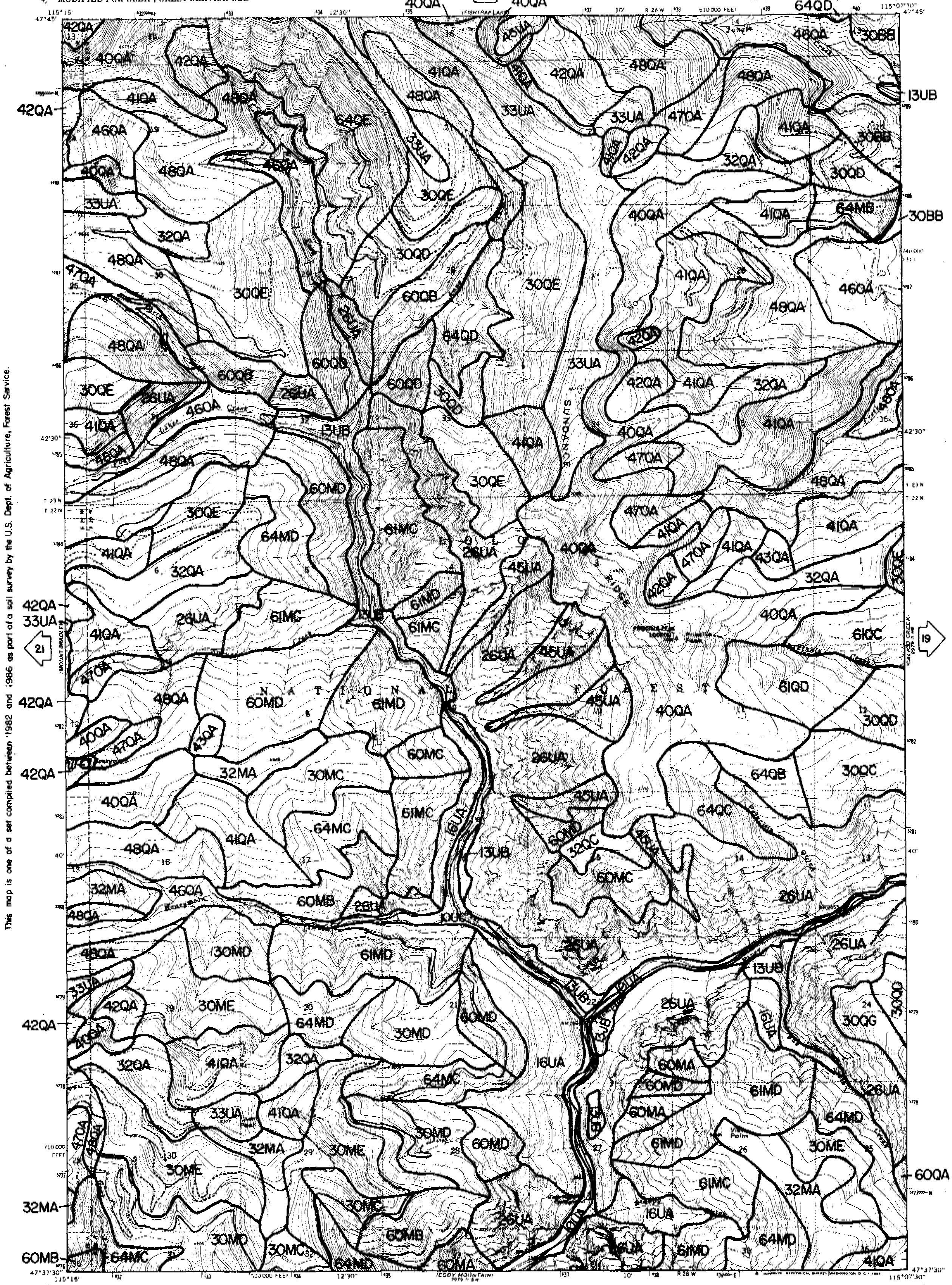
CALICO CREEK, MONT.
N4737.5—W11500/7.5
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PRISCILLA PEAK QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

KOOTENAI NF
KANIKSU NF
COEUR D'ALENE NF
ST JOE NF
CLEARWATER NF
LOLO NATIONAL FOREST
WEST

20

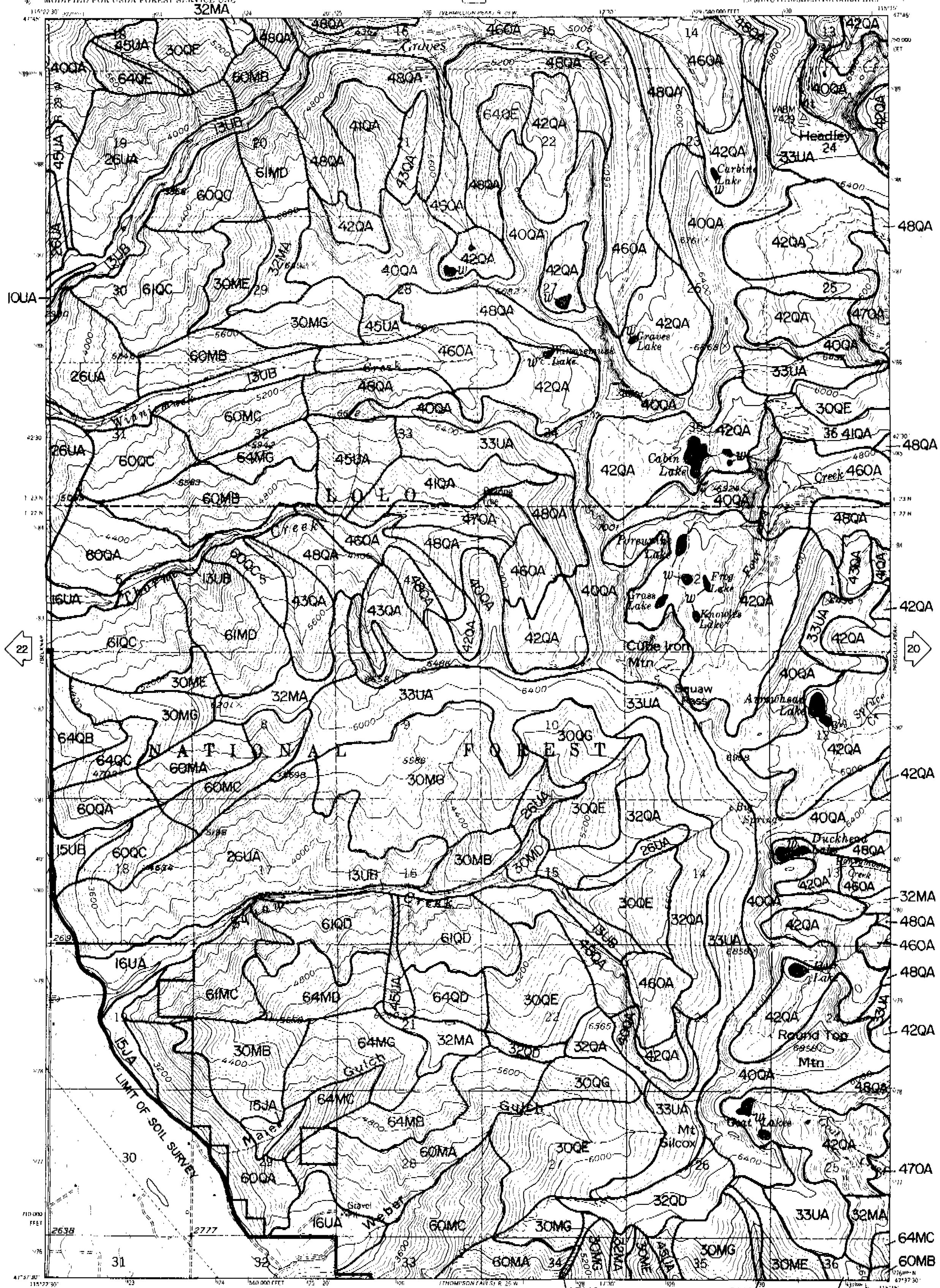
PRISCILLA PEAK, MONT.
N4737.5—W11507.5/7.5
1964
DMA 2672 II NW—SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

THOMPSON FALLS N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

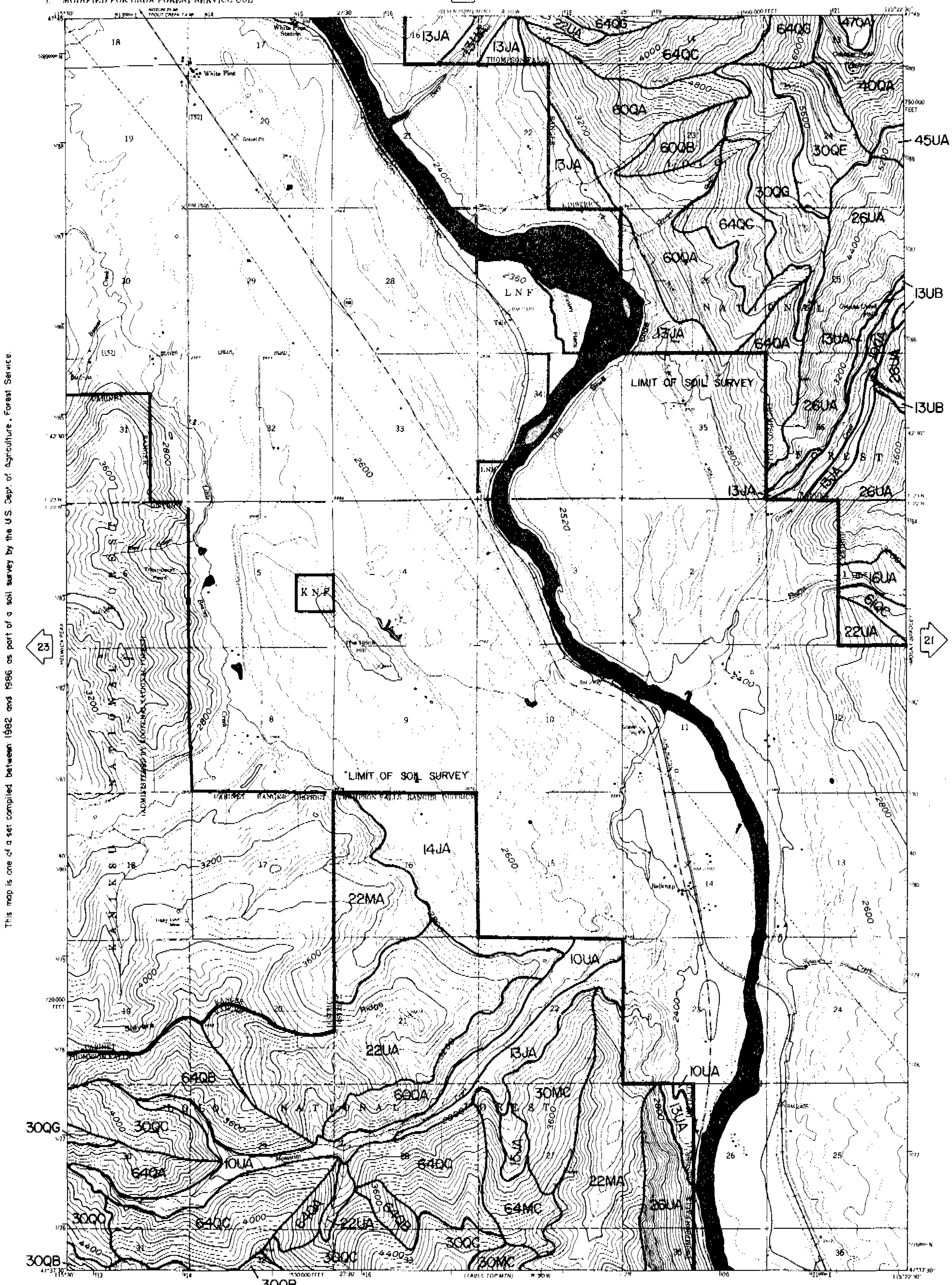
21

THOMPSON FALLS N.E., MONT.
N4737.5—W11515/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

THOMPSON FALLS N.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

22

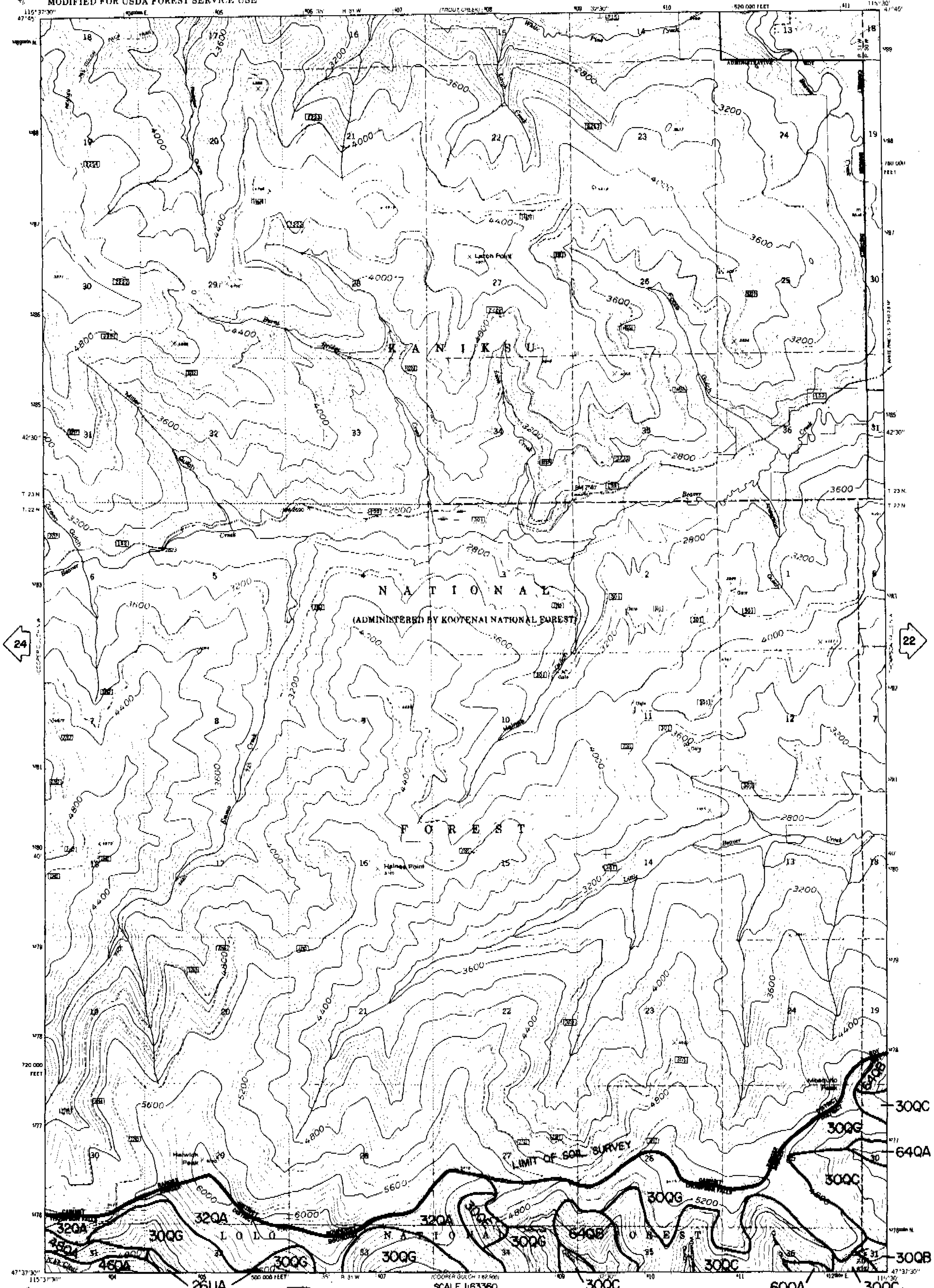
THOMPSON FALLS N.W., MONT.
N4737.5-W11522.5/7.5
1957

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

COOPER GULCH NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

KOOTENAI NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

23

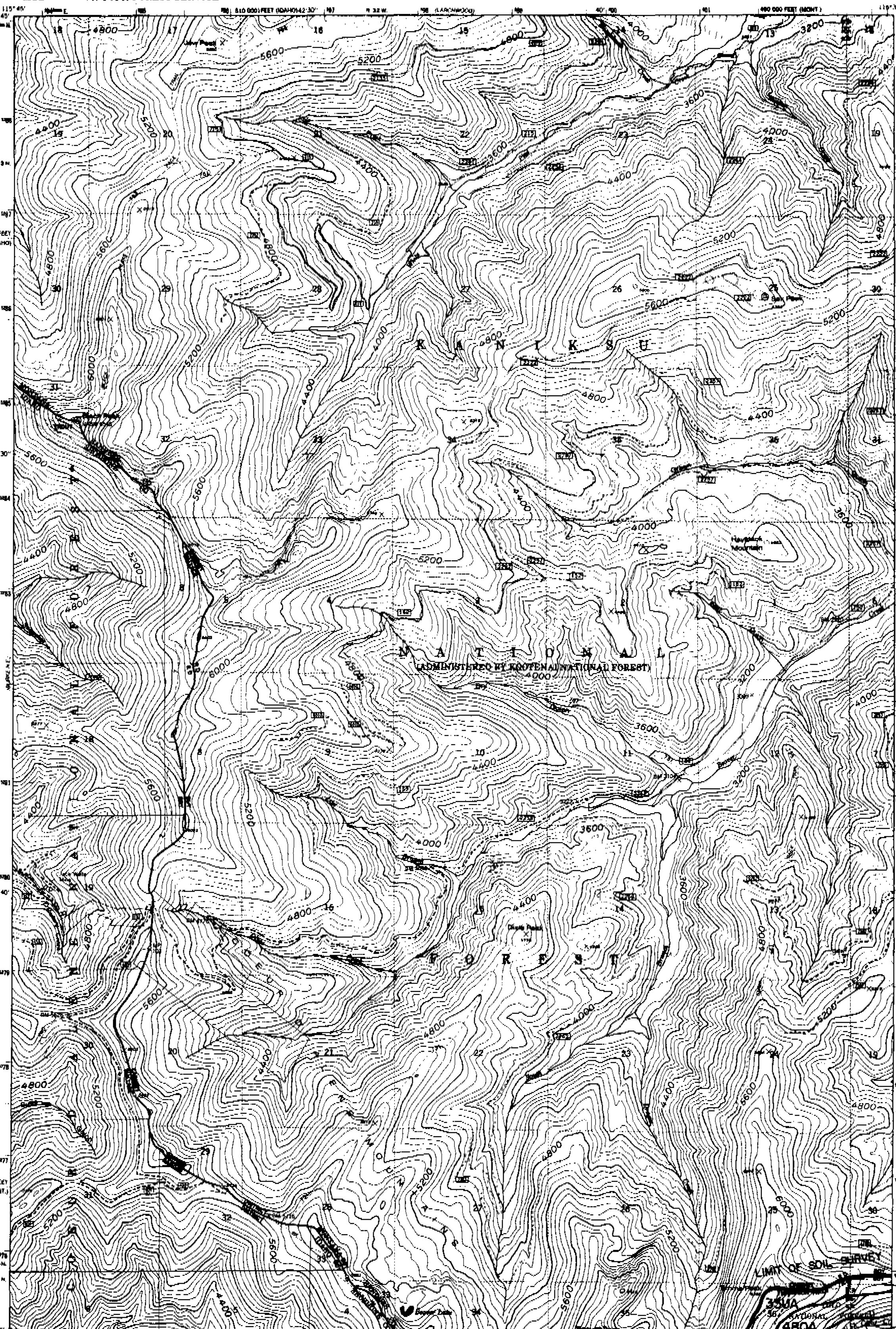
COOPER GULCH NE
MONTANA
N4737.5-W11530/7.5
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

COOPER GULCH NW QUADRANGLE
MONTANA-IDAHO
7.5 MINUTE SERIES

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

32

LEGEND

- National Forest Boundary
- Non-Forest Land
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Locked Gate
- U.S. Highway
- State Highway
- County Highway
- Forest Road
- Forest Trail

TOWNSHIP AND SECTION LINE CLASSIFICATION

- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, BLM Protraction

KOOTENAI NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

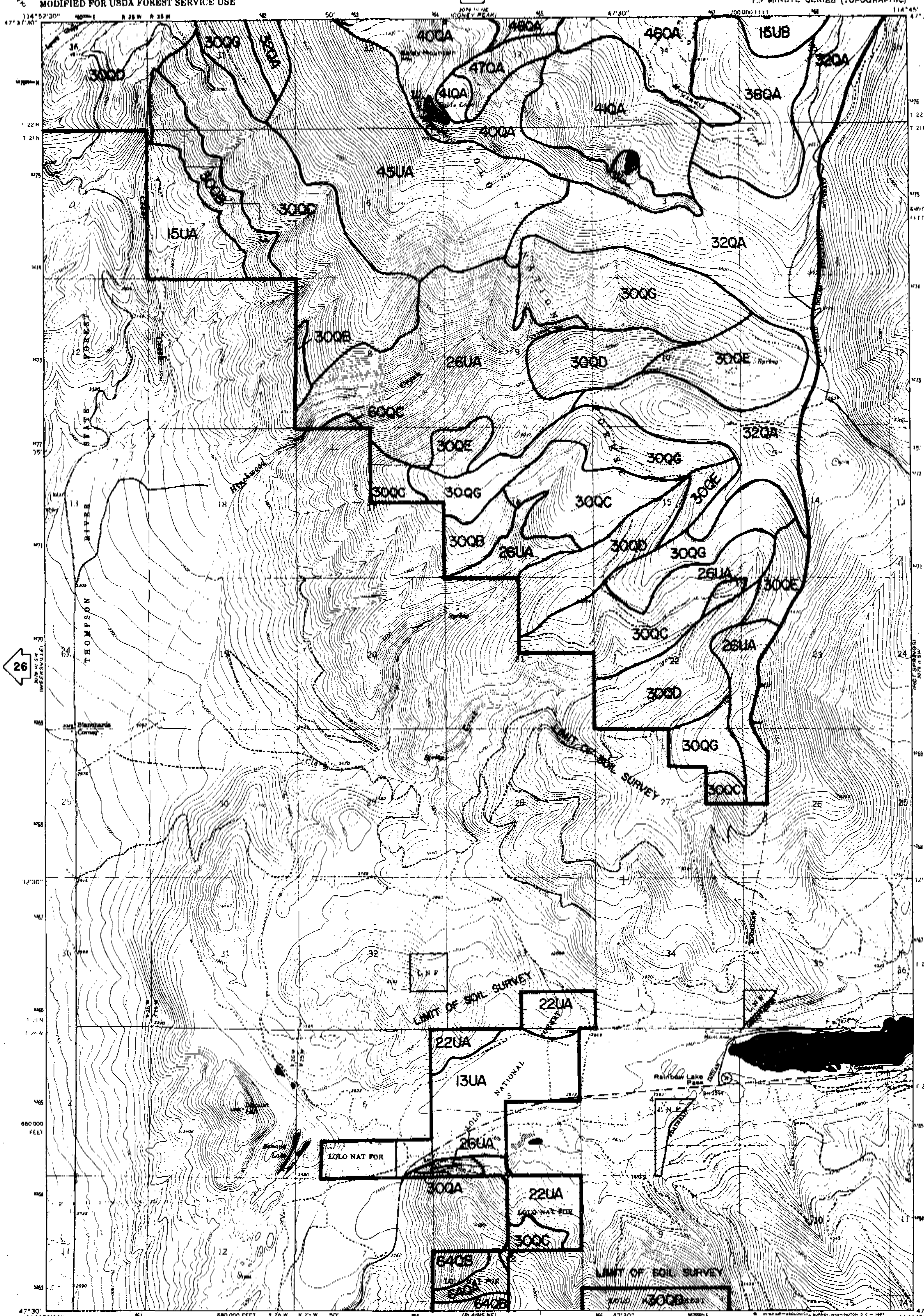
24

COOPER GULCH NW
MONTANA-IDAHO
1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BALDY LAKE QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

34

SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

25

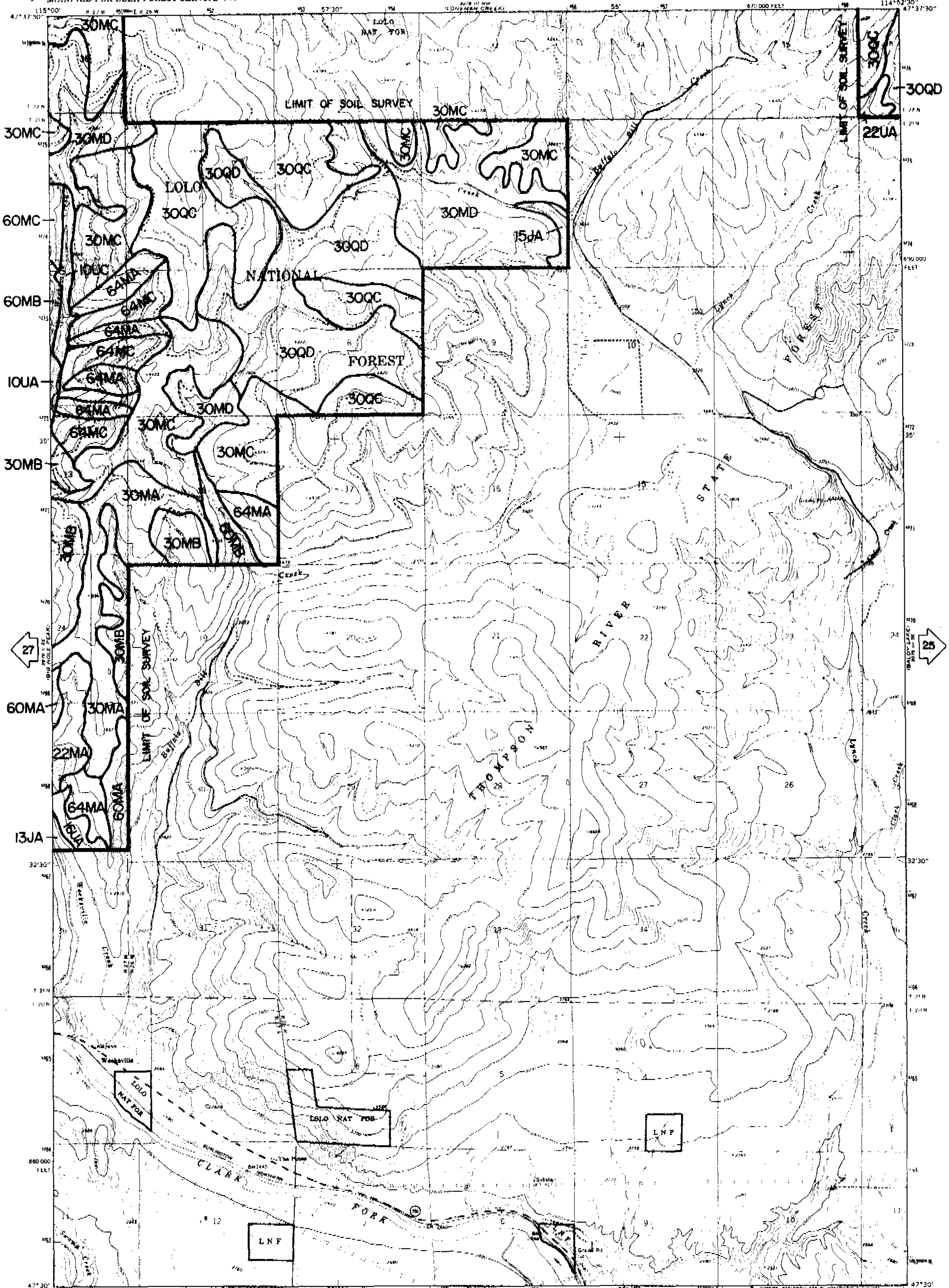
BALDY LAKE, MONT.
N4730—W11445/7.5
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

WEEKSVILLE QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land

TOWNSHIP AND SECTION LINE CLASSIFICATION

- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
CENTRAL

26

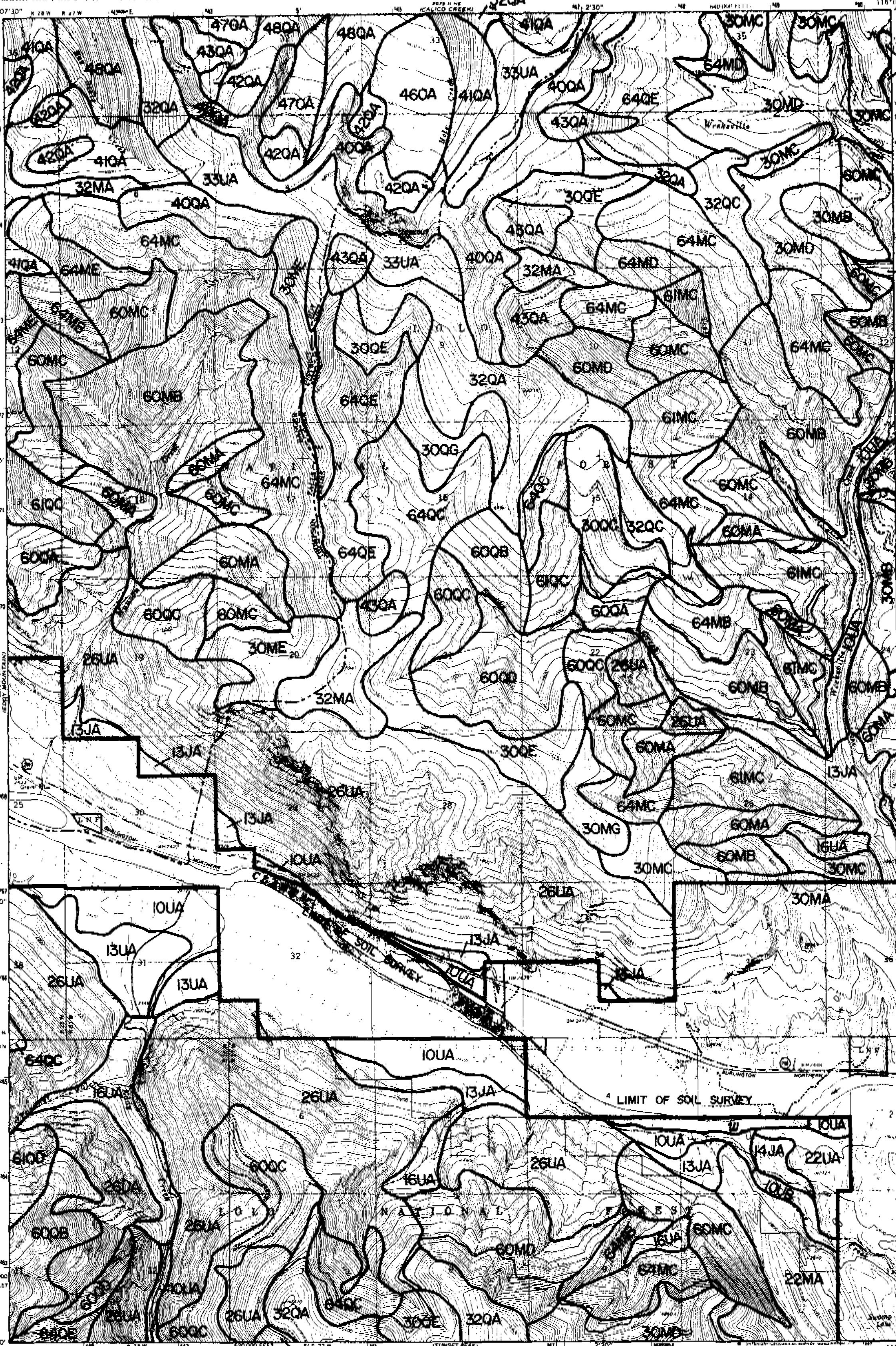
WEEKSVILLE, MONT.
N4730—W11452.5/7.5
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BIG HOLE PEAK QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST WEST

27

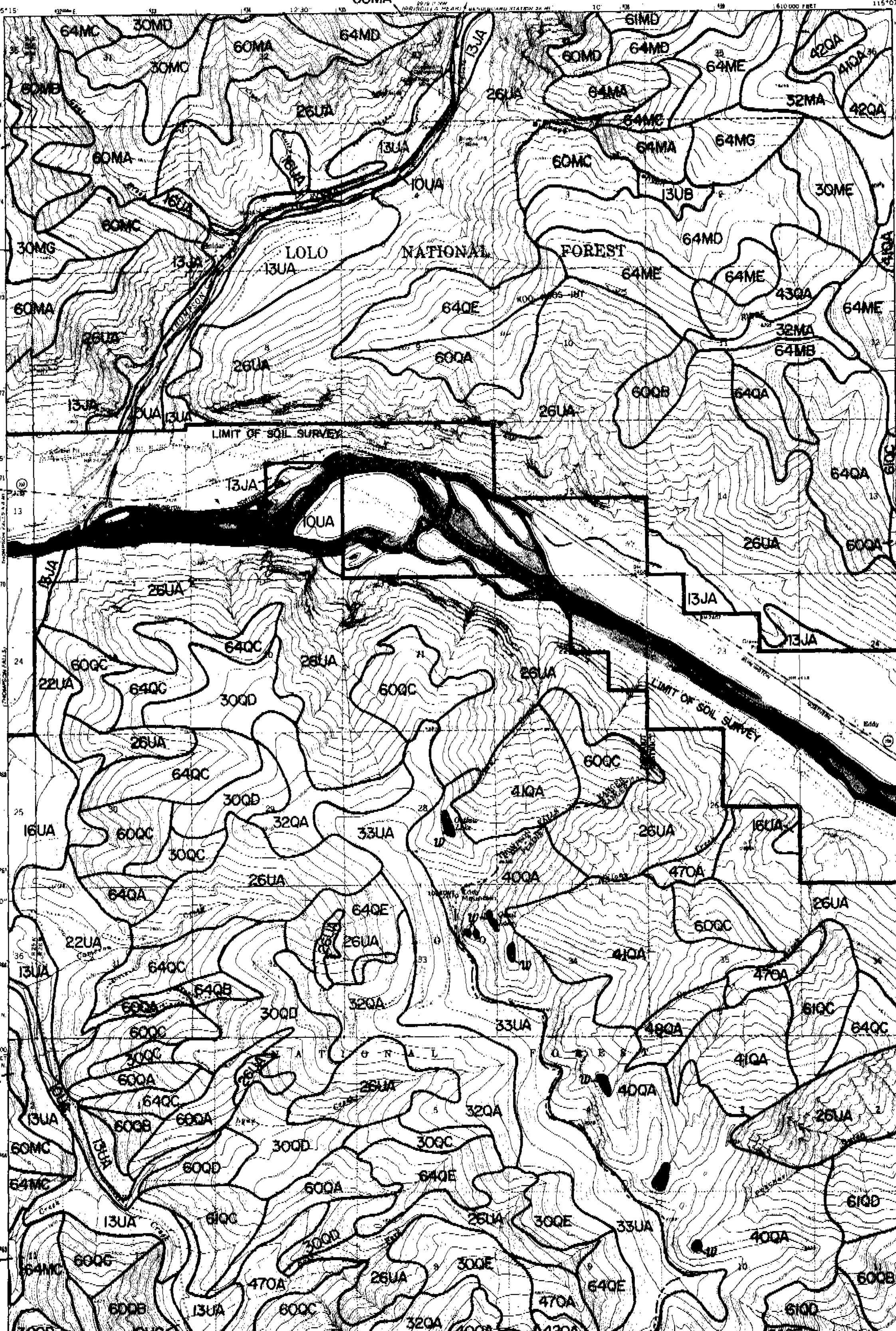
BIG HOLE PEAK, MONT.
N4730—W11500/7.5
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

EDDY MOUNTAIN QUADRANGLE
MONTANA–SANDERS CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
WEST

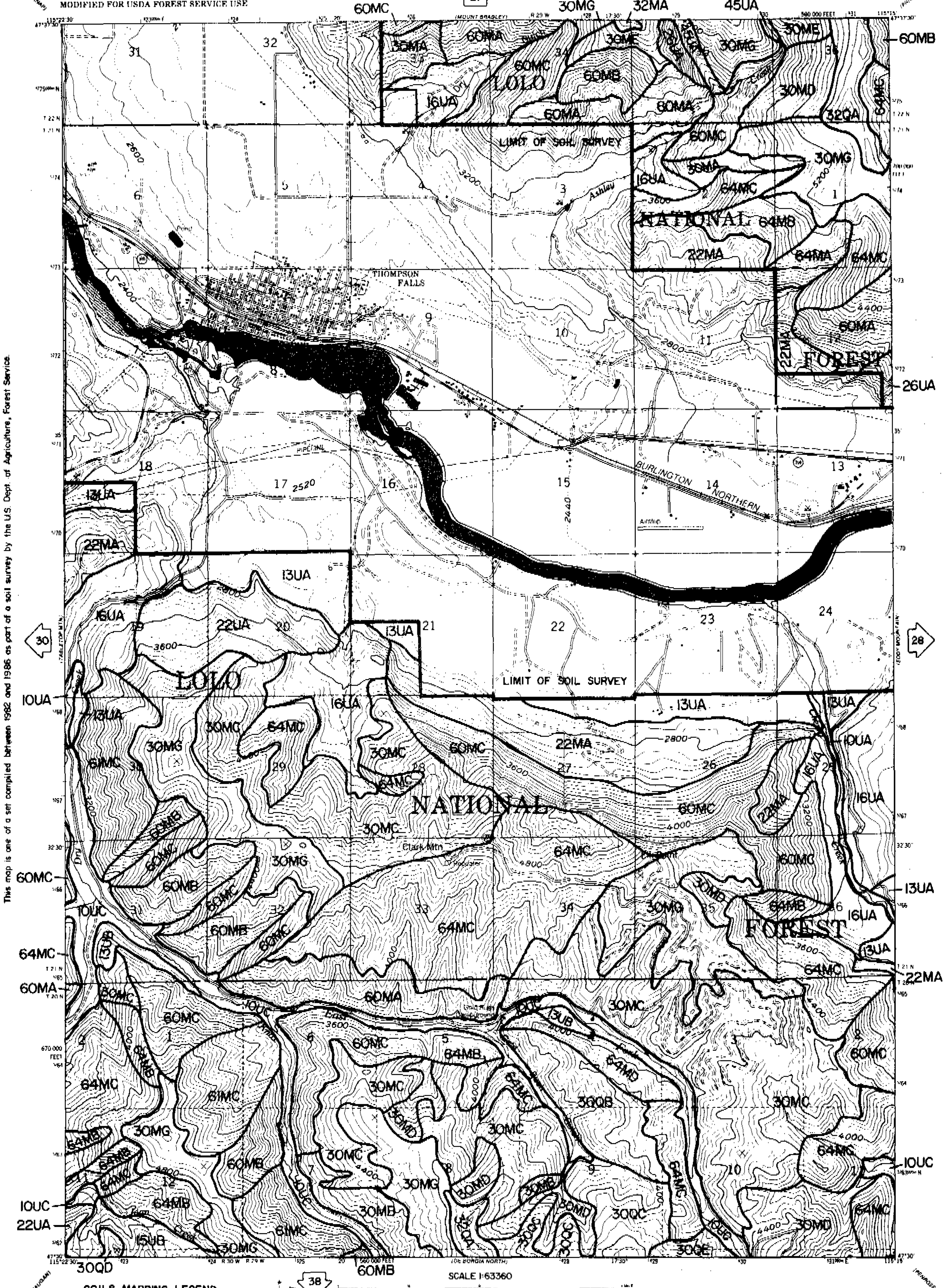
28

EDDY MOUNTAIN, MONT.
N4730—W11507.5/7.5
1964

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

THOMPSON FALLS S.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

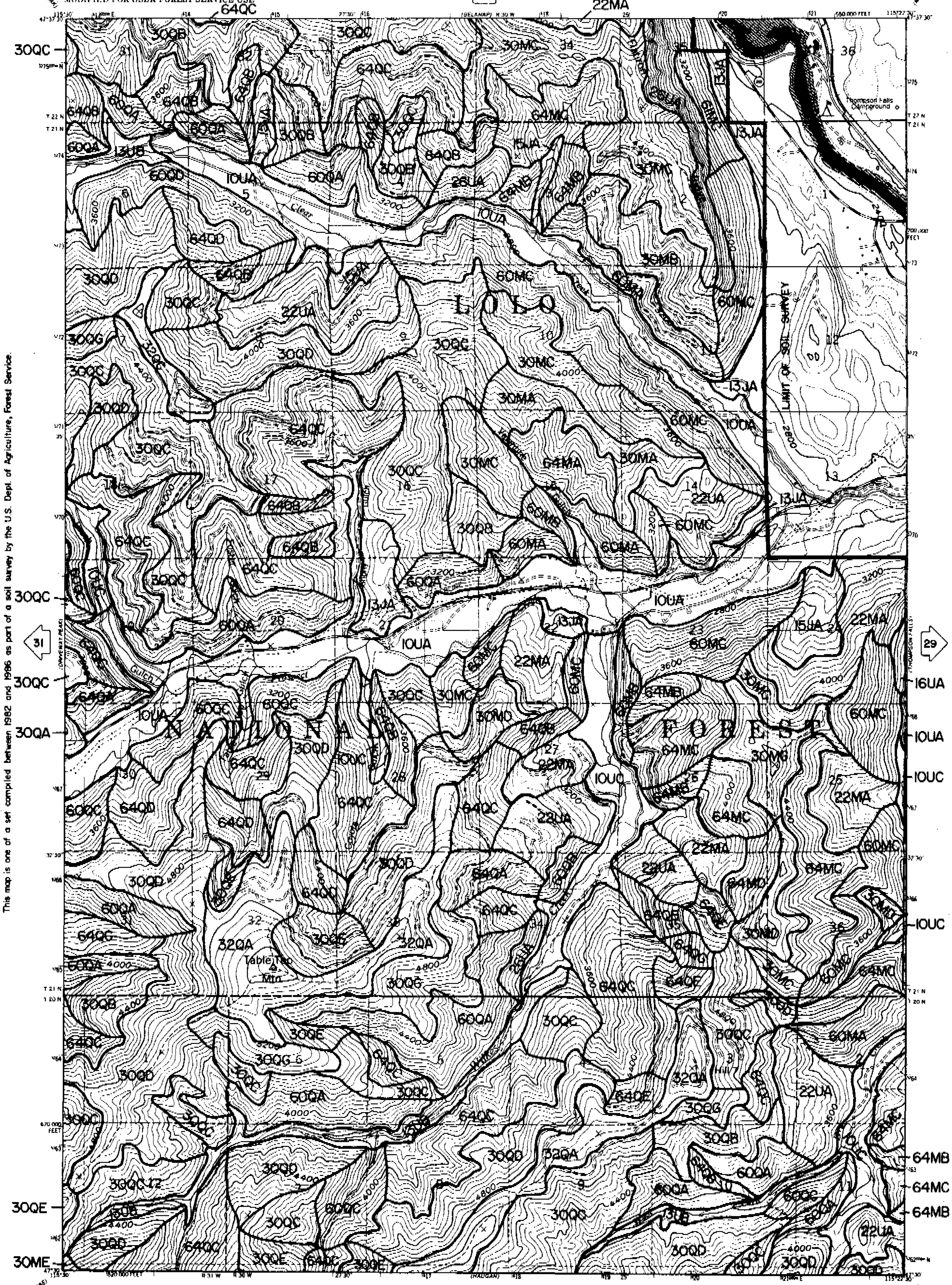
29

THOMPSON FALLS S.E., MONT.
N4730-W11515/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

THOMPSON FALLS S.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST WEST

30

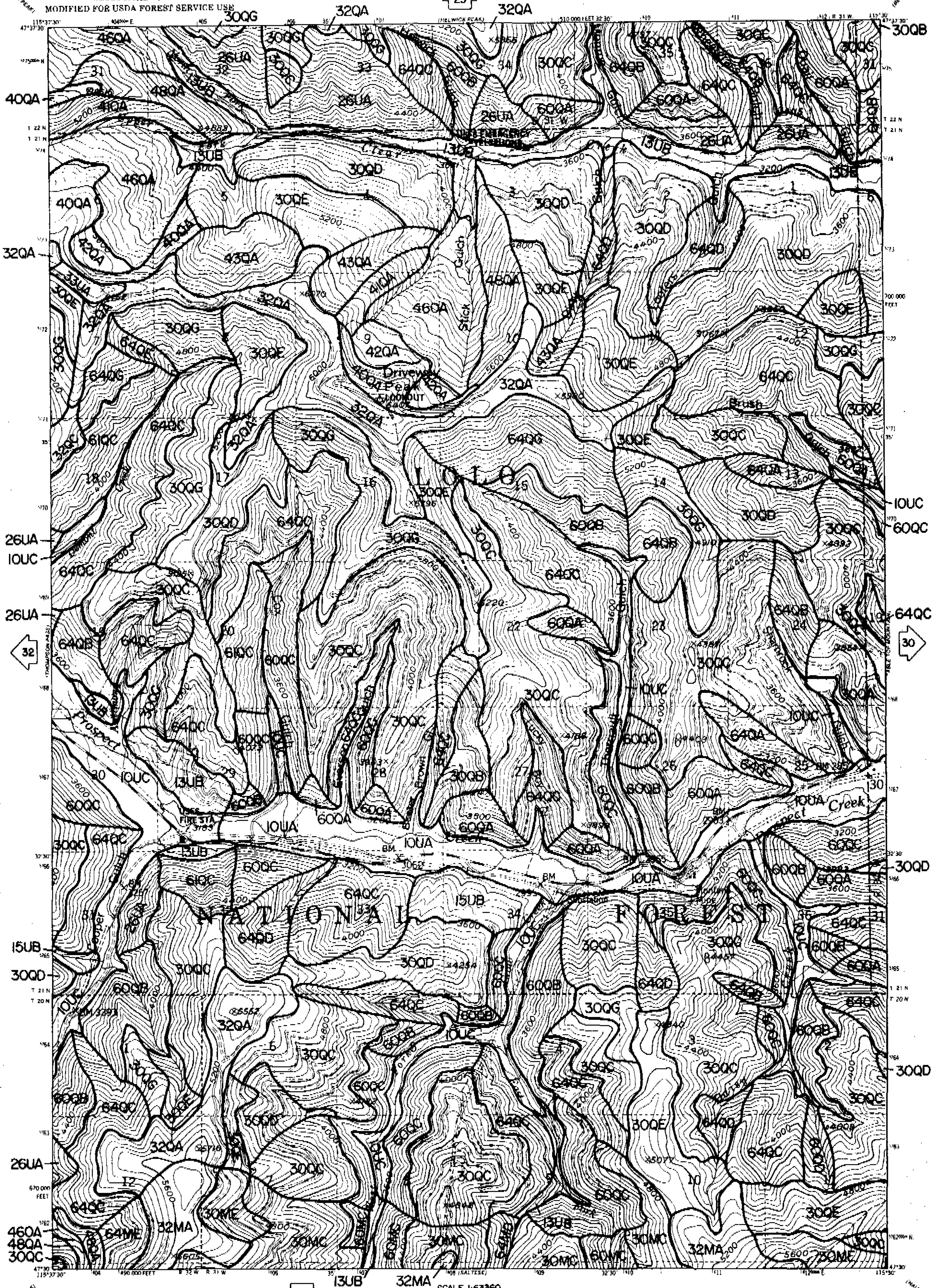
THOMPSON FALLS S.W., MONT.
N4730-W11522.5/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

COOPER GULCH S.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

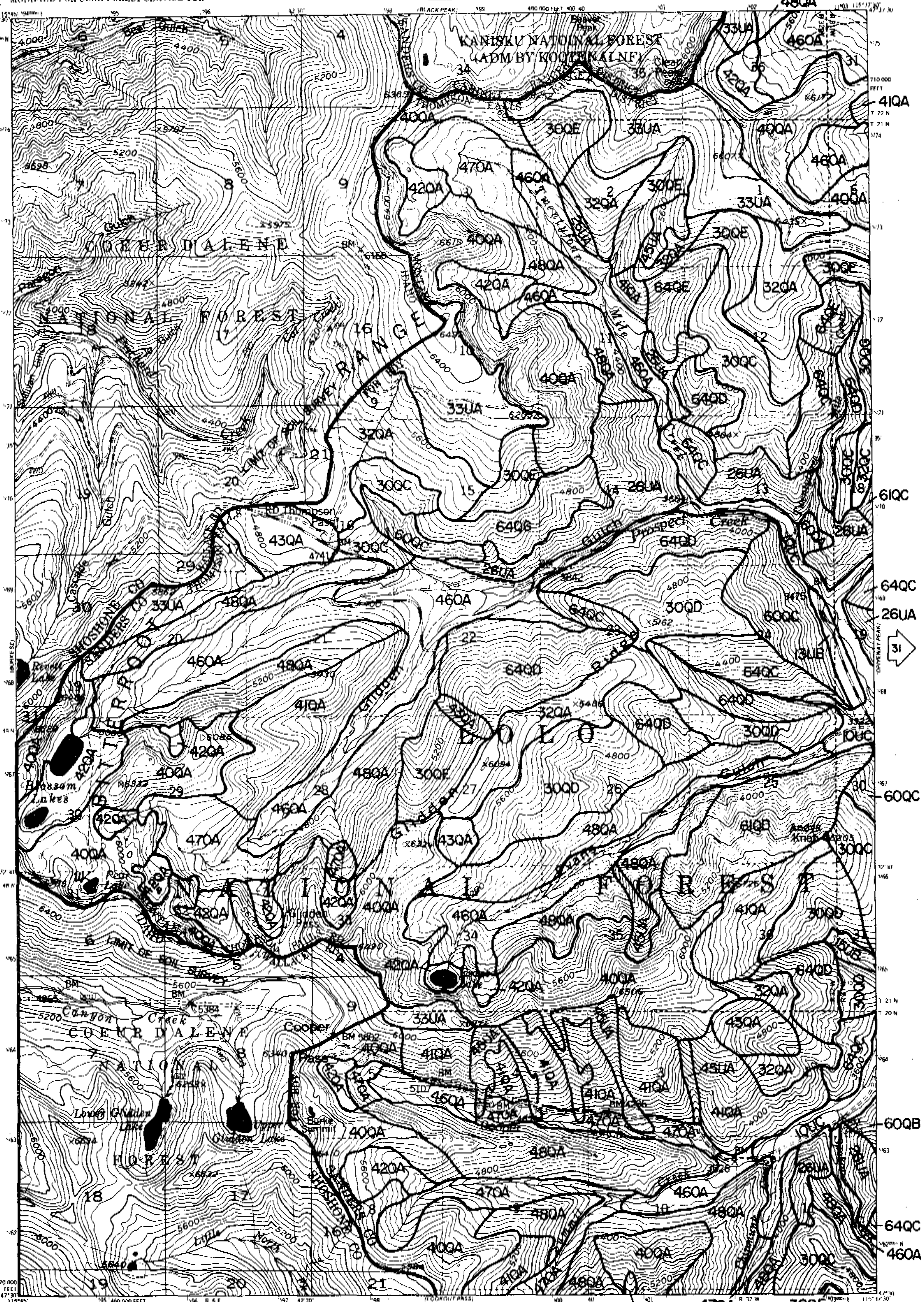
31

COOPER GULCH S.E., M
N4730-W11530/7.5
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

COOPER GULCH S.W. QUADRANGLE
IDAHO-MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

41

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST WEST

32

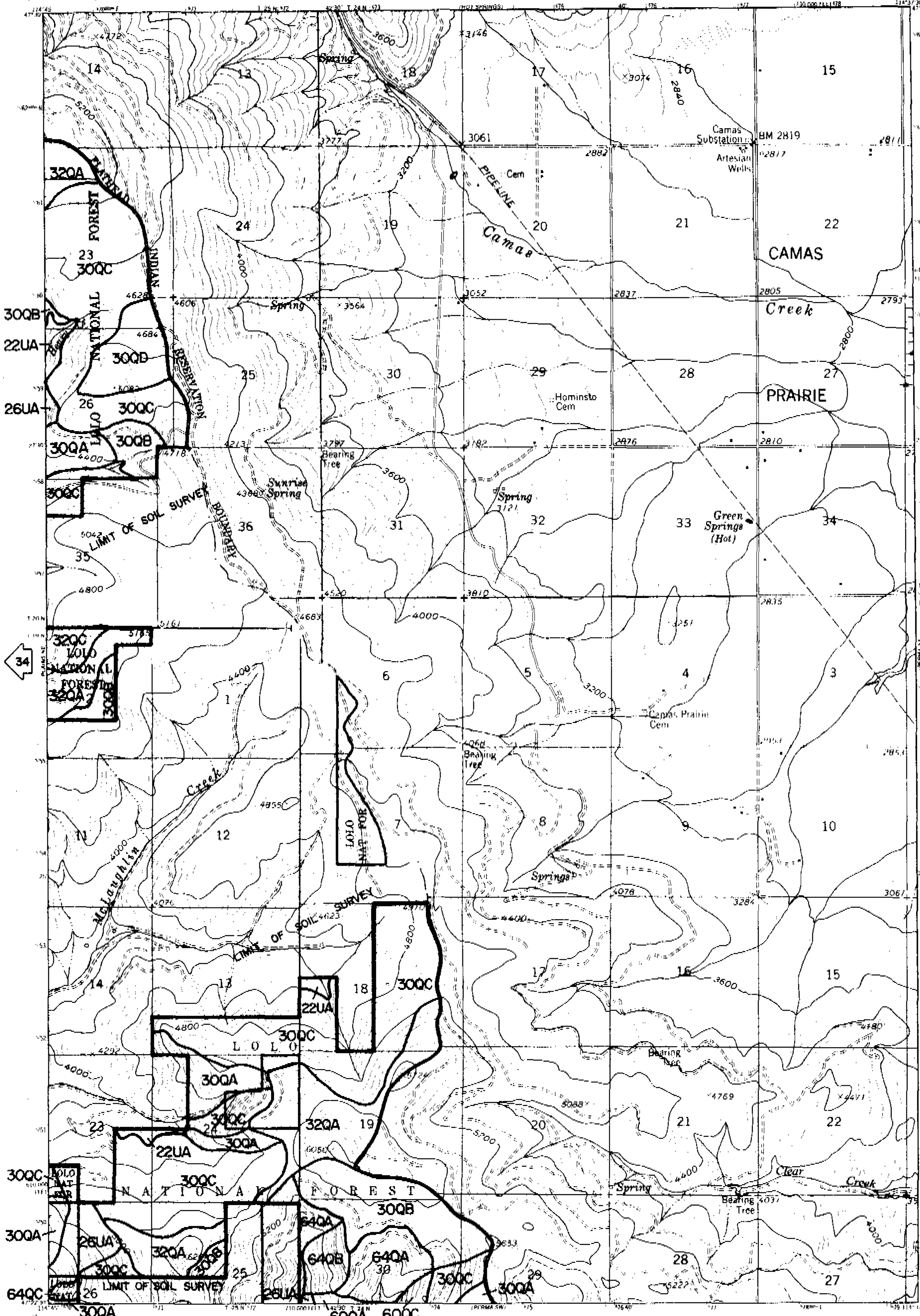
COOPER GULCH S.W., ID MT
N4730 W11537.5/7.5
1956

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

PERMA NW, QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

33

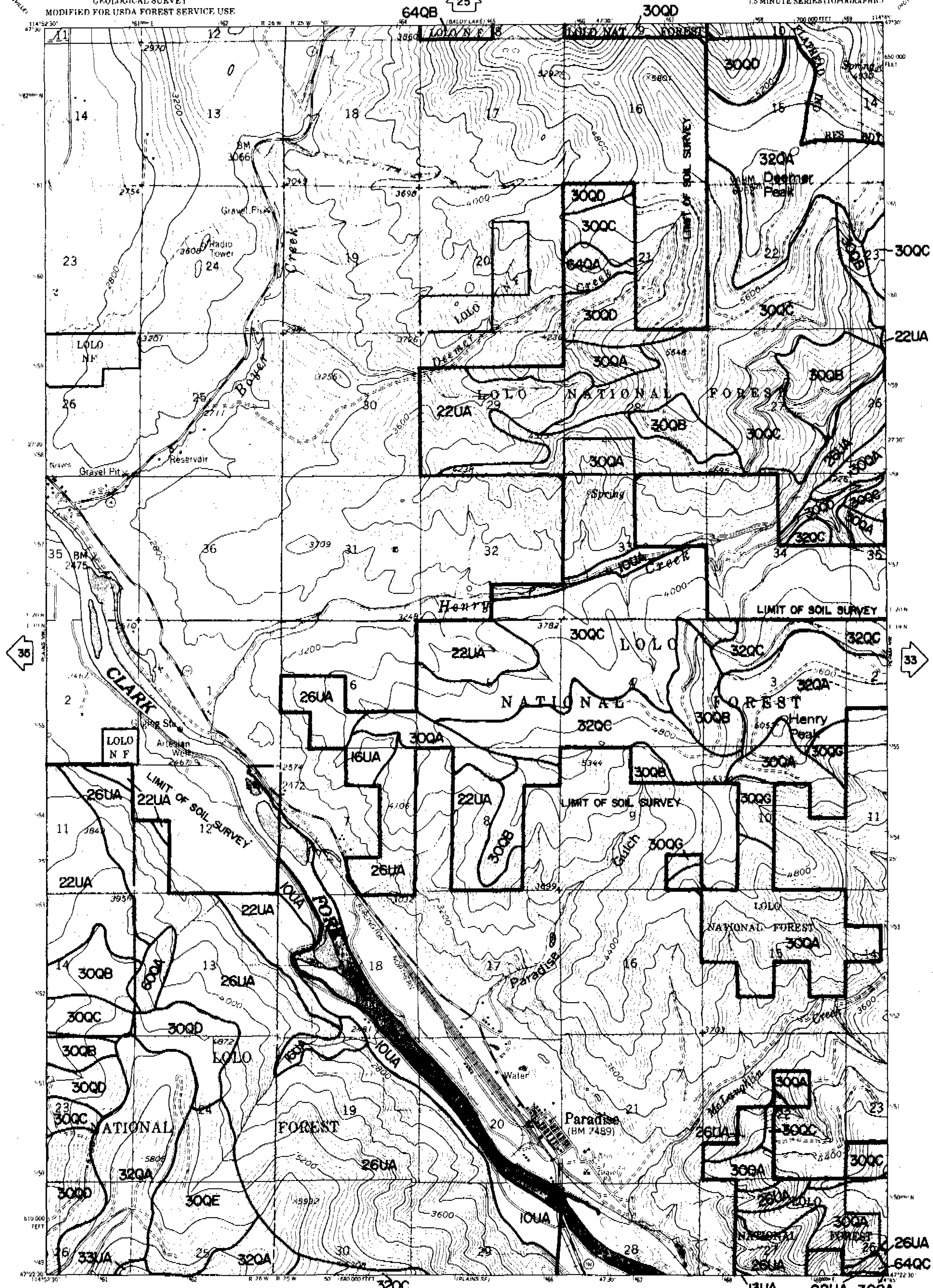
PERMA NW, MONTANA
N4722.5 W11437.5/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PLAINS NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

(line)	Map Unit Boundary
(heavy line)	Limit of Soil Survey
42QA	Map Unit Symbols
w	Water
(125)	Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

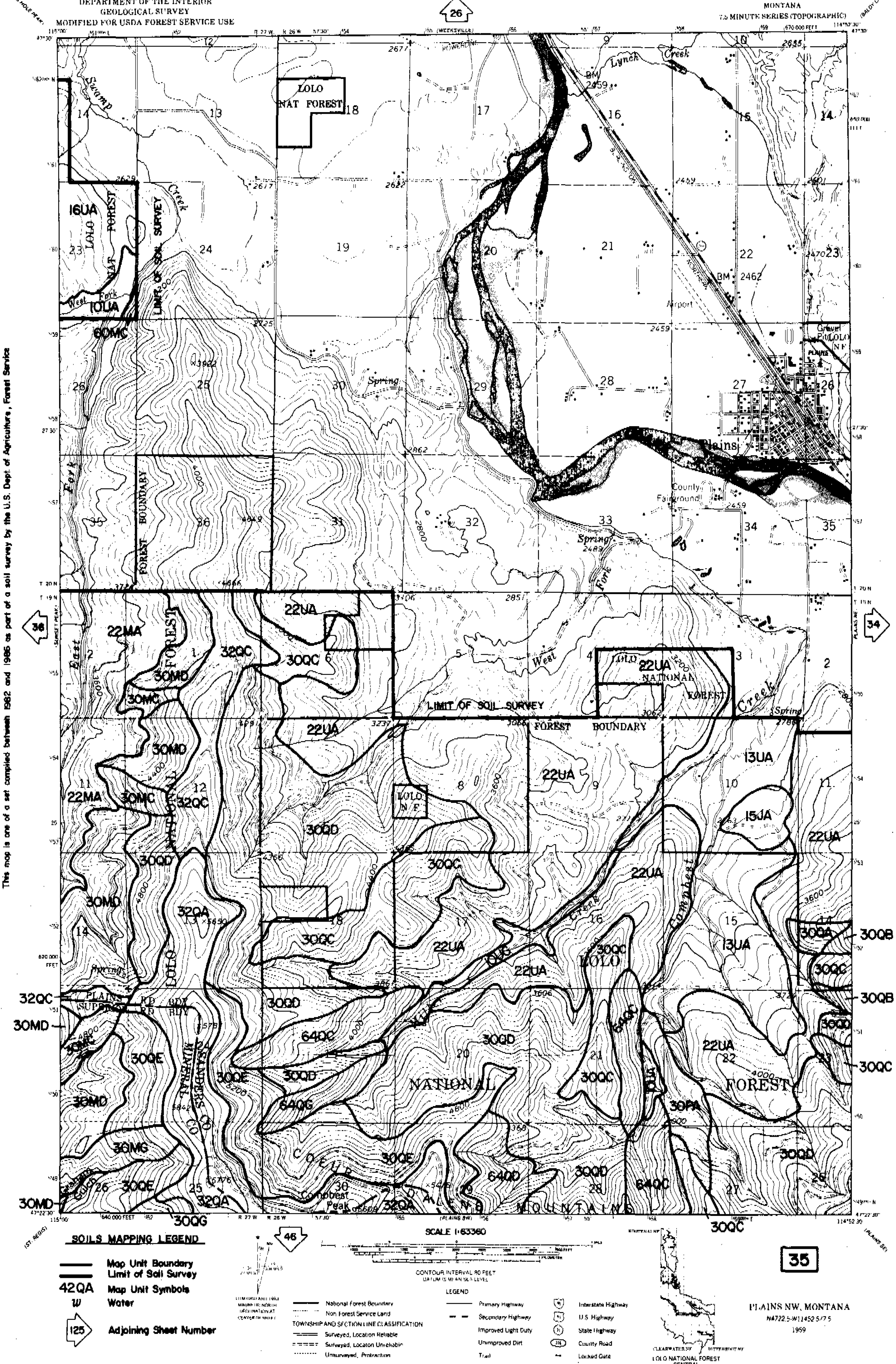
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

KOOTENAI NF
CLEARWATER NF
BITTERROOT NF
LOLO NATIONAL FOREST CENTRAL

34

PLAINS NE, MONTANA.
N4722.5-W11445/7.5
1959

SOIL SURVEY 1986



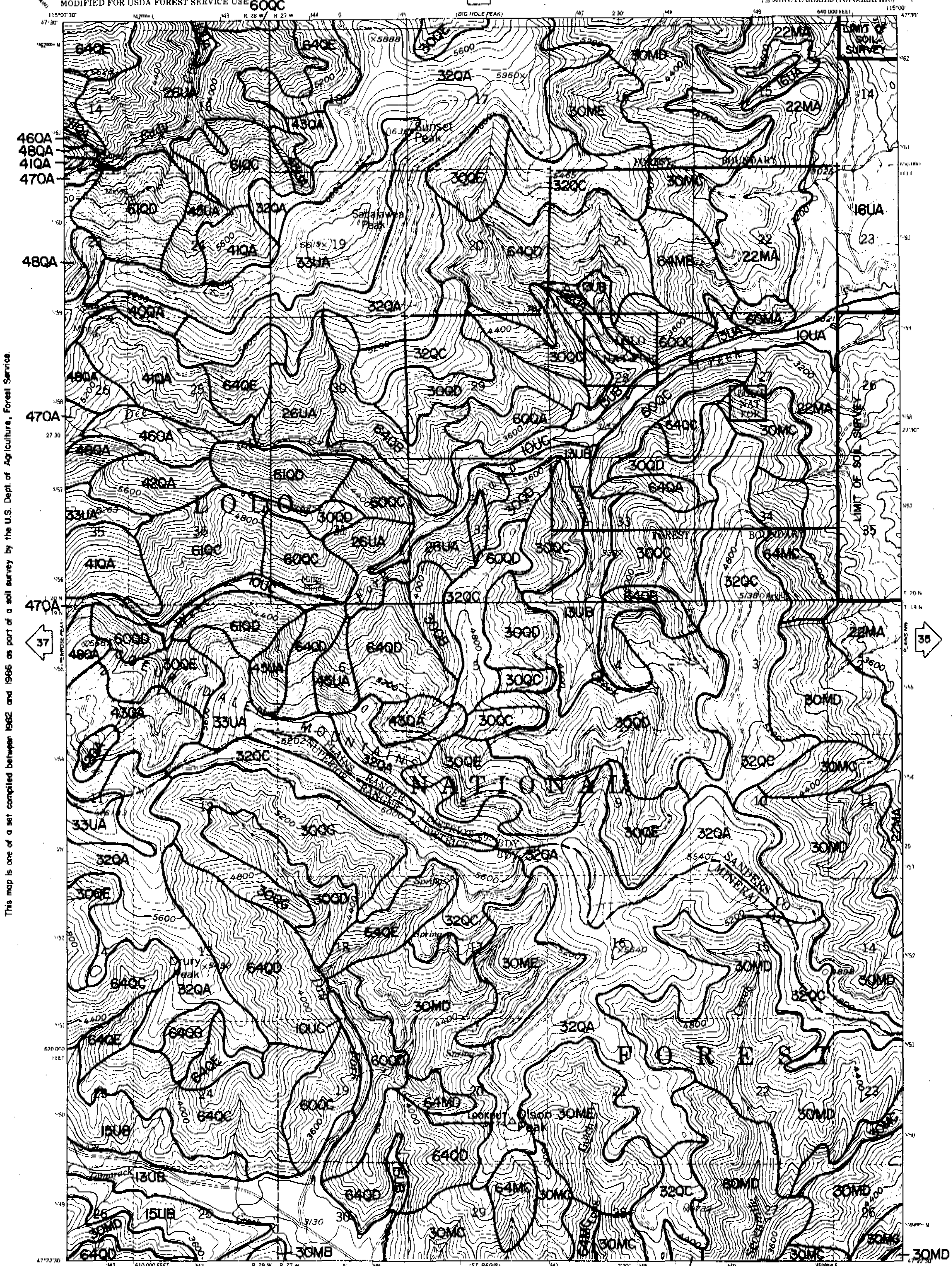
This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ST. REGIS N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

36

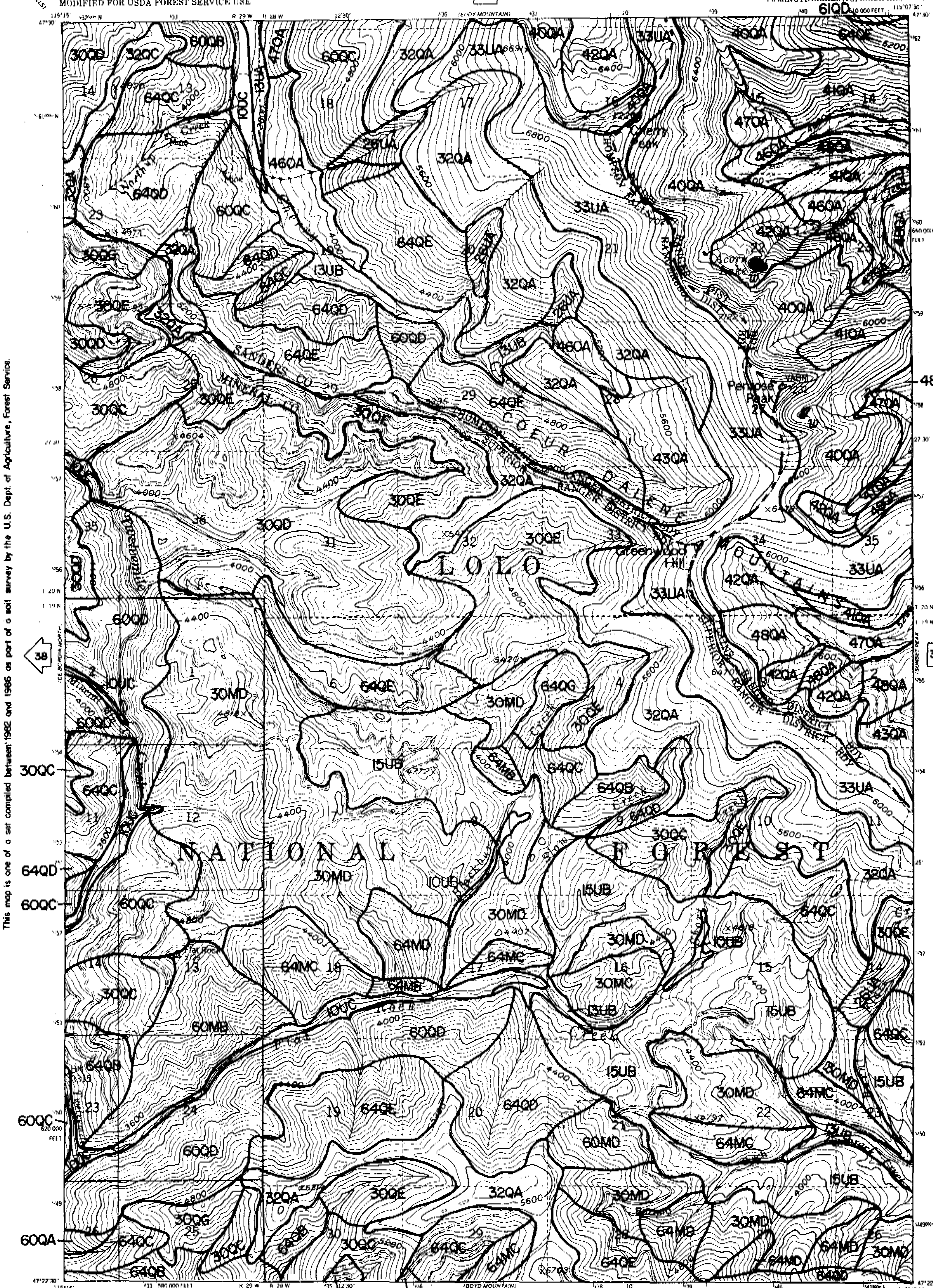
ST. REGIS N.E., MT
N4722.5-W11500/7.5
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ST. REGIS N.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

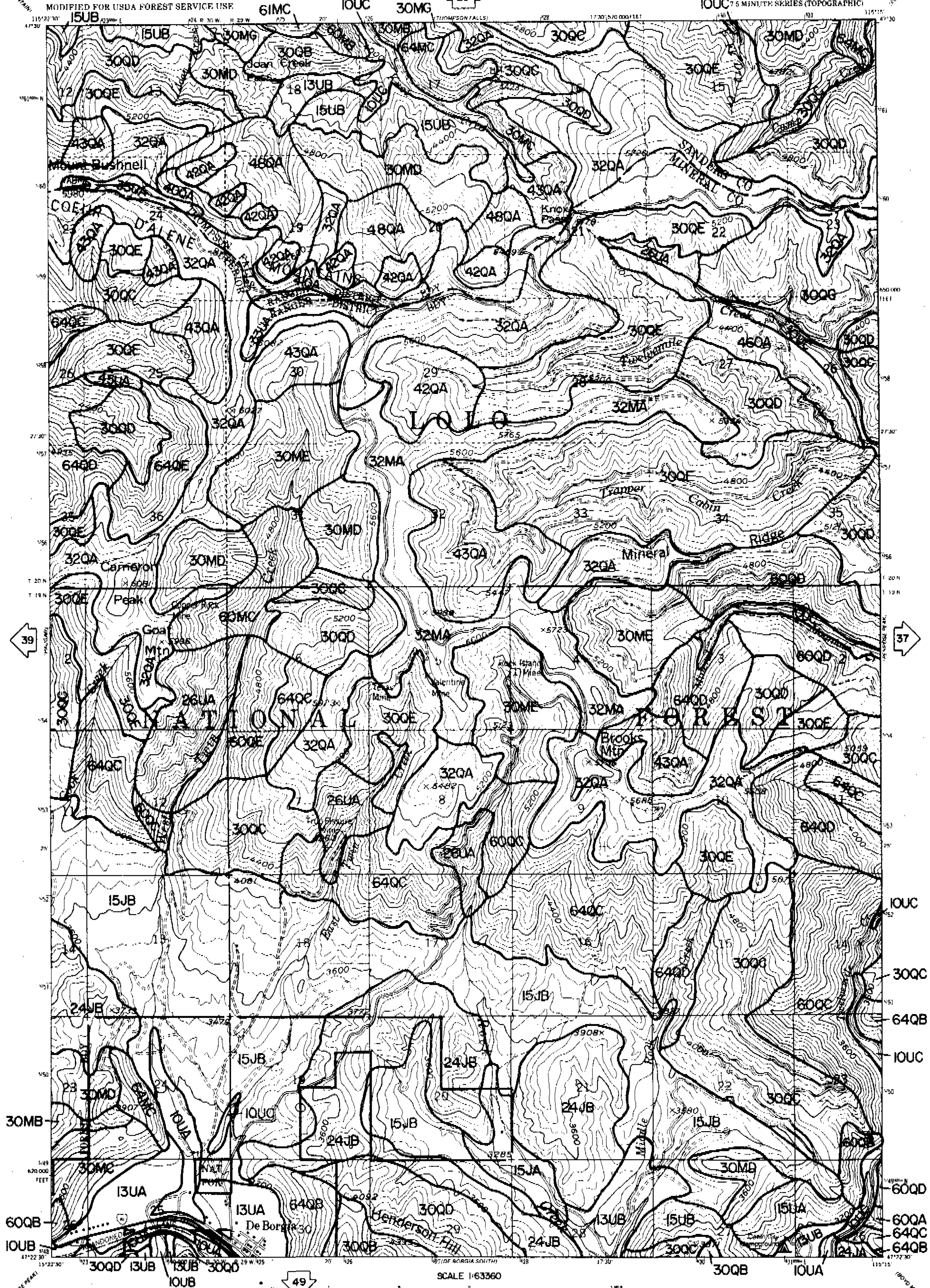
37

ST. REGIS N.W., MT
N4722.5-W11507.5/7.5
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

HAUGAN N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:63360

38

HAUGAN N.E., MONT.
N4722.5-W11515/7.5
1957

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

SOILS MAPPING LEGEND

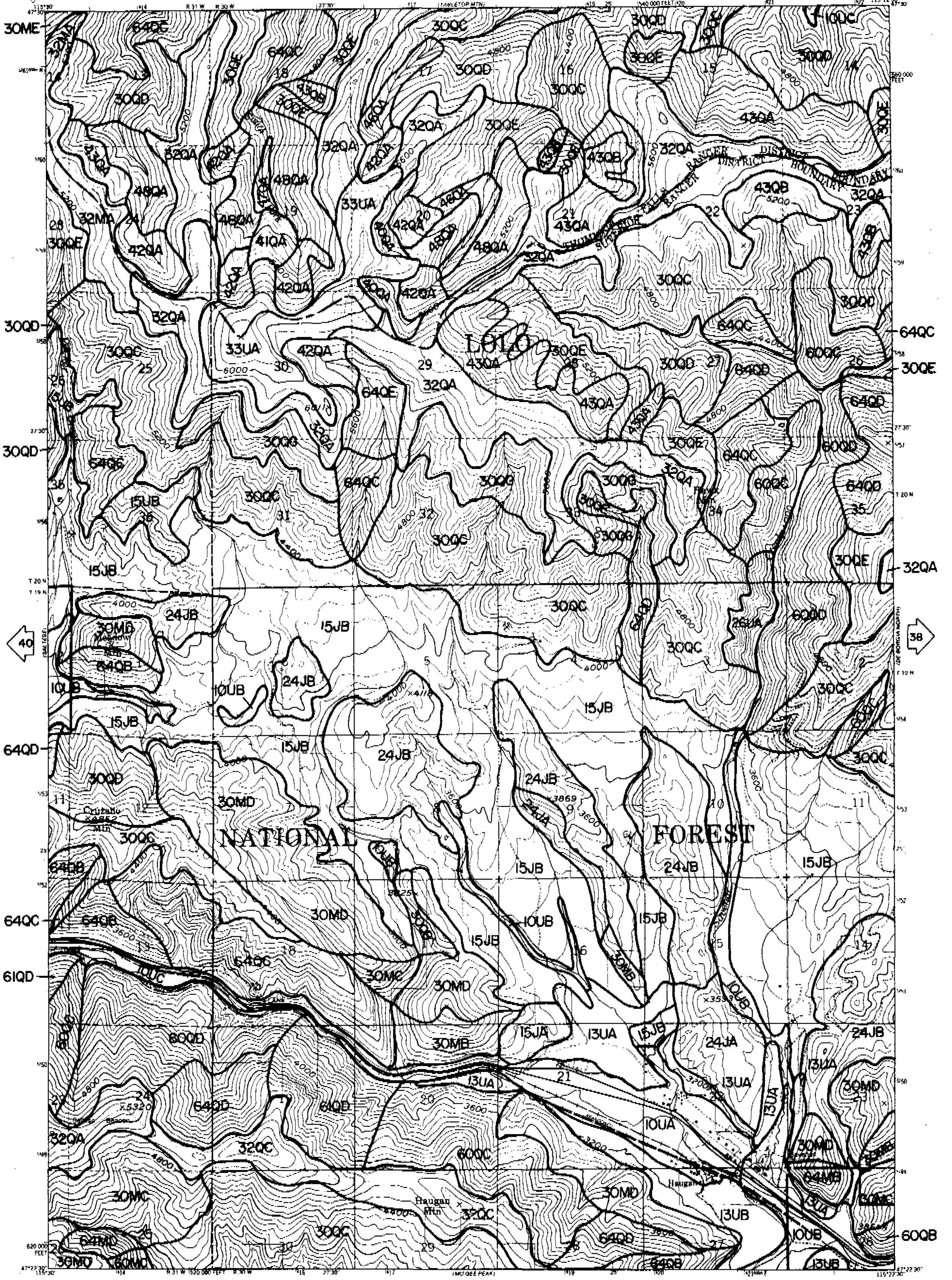
- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

HAUGAN N.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

———	Map Unit Boundary
═══	Limit of Soil Survey
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

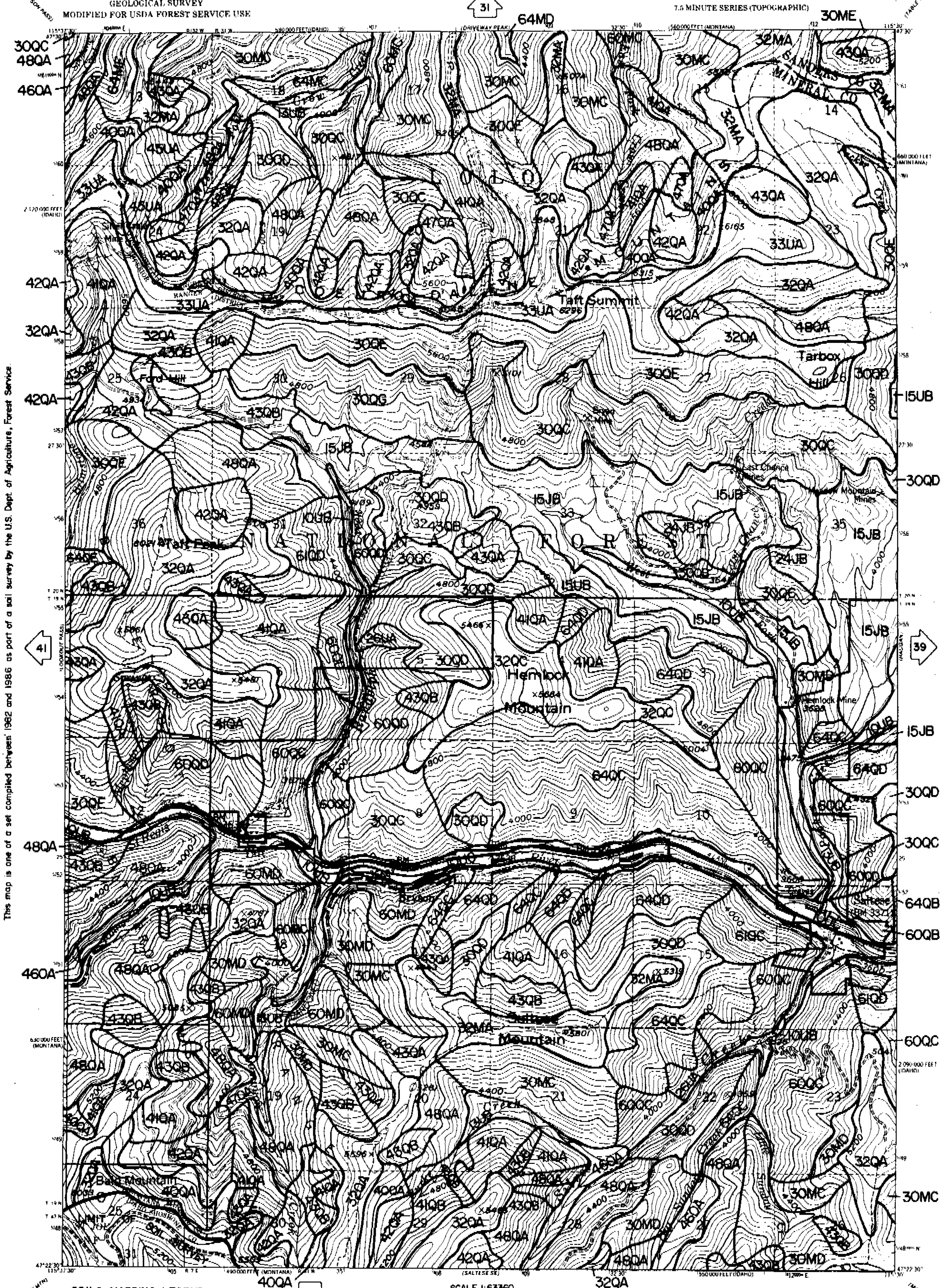
39

HAUGAN N.W., MT
N4722.5 W11522.5/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SALTESE N.E. QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL AND SANDERS COUNTIES, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST WEST

40

SALTESE N.E., MT ID

N4722.5-W11530/7.5

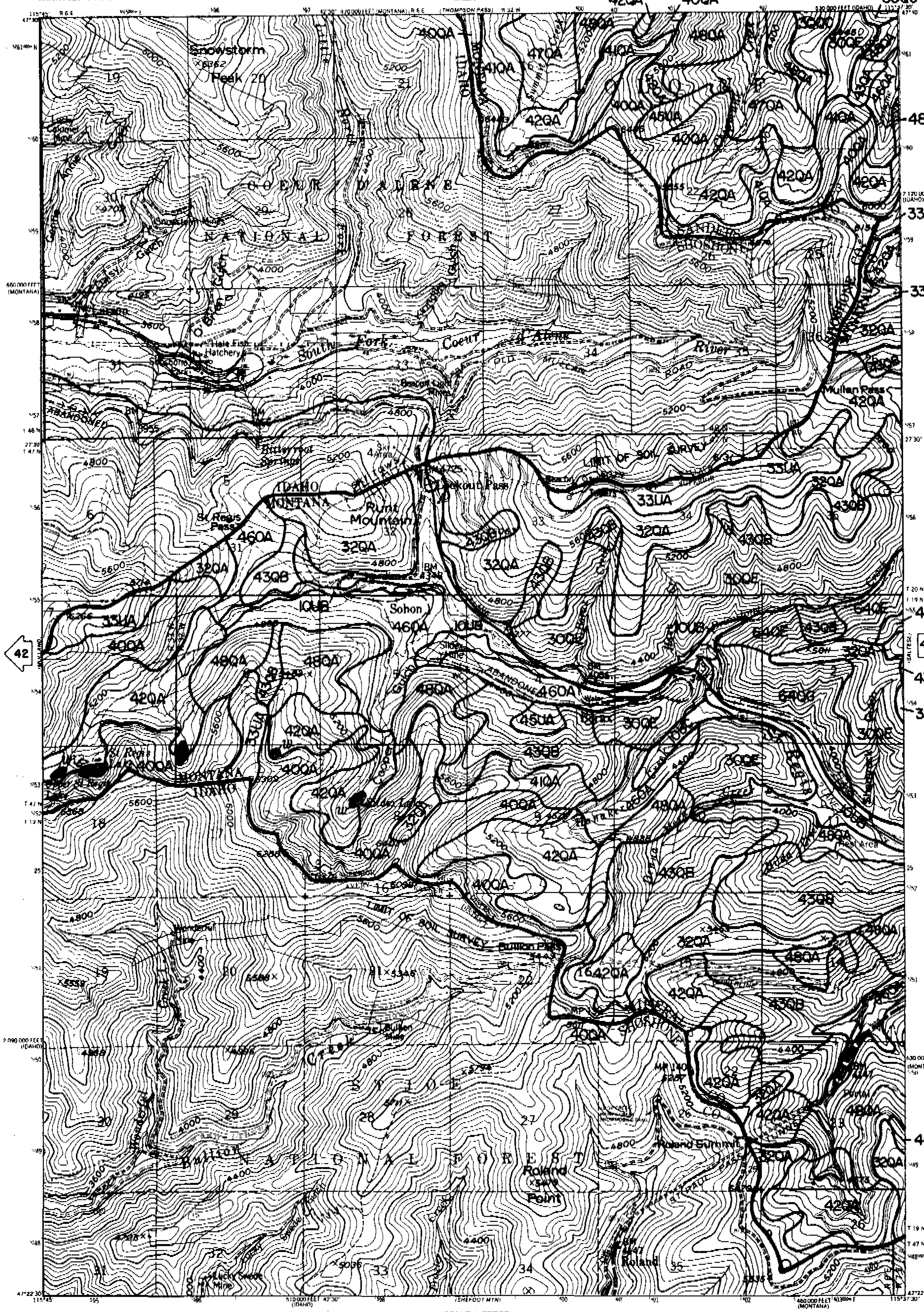
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SALTESE N.W. QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

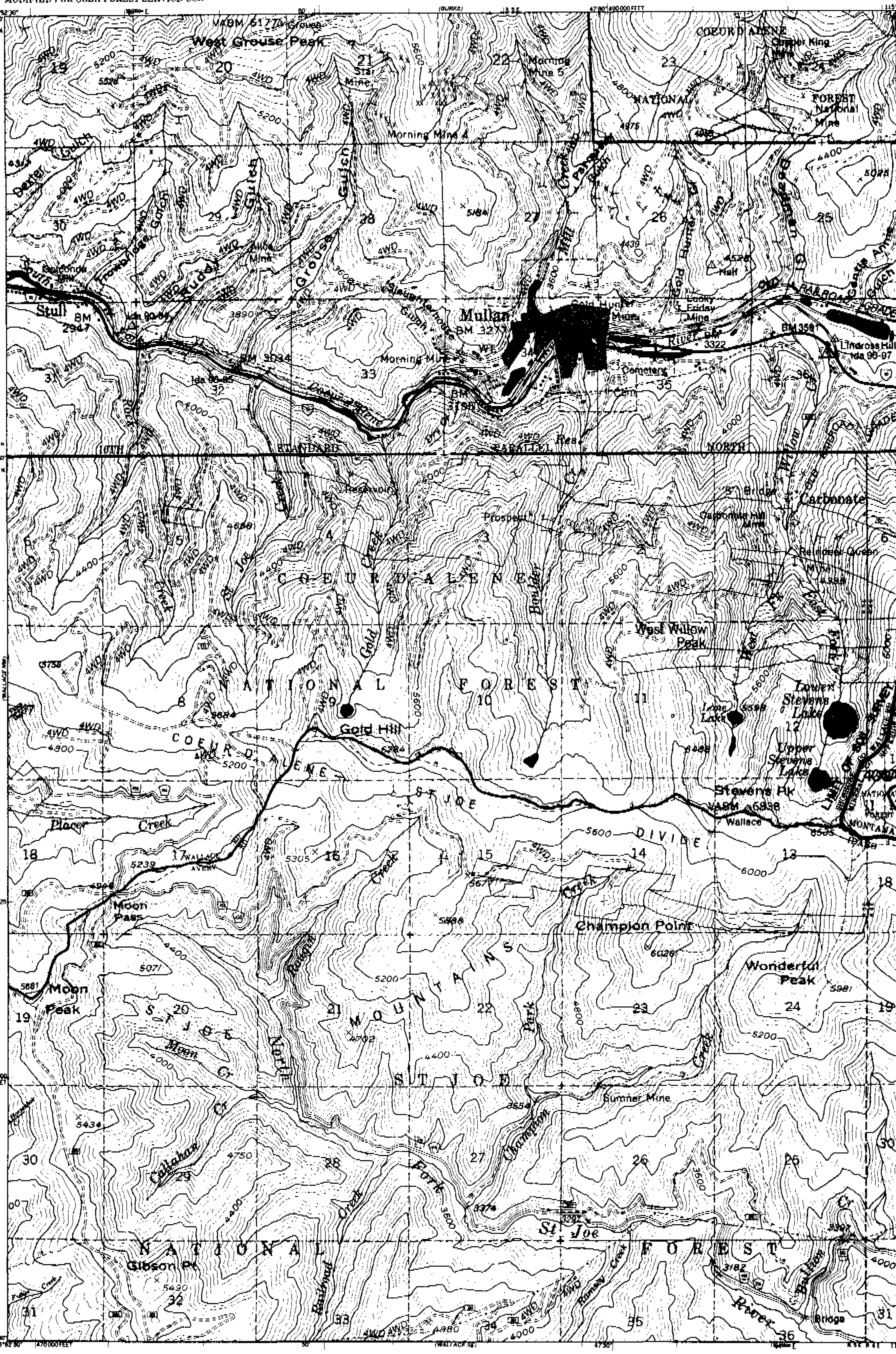
41

SALTESE N.W., ID MT
N4722.5 — W11537.5/7.5
1956

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

WALLACE NE QUADRANGE
SHOSHONE AND MINERAL COUNTIES, IDAHO-MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1967 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Administrative Order Boundary
Non-Forest Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Road, Paved
Improved Road, Gravel
Improved Road, Dirt
Unimproved Road, Dirt
Trail
Locked Gate

Interstate
U.S. Highway
State Highway
County Road
Primary Forest Route
Forest Road
Forest Trail

42

WALLACE NE, IDAHO-MONTANA
N4722.5-W11545/7.5
1981

715-3-2-1

ST. JOE, COEUR D'ALENE AND LOLO NATIONAL FORESTS

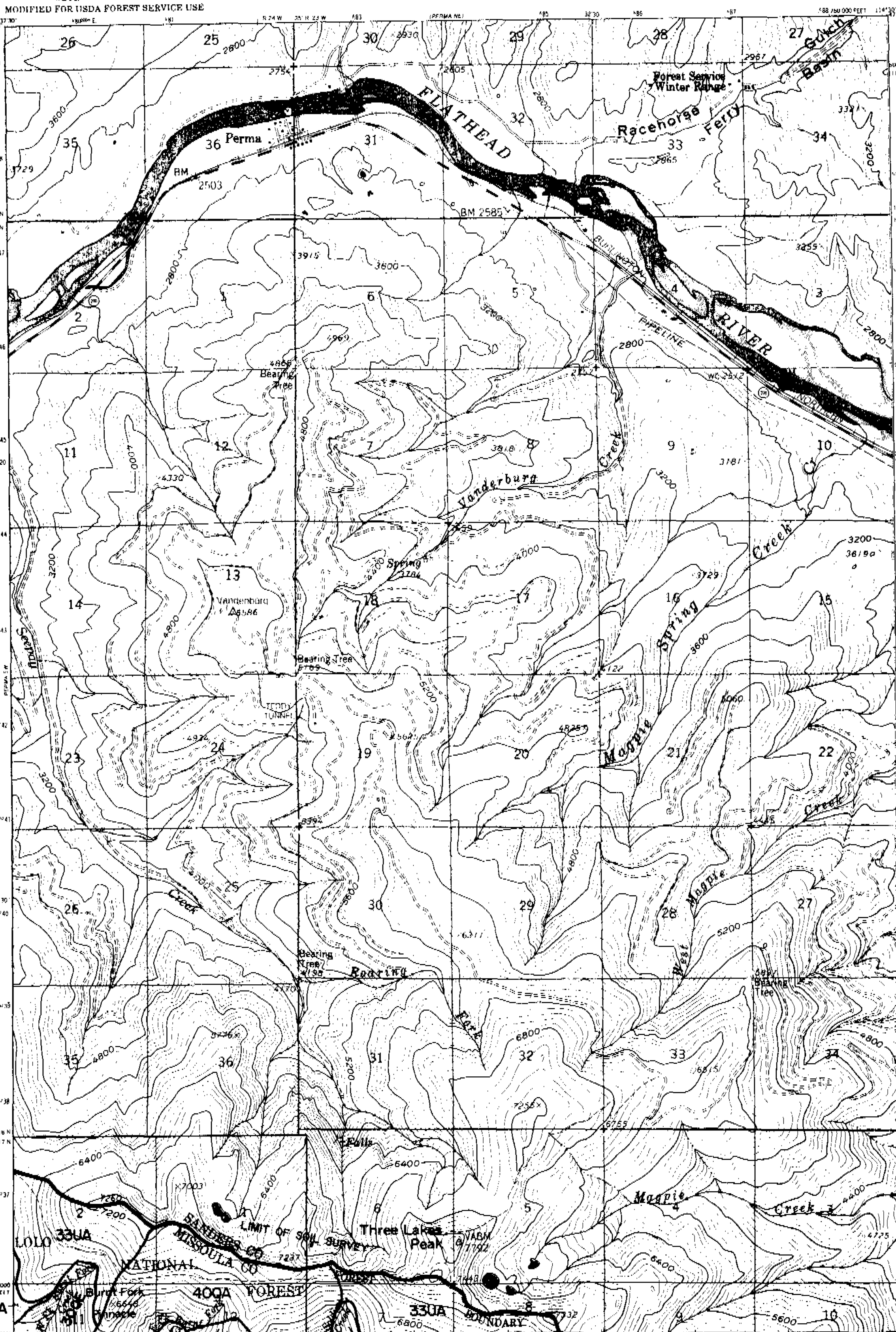
This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PERMA SE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

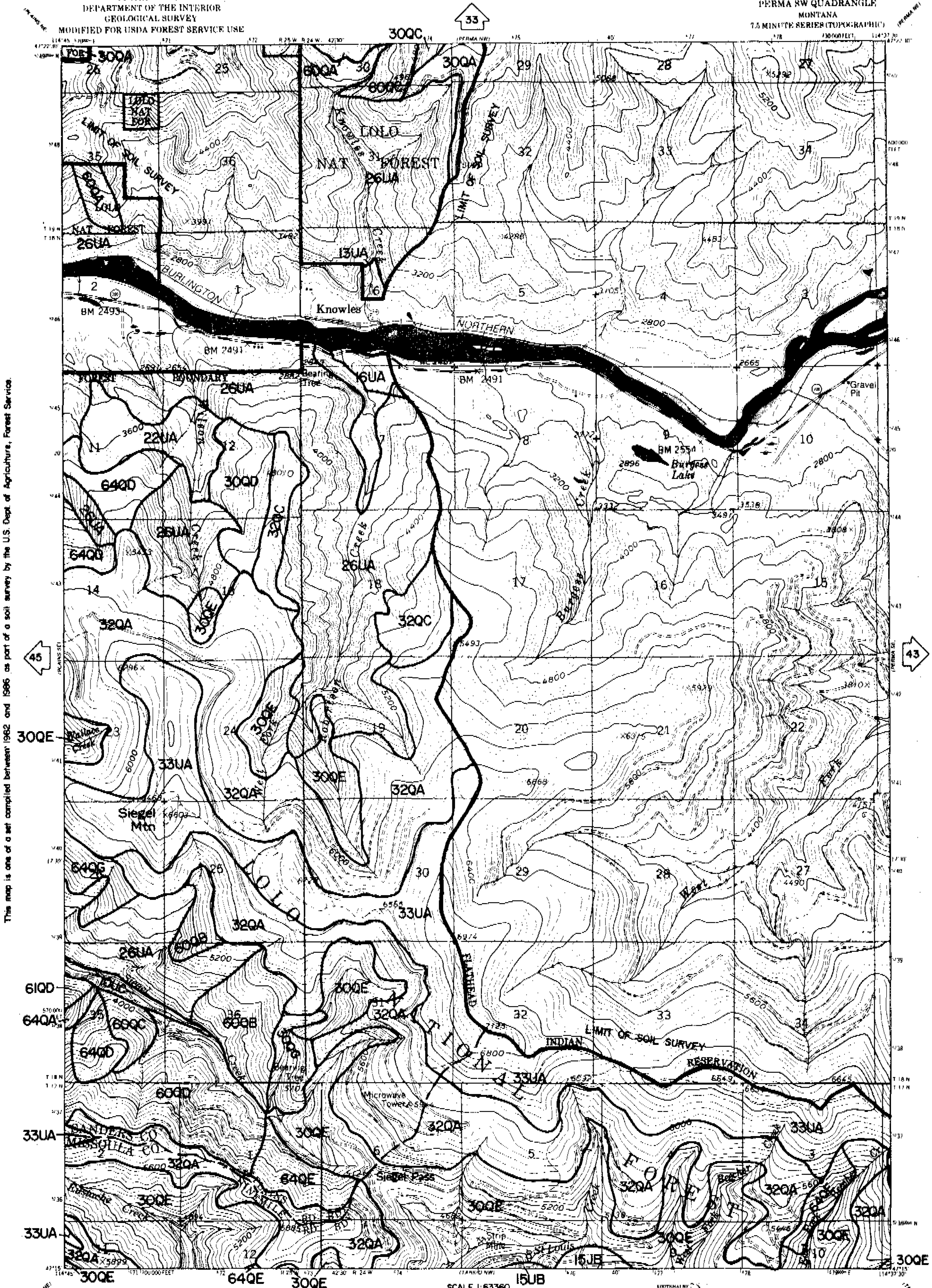
43

PERMA SE, MONT
N4715 W11430/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PERMA SW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1962 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

77

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

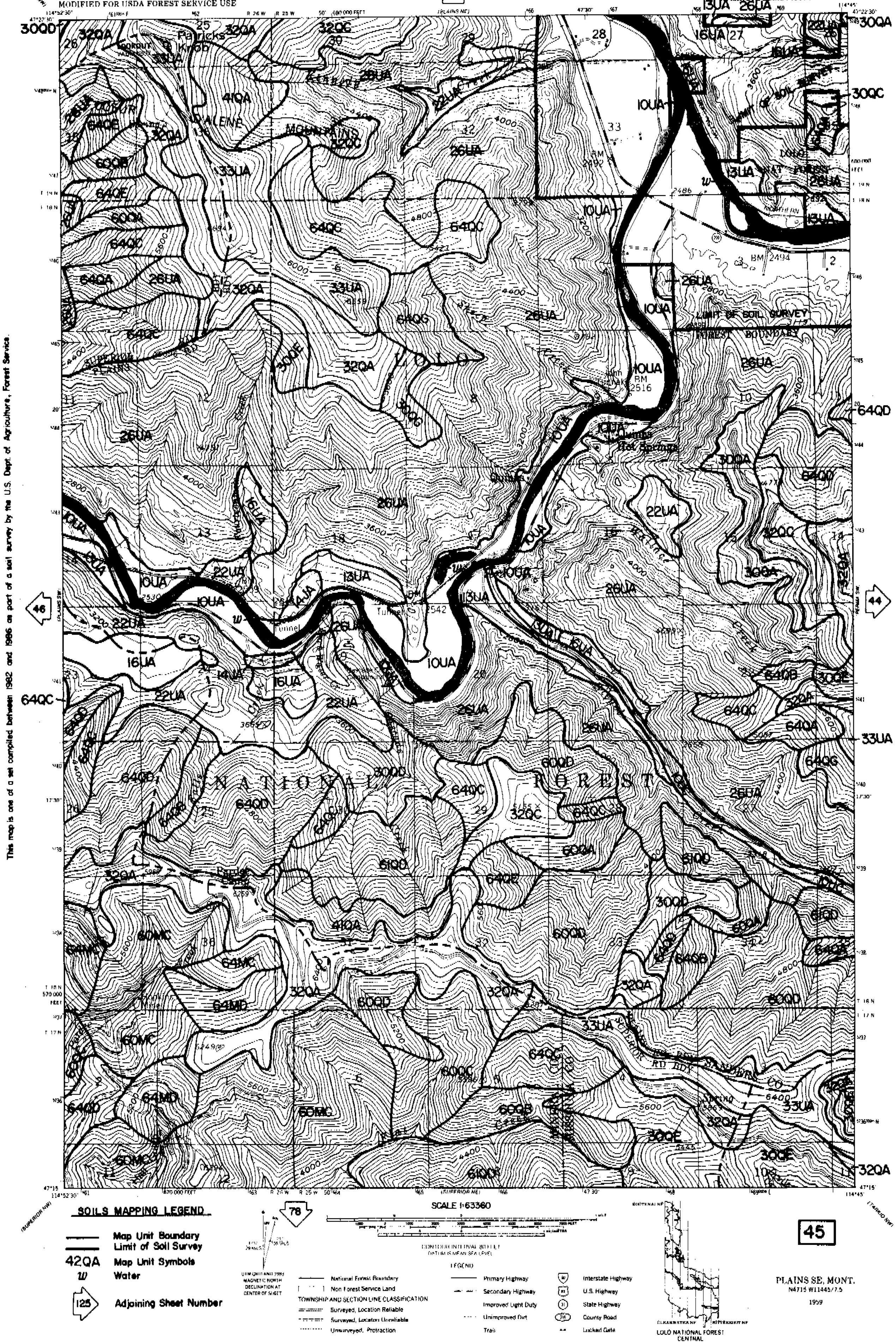
44

PERMA SW, MONTANA
N4715-W11437.5/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PLAINS SE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



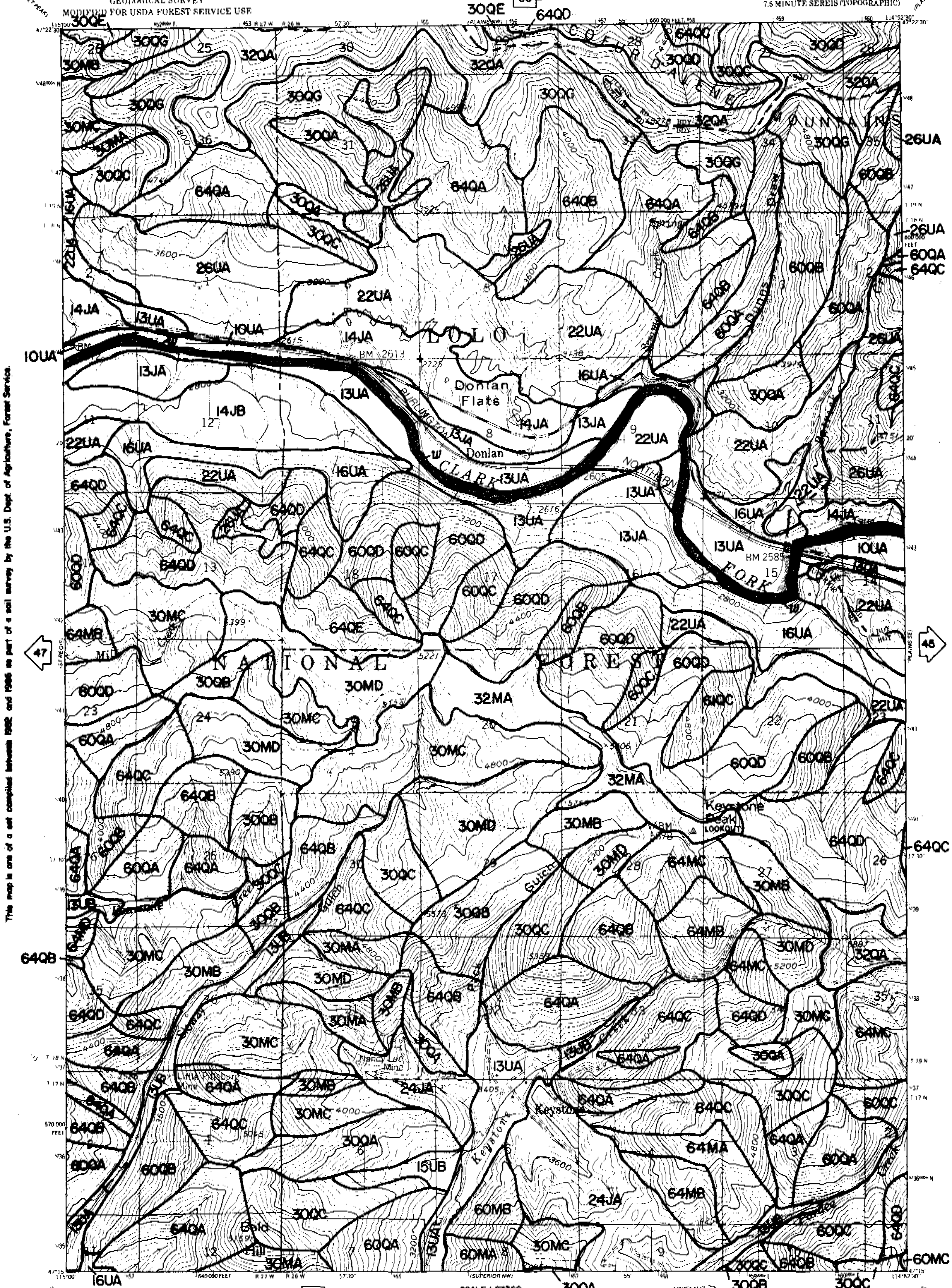
This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PLAINS SW QUADRANGLE
MONTANA
7.5 MINUTE SEREIS (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *W* Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST CENTRAL

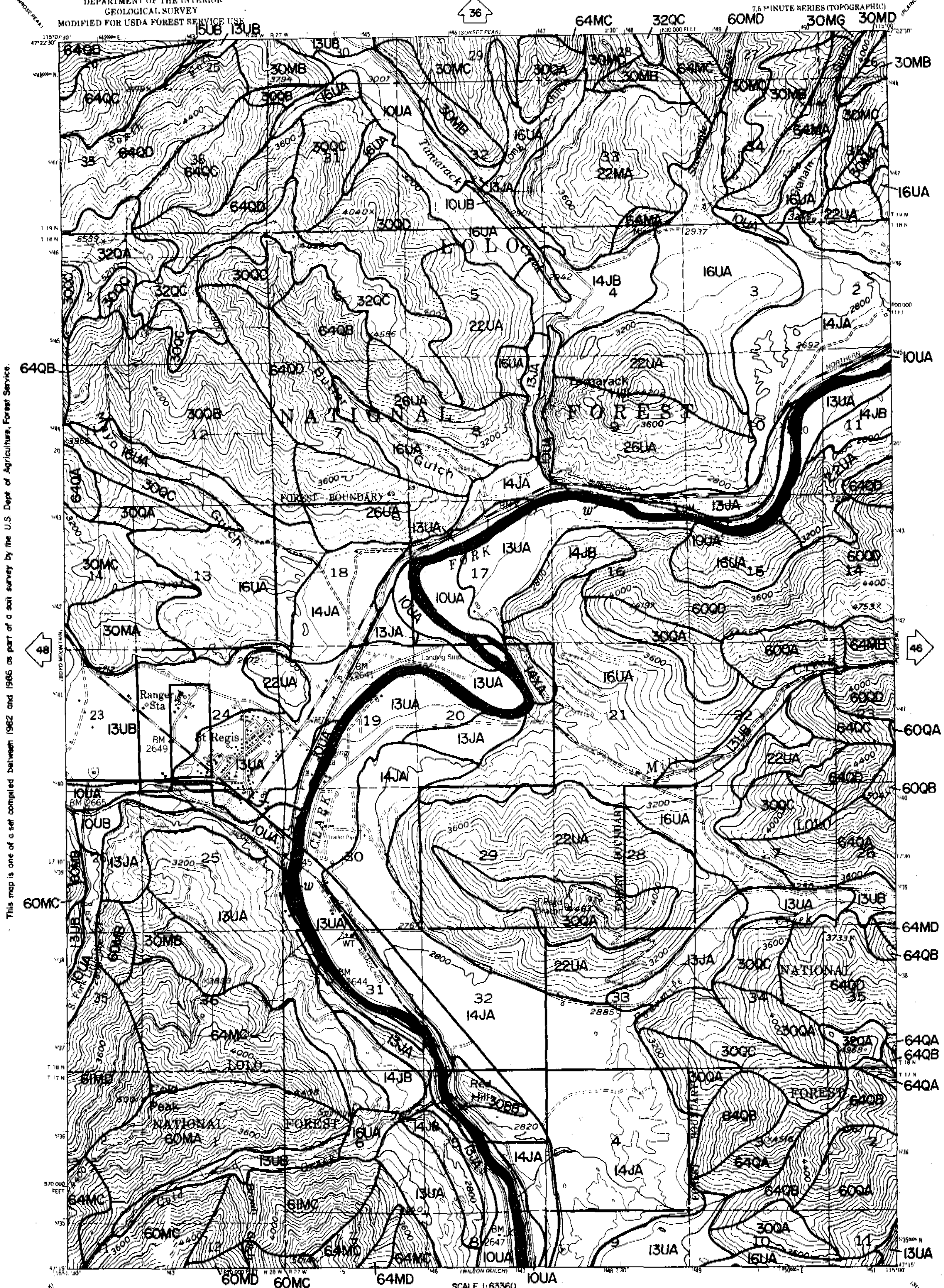
46

PLAINS SW, MONT.
N4715-W11452.5/7.5
1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

ST. REGIS S.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND
- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
WEST

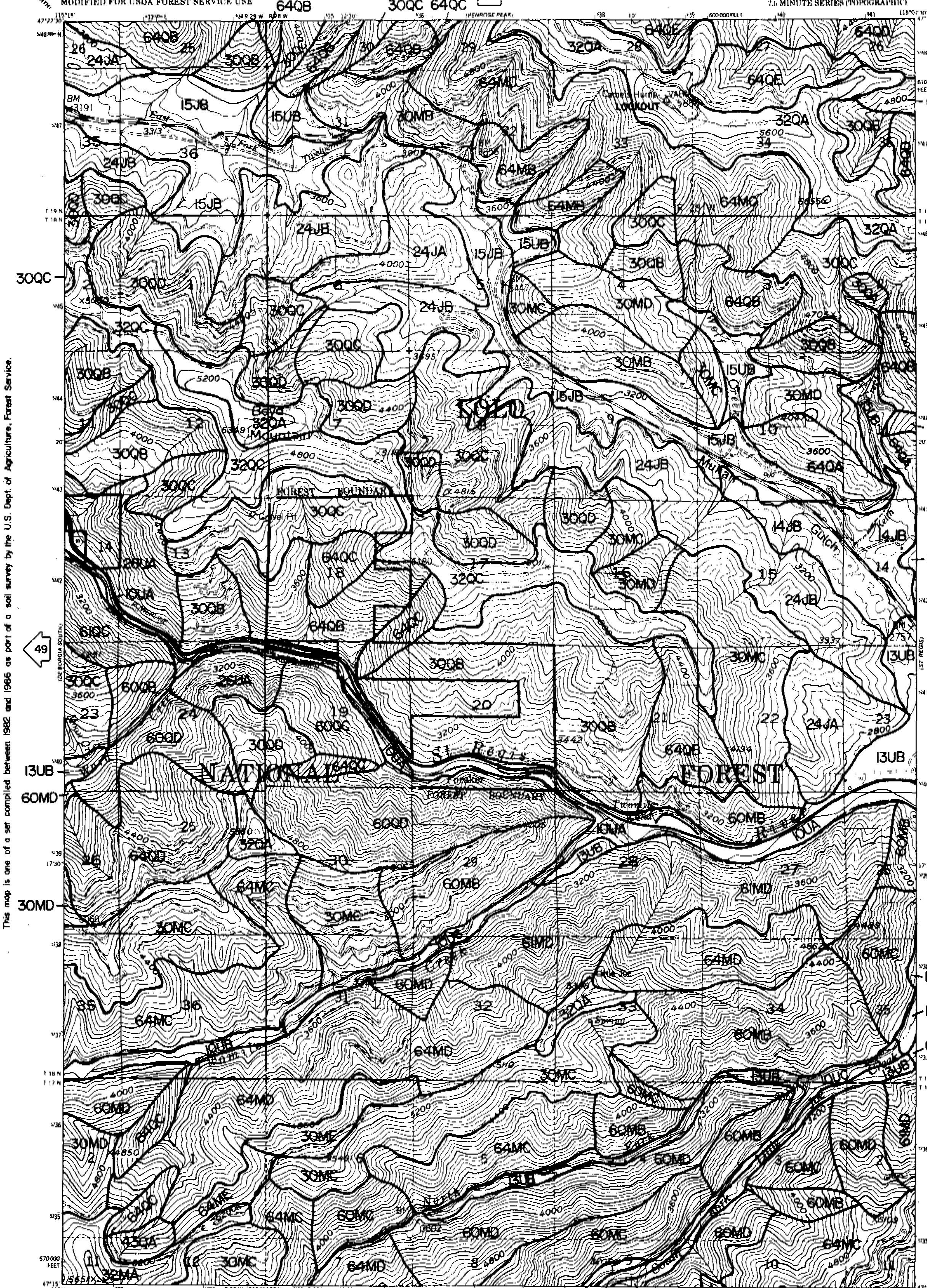
47

ST. REGIS S.E., MT
N4715 W11500/7.5
1956

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ST. REGIS QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



48

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

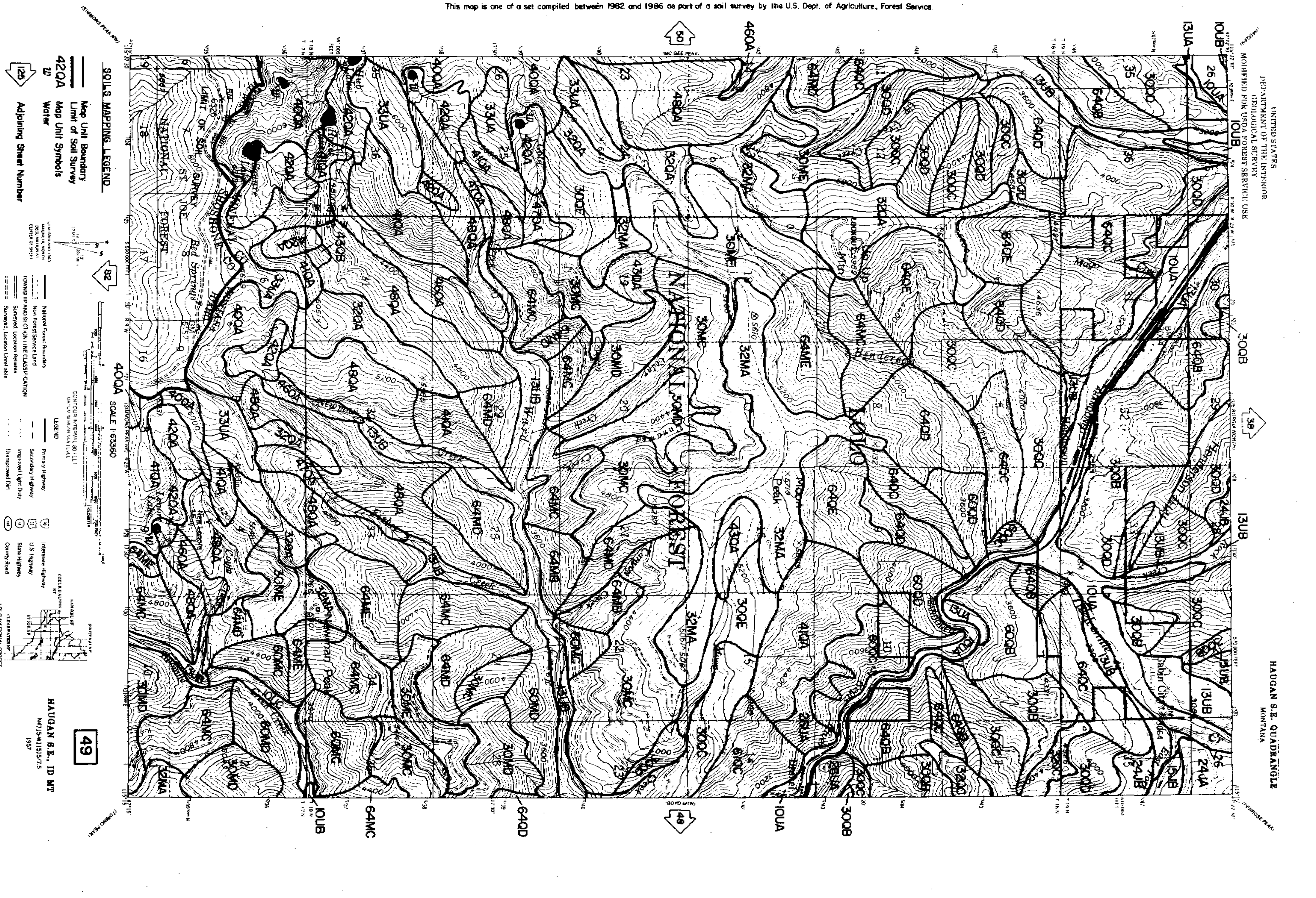
CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND
National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST WEST

ST. REGIS S.W., MT
N4715-W11507.5/7.5
1956

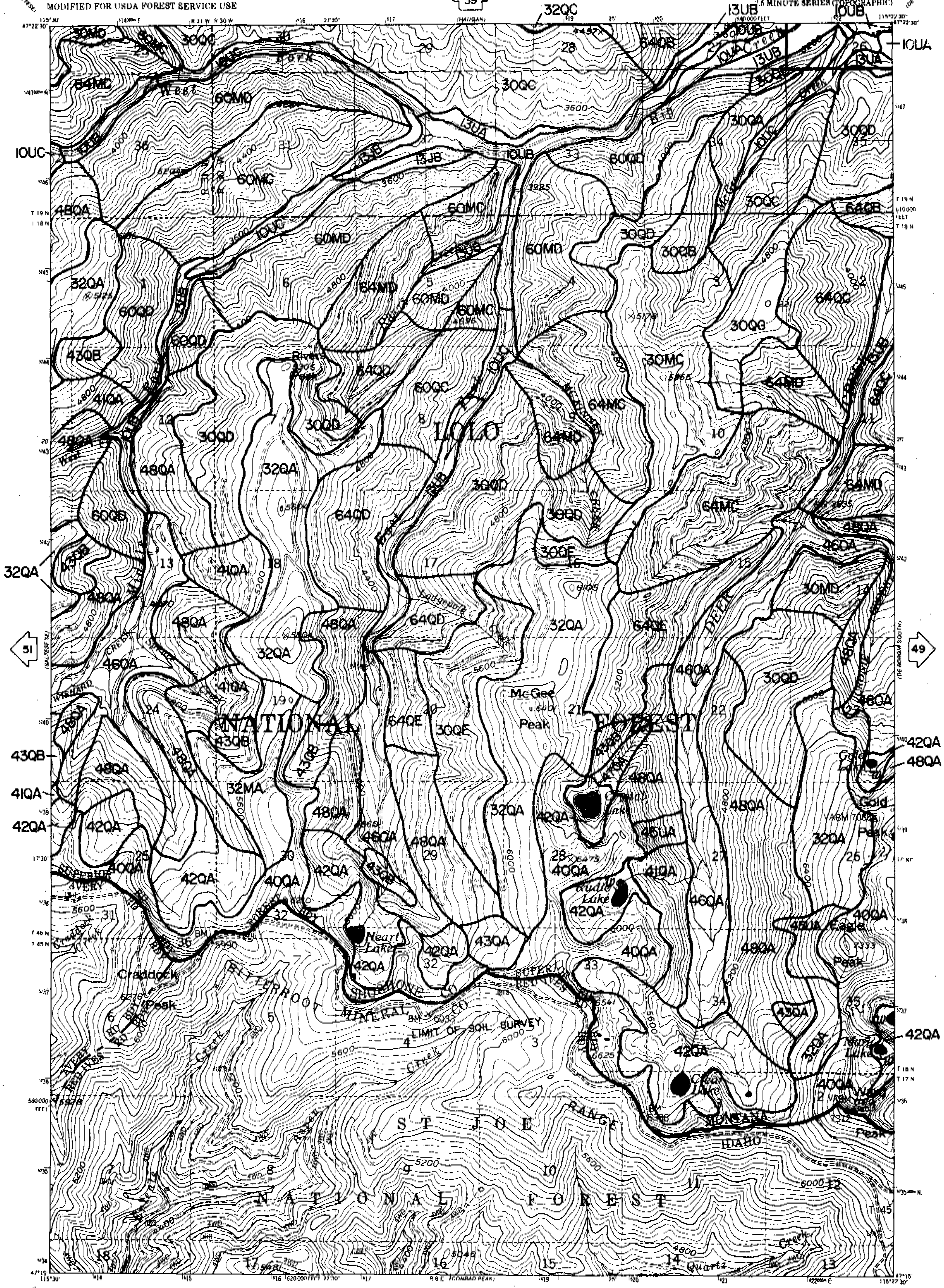
This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

HAUGAN S.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

UTM GRID AND 1957 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
WEST

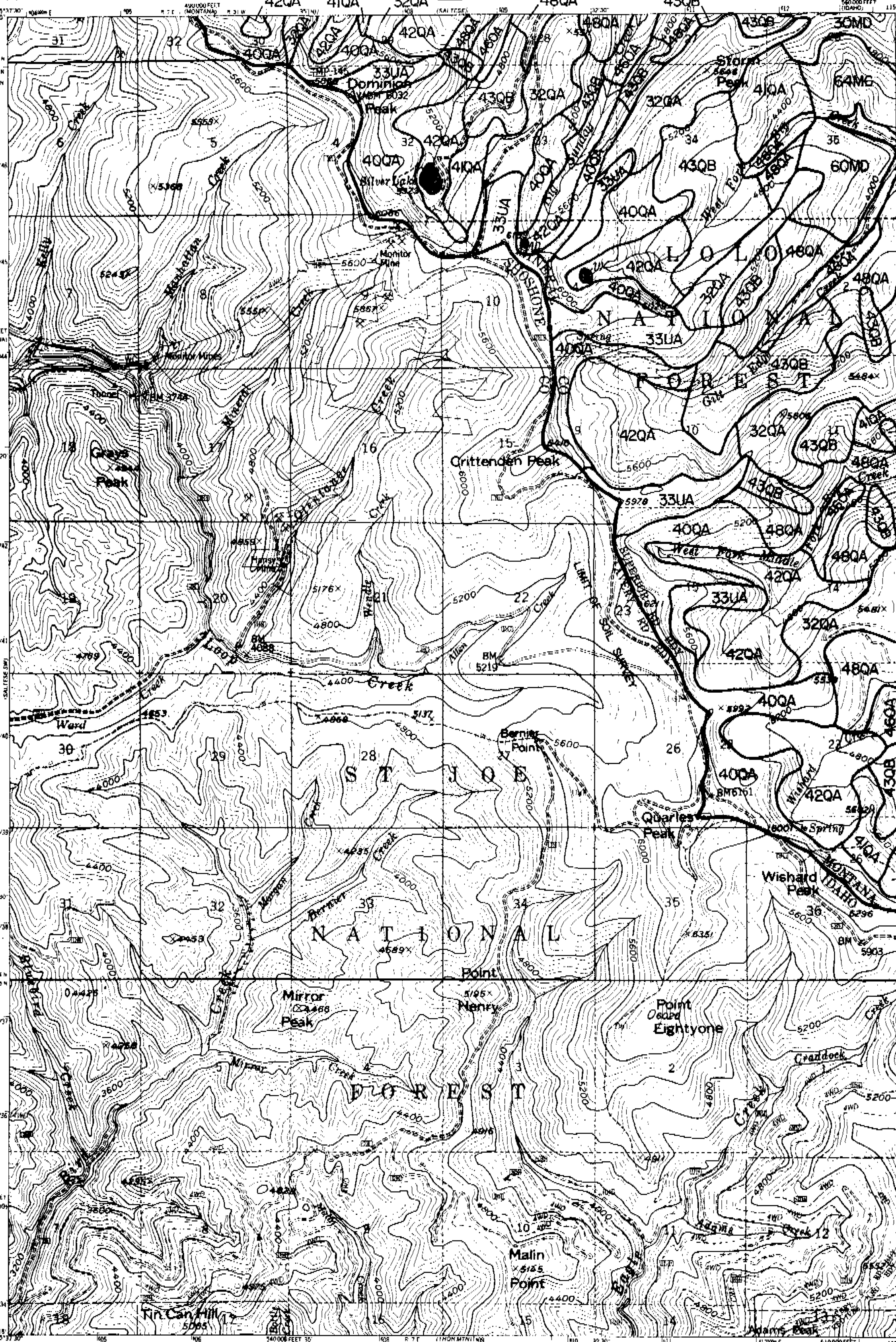
50

HAUGAN S.W., ID MT
N4715-W11522.5/7.5
1957

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SALTESE SE QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND
National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
WEST

51

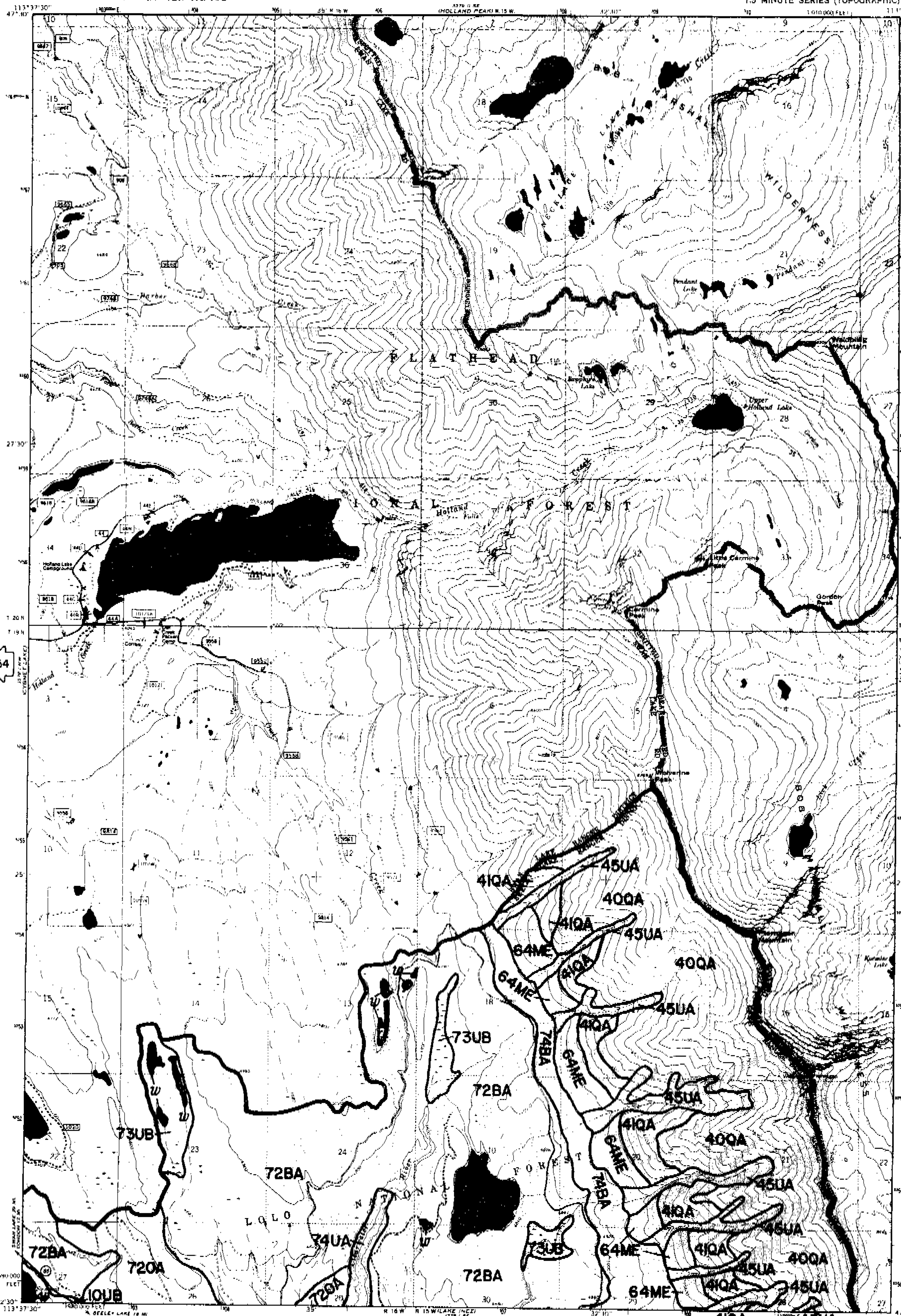
SALTESE SE, IDAHO-MONTANA
N4715-W11530/7.5
1956

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

HOLLAND LAKE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service



SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

53

HOLLAND LAKE, MONT.
N4722.5—W11330/7.5
1965

FLATHEAD NATIONAL FOREST

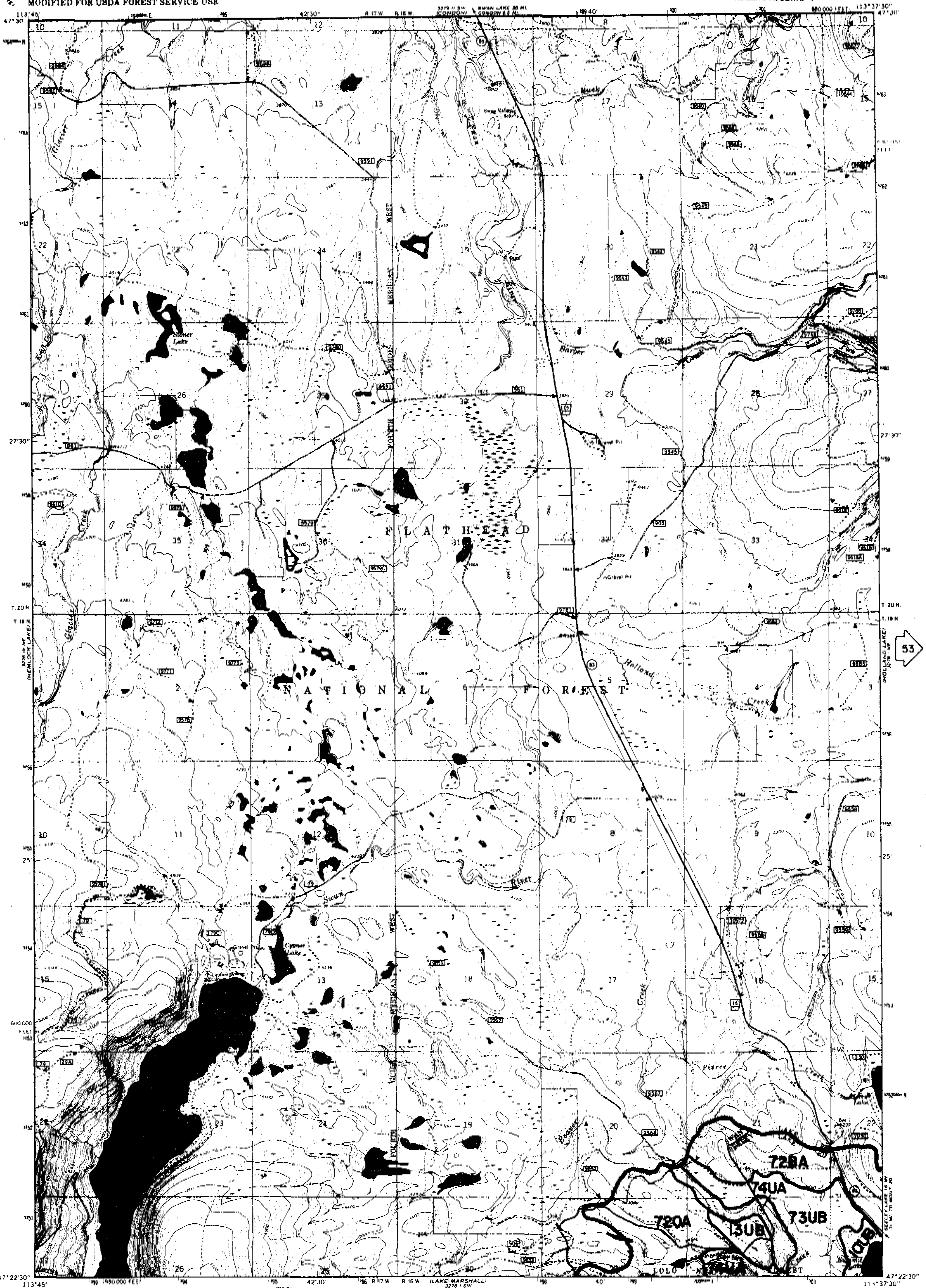
713-3-1-1

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CYGNET LAKE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

UTM GRID AND 1965 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Road, Paved
Improved Road, Gravel
Improved Road, Dirt
Unimproved Road, Dirt
Trail
Locked Gate

Interstate
U.S. Highway
State Highway
County Road
Primary Forest Route
Forest Road
Forest Trail

FLATHEAD NATIONAL FOREST

54

CYGNET LAKE, MONT.
N4722.5 — W11337.5/7.5
1965
DMA 3278 I NW—SERIES V894

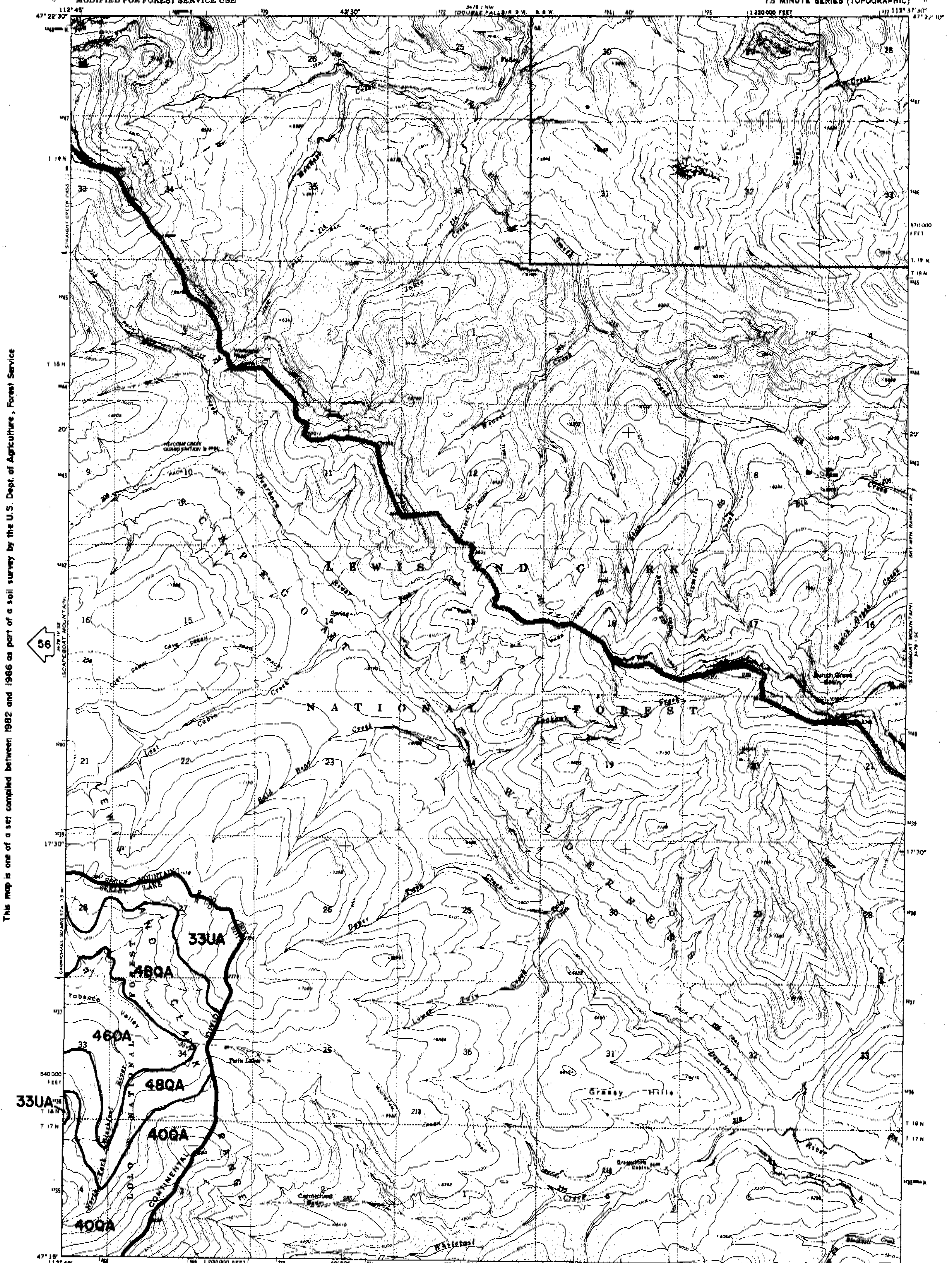
713-3-1-2

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

JAKIE CREEK QUADRANGLE
MONTANA—LEWIS AND CLARK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service



64

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, BLM Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate
U.S. Highway
State Highway
County Highway
Forest Road
Forest Trail

LEWIS & CLARK NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

55

JAKIE CREEK, MONT.
N4715—W11237.5/7.5
1970

712-3-1-3

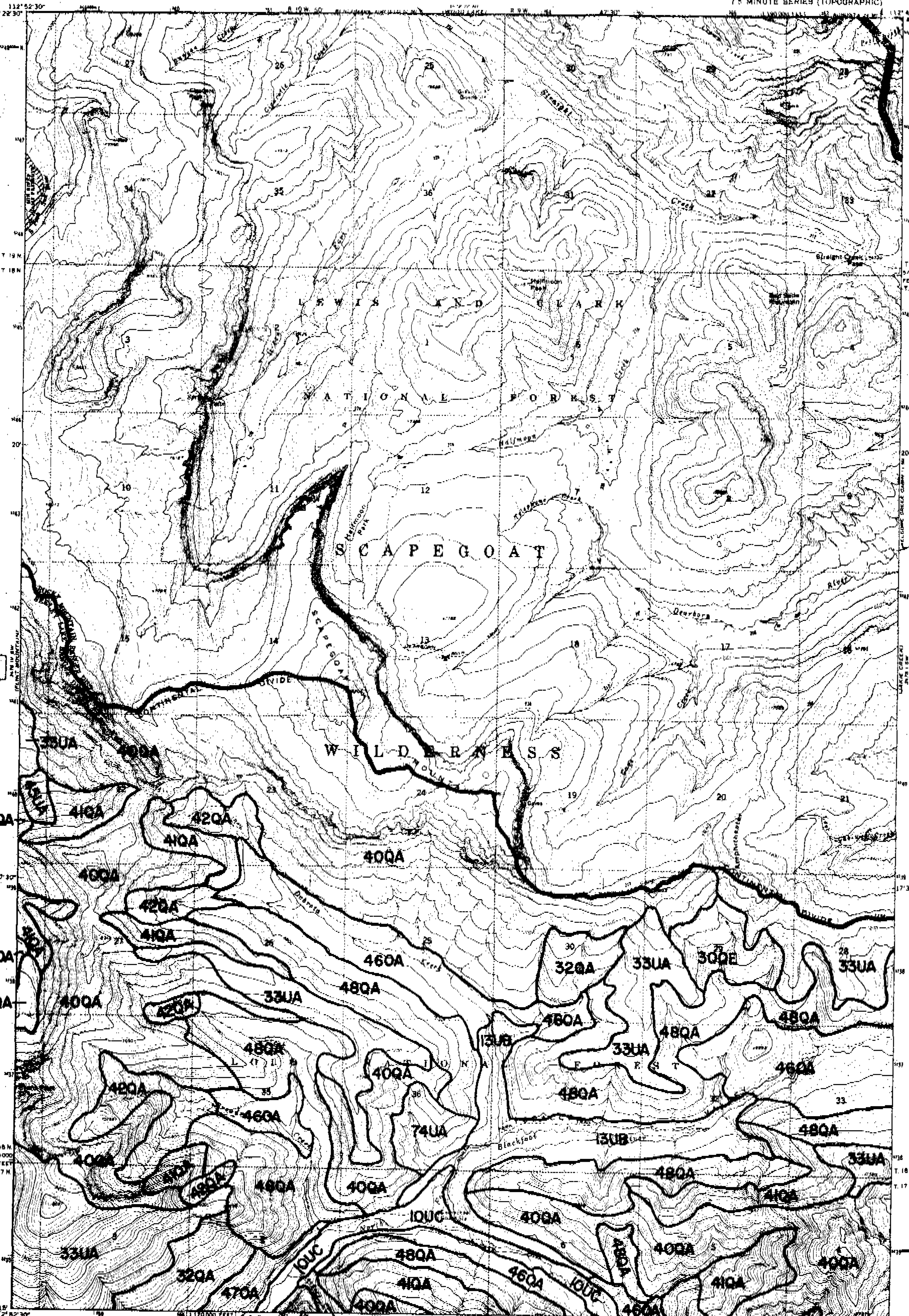
SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

SCAPEGOAT MOUNTAIN QUADRANGLE
MONTANA - LEWIS AND CLARK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

48QA 46QA 65

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- W Water
- 126 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

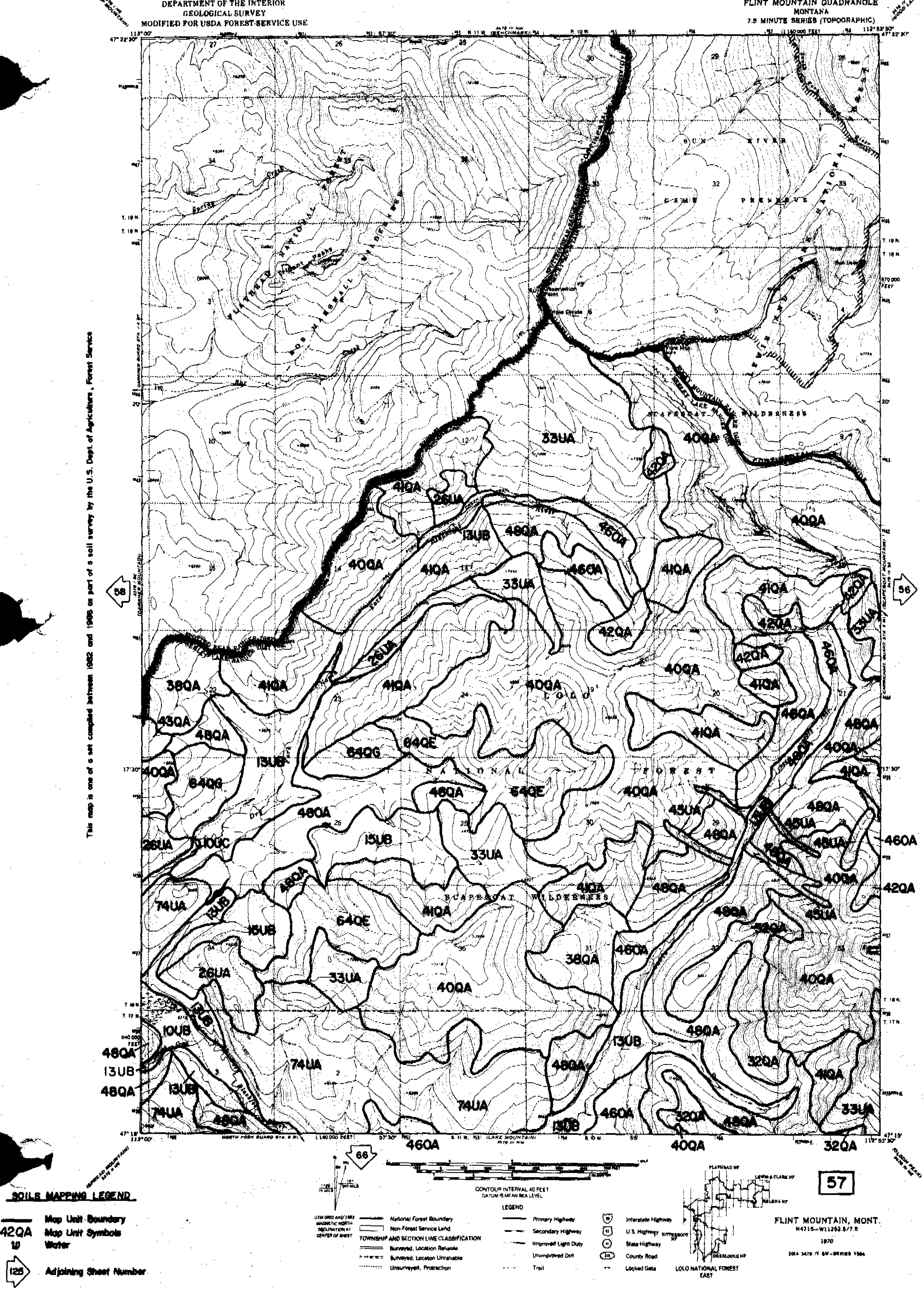
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
EAST

56

SCAPEGOAT MOUNTAIN, MONT.
N4715—W11245/7.5
1970

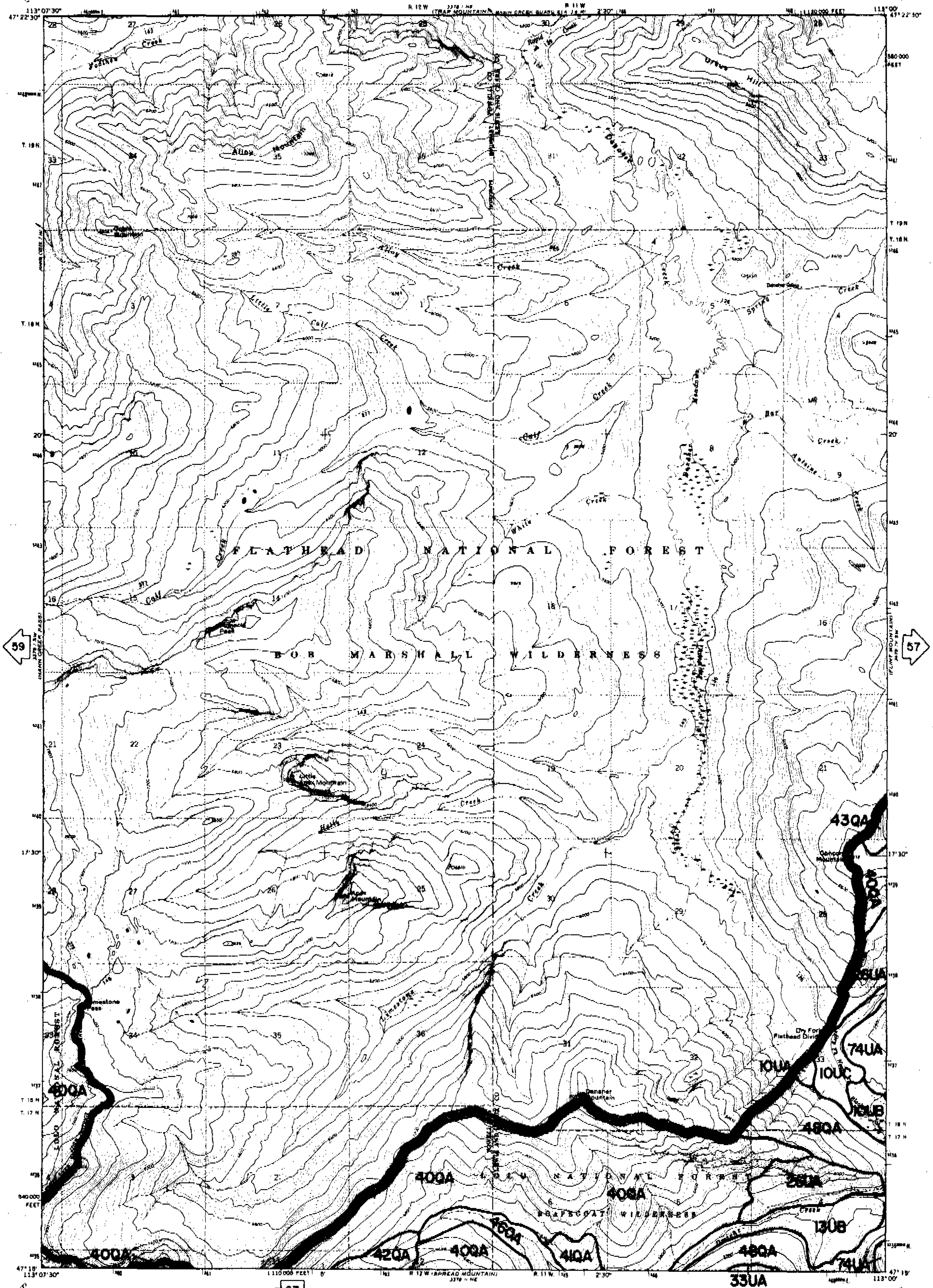
LOLO NATIONAL FOREST
SOIL SURVEY 1986



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

DANAHER MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

National Forest Boundary
Non-Forest Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction

- Primary Highway
- Secondary Highway
- Improved Road, Paved
- Improved Road, Gravel
- Improved Road, Dirt
- Unimproved Road, Dirt
- Trail
- Locked Gate

- Interstate
- U.S. Highway
- State Highway
- County Road
- Primary Forest Route
- Forest Road
- Forest Trail

FLATHEAD NATIONAL FOREST

58

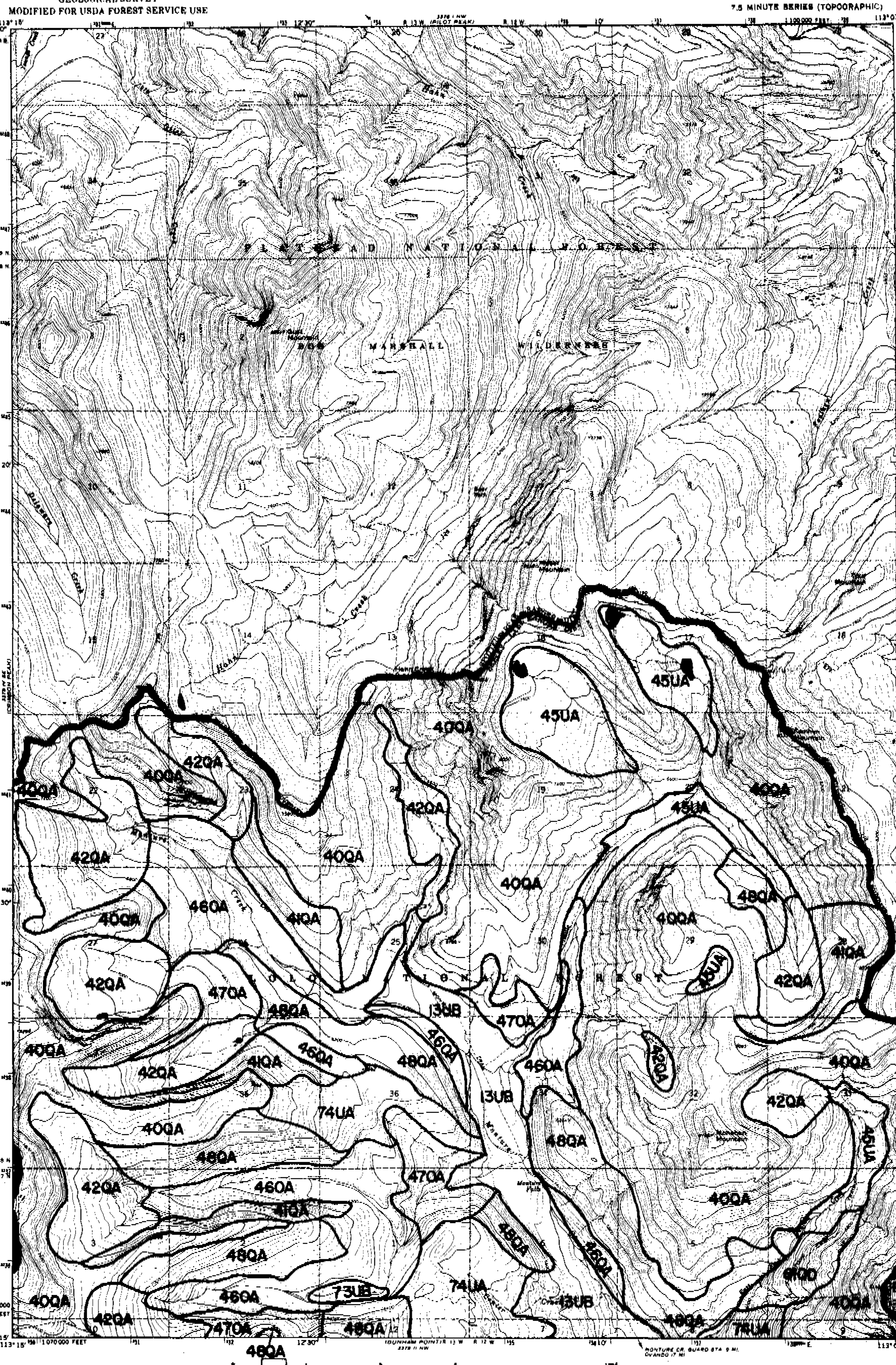
DANAHER MOUNTAIN, MONTANA
N4715—W11300/7.5
1970
713-4-1-4

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

HAHN CREEK PASS QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Road, Paved
Improved Road, Gravel
Improved Road, Dirt
Unimproved Road, Dirt
Trail
Locked Gate
Interstate
U.S. Highway
State Highway
County Road
Primary Forest Route
Forest Road
Forest Trail

FLATHEAD NATIONAL FOREST

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

59

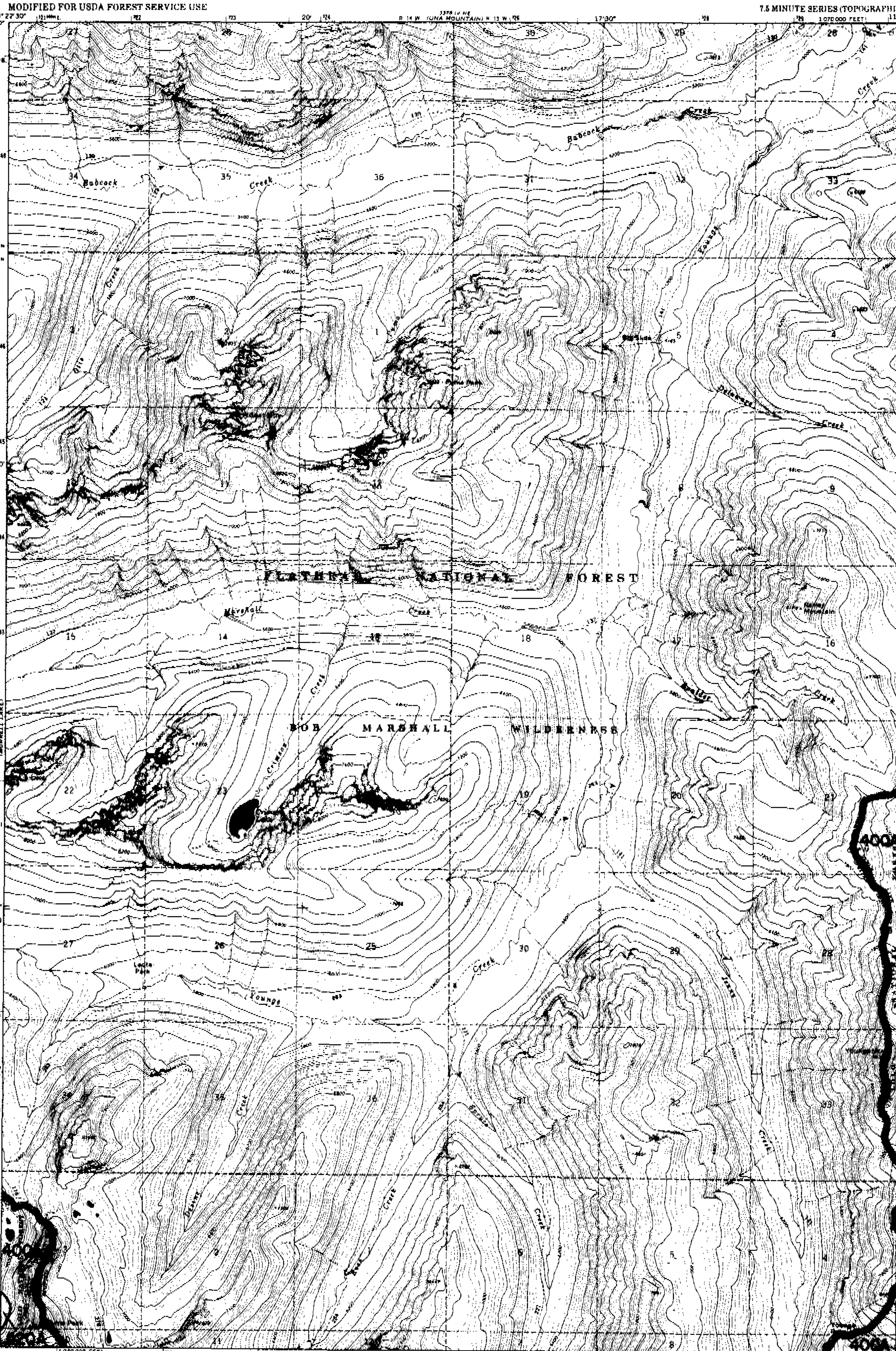
HAHN CREEK PASS, MONTANA
N4715—W11307.5/7.5
1970

713-4-1-3

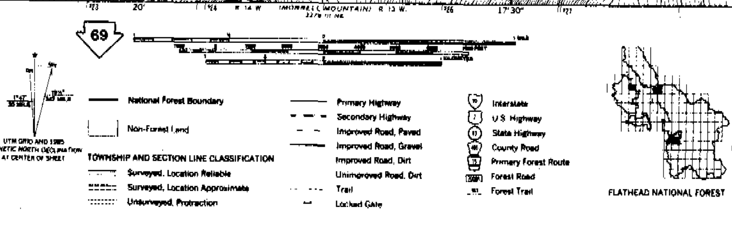
LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CRIMSON PEAK
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

———	Map Unit Boundary
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

60

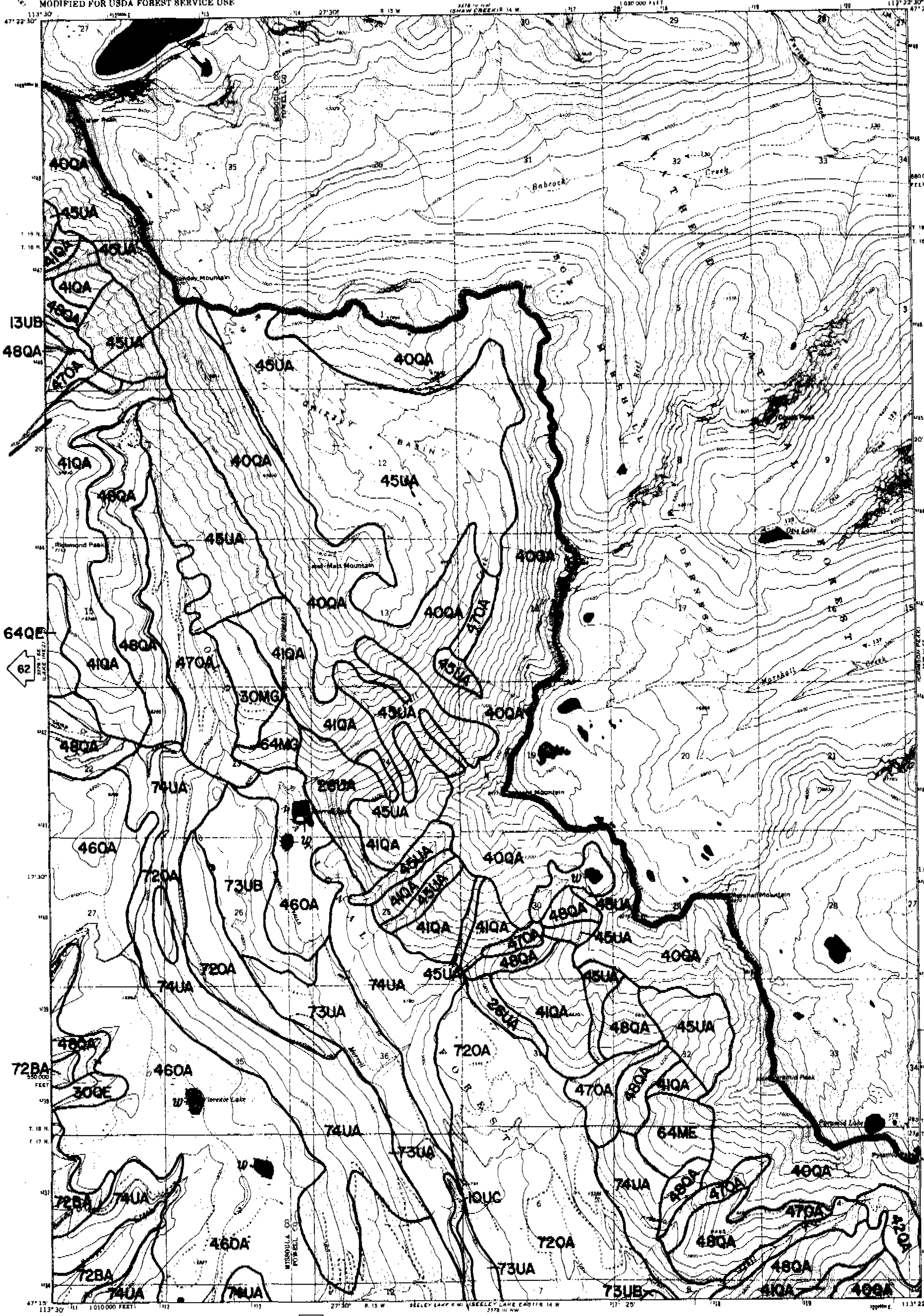
CRIMSON PEAK, MONTANA
N4715—W11315/7.5
1970
713-4-2-4

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MORRELL LAKE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

FLATHEAD NATIONAL FOREST

61

MORRELL LAKE, MONT.
N4715—W11322.5/7.5
1970
DMA 3378 IV SW—SERIES V894

713-4-2-3

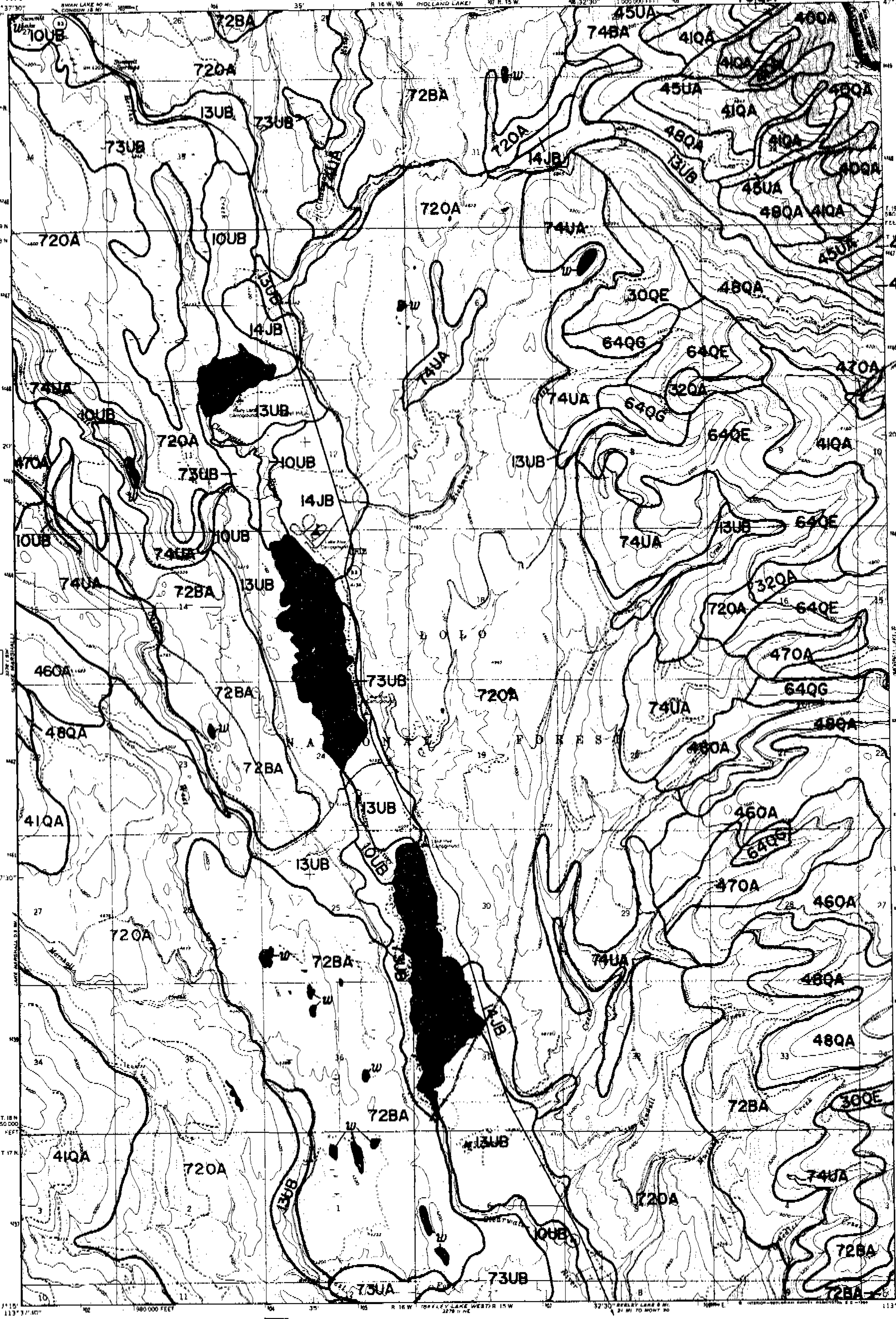
SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

LAKE INEZ QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U. S. Dept. of Agriculture, Forest Service

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST EAST

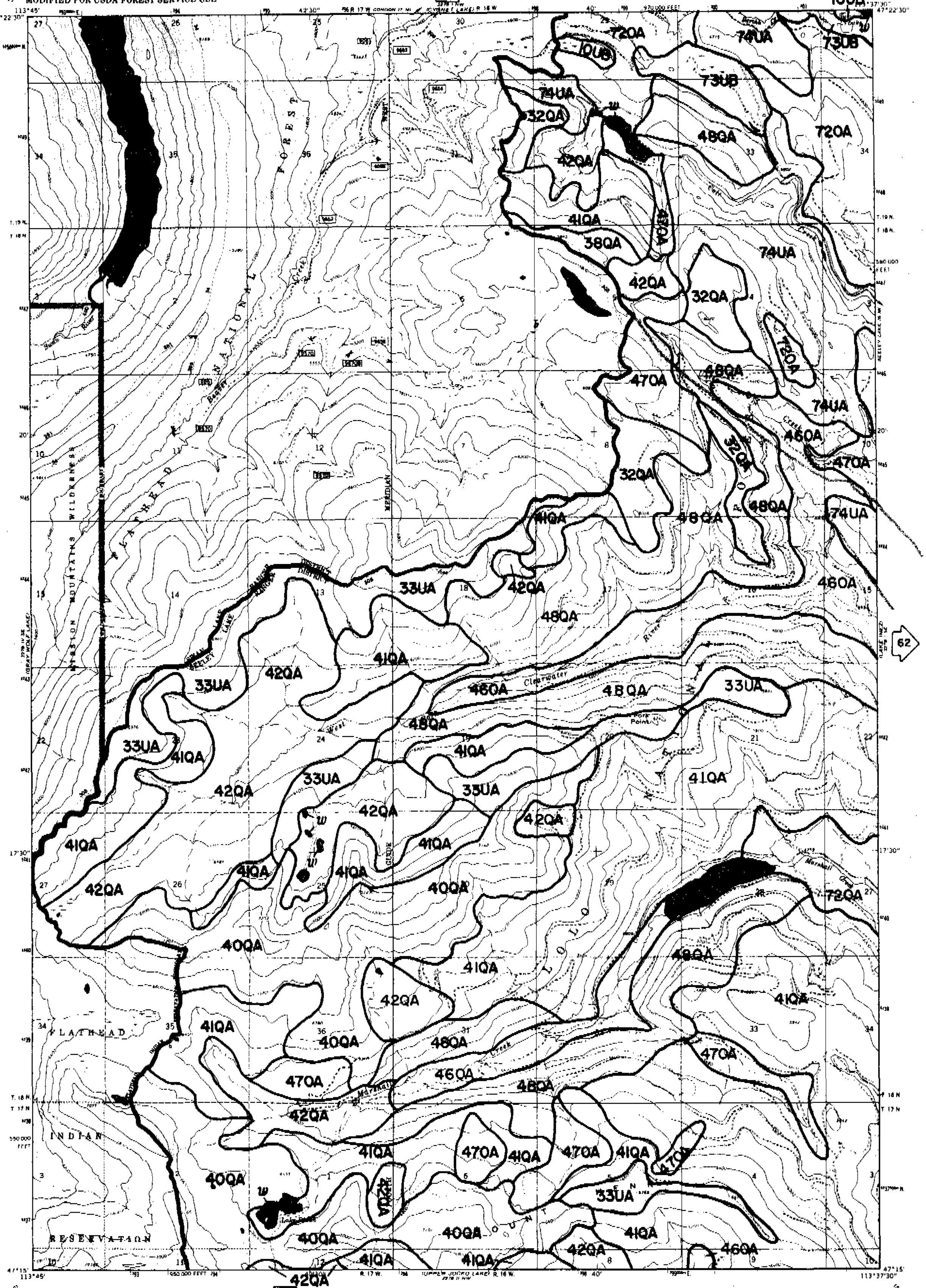
62

LAKE INEZ, MONT.
N4715—W11330/7.5
1965

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

LAKE MARSHALL QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1985 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Road, Paved
Improved Road, Gravel
Improved Road, Dirt
Unimproved Road, Dirt
Trail
Locked Gate

Interstate
U.S. Highway
State Highway
County Road
Primary Forest Route
Forest Road
Forest Trail

63

LAKE MARSHALL, MONT.
N4715—W11337.5/7.5
1985
DMA 3378 I SW—SERIES V894

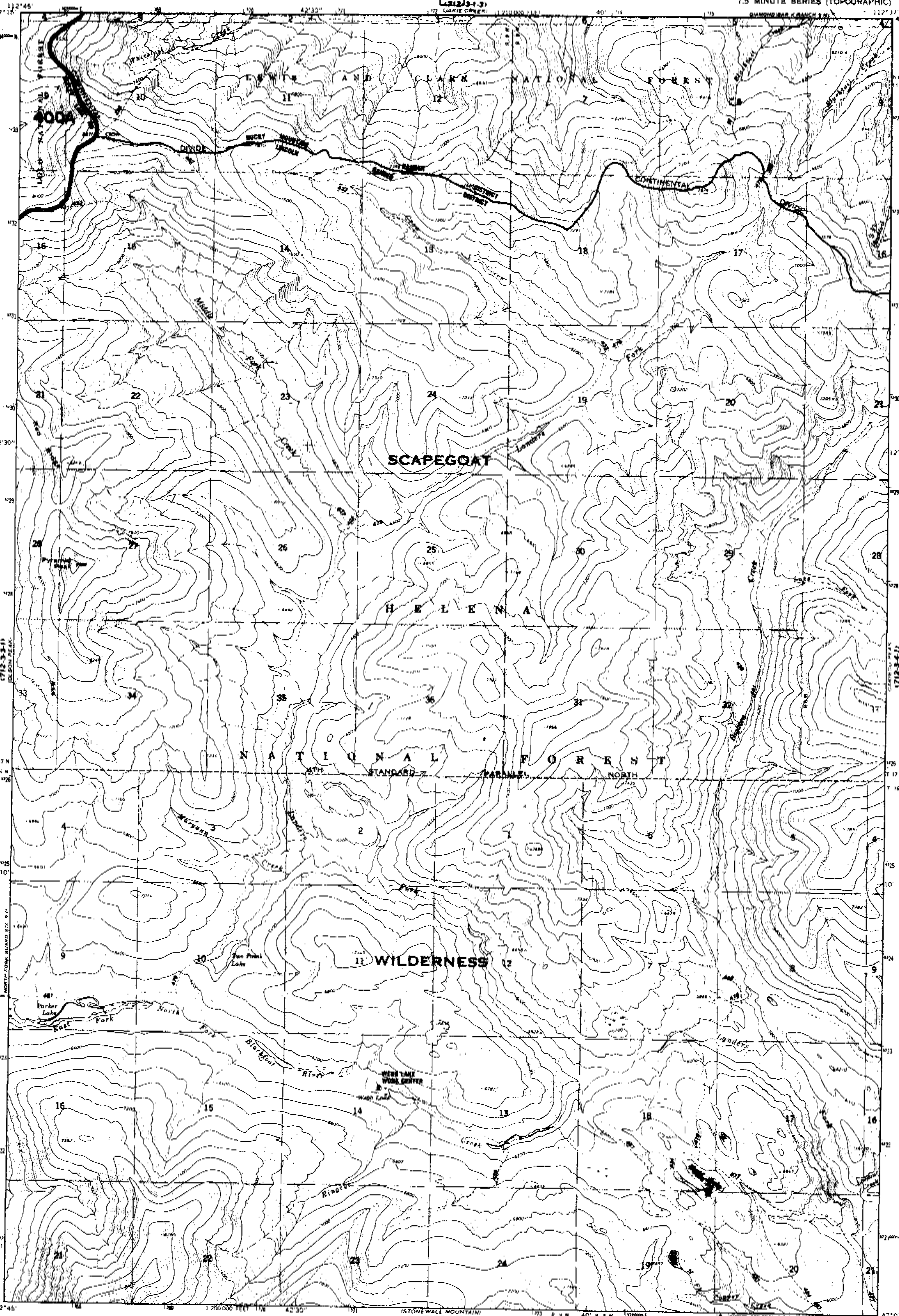
FLATHEAD NATIONAL FOREST

713-3-1-3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

HEART LAKE QUADRANGLE
MONTANA – LEWIS AND CLARK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

UTM GRID AND 1979 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier
Locked Gate

U.S. Highway
State Highway
County Road
Forest Road
Forest Trail

HELENA NATIONAL FOREST

(ARRASTRA MOUNTAIN) (712-3-3-4)

(SILVER KING MOUNTAIN) (712-3-4-4)

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

64

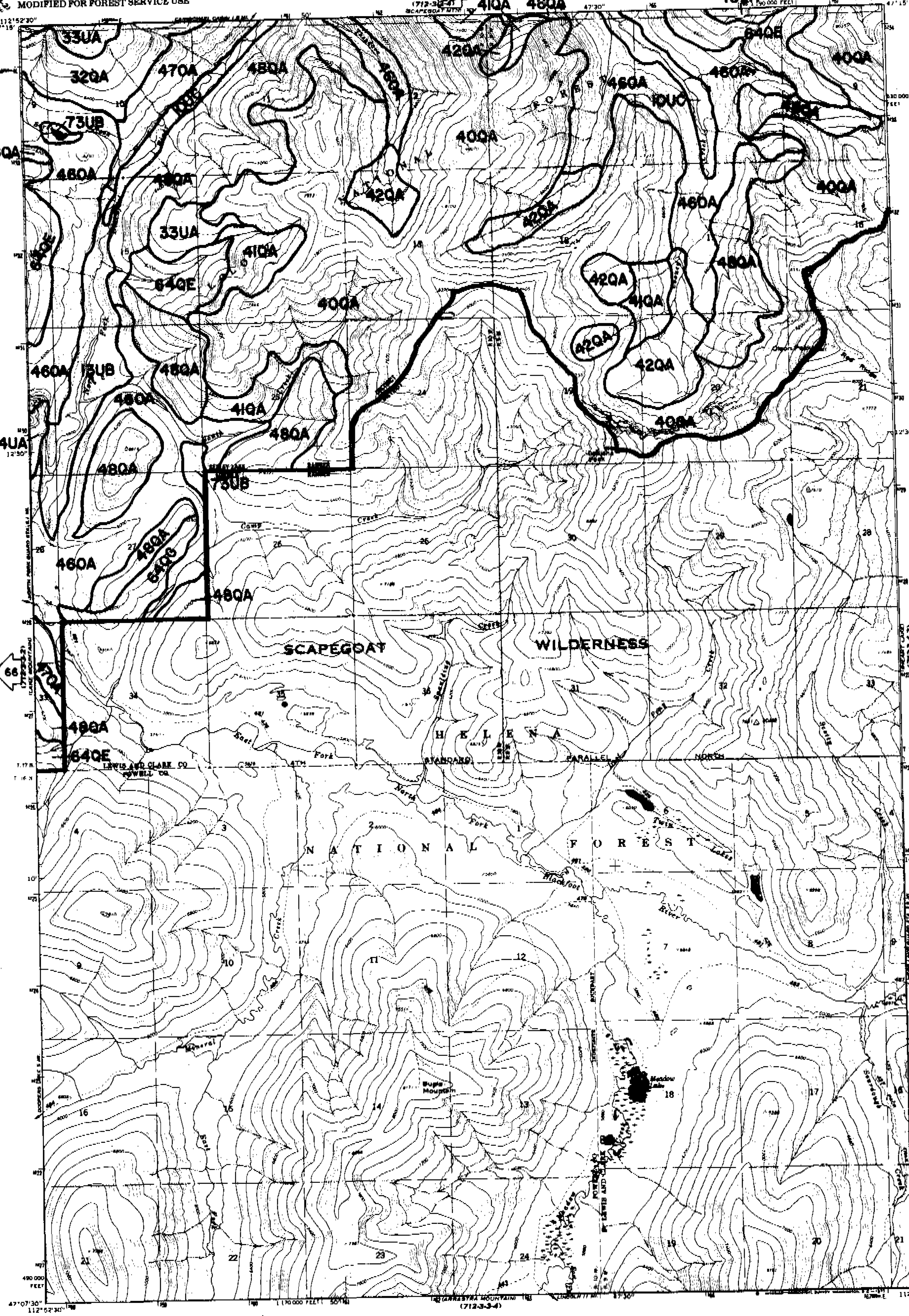
HEART LAKE, MONT.
N4707.5—W11237.5/7.5
1968
712-3-4-2

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

OLSON PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



SOILS MAPPING LEGEND

—— Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND
National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier
Locked Gate
U.S. Highway
State Highway
County Road
Forest Road
Forest Trail

HELENA NATIONAL FOREST

65

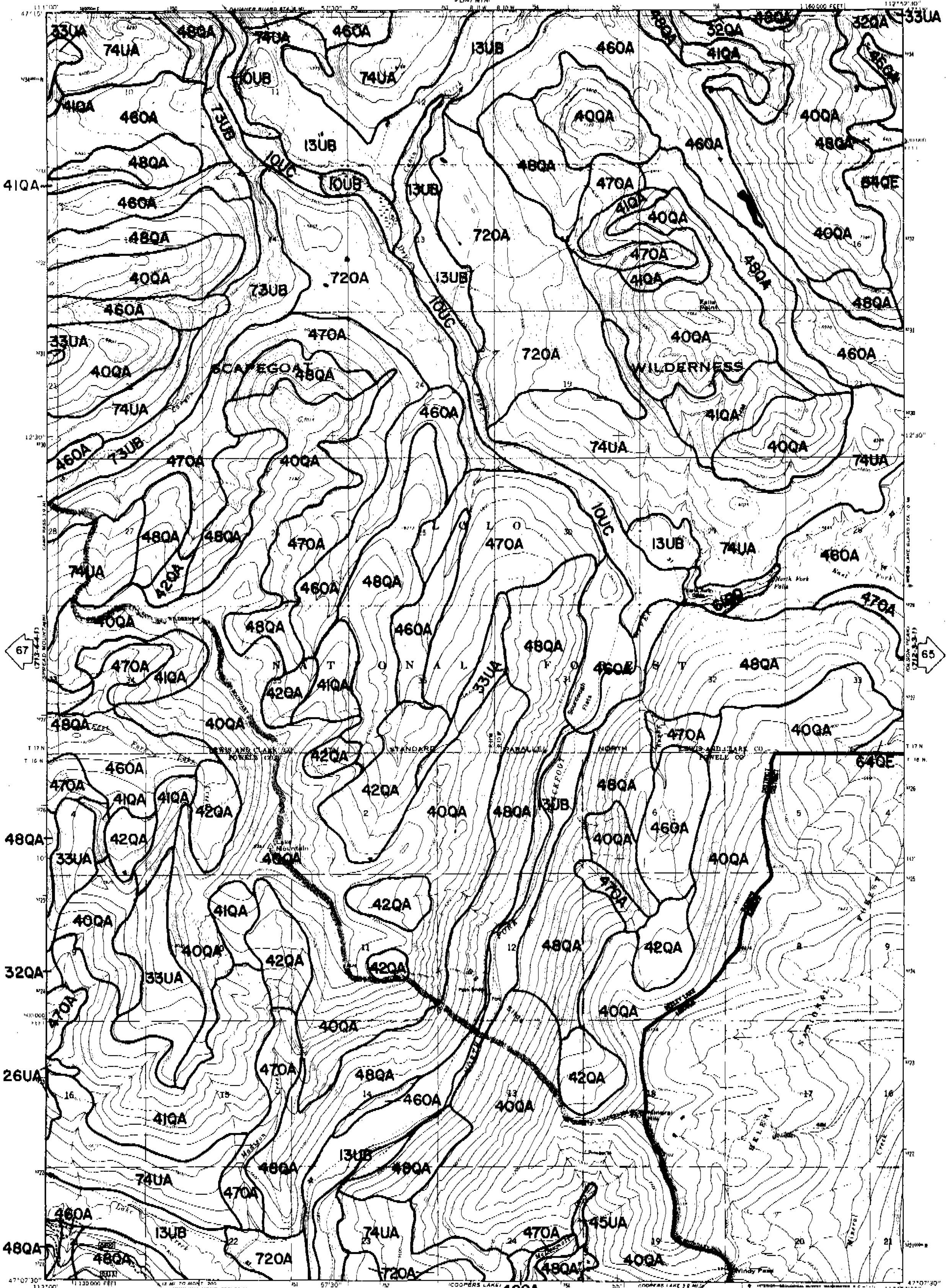
OLSON PEAK, MONT.
N4707.5—W11245/7.5
1968

712-3-3-1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

LAKE MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

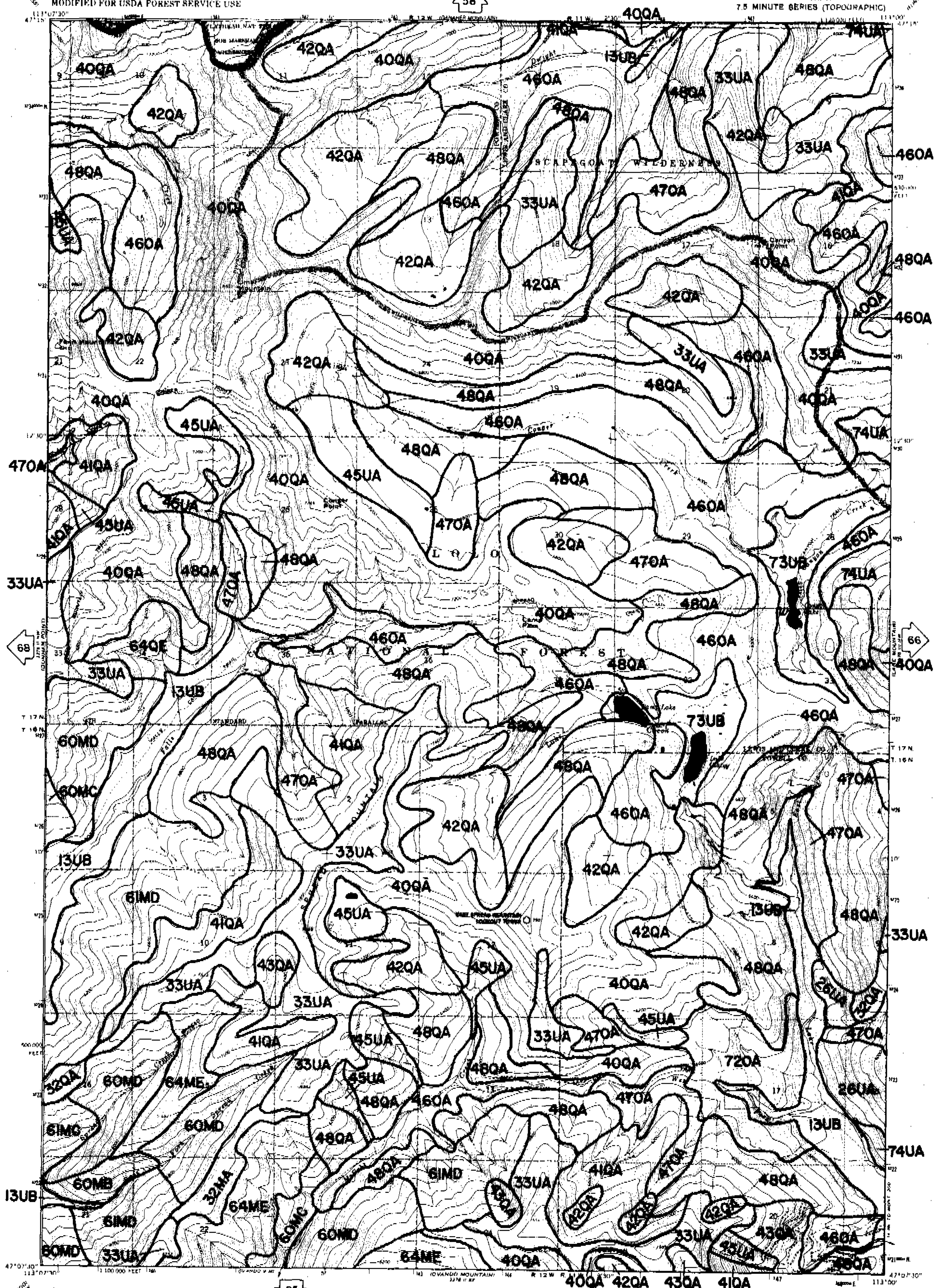
66

LAKE MOUNTAIN, MONT.
N4707.5—W11252.5/7.5
1968
712-3-3-2

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SPREAD MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
EAST

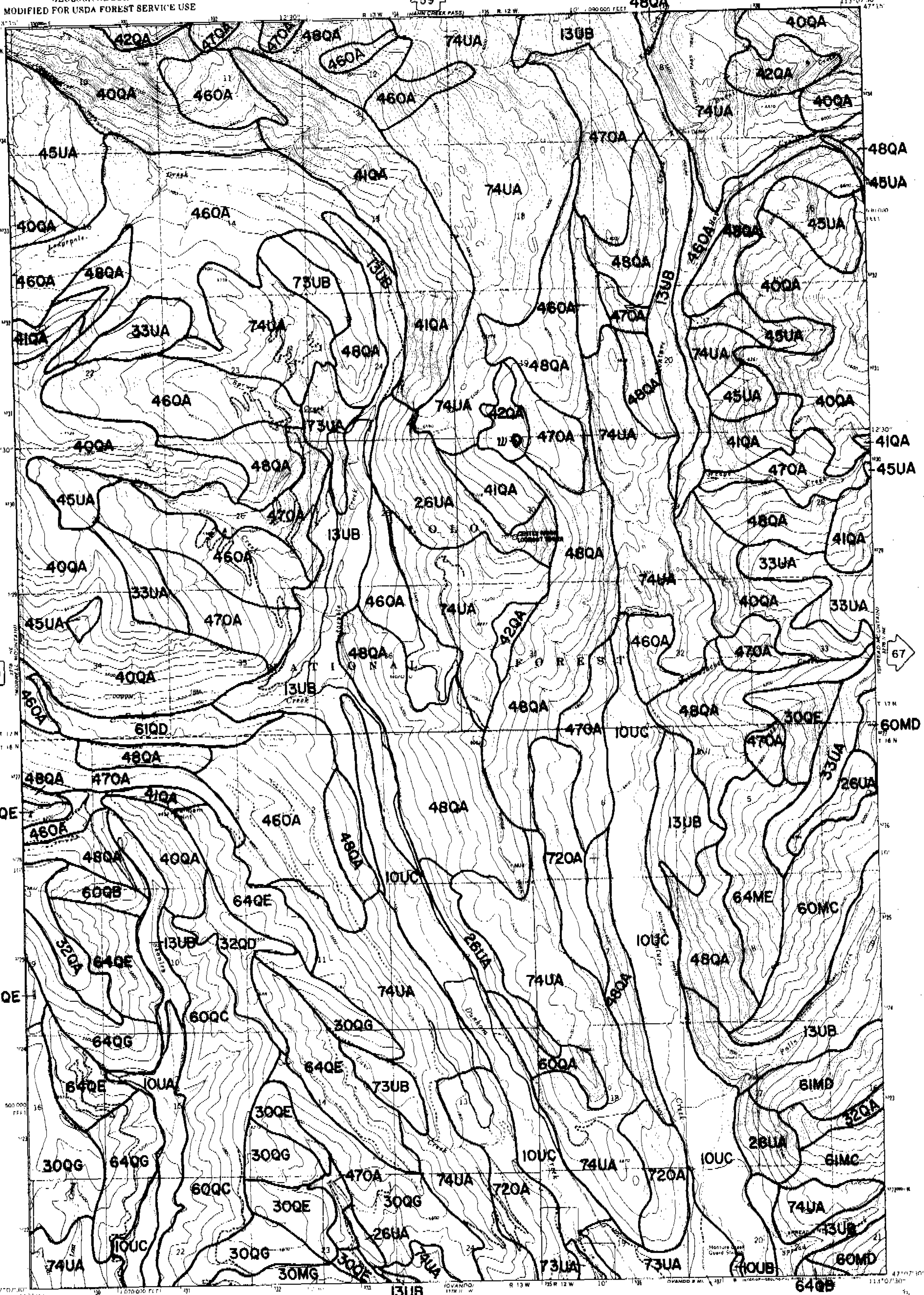
67

SPREAD MOUNTAIN, MONT.
N4707.5—W11300/7.5
1968

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

DUNHAM POINT QUADRANGLE
MONTANA – POWELL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1962 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

DUNHAM POINT, MONT.

LOLO NATIONAL FOREST EAST

SOILS MAPPING LEGEND

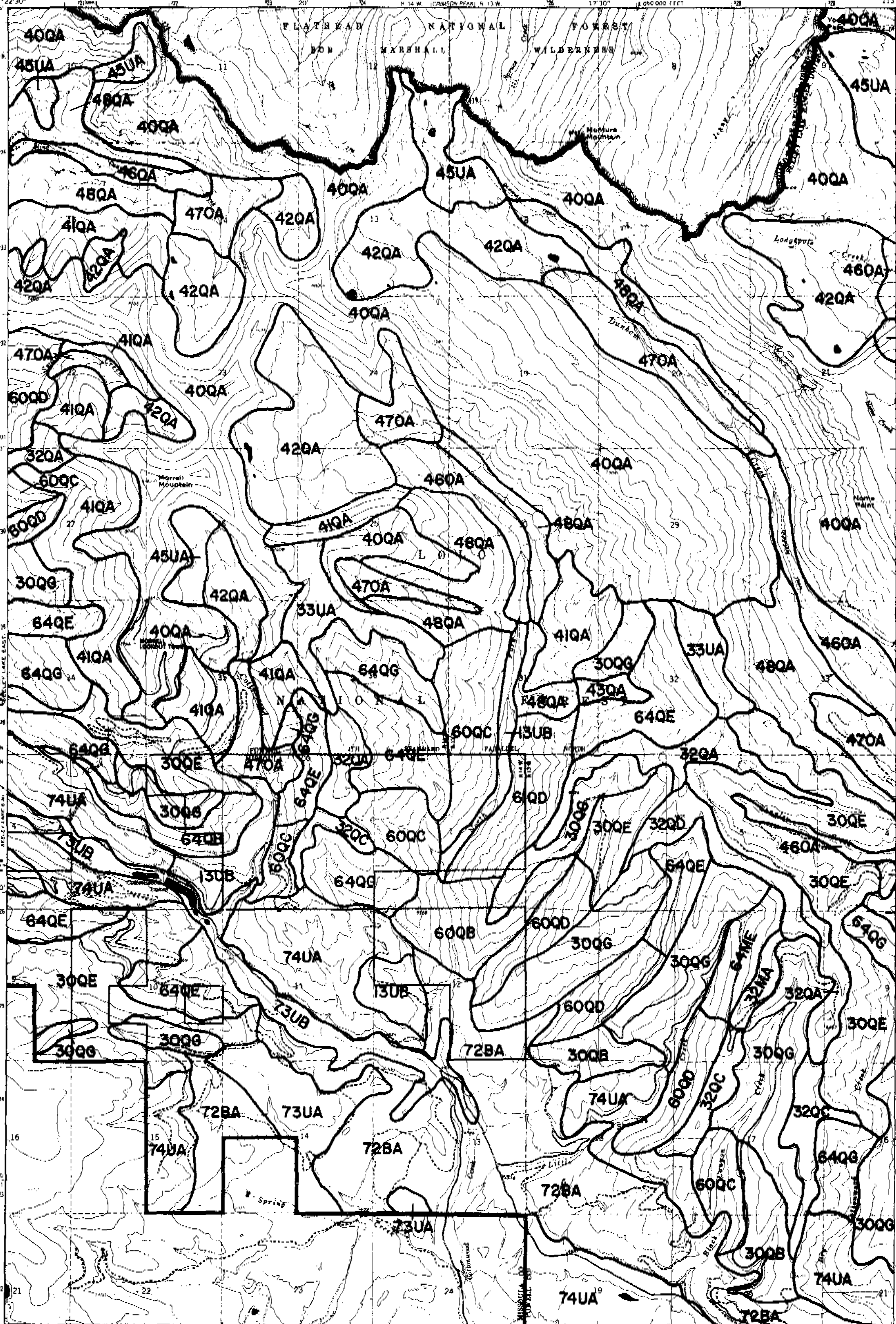
Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

MORRELL MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



S MAPPING LEGEND

——	Map Unit Boundary
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

69

MORRELL MOUNTAIN, MONT.
N4707.5—W11315/7.5
1965

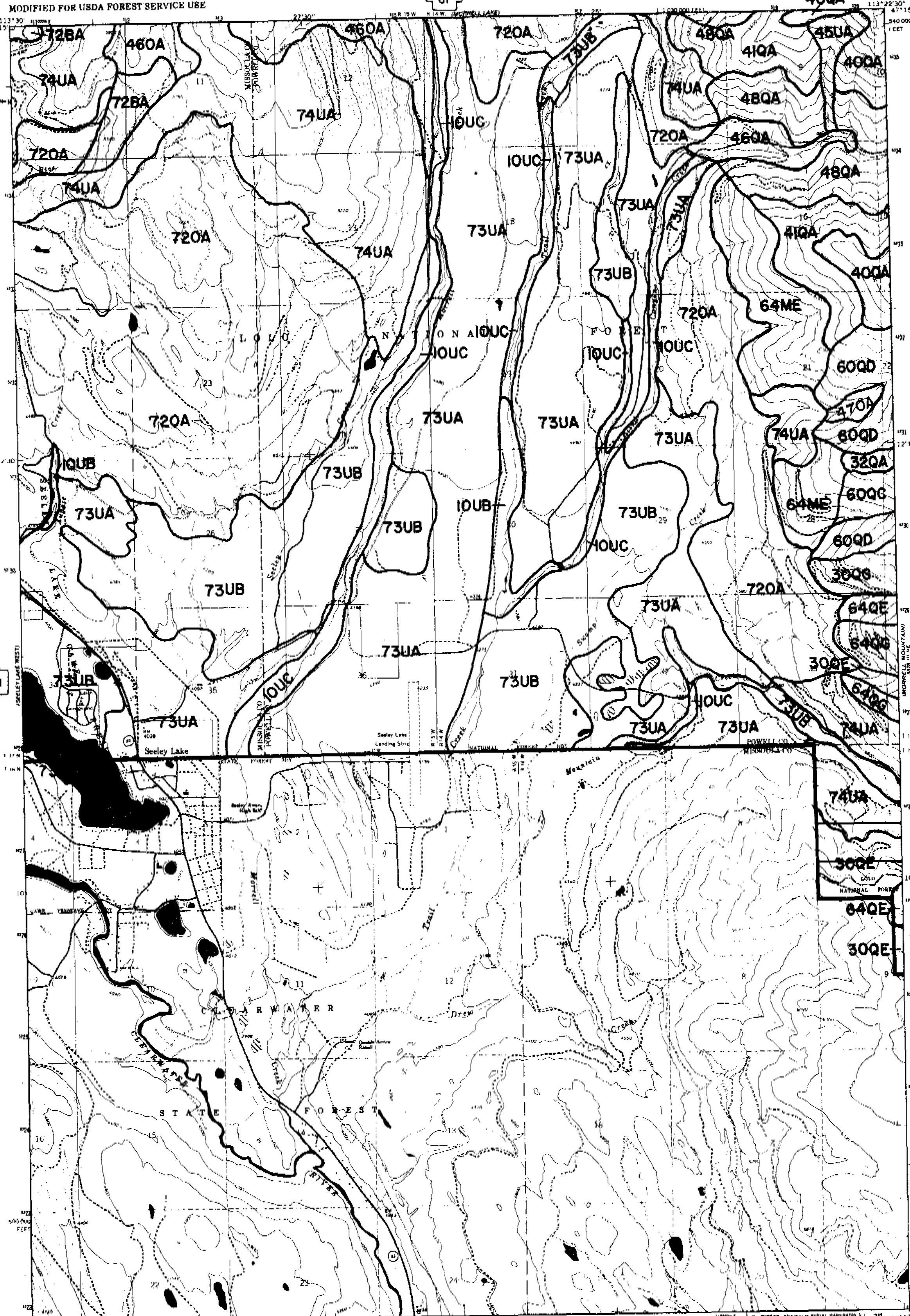
LOLO NATIONAL FOREST
EAST

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SEELEY LAKE EAST QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST EAST

70

SEELEY LAKE EAST, MONT.
N4707.5—W11322.5/7.5
1965

SOILS MAPPING LEGEND

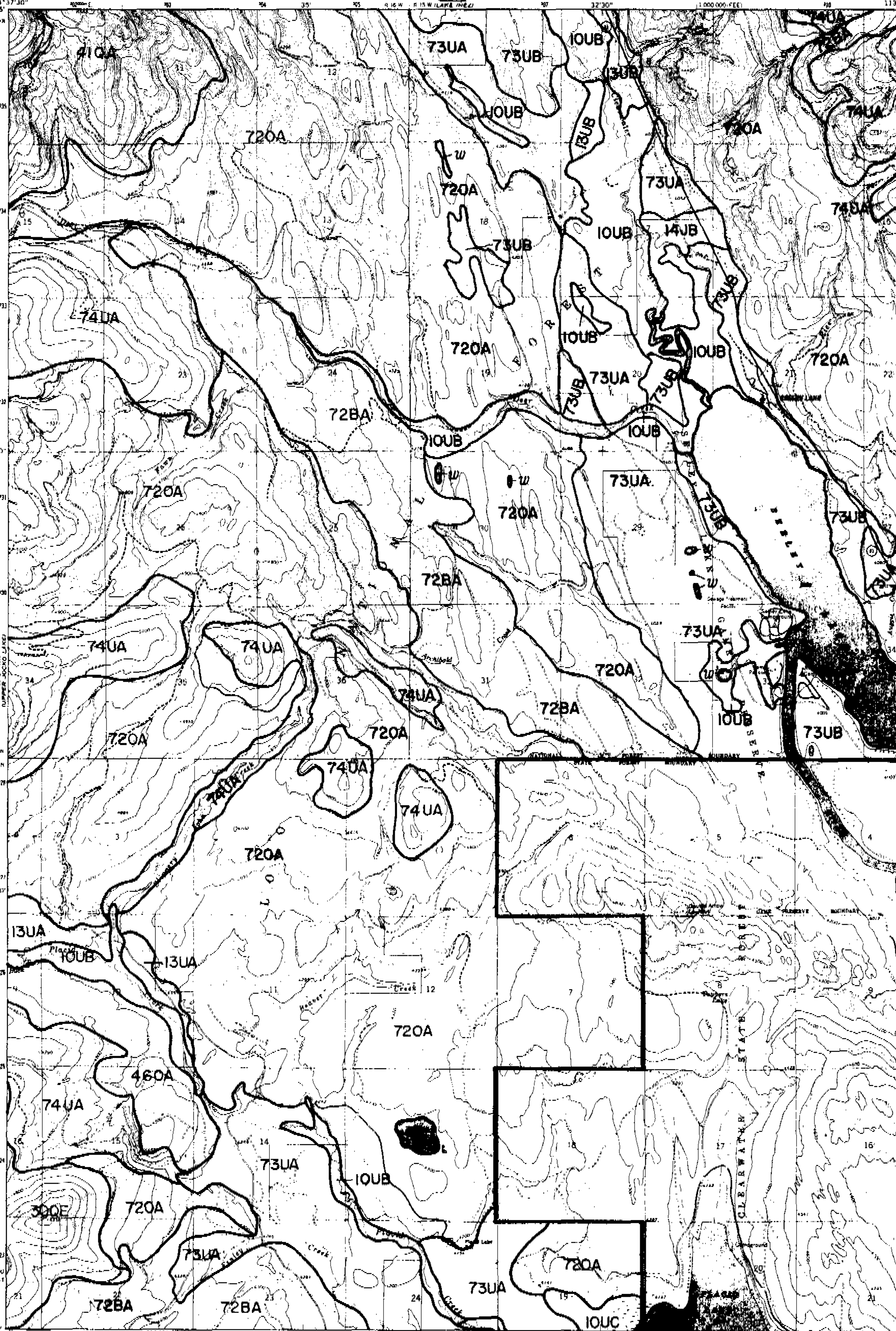
- Map Unit Boundary
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

SEELEY LAKE WEST QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

SEELEY LAKE WEST, MONT.
N4707.5—W11330/7.5
1965

LOLO NATIONAL FOREST
EAST

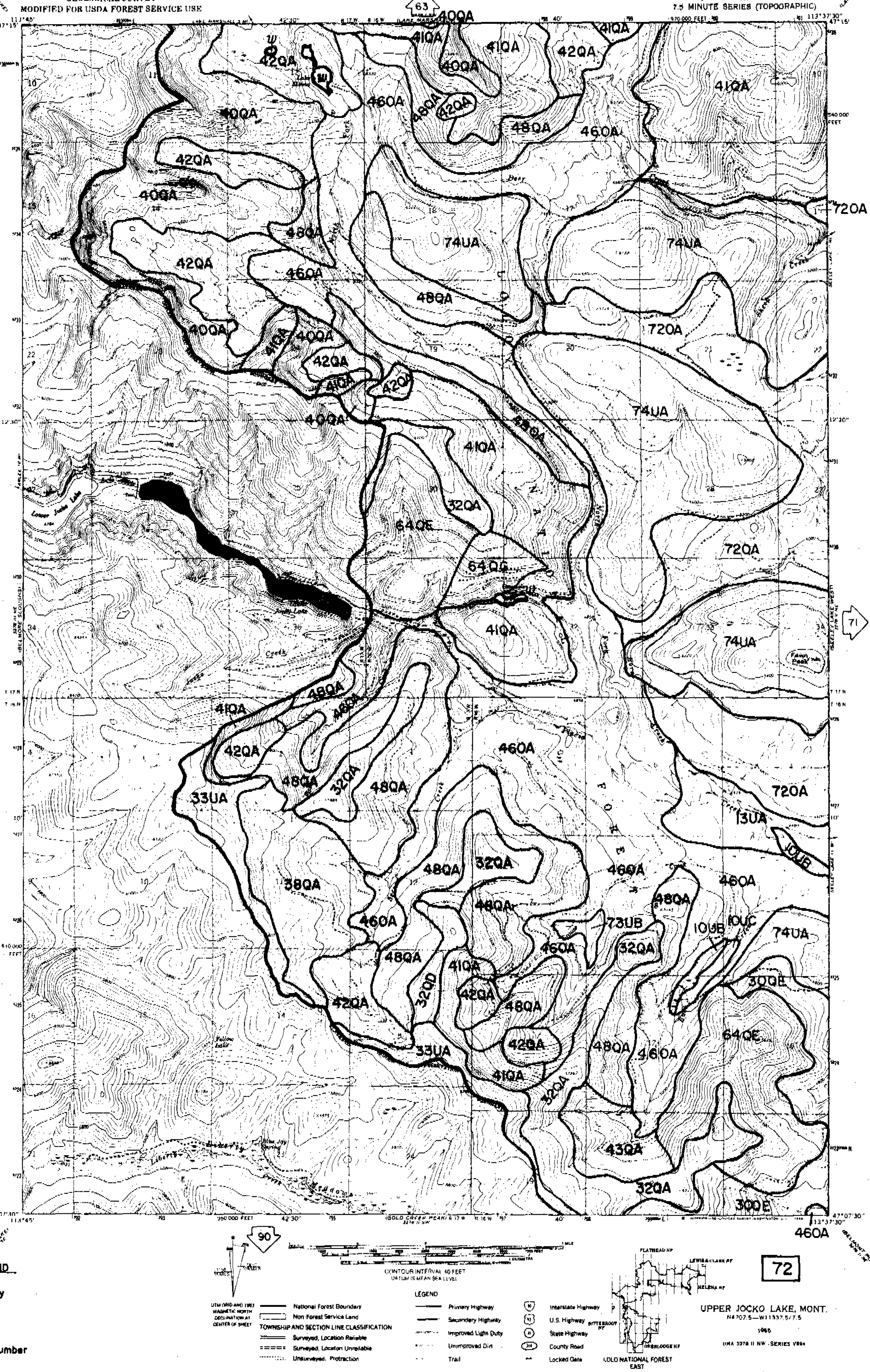
SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

UPPER JOCKO LAKE QUADRANGLE
MONTANA – MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

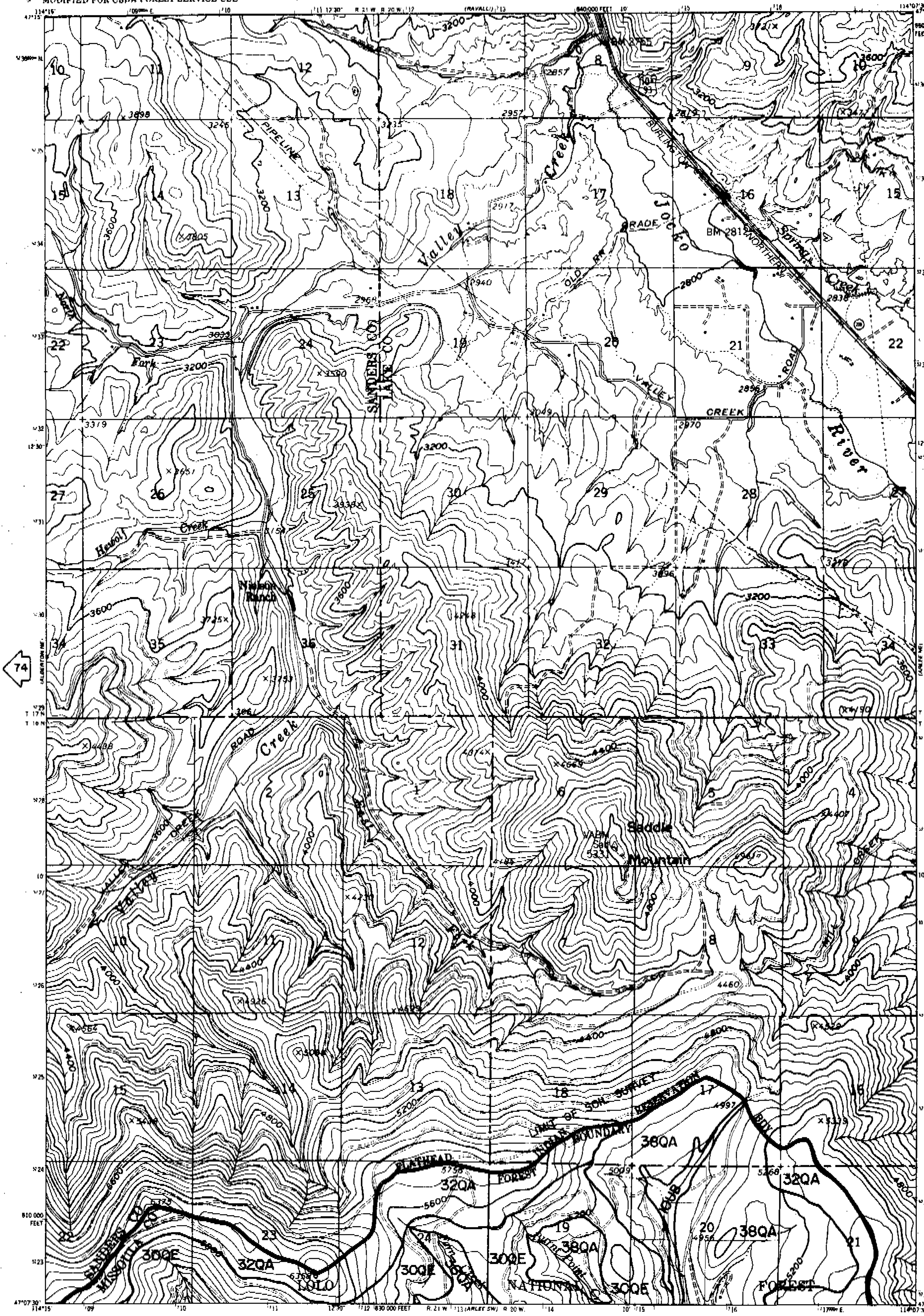
- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ARLEE NW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

73

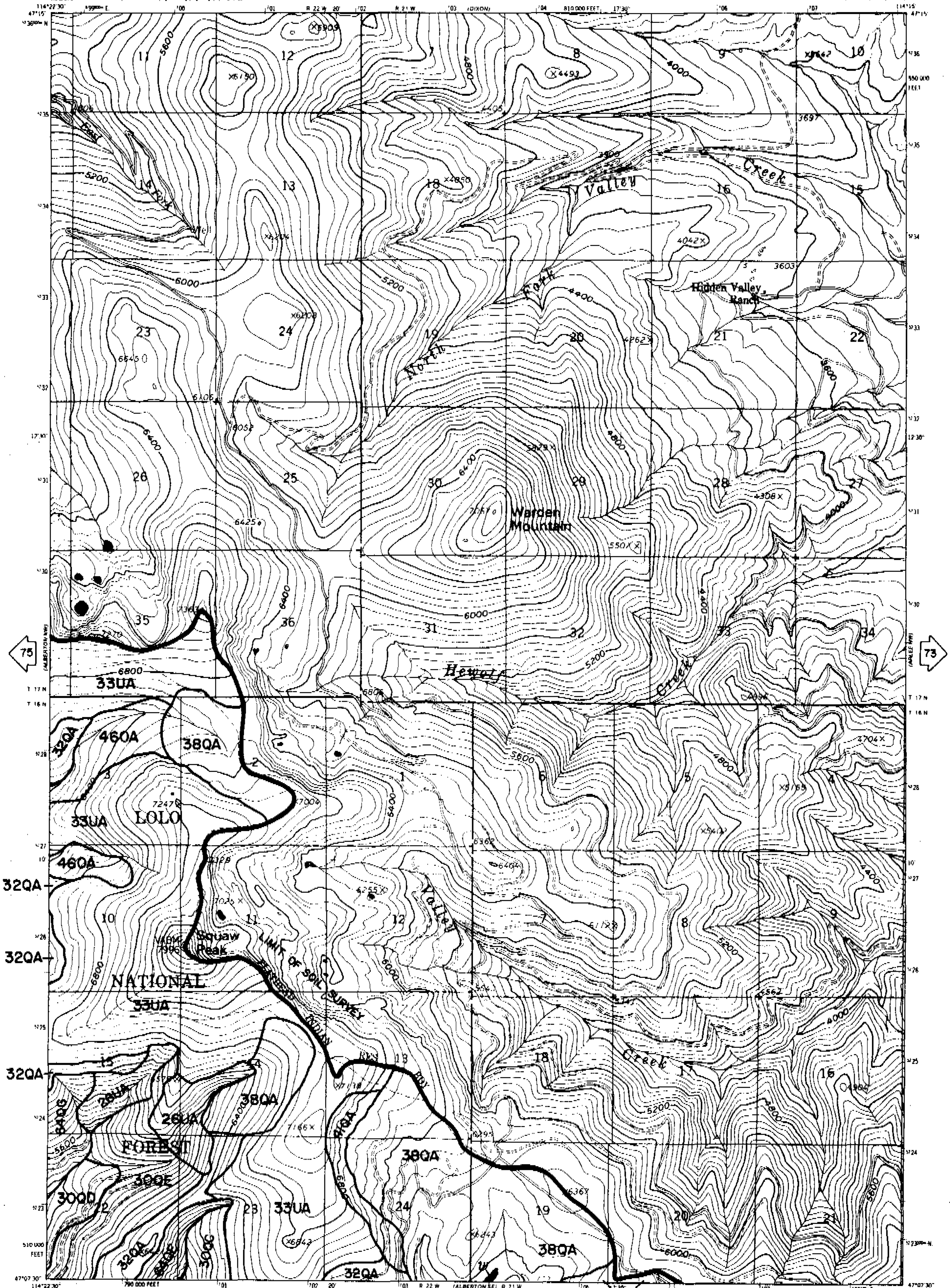
ARLEE NW, MONTANA
N4707.5-W1147.5/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ALBERTON NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary	Primary Highway
Non-Forest Service Land	Secondary Highway
TOWNSHIP AND SECTION LINE CLASSIFICATION	Improved Light Duty
Surveyed, Location Reliable	Unimproved Dirt
Surveyed, Location Unreliable	Trail
Unsurveyed, Protraction	

Interstate Highway · U.S. Highway · State Highway · County Road · Locked Gate

LOLO NATIONAL FOREST CENTRAL

74

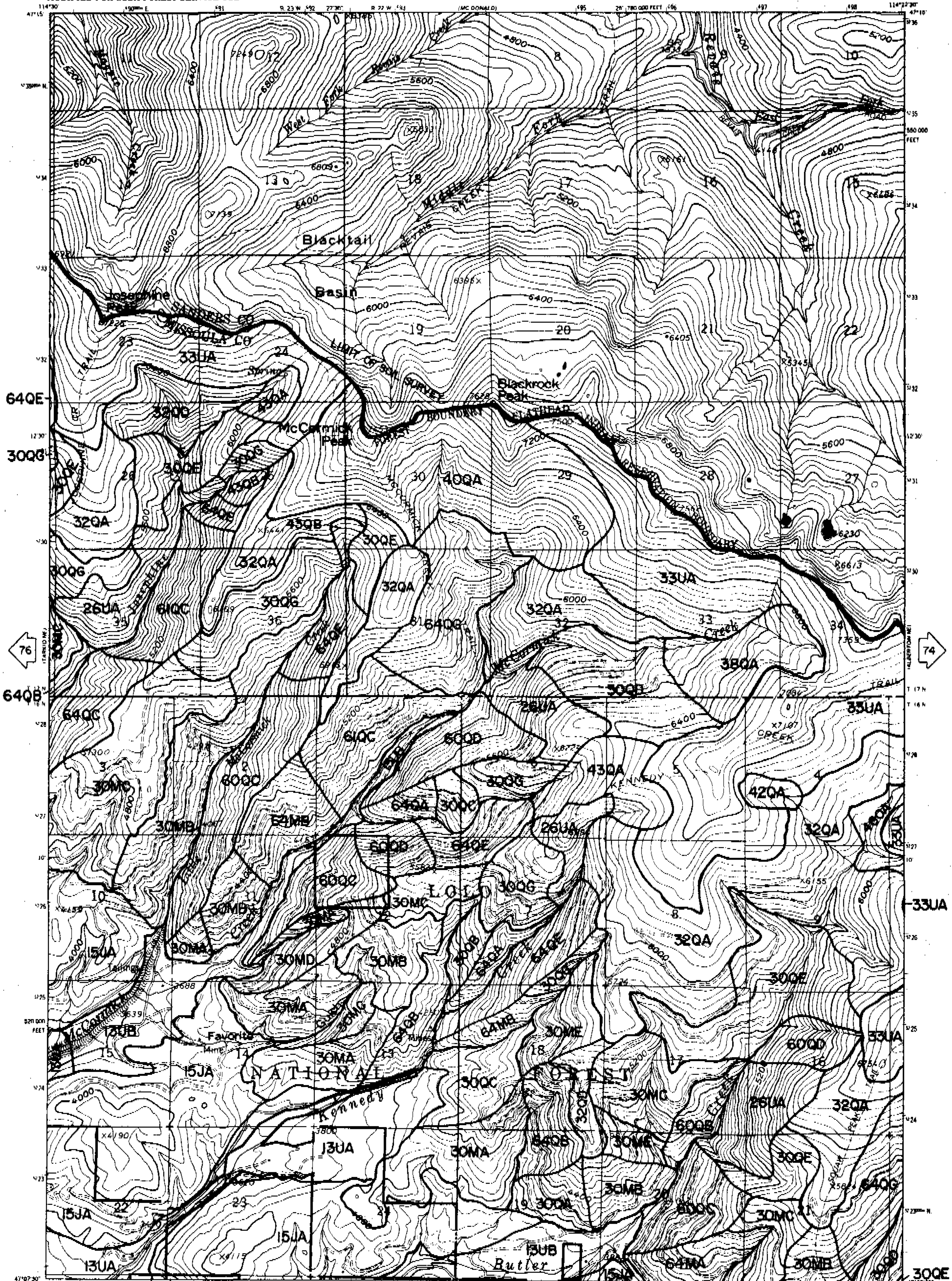
ALBERTON NE, MONTANA
N4705.5-W11415/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ALBERTON NW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Service Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

LEGEND
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

75

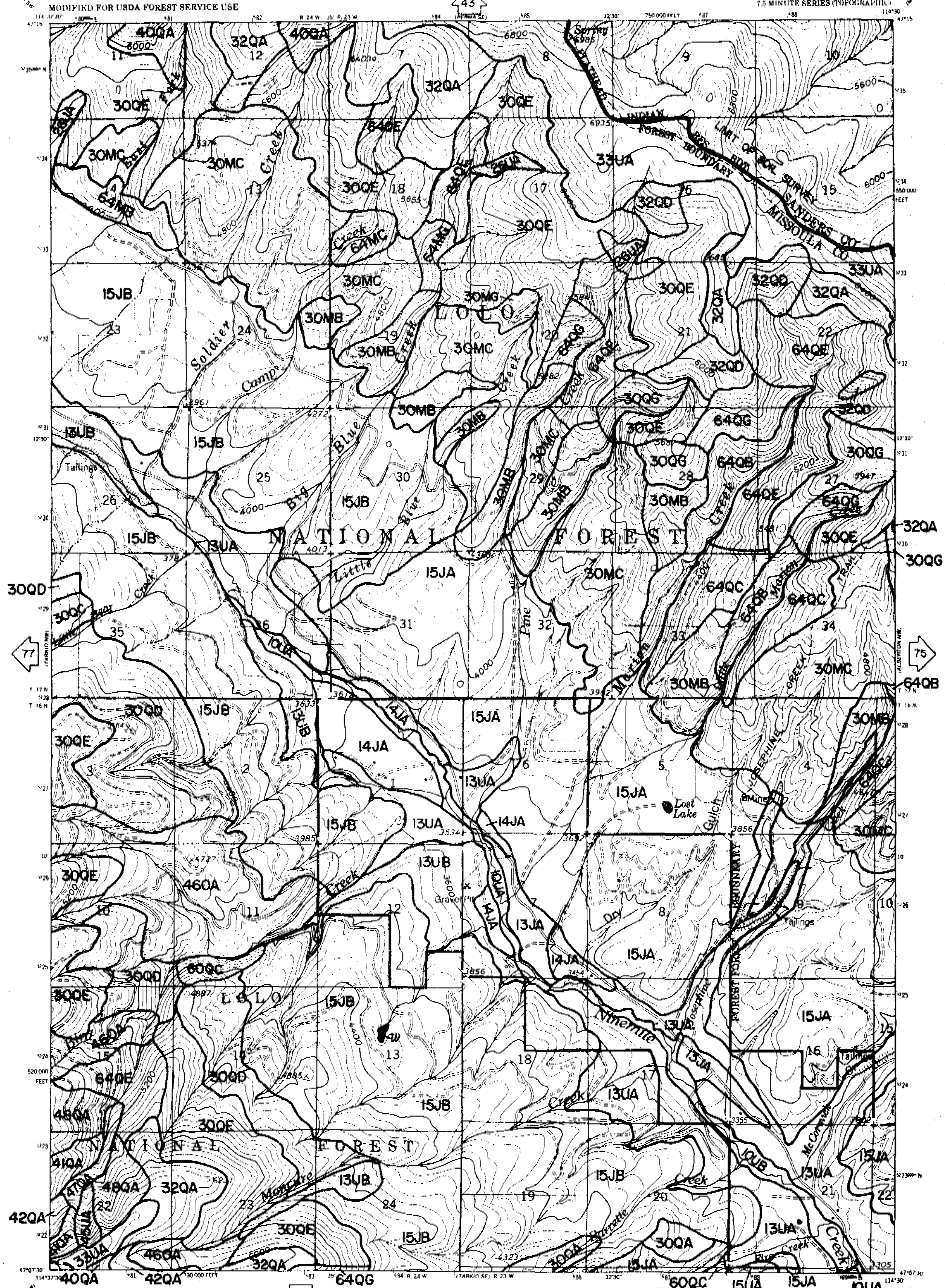
ALBERTON NW, MONTANA
N4707.5-W11422.5/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

TARKIO NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

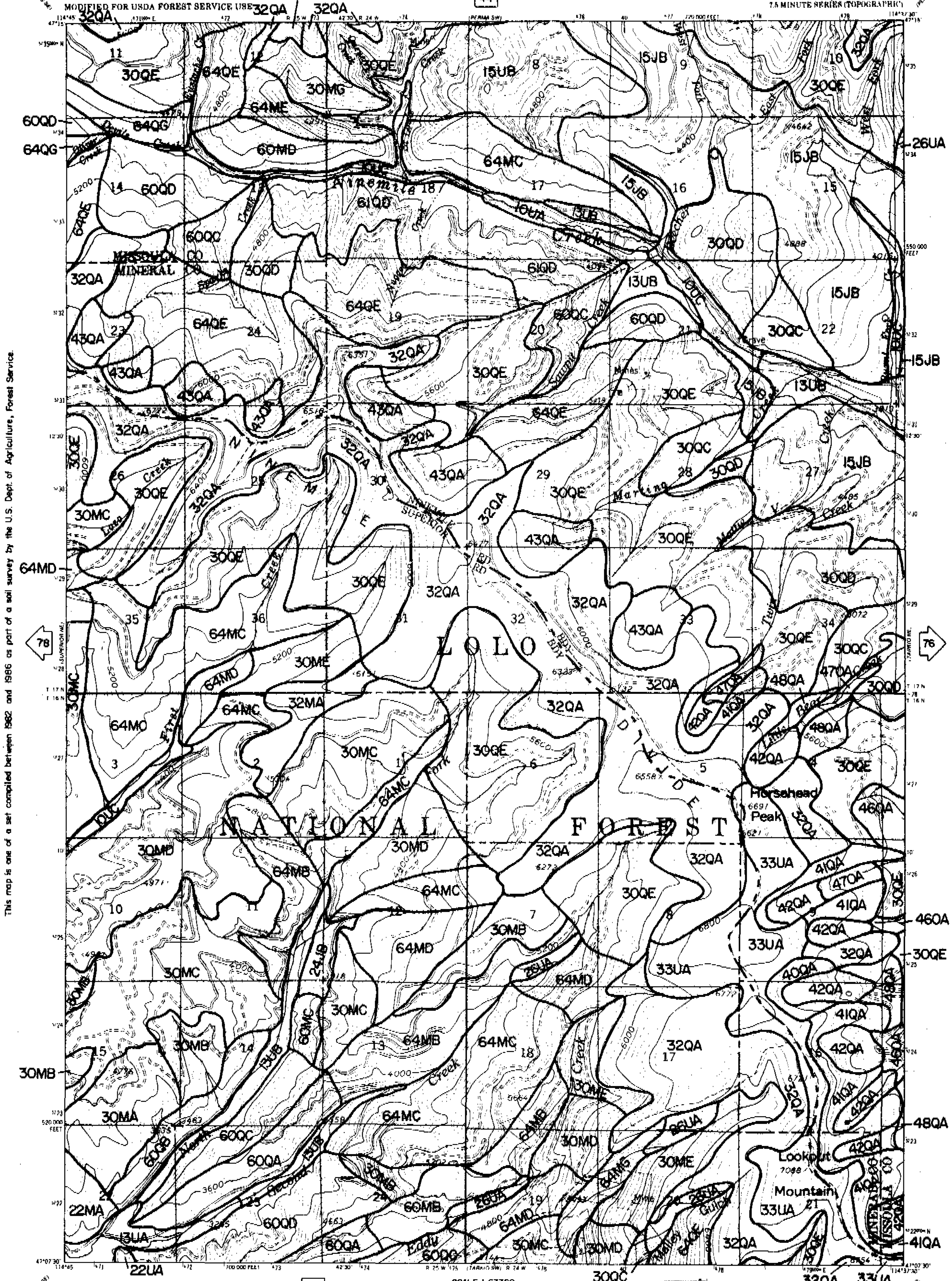
LOLO NATIONAL FOREST
CENTRAL

TARKIO NE, MONT.
N4707.5-W11430/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

TARKIO NW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

77

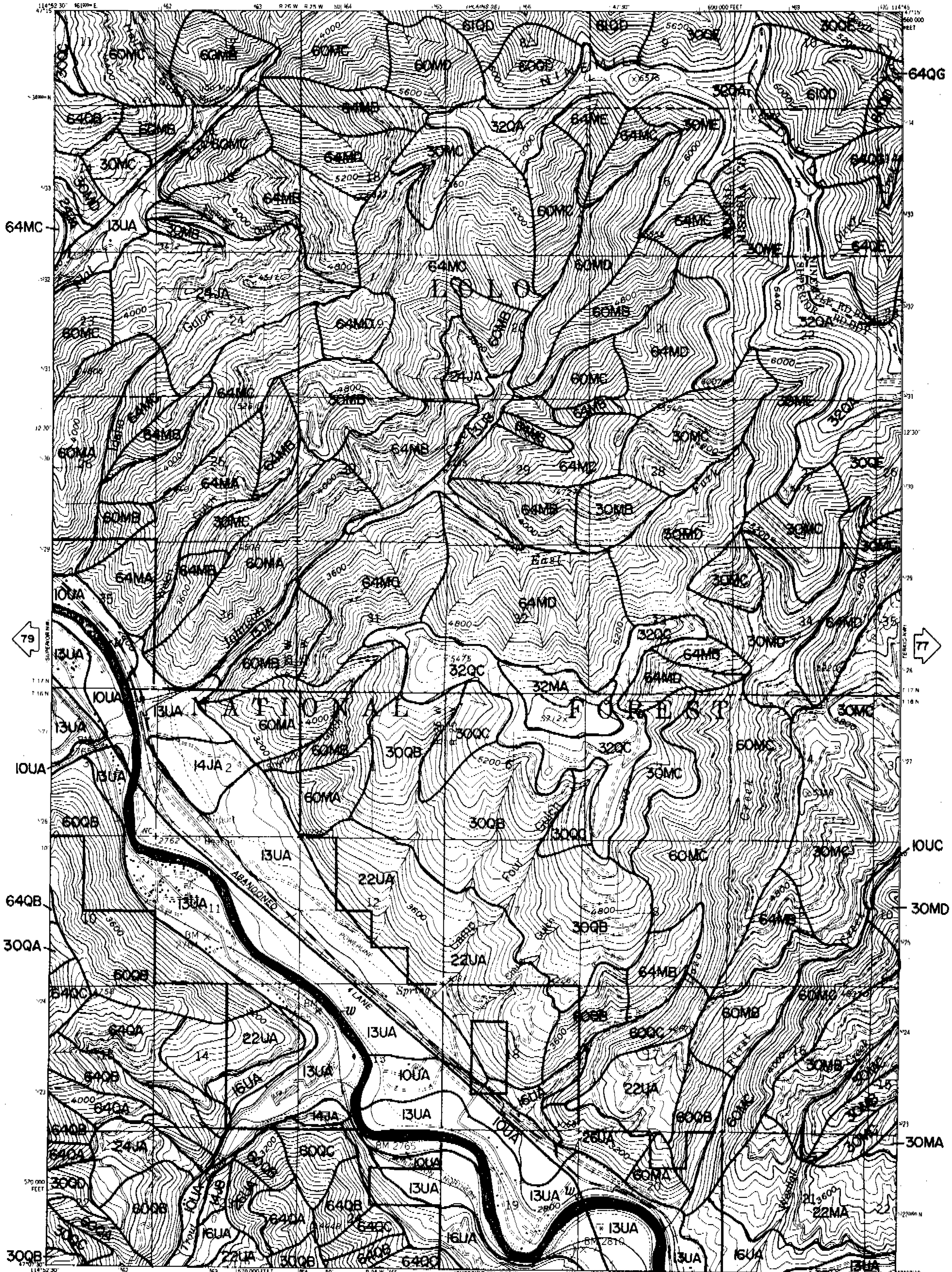
TARKIO NW, MONT.
N4707.5-W11437.5/7.5
1959

LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SUPERIOR NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

78

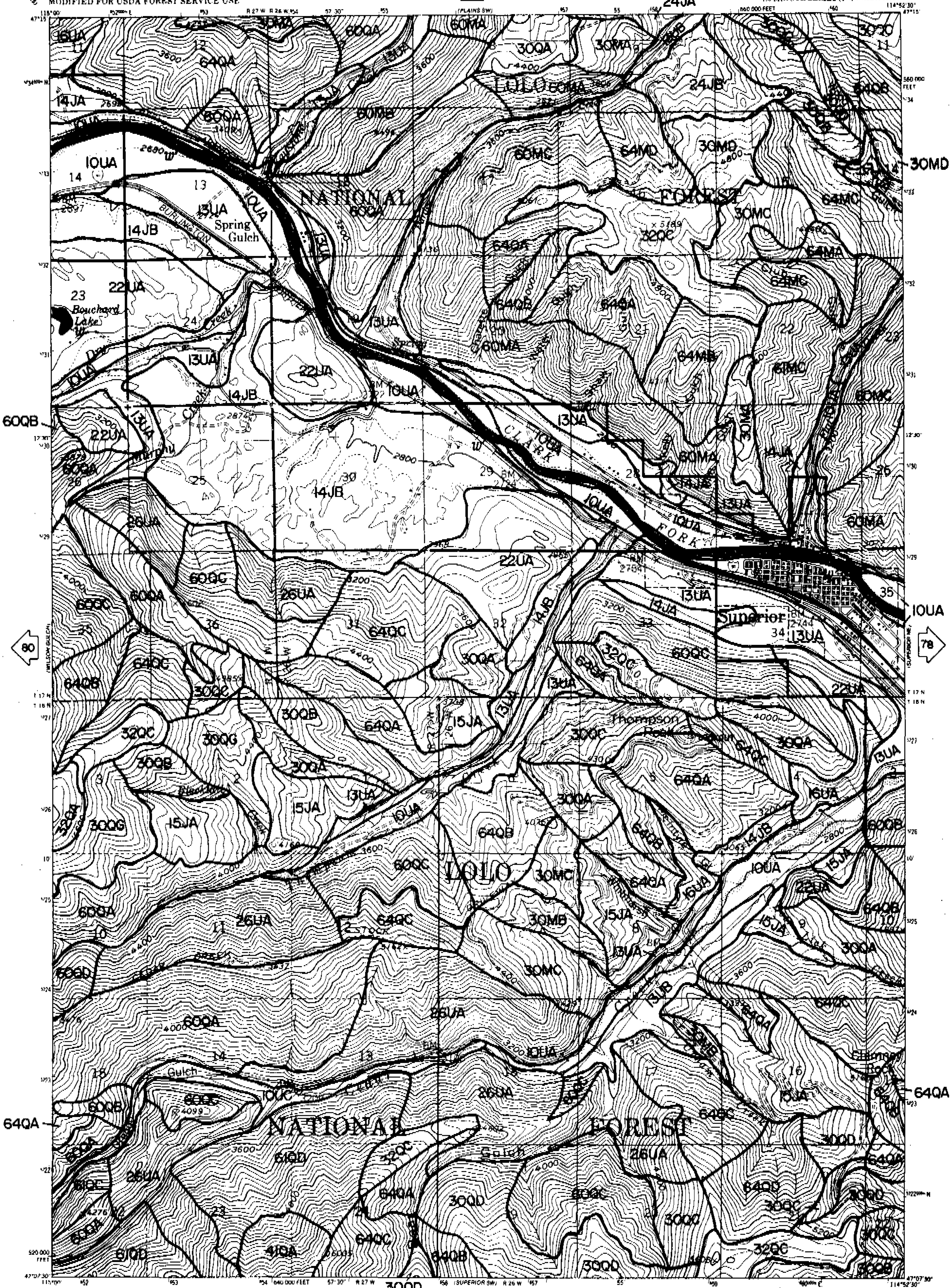
SUPERIOR NE, MONT.
N4707.5 W11445/7.5
1960

LOLO NATIONAL FOREST
CENTRAL

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SUPERIOR NW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST CENTRAL

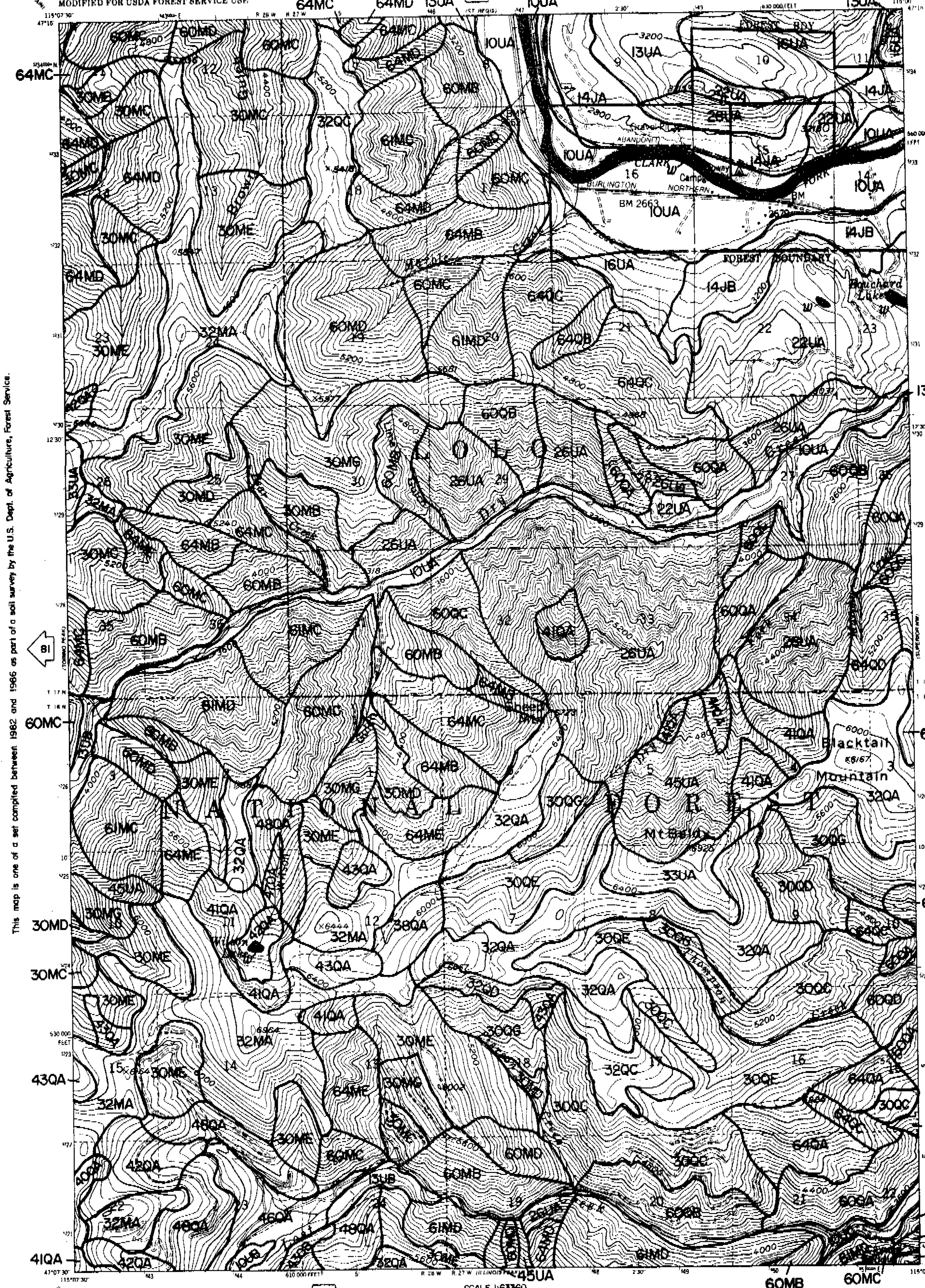
79

SUPERIOR NW MONT.
N4707.5-W11452.5/7.5
1960

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ILLINOIS PEAK N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
WEST

80

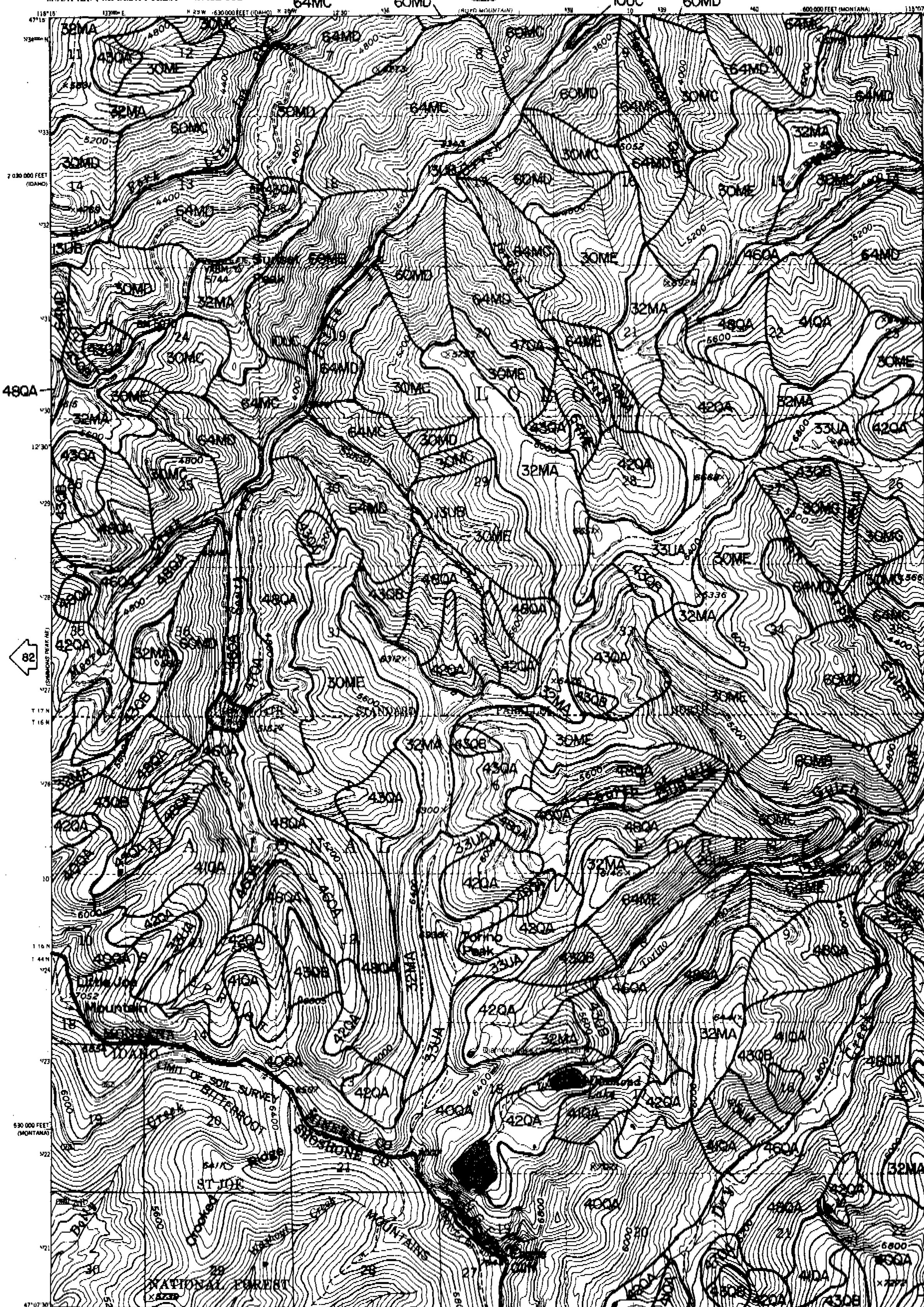
ILLINOIS PEAK N.E., MONT.
N4607.5-W11500/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ILLINOIS PEAK N.W. QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LOLO NATIONAL FOREST
WEST

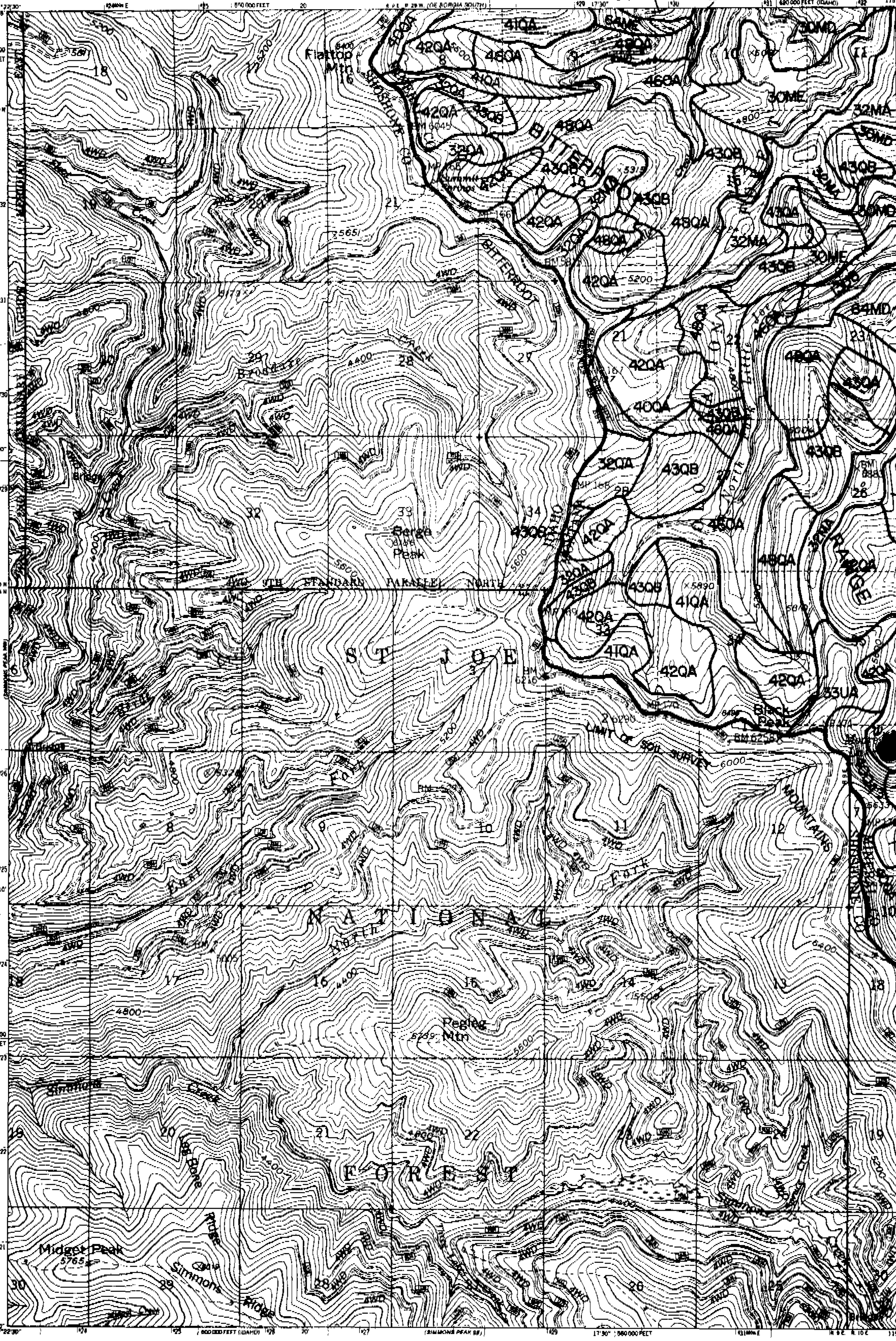
81

ILLINIOS PEAK N.W., MONT.
N4707.5 W11507.5/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SIMMONS PEAK NE QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

ST JOE NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

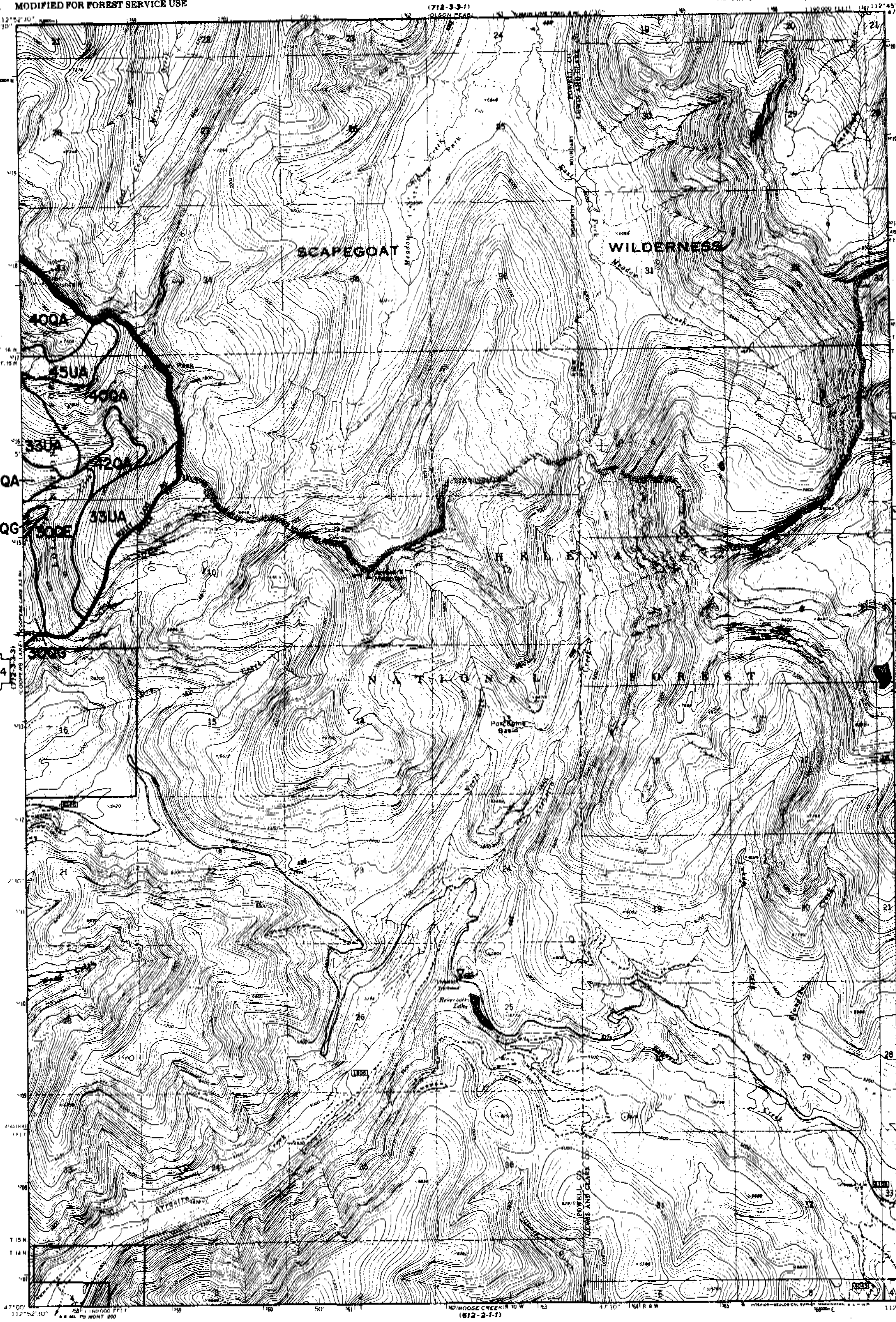
82

SIMMONS PEAK NE, IDA.-MONT.
N4707.5-W11515/7.5
1967
715-4-3-1

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

ARRASTRA MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

——	Map Unit Boundary
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

83

ARRASTRA MOUNTAIN, MONT.

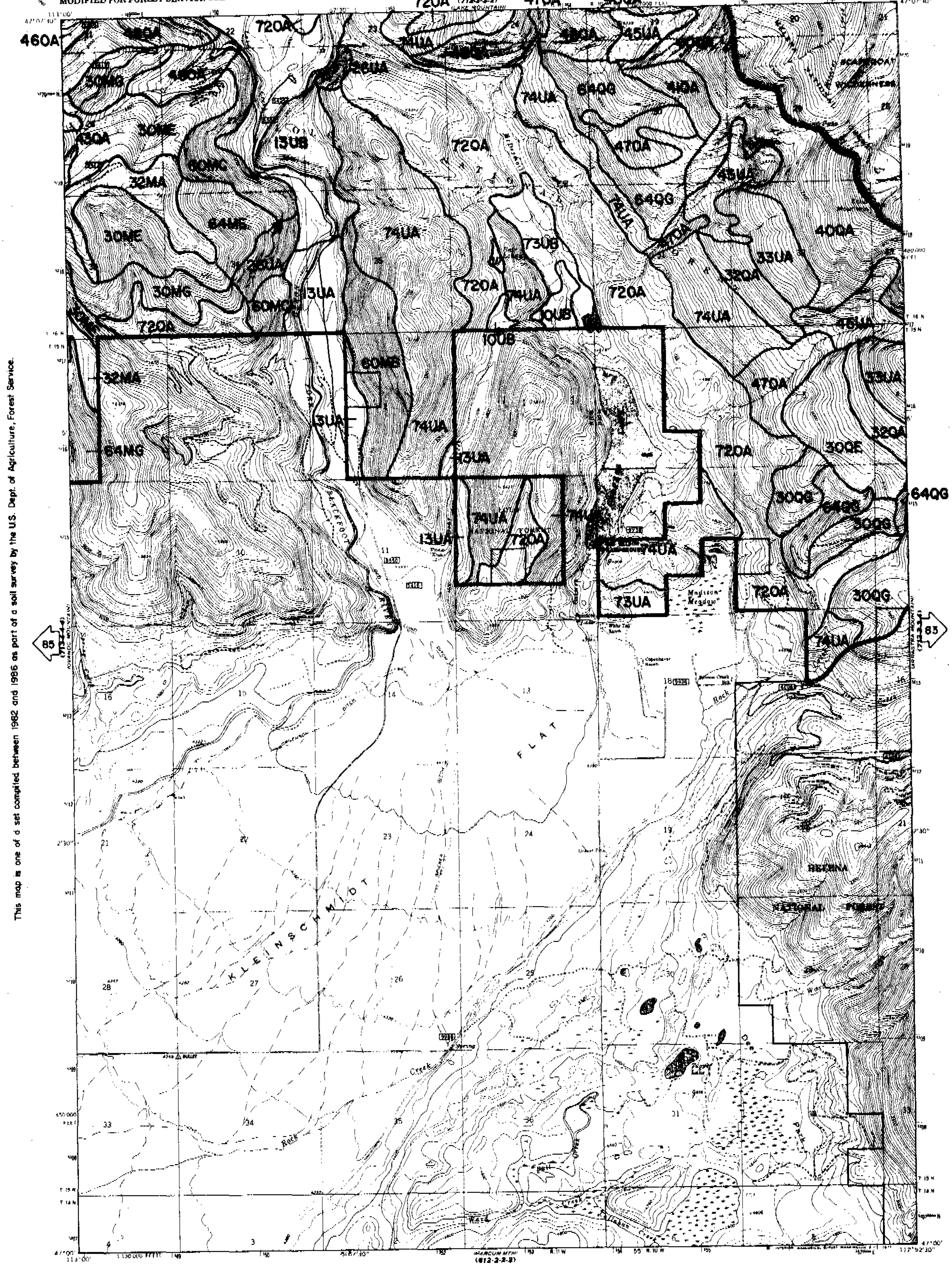
1968

712-3-3-4

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

COOPERS LAKE QUADRANGLE
MONTANA–POWELL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Light Duty
- Primitive
- Trail
- Barrier
- Locked Gate
- U.S. Highway
- State Highway
- County Road
- Forest Road
- Forest Trail

HELENA NATIONAL FOREST

84

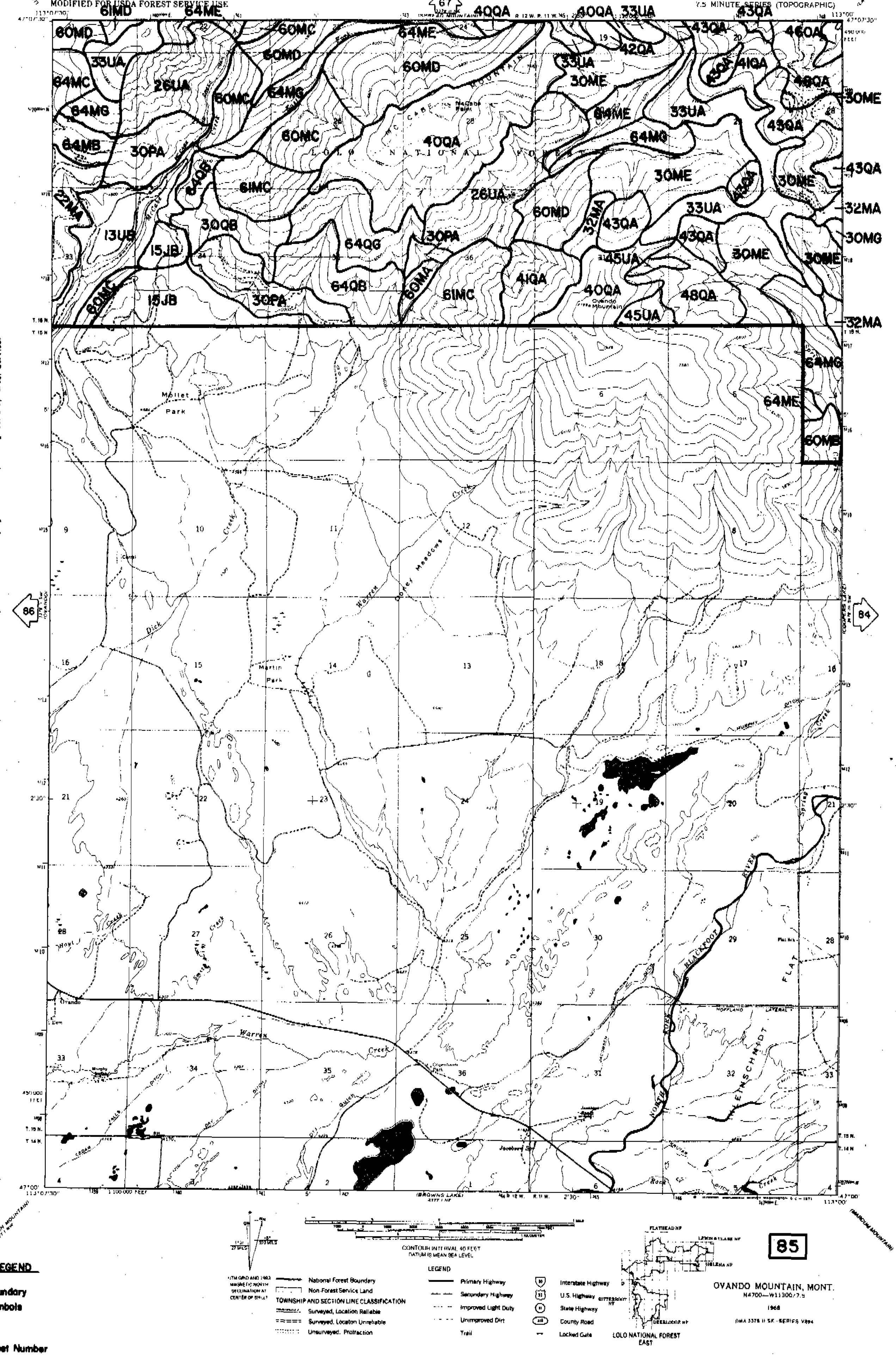
COOPERS LAKE, MONT.
N4700—W11252.5/7.5
1968

712-3-3-3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

OVANDO MOUNTAIN QUADRANGLE
MONTANA - POWELL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

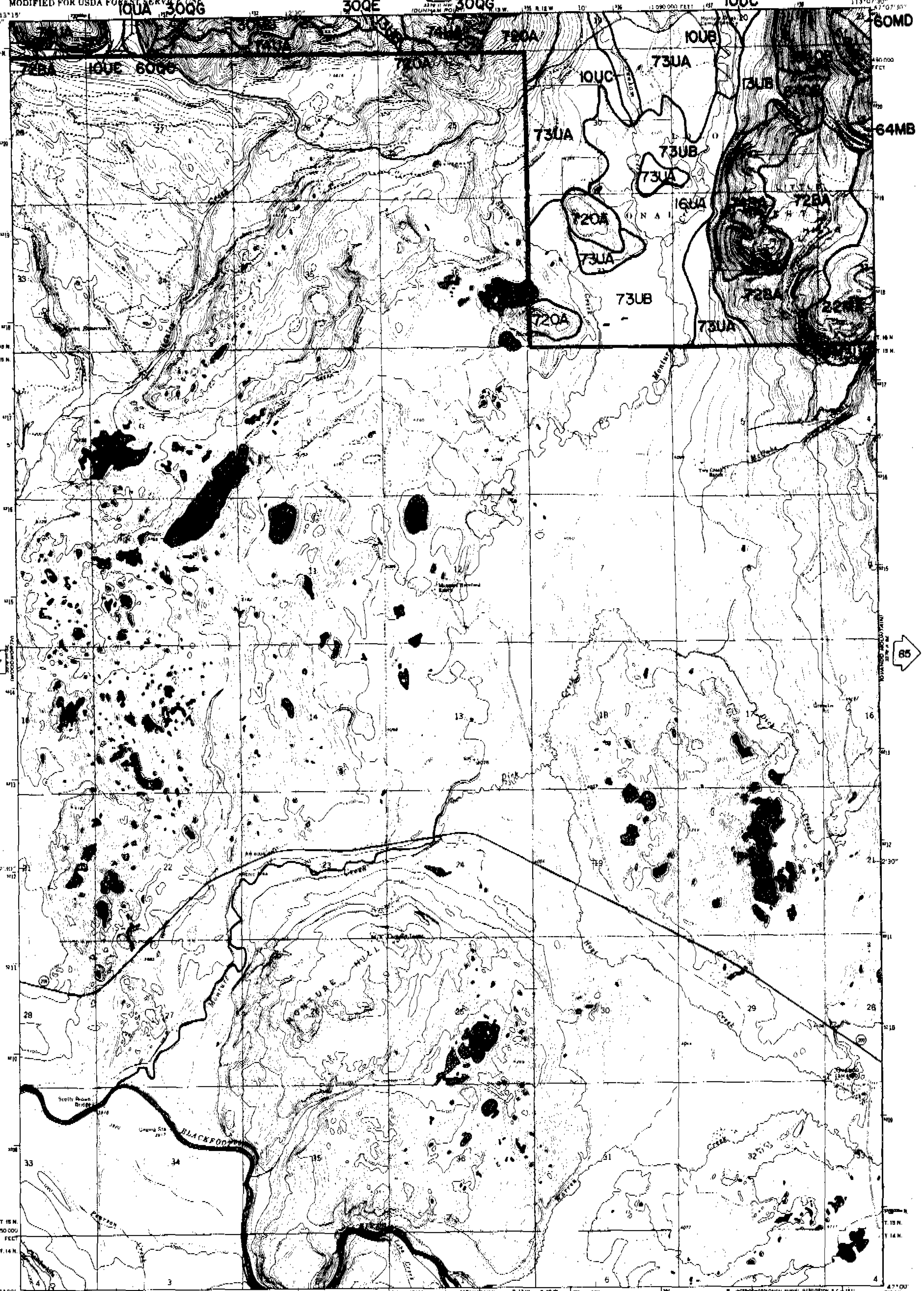
- Map Unit Boundary
- 42QA — Map Unit Symbols
- W — Water
- 125 — Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

OVANDO QUADRANGLE
MONTANA – POWELL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary	Primary Highway	Interstate Highway
Non-Forest Service Land	Secondary Highway	U.S. Highway
TOWNSHIP AND SECTION LINE CLASSIFICATION	Improved Light Duty	State Highway
Surveyed, Location Reliable	Unimproved Dirt	County Road
Surveyed, Location Unreliable	Trail	Locked Gate
Unsurveyed, Protraction		

86

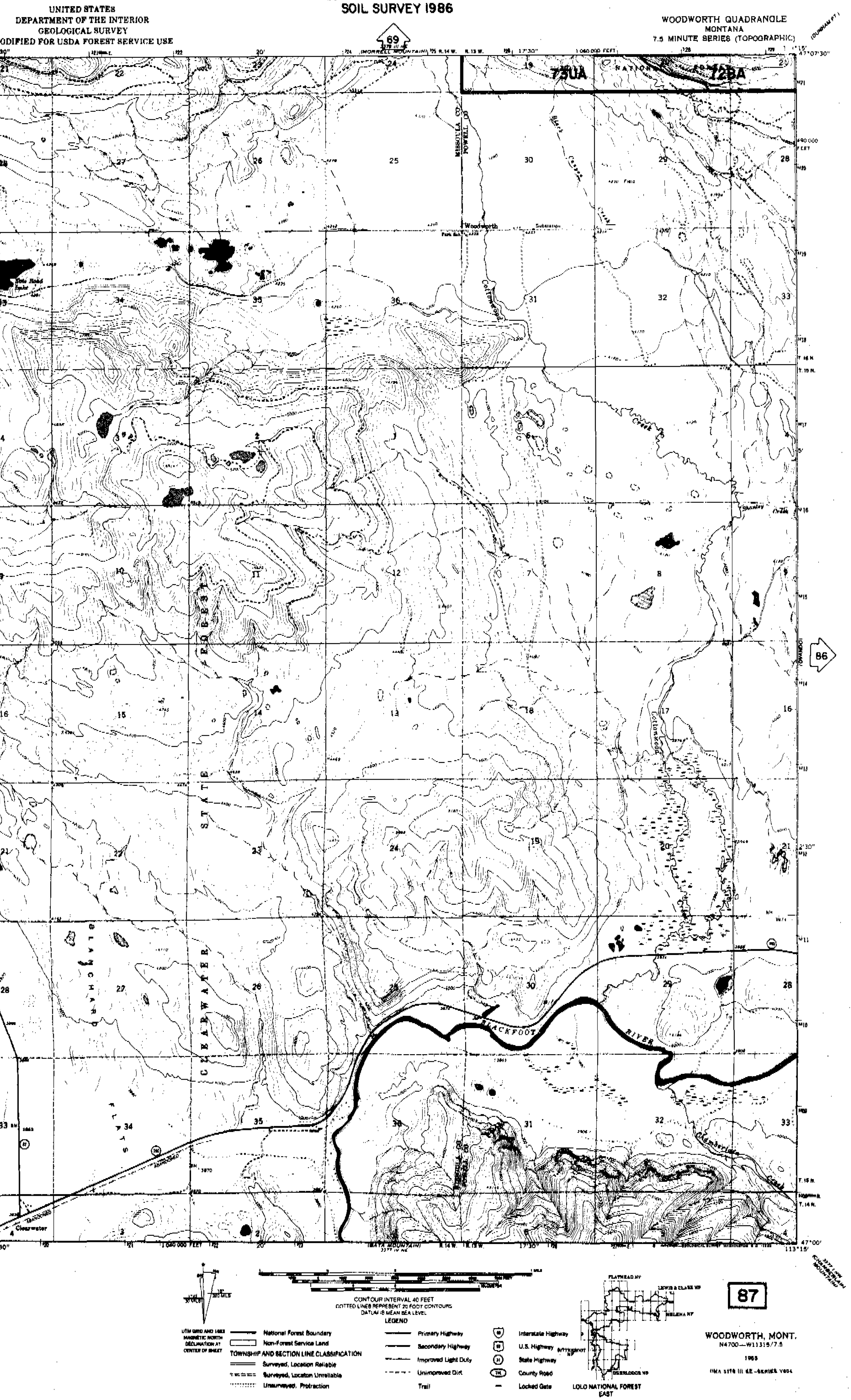
LOLO NATIONAL FOREST
EAST

OVANDO, MONT.
N4700 — W11307.5/7.5
1968
DMA 3378 II SW—SERIES V894

SOILS MAPPING LEGEND

——	Map Unit Boundary
42QA	Map Unit Symbols
W	Water
125	Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986



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SOILS MAPPING LEGEND

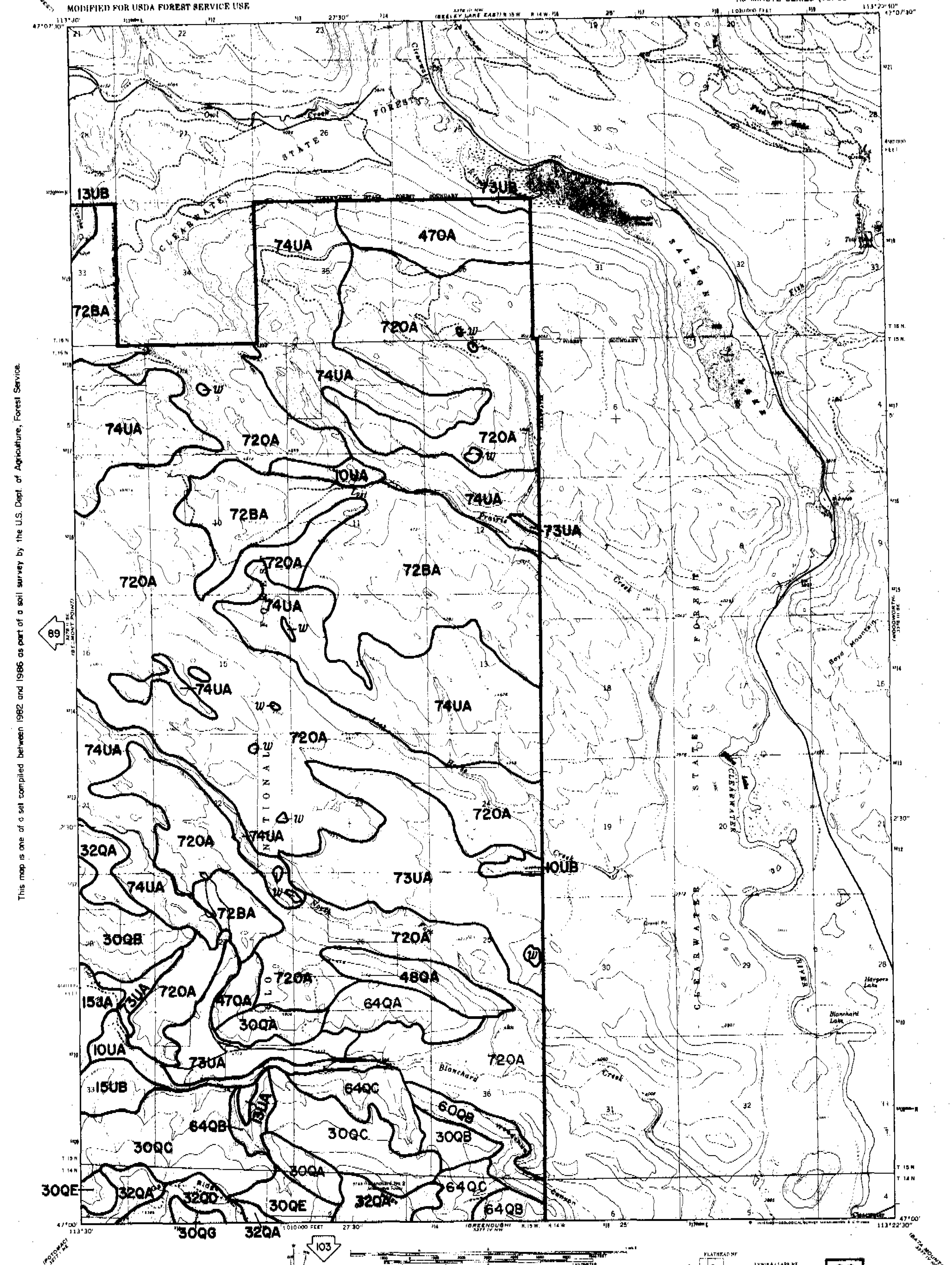
———	Map Unit Boundary
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SALMON LAKE QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



103

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

88

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

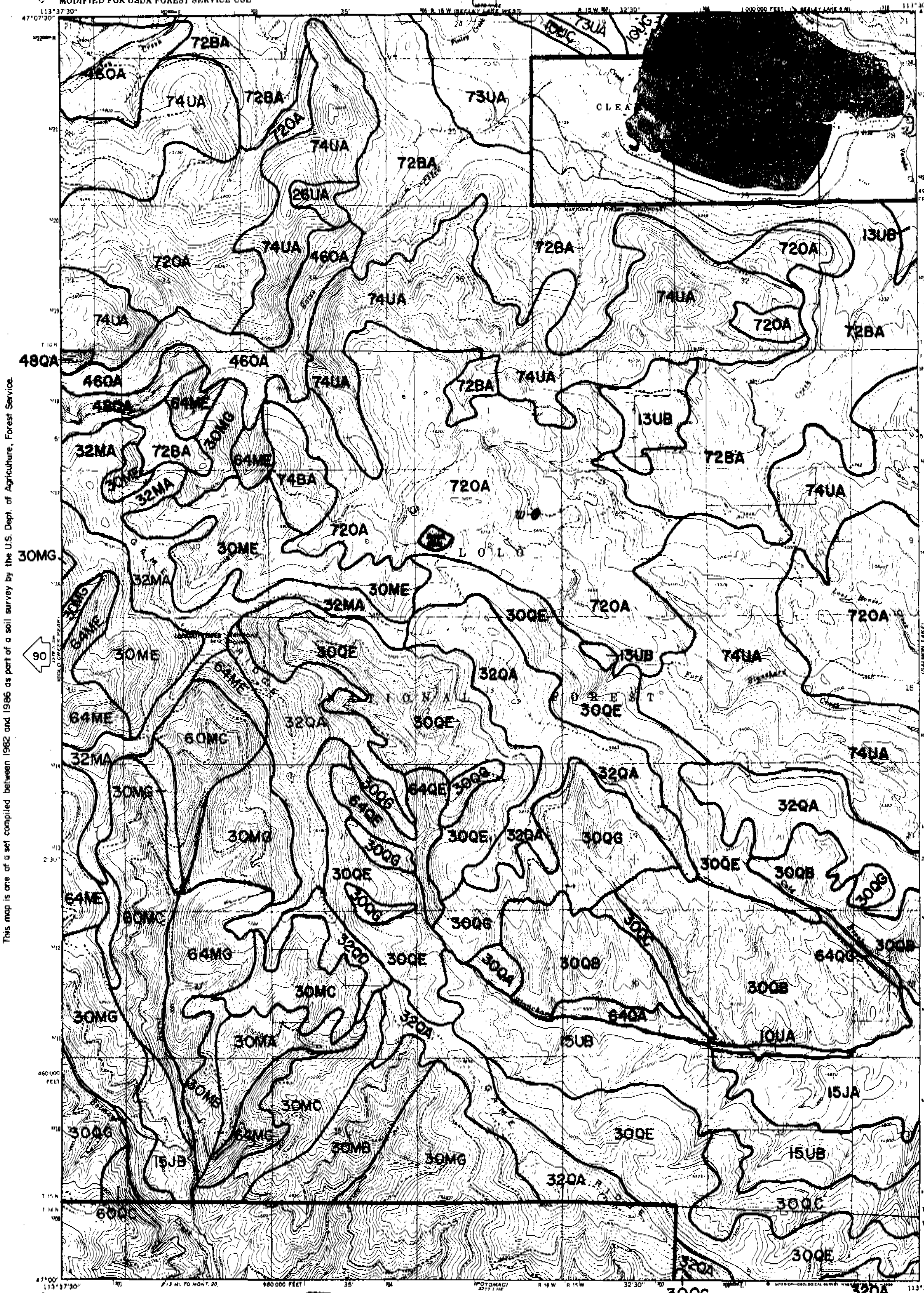
LOLO NATIONAL FOREST
EAST

SALMON LAKE, MONT.
N4700—W11322.5/7.5
1969
DMA 3378 III SW—SERIES V894

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

BELMONT POINT QUADRANGLE
MONTANA—MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST EAST

89

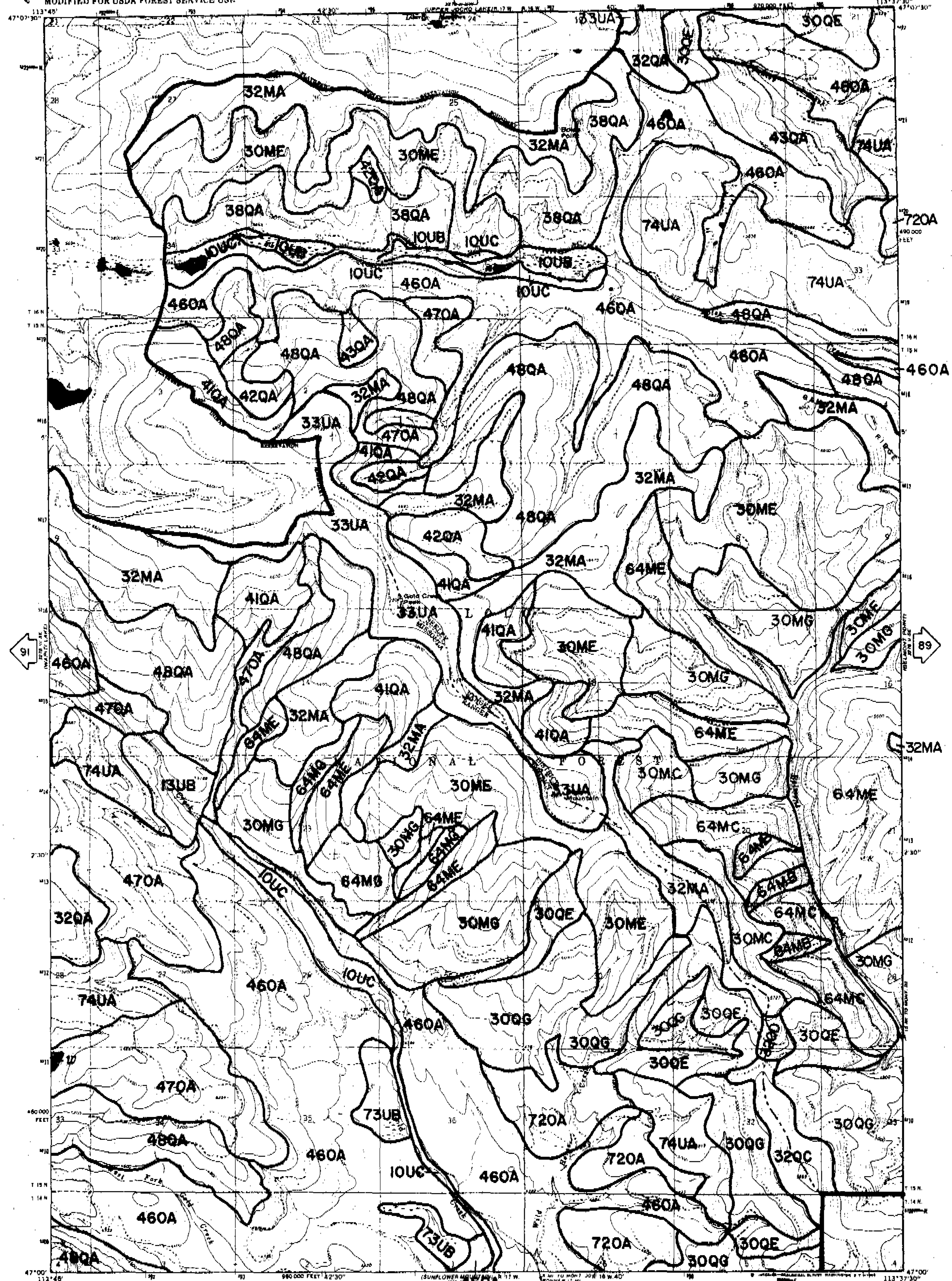
BELMONT POINT, MONT.
N4700—W11330/7.5
1986

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

GOLD CREEK PEAK QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

w Water

125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

90

GOLD CREEK PEAK, MONT.
N4700—W11337.5/7.5
1965

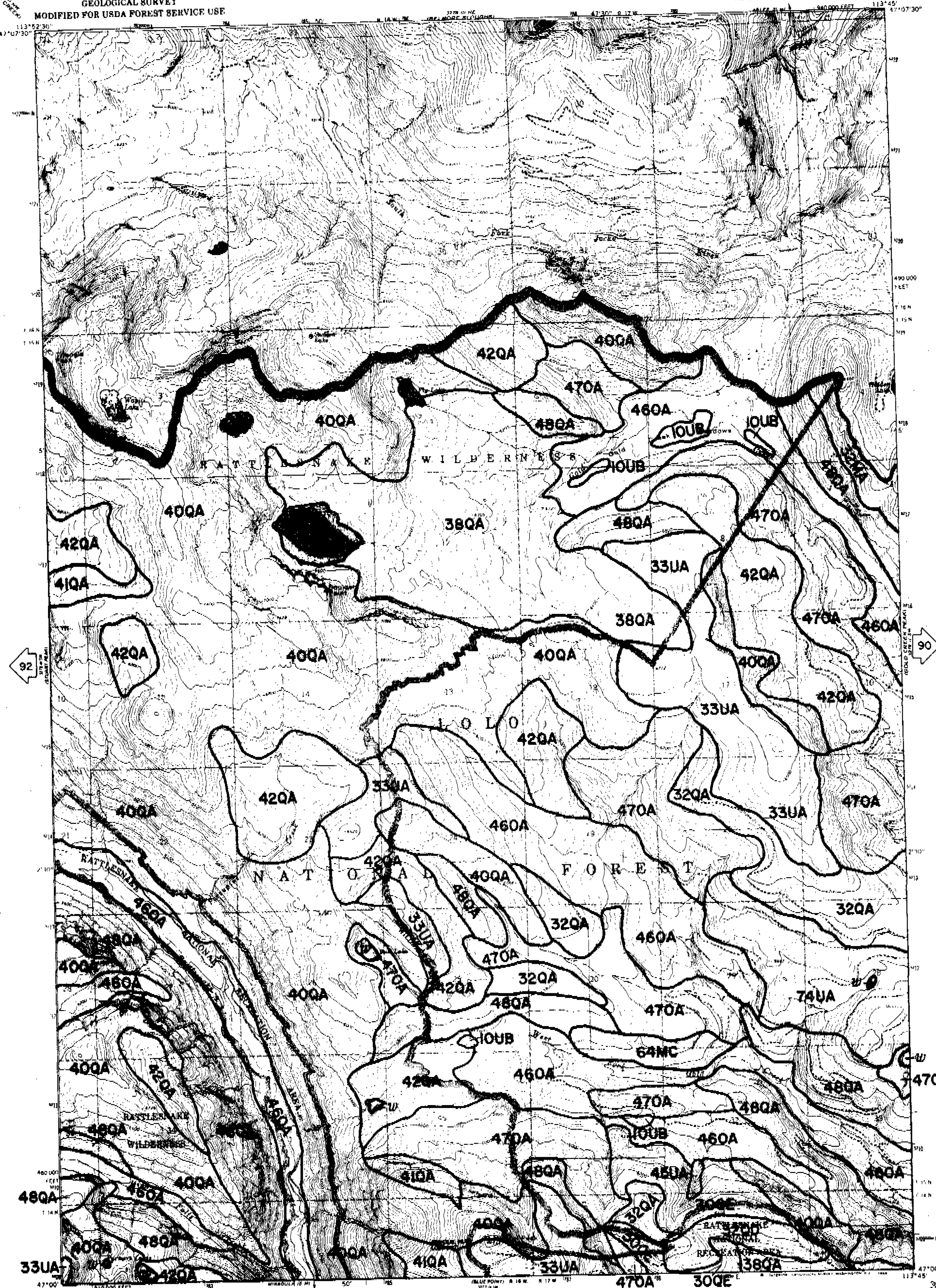
LOLO NATIONAL FOREST
EAST

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

WAPITI LAKE QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



91

WAPITI LAKE, MONT.

1960

LOLO NATIONAL FOREST EAST

SOILS MAPPING LEGEND

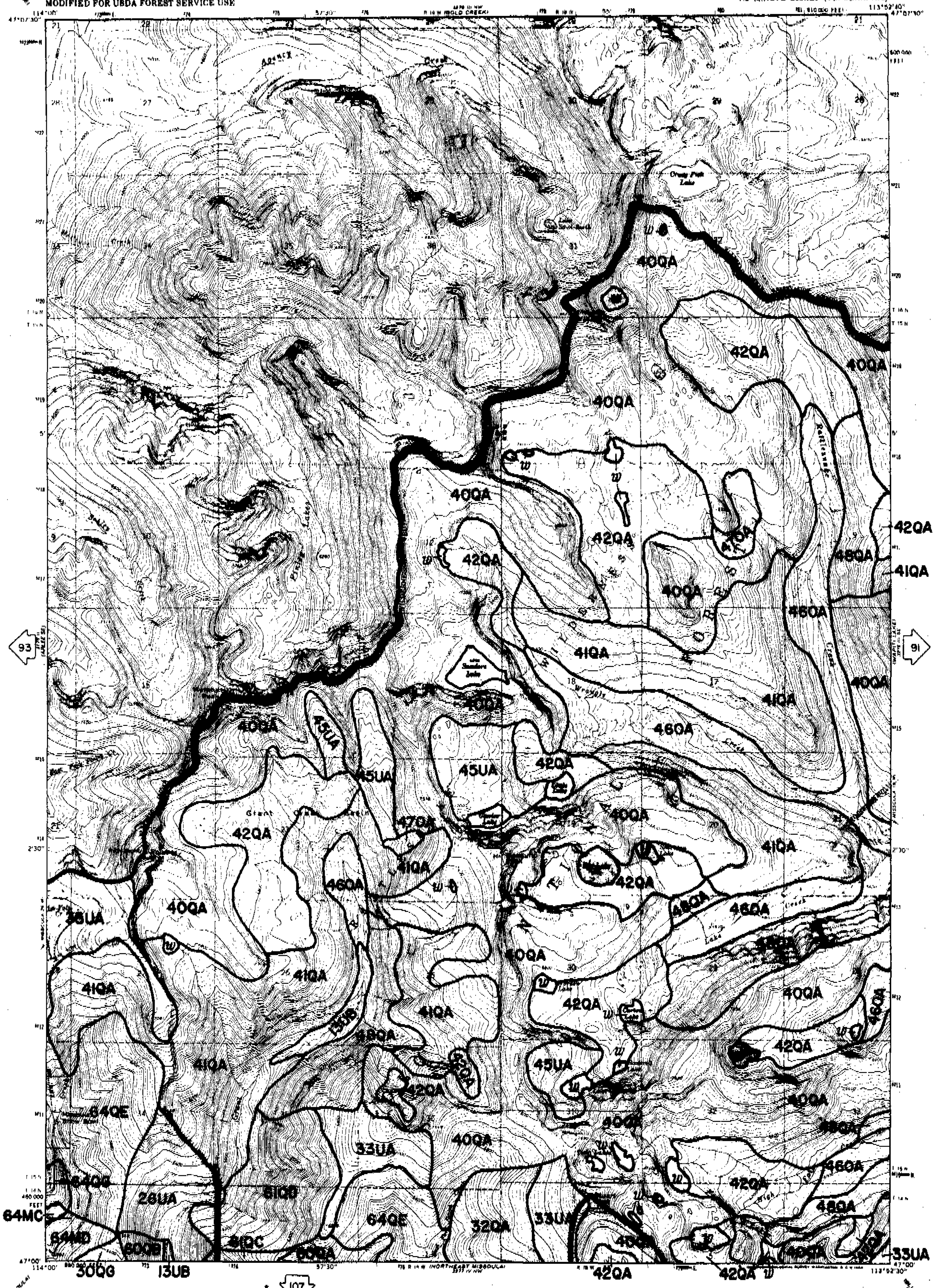
Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

STUART PEAK QUADRANGLE
MONTANA—MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



92

STUART PEAK, MONT.
N4700—W11352.5/7.5
1965

LOLO NATIONAL FOREST
EAST

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

SOILS MAPPING LEGEND

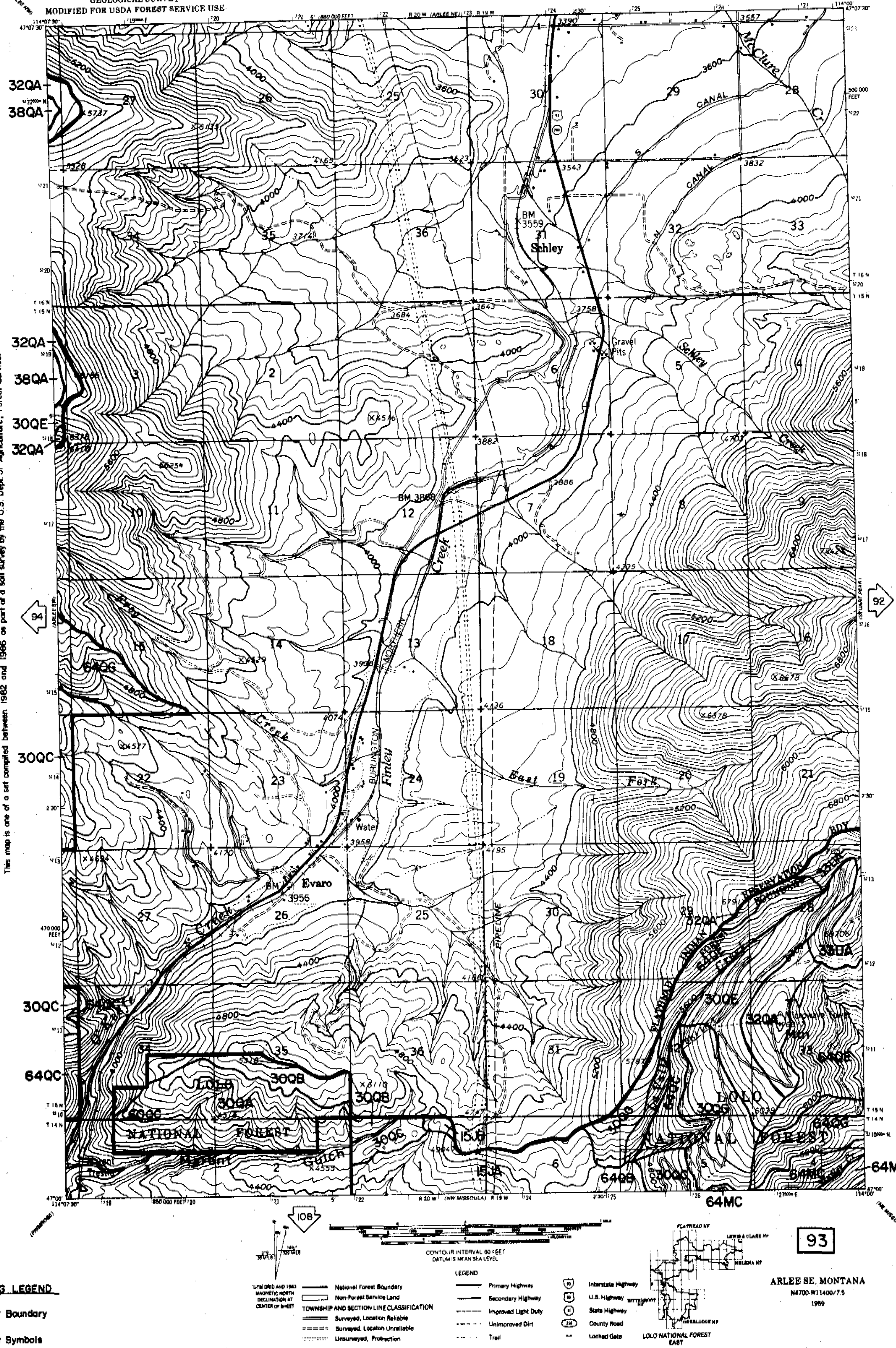
Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ARLEE SE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



ARLEE SE, MONTANA
N4700-W11400/7.5
1959

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

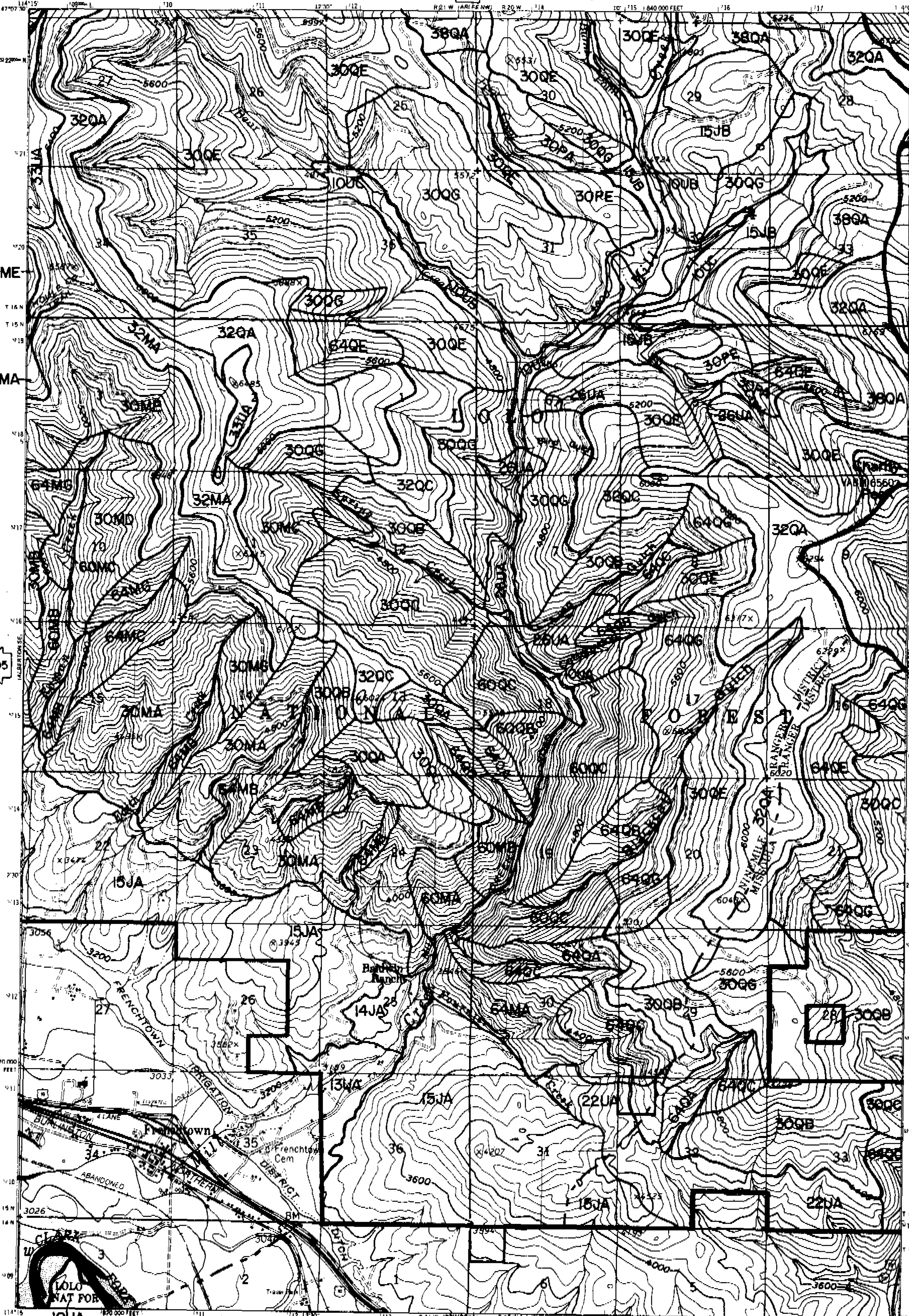
w Water

Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ARLEE SW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

UTM GRID AND 1963 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LOLO NATIONAL FOREST CENTRAL

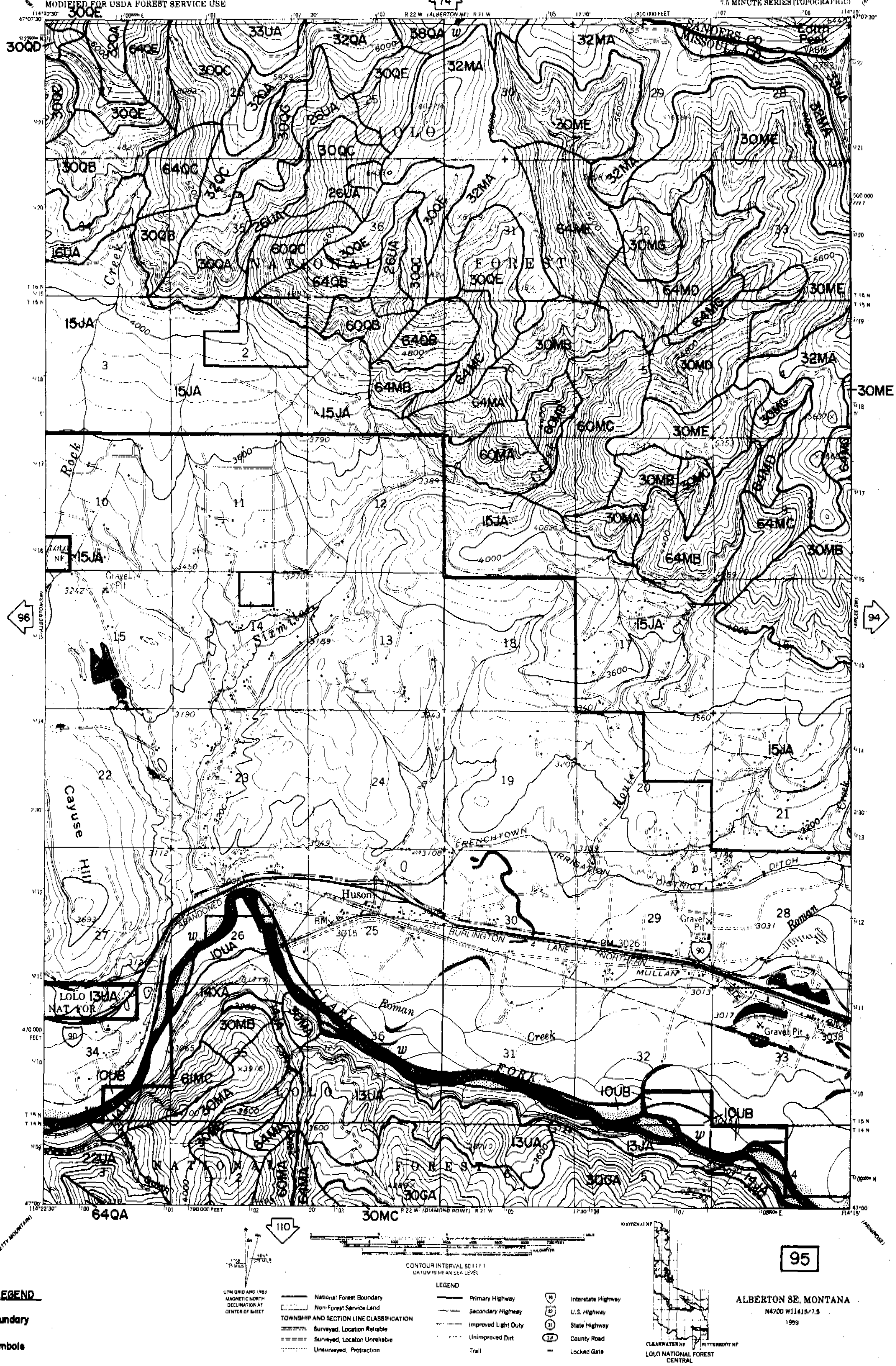
94

ARLEE SW, MONTANA
N4700-W11407.5/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ALBERTON SE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



95

ALBERTON SE, MONTANA
N4700 W11415/7.5
1959

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

w Water

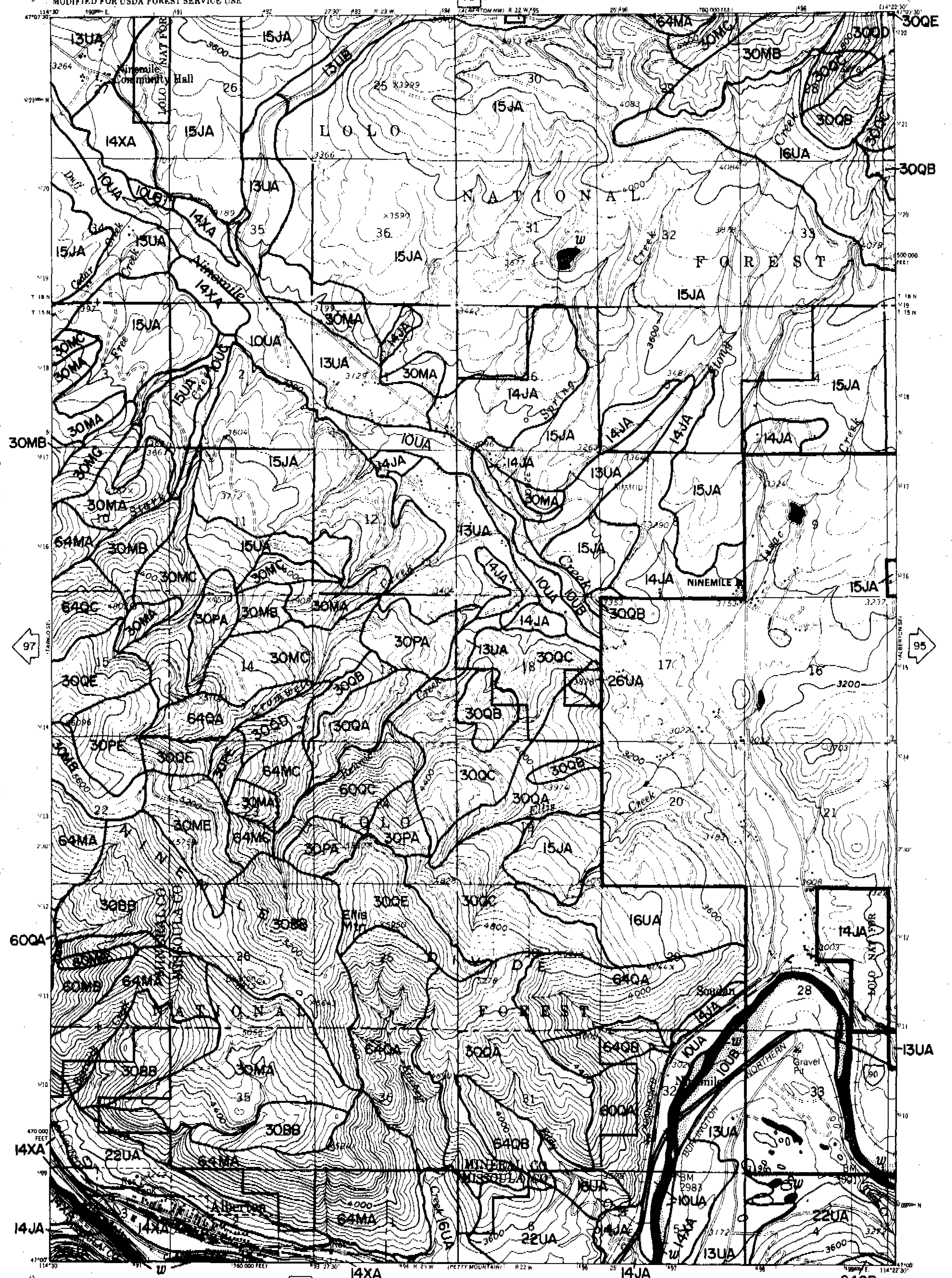
125 Adjoining Sheet Number

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ALBERTON SW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND
National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

96

ALBERTON SW, MONTANA
N4700-W11422.5/7.5
1959

SOILS MAPPING LEGEND

Map Unit Boundary

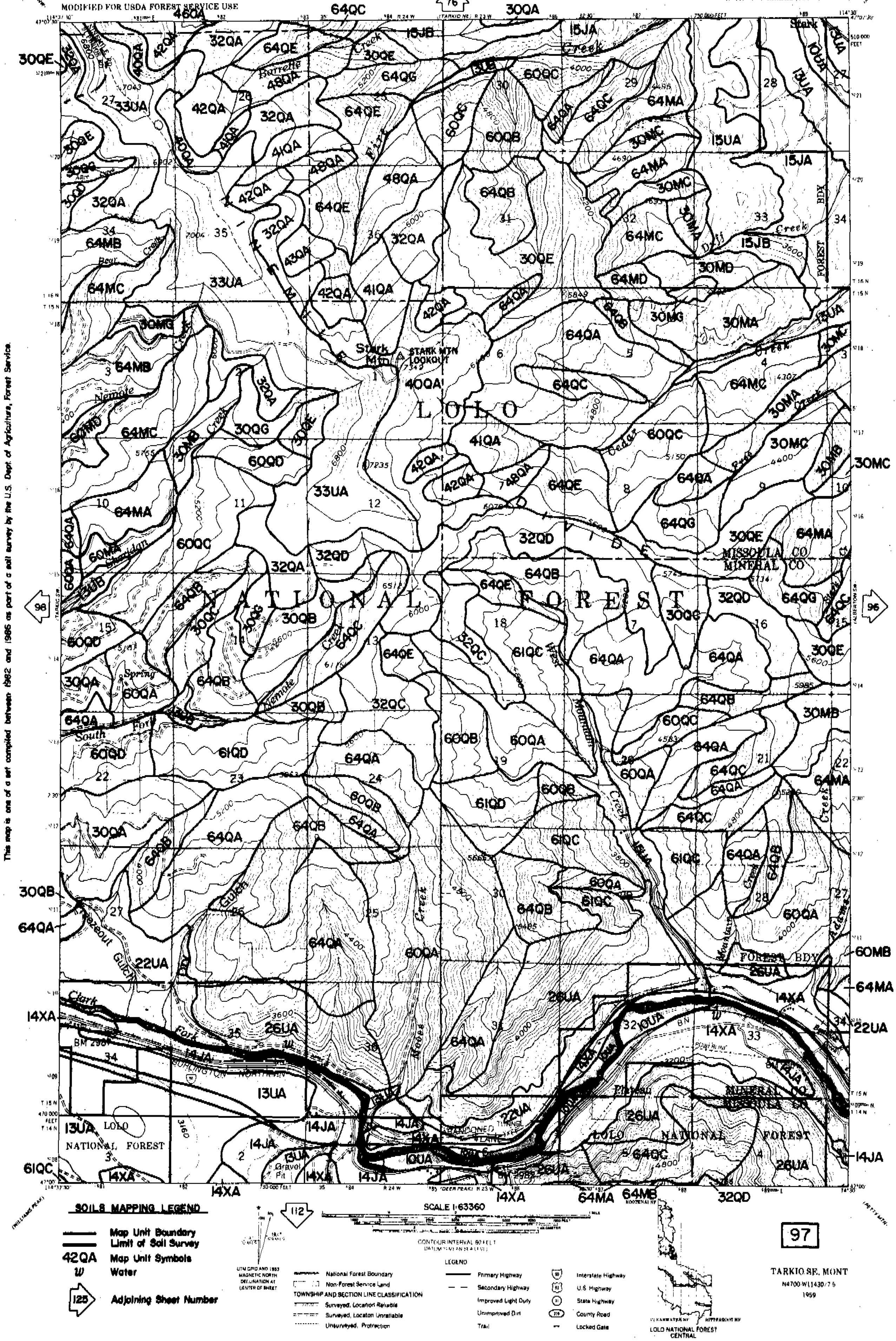
42QA Map Unit Symbols
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

TARKIO SE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET

97

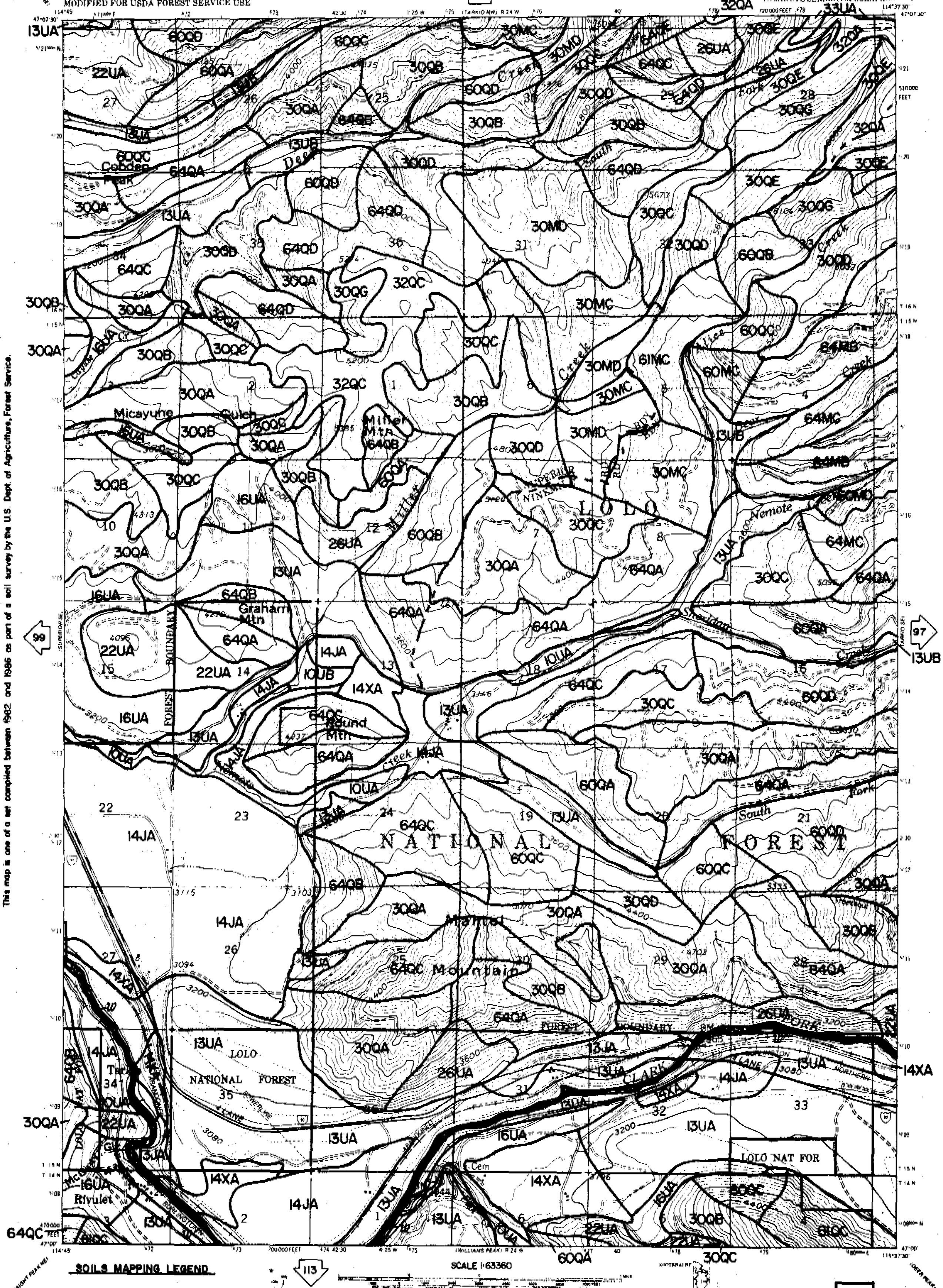
TARKIO SE, MONT
N4700-W11430/7.5
1959

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

TARKIO SW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

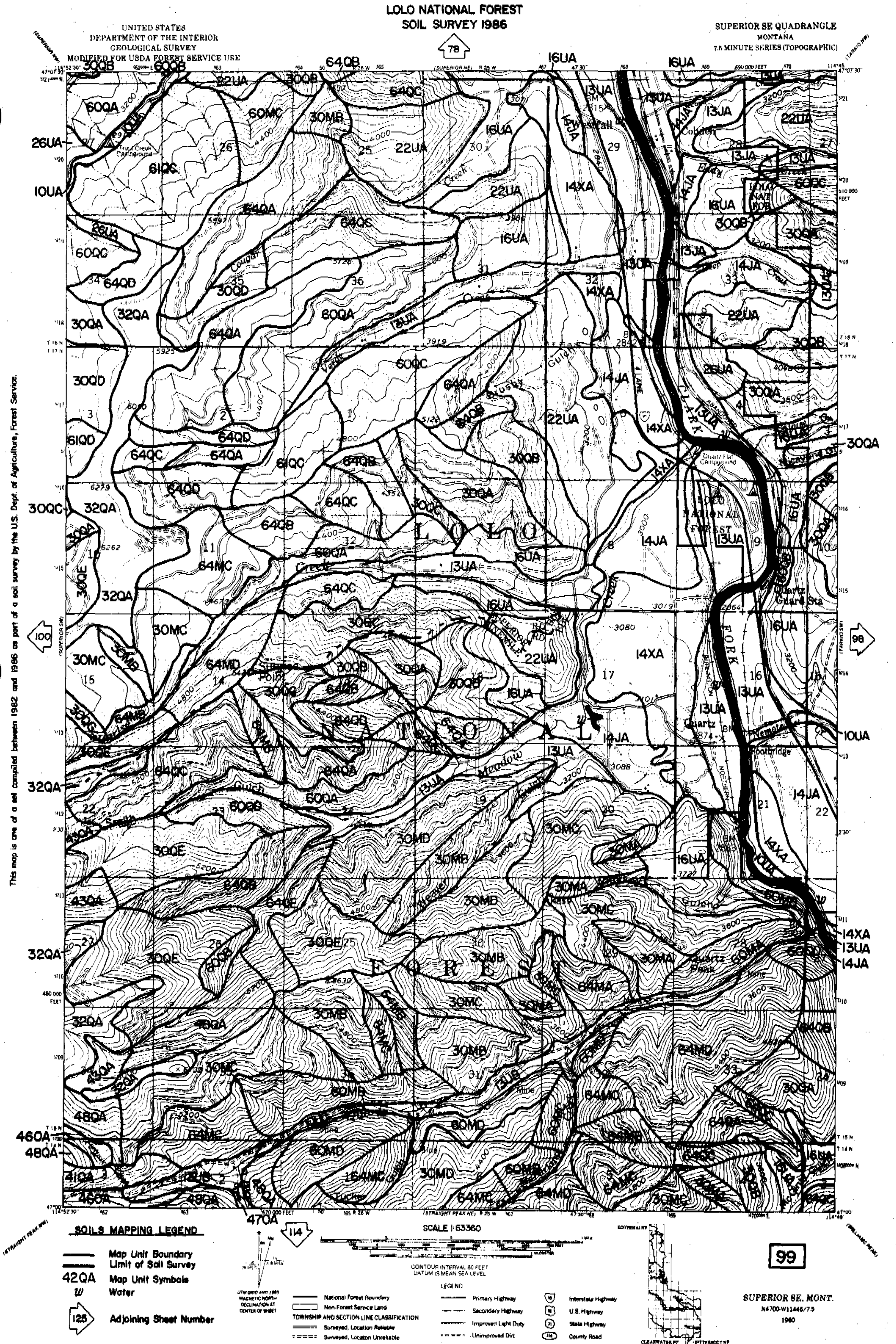
113

SCALE 1:63360

98

TARKIO SW. MONT.
N4700-W11437.5/7.5
1959

LOLO NATIONAL FOREST
CENTRAL

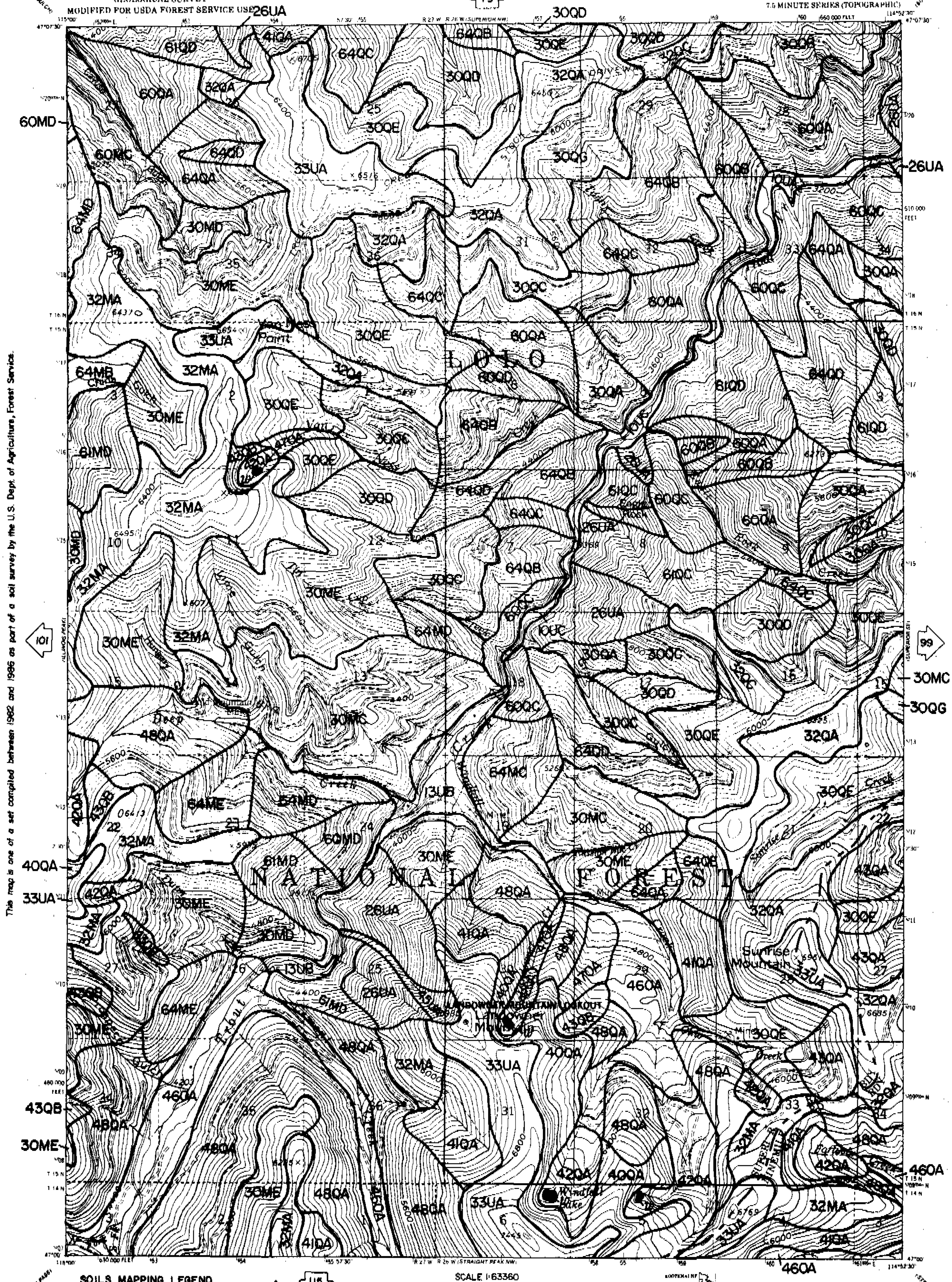


This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SUPERIOR SW QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary		Primary Highway		Interstate Highway	
Non-Forest Service Land		Secondary Highway		U.S. Highway	
TOWNSHIP AND SECTION LINE CLASSIFICATION		Improved Light Duty		State Highway	
Surveyed, Location Reliable		Unimproved Dirt		County Road	
Surveyed, Location Unreliable		Trail		Locked Gate	
Unsurveyed, Protraction					

LOLO NATIONAL FOREST CENTRAL

100

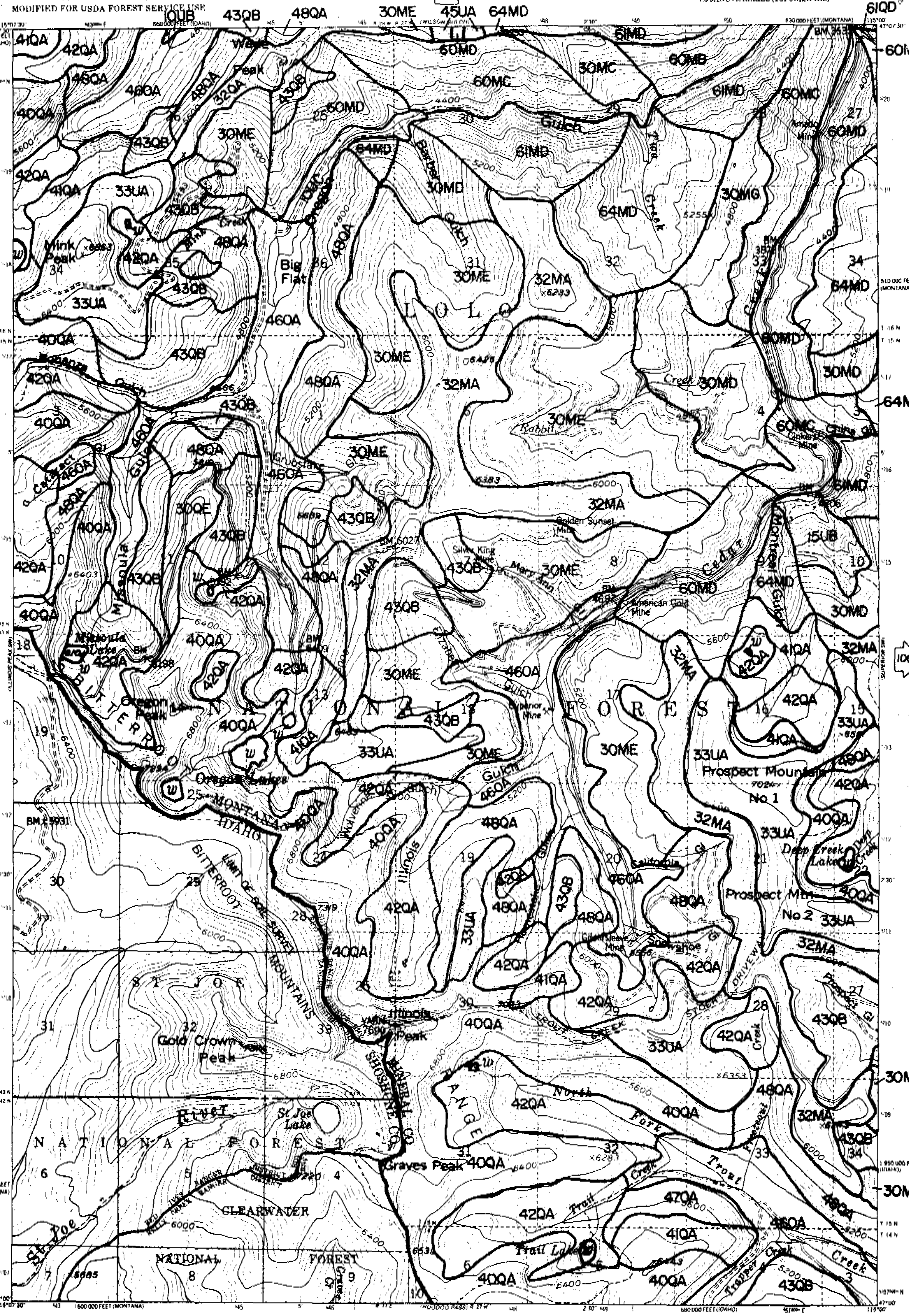
SUPERIOR SW, MONT.
N4700-W11452.5/7.5
1960

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ILLINOIS PEAK S.E. QUADRANGLE
SHOSHONE COUNTY, IDAHO AND MINERAL COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service



SCALE 1:63360

CONTOUR INTERVAL 80 FEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST WEST

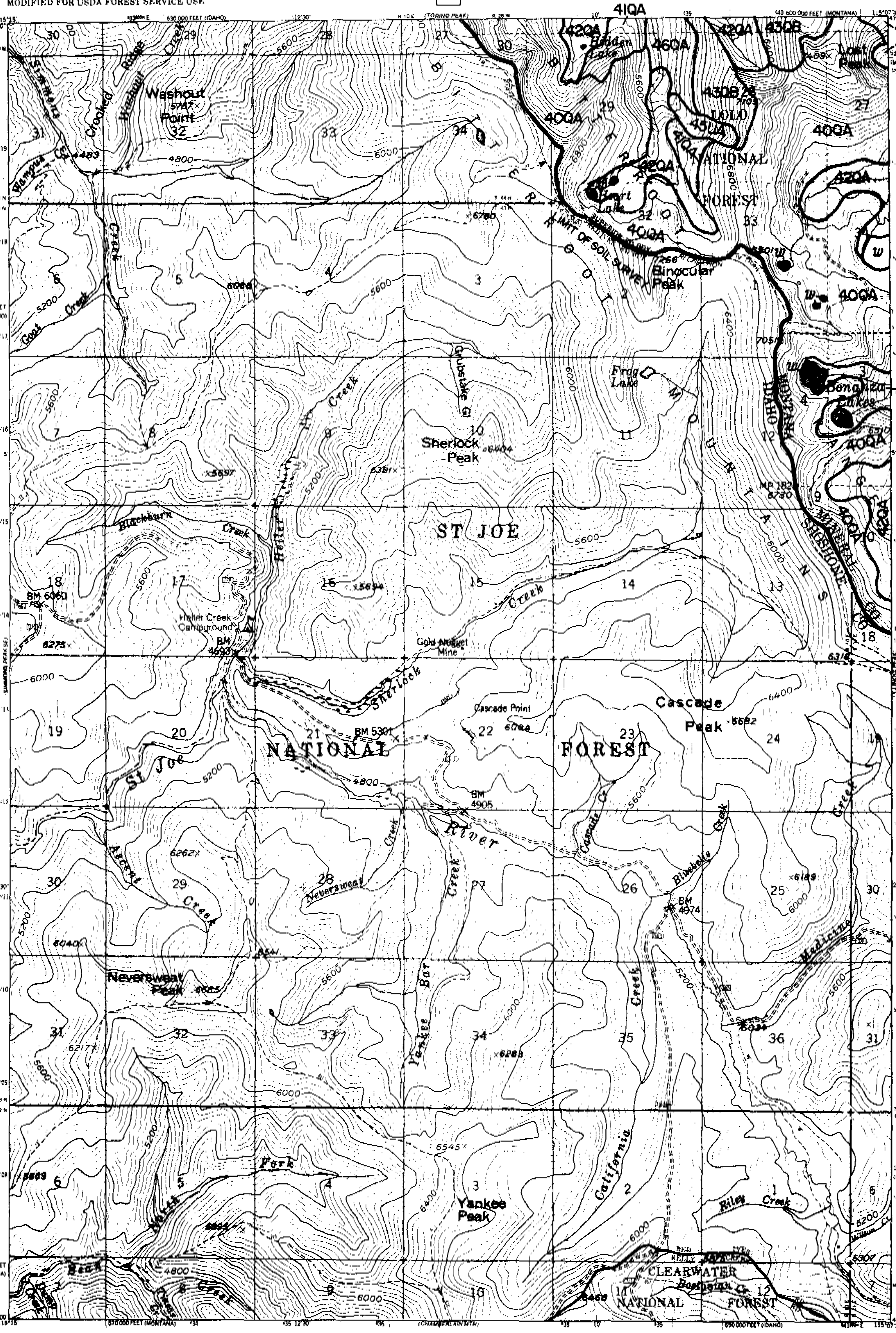
101

ILLINOIS PEAK S.E., ID MT
N4700-W11500/7.5
1957

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

ILLINOIS PEAK SW QUADRANGLE
IDAHO-MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
WEST

102

ILLINOIS PEAK SW, IDA.-MONT.
N4700-W11507.5/7.5
1957

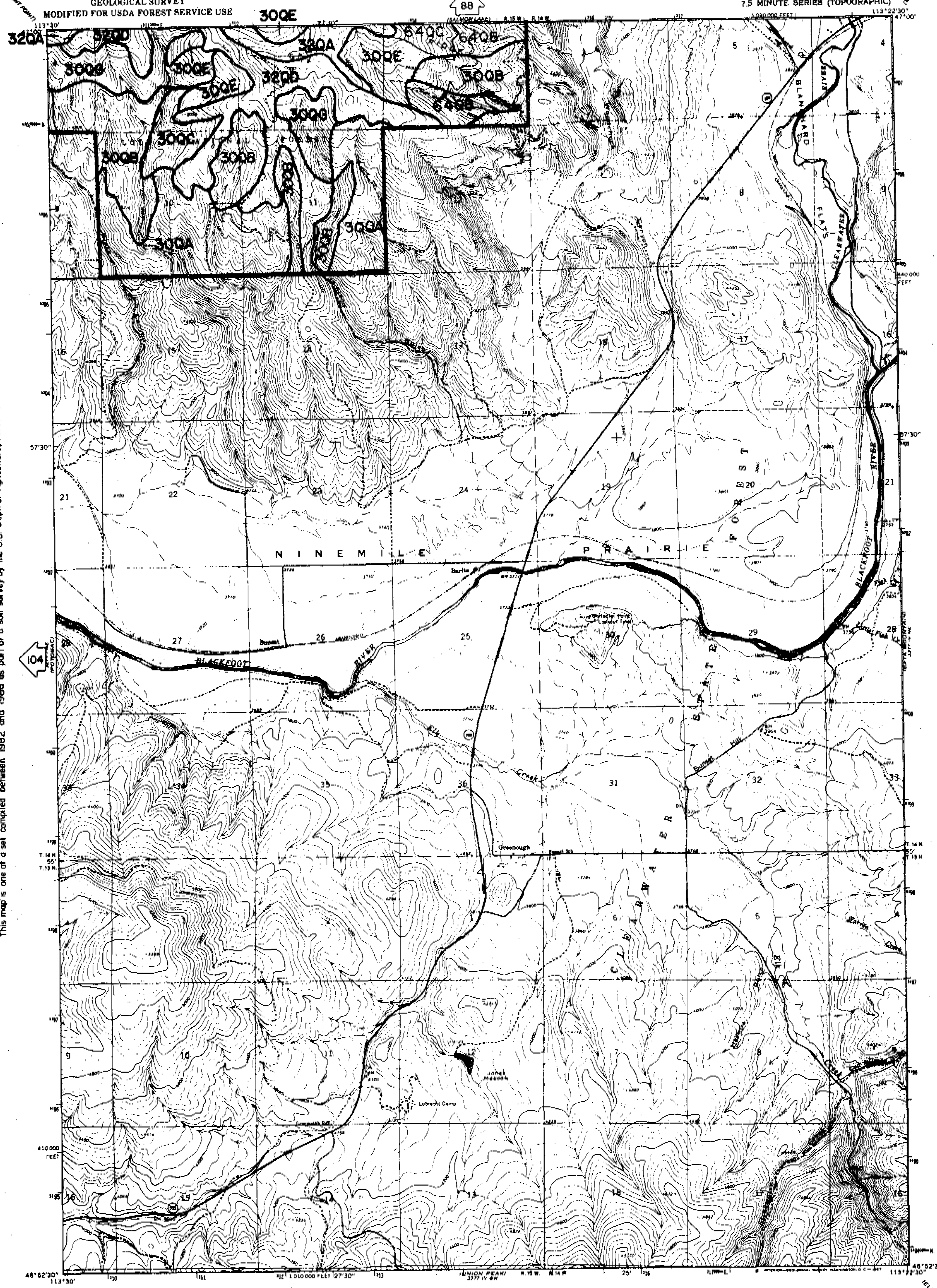
This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

GREENOUGH QUADRANGLE
MONTANA—MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST EAST

103

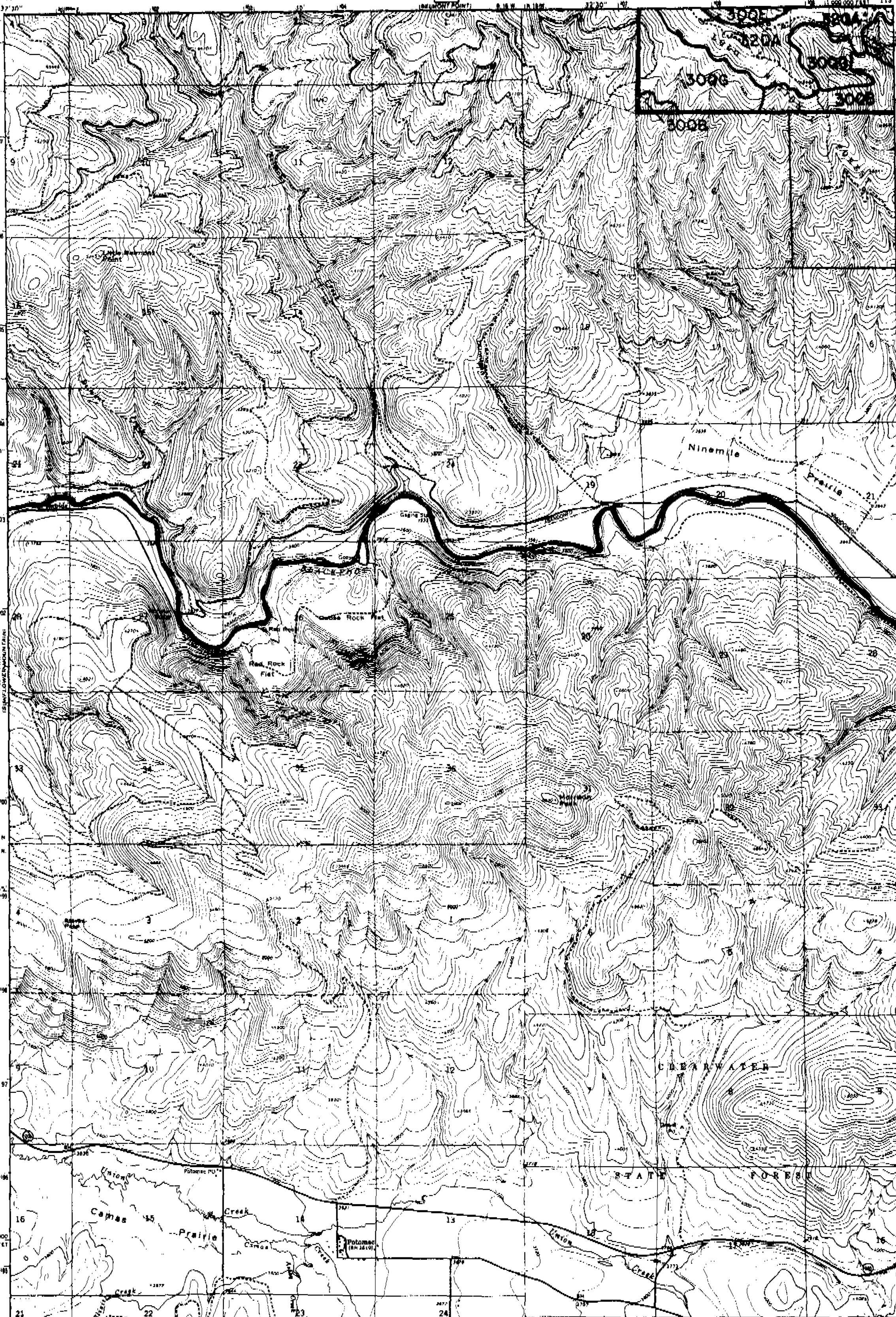
GREENOUGH, MONT.
N4652.5—W11322.5/7.5
1966
DMA 3377 IV NW—SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

POTOMAC QUADRANGLE
MONTANA – MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOIL MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

104

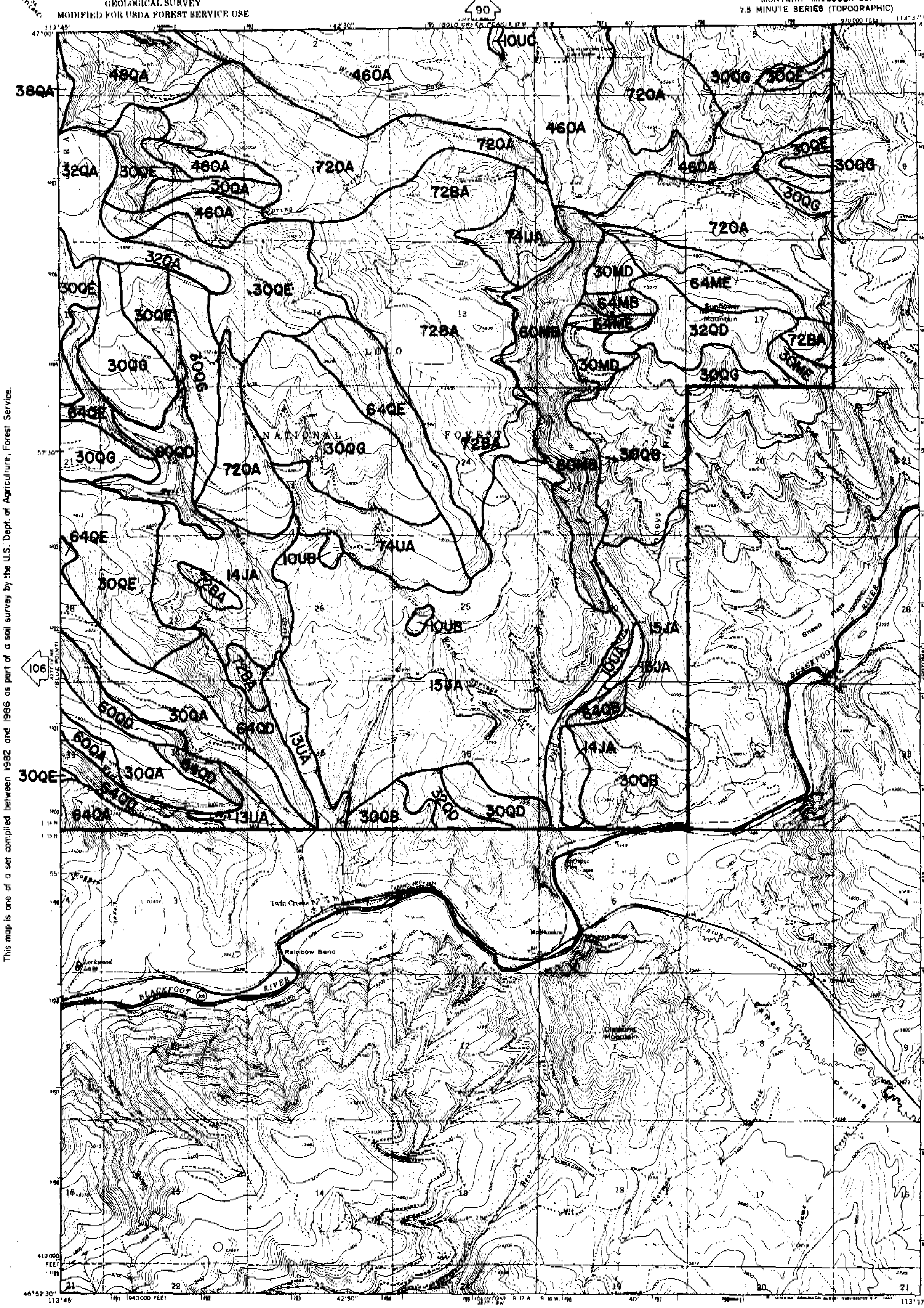
LOLO NATIONAL FOREST
EAST

POTOMAC, MONT.
N4652.5—W11330/7.5
1968

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

SUNFLOWER MOUNTAIN QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
EAST

105

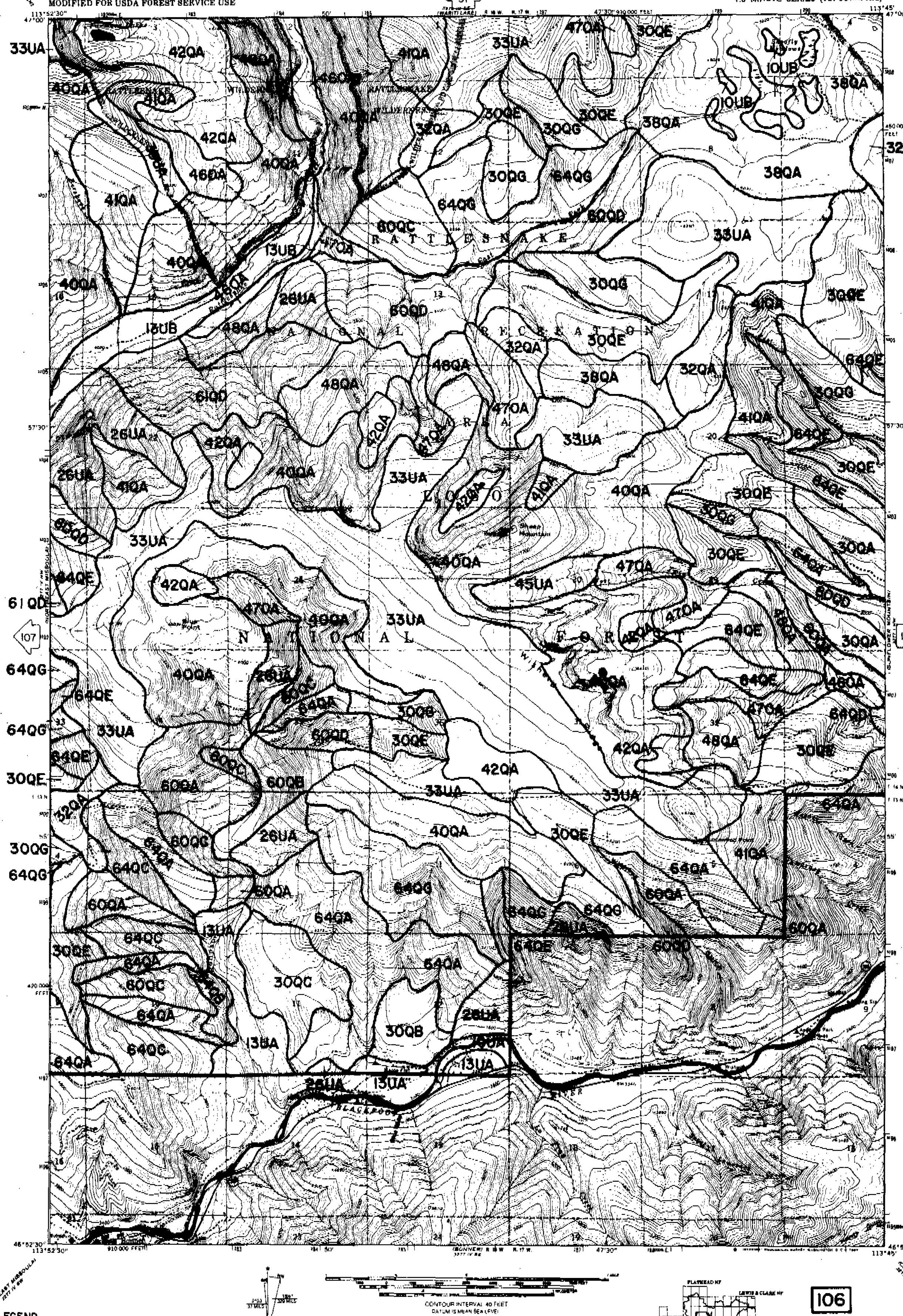
SUNFLOWER MOUNTAIN, MONT.
N4652.5-W11337.5/7.5
1965

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BLUE POINT QUADRANGLE
MONTANA—MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary	Primary Highway
Non-Forest Service Land	Secondary Highway
TOWNSHIP AND SECTION LINE CLASSIFICATION	Improved Light Duty
Surveyed, Location Reliable	Unimproved Dirt
Surveyed, Location Unreliable	Trail
Unsurveyed, Protraction	
Interstate Highway	U.S. Highway
State Highway	County Road
Locked Gate	

LOLO NATIONAL FOREST EAST

106

BLUE POINT, MONT.
N4652.5—W11345/7.5

1965

DMA 3277 IV NE—SERIES V894

SOILS MAPPING LEGEND

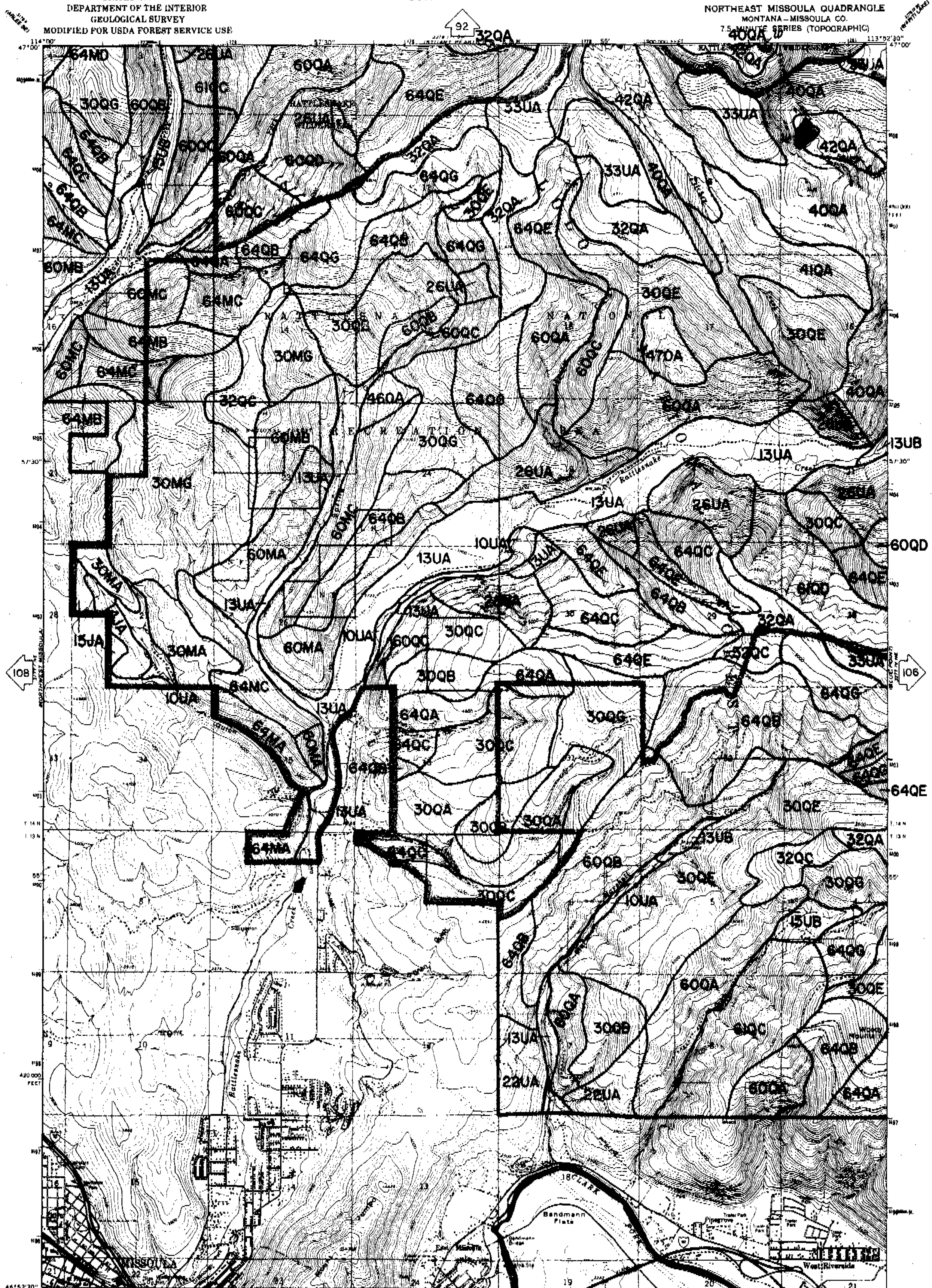
———	Map Unit Boundary
42QA	Map Unit Symbols
W	Water
125	Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

NORTHEAST MISSOULA QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary	Primary Highway
Non-Forest Service Land	Secondary Highway
TOWNSHIP AND SECTION LINE CLASSIFICATION	Improved Light Duty
Surveyed, Location Reliable	Unimproved Dirt
Surveyed, Location Unreliable	Trail
Unsurveyed, Protraction	

Interstate Highway	
U.S. Highway	
State Highway	
County Road	
Locked Gate	

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LOLO NATIONAL FOREST EAST

107

NORTHEAST MISSOULA, MONT.
N4652.5—W11352.5/7.5
1964
DMA 3277 IV NW—SERIES V884

SOILS MAPPING LEGEND

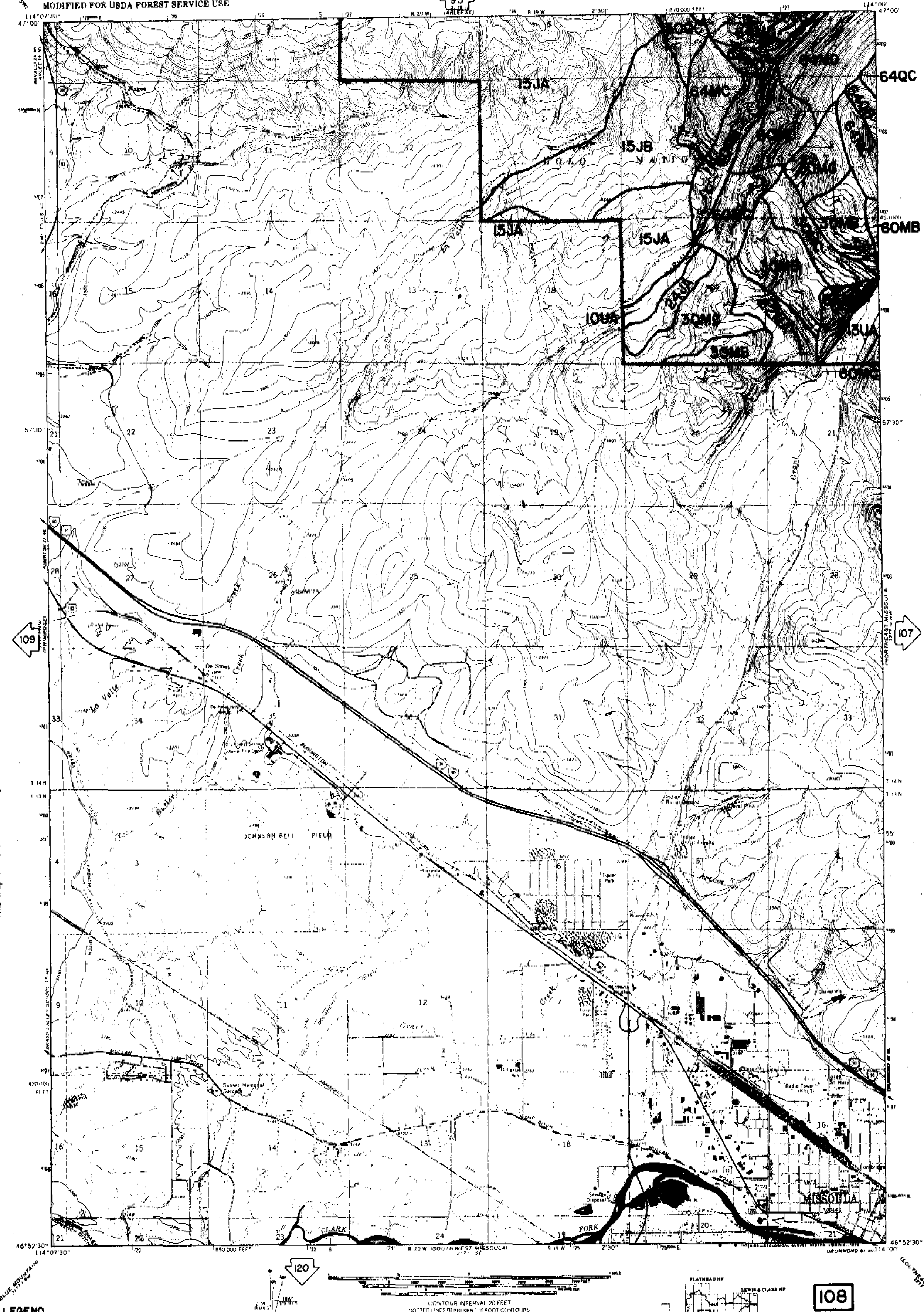
———	Map Unit Boundary
42QA	Map Unit Symbols
w	Water
125	Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

NORTHWEST MISSOULA QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



108

SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

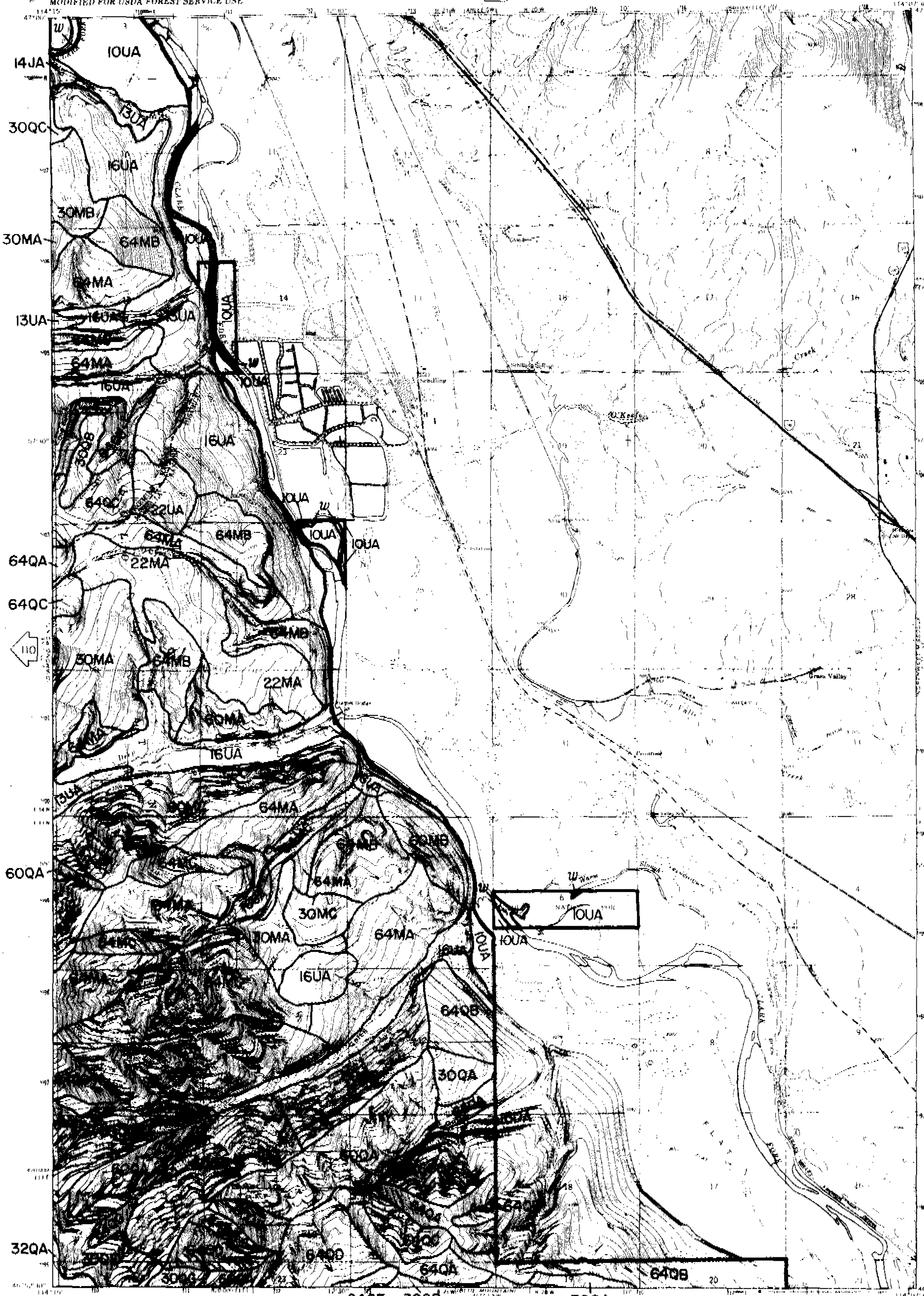
LOLO NATIONAL FOREST EAST

NORTHWEST MISSOULA, MONT.
N4652.5—W11400/7.5
1964
PHOTOREVISED 1979
DMA 3177 I NE—SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PRIMROSE QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service

109

PRIMROSE, MONT.

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

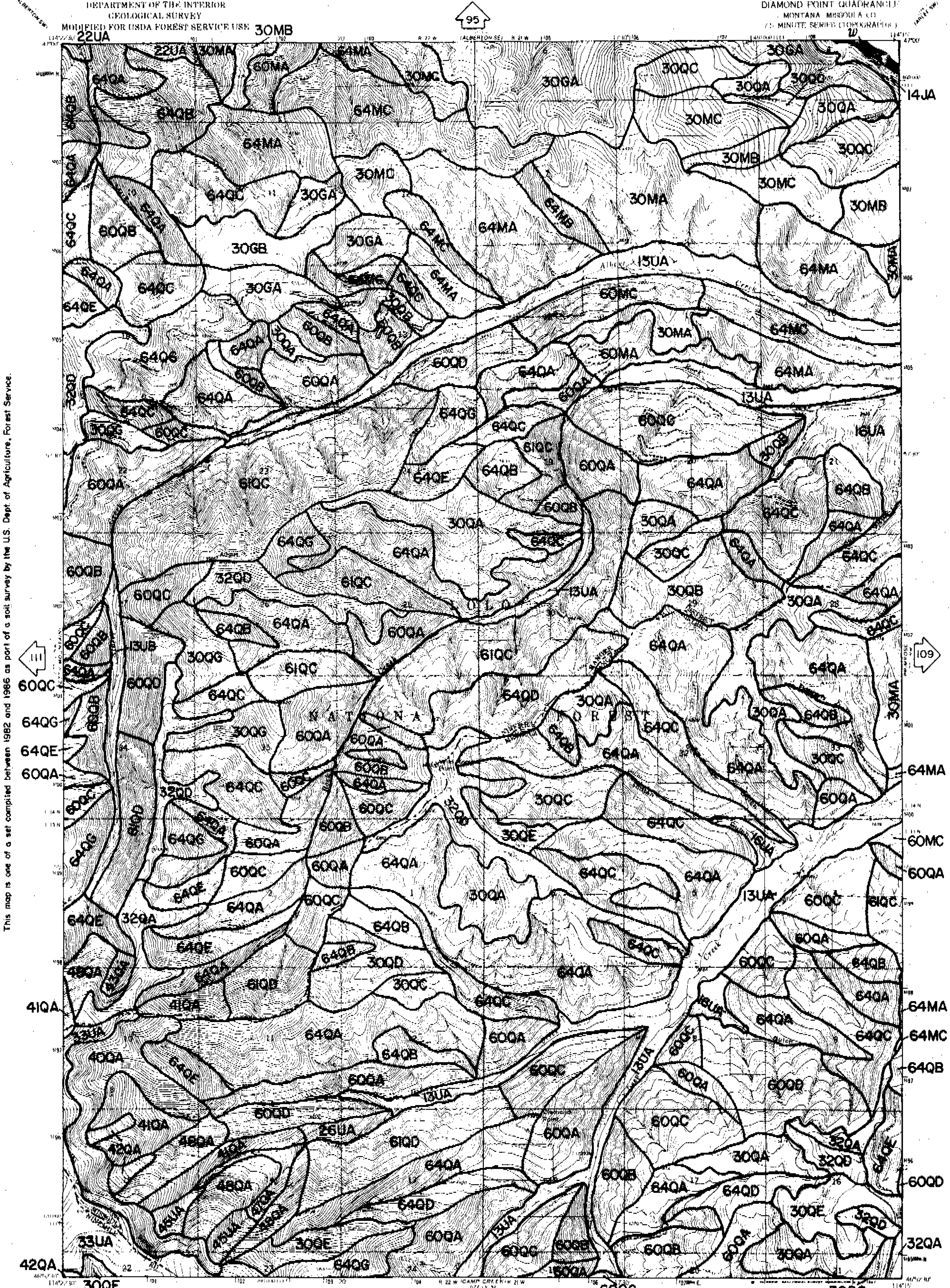
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

DIAMOND POINT QUADRANGLE
MONTANA MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

CLEARWATER NF
BITTERROOT NF
LOLO NATIONAL FOREST
CENTRAL

110

DIAMOND POINT, MONT.

1964

SOILS MAPPING LEGEND

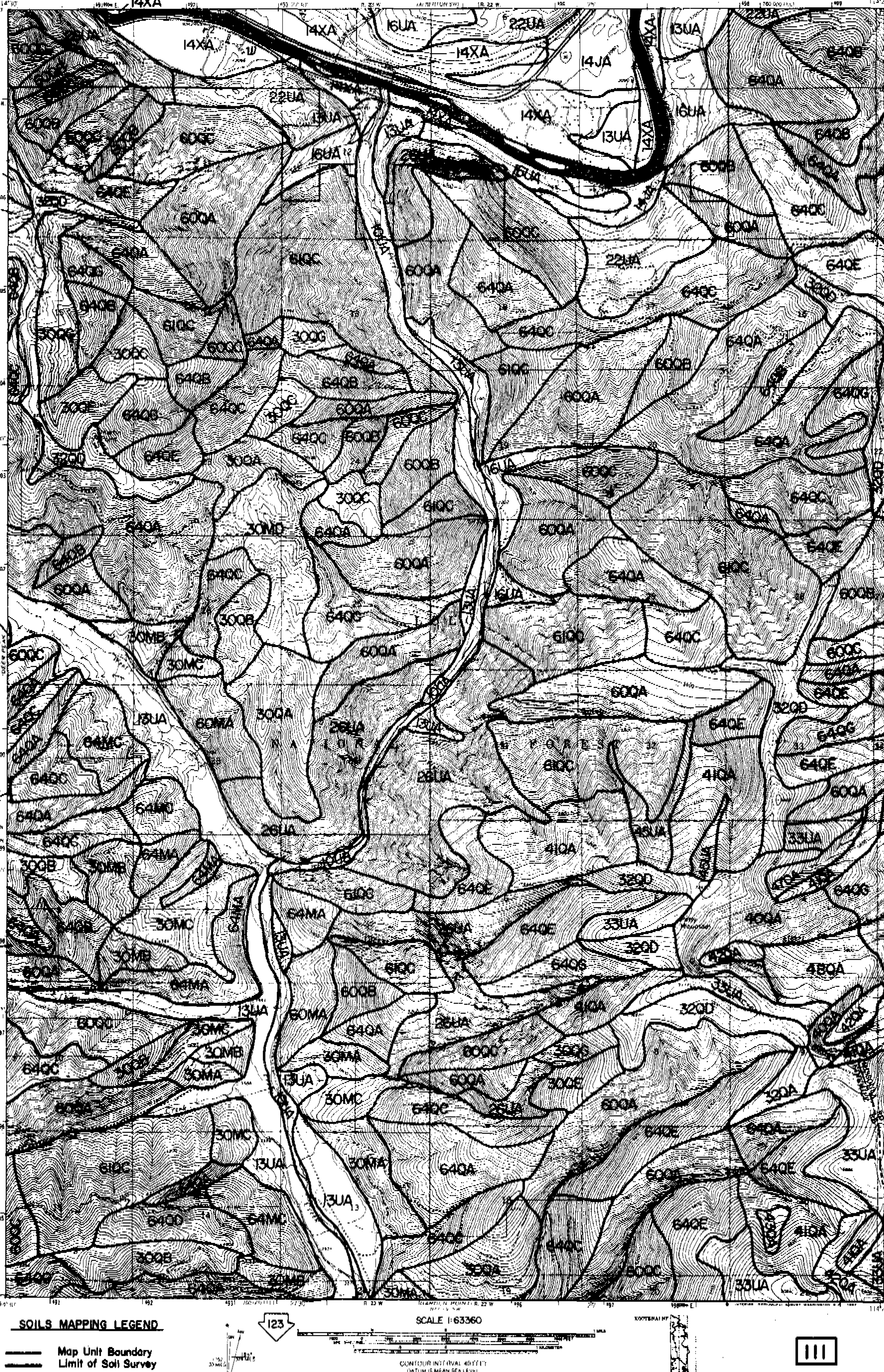
Map Unit Boundary
42QA Map Unit Symbols
w Water

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

PETTY MOUNTAIN QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
CENTRAL

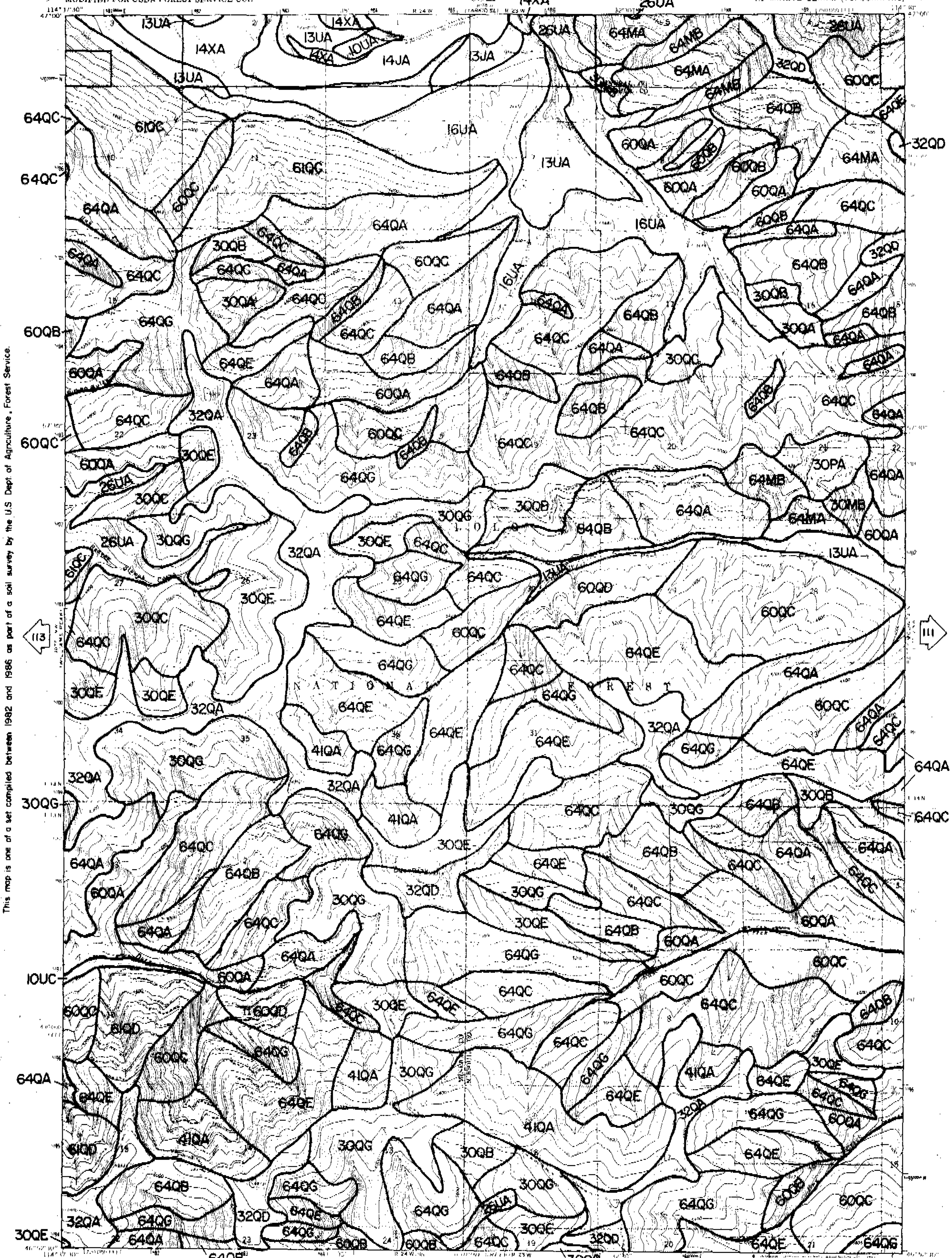
111

PETTY MOUNTAIN, MONT.
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

DEER PEAK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

SCALE 1:63360

CONTOUR INTERVAL 40 FEET

LEGEND

- National Forest Boundary
- Non Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
CENTRAL

112

DEER PEAK, MONT.

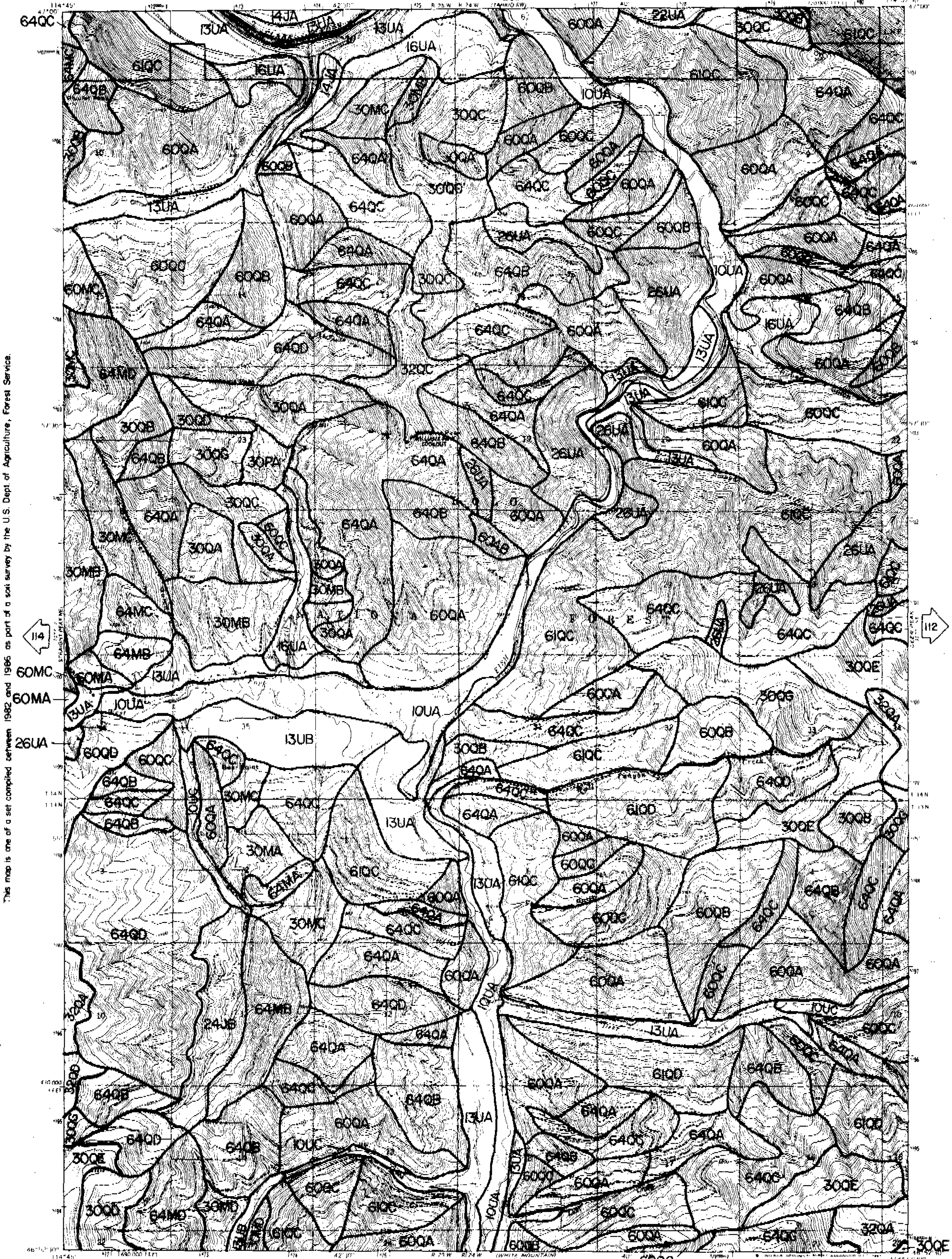
1964

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

WILLIAMS PEAK QUADRANGLE
MONTANA - MINERAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:63360

CONTOUR INTERVAL 40 FEET

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

LEGEND

- National Forest Boundary
- Non-Forest Service Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail
- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

LOLO NATIONAL FOREST
CENTRAL

113

WILLIAMS PEAK, MONT.

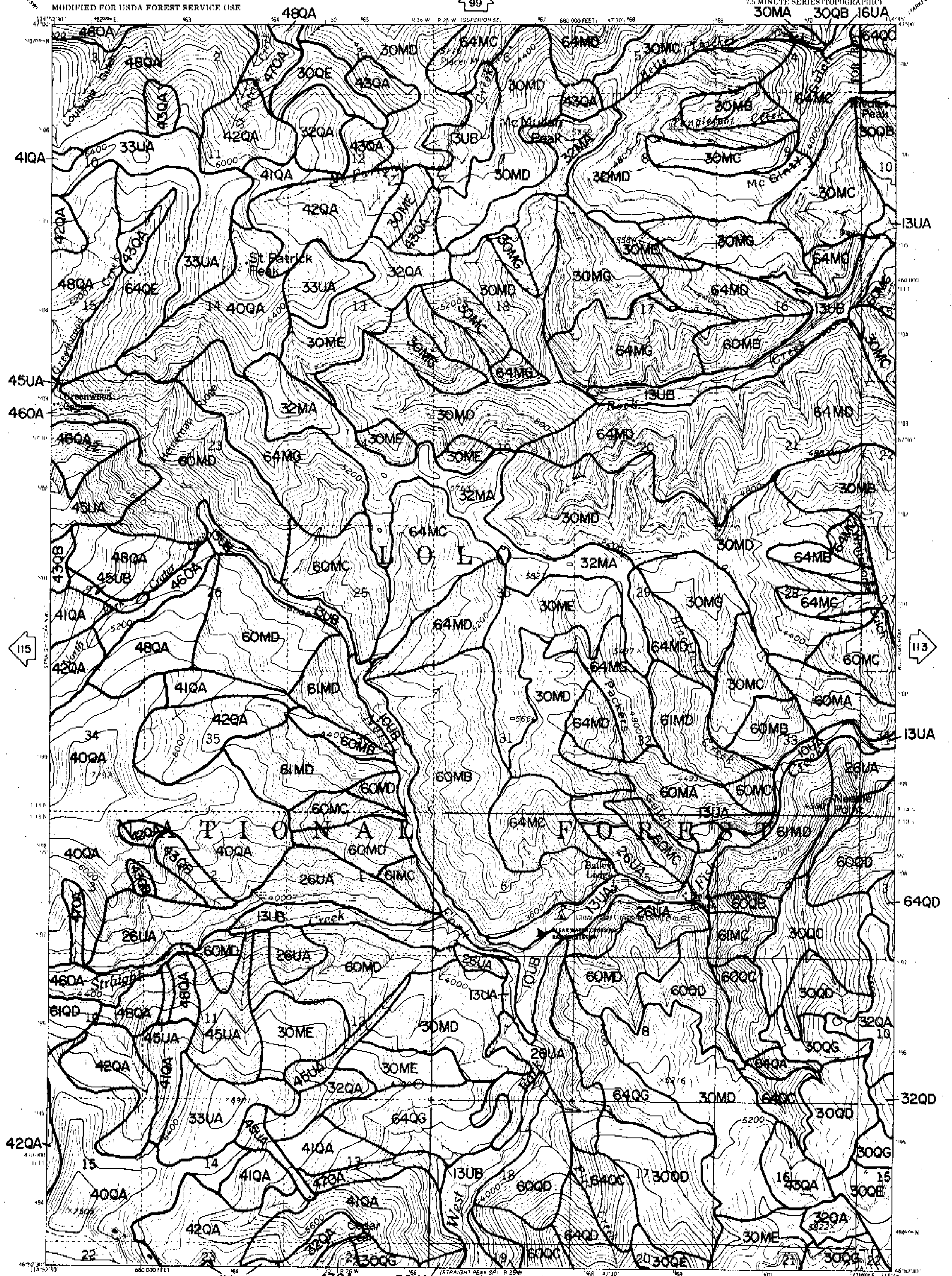
1964

DMA 3077 I NW-SERIES V894

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

STRAIGHT PEAK NE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

SCALE 1:63360

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

UTM GRID AND 1960 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

- National Forest Boundary
- Non-Forest Service Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location Reliable
- Surveyed, Location Unreliable
- Unsurveyed, Protraction

- Primary Highway
- Secondary Highway
- Improved Light Duty
- Unimproved Dirt
- Trail

- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Locked Gate

KOOTENAI NF
CLEARWATER NF
BITTERROOT NF
LOLO NATIONAL FOREST CENTRAL

114

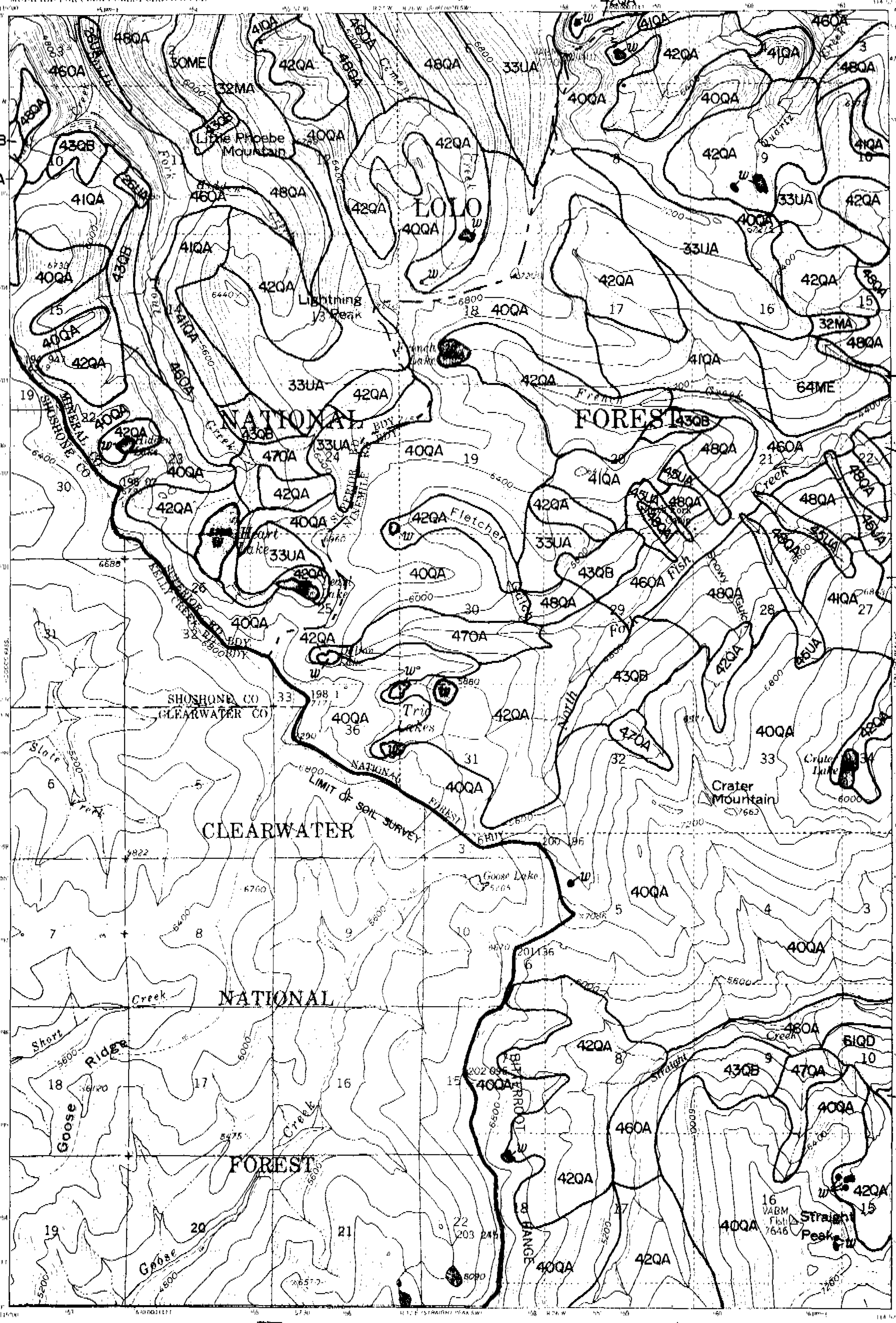
STRAIGHT PEAK NE, MONT.
N4652.5-W11445/7.5
1960

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

STRAIGHT PEAK NW QUADRANGLE
IDAHO-MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

SCALE 1:63360

STRAIGHT PEAK NW, IDA.-MONT.
1960

LOLO NATIONAL FOREST
CENTRAL

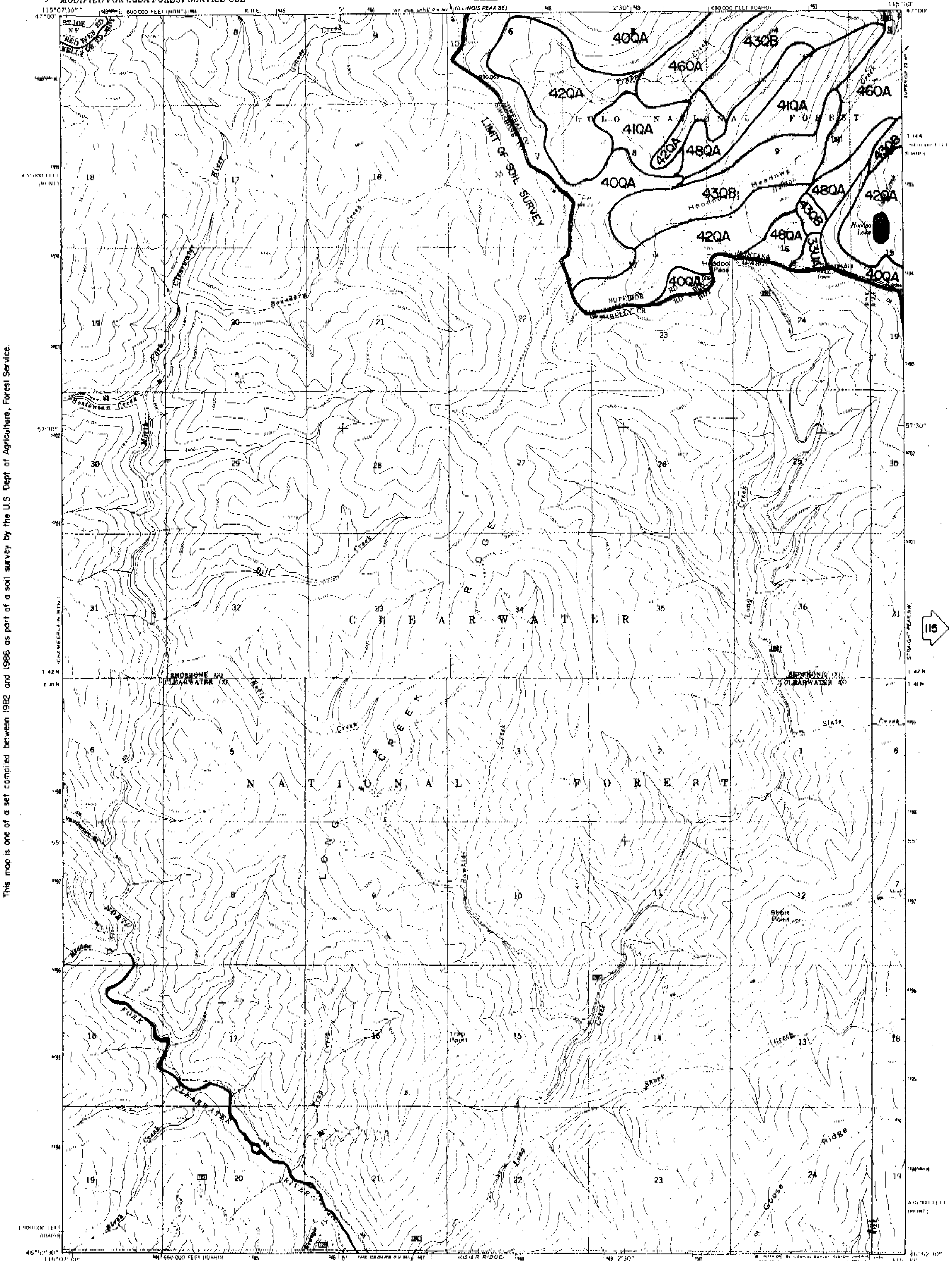
115

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

HOODOO PASS QUADRANGLE
IDAHO–MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.



SCALE 1:63360

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SOILS MAPPING LEGEND

- Map Unit Boundary
- Limit of Soil Survey
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, BLM Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Locked Gate

U.S. Highway
State Highway
County Highway
Forest Road
Forest Trail

CLEARWATER NATIONAL FOREST
QUADRANGLE LOCATION DIAGRAM

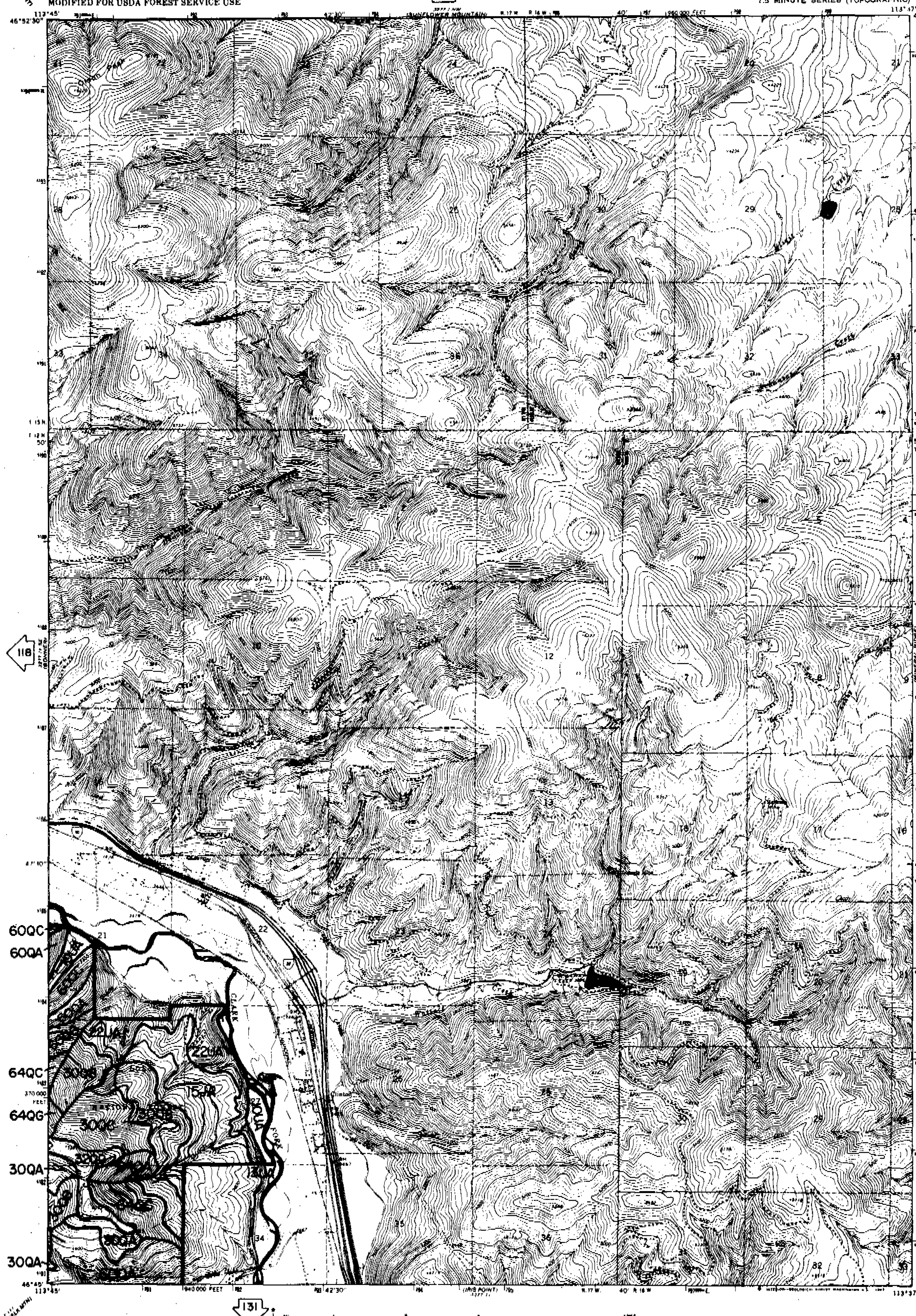
116

HOODOO PASS, IDAHO–MONT.
N4652.5—W11500/7.5
1966
PHOTOREVISED 1984
DMA 2977 I NE–SERIES V893

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CLINTON QUADRANGLE
MONTANA—MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
EAST

CLINTON, MONT.
N4645—W11337.5/7.5
1965

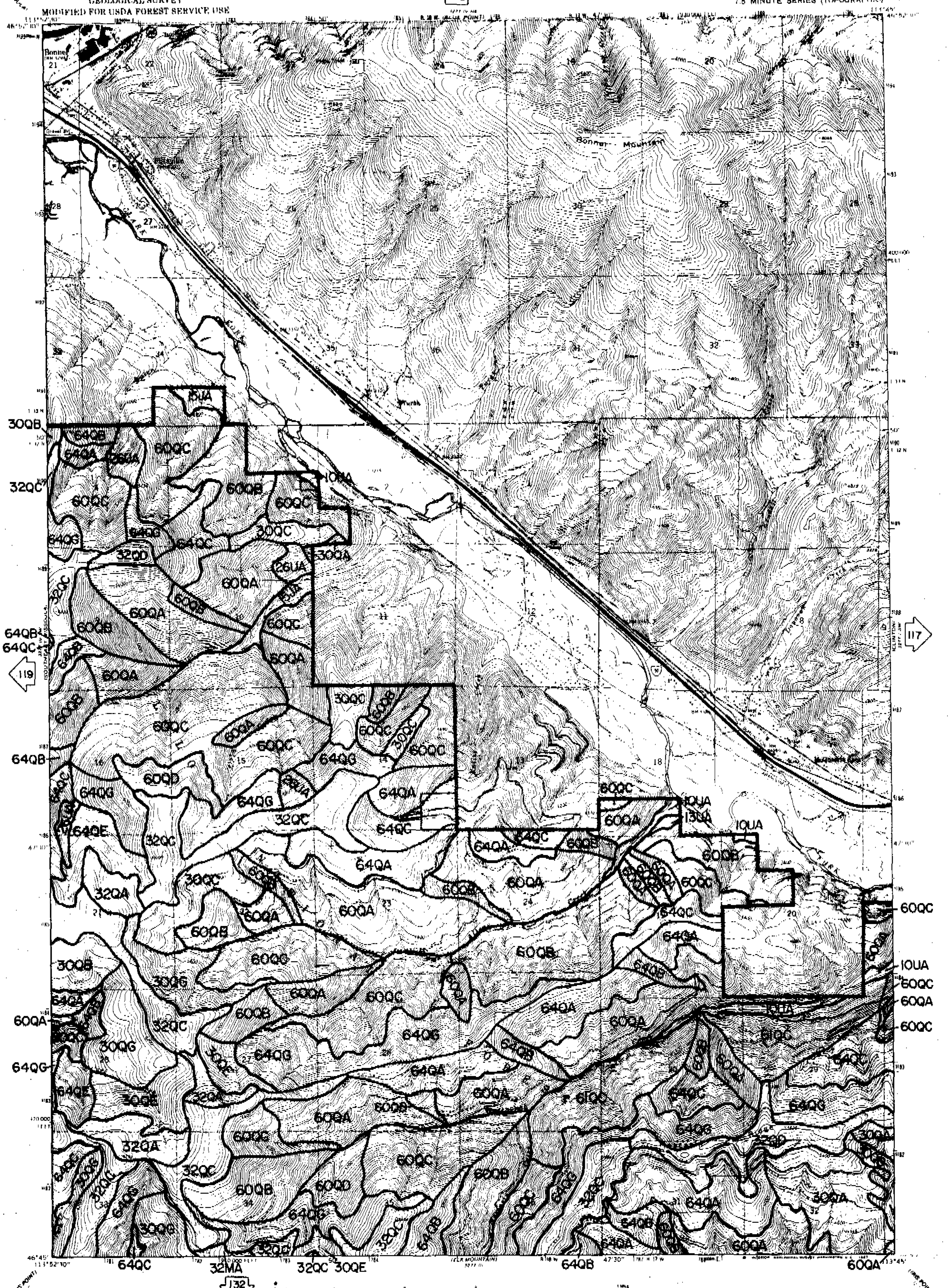
SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- W Water
- 125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BONNER QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



BONNER, MONT.
N4645—W11345/7.5
1965
DMA 3277 IV SE—SERIES V894

SOILS MAPPING LEGEND

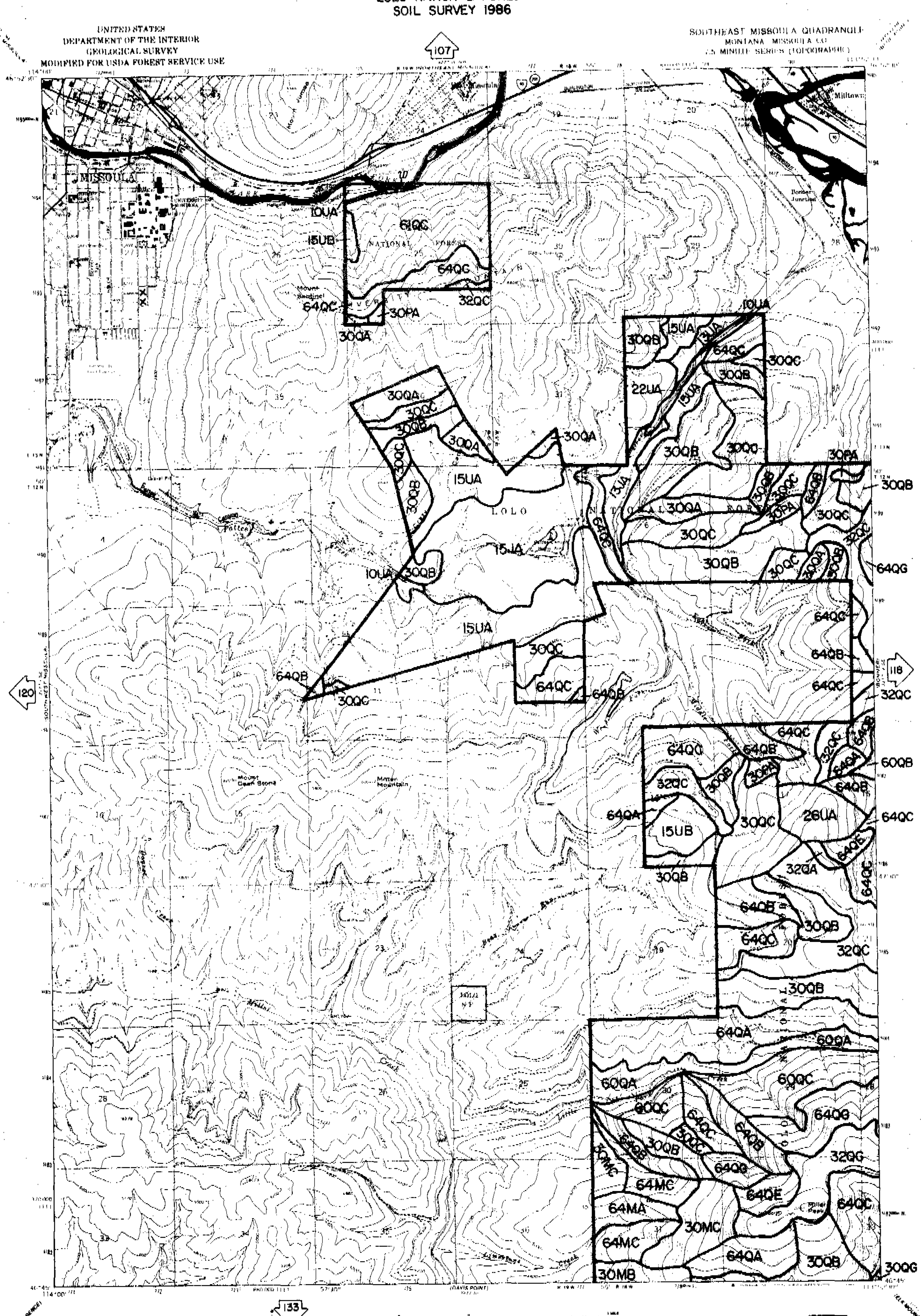
Map Unit Boundary

42QA Map Unit Symbols

w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986



SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

W Water

125 Adjoining Sheet Number

CONTOUR INTERVAL 40 FEET

LEGEND

National Forest Boundary

Non-Forest Service Land

TOWNSHIP AND SECTION LINE CLASSIFICATION

Surveyed, Location Reliable

Surveyed, Location Unreliable

Unsurveyed, Protraction

Primary Highway

Secondary Highway

Improved Light Duty

Unimproved Dirt

Trail

Interstate Highway

U.S. Highway

State Highway

County Road

Locked Gate

LOLO NATIONAL FOREST EAST

119

SOUTHEAST MISSOULA, MONT.

N4645 — W11352.5/7.5

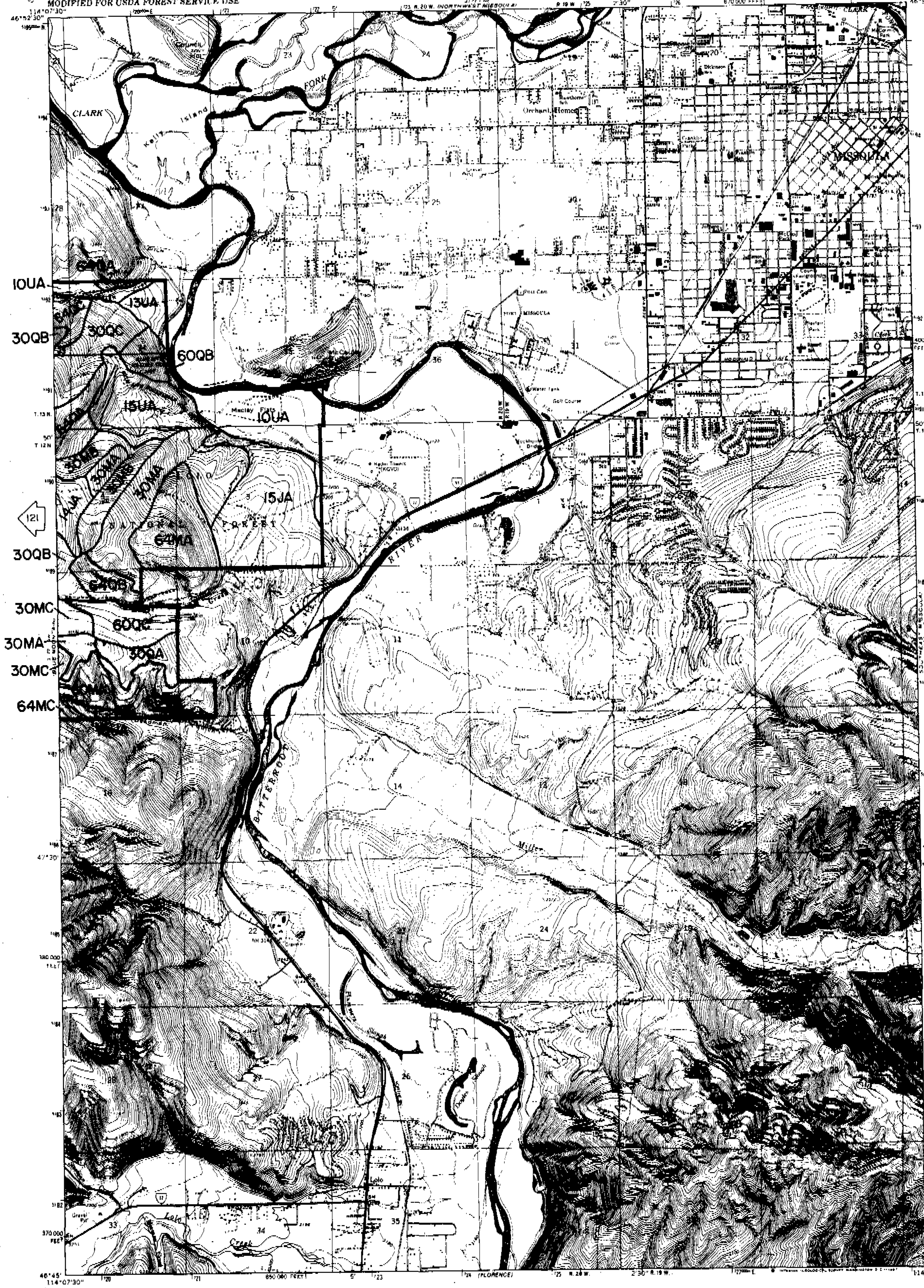
1964

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SOUTHWEST MISSOULA QUADRANGLE
MONTANA–MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.



CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
EAST

120

SOUTHWEST MISSOULA, MONT.
N4645—W11400/7.5
1964

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

w Water

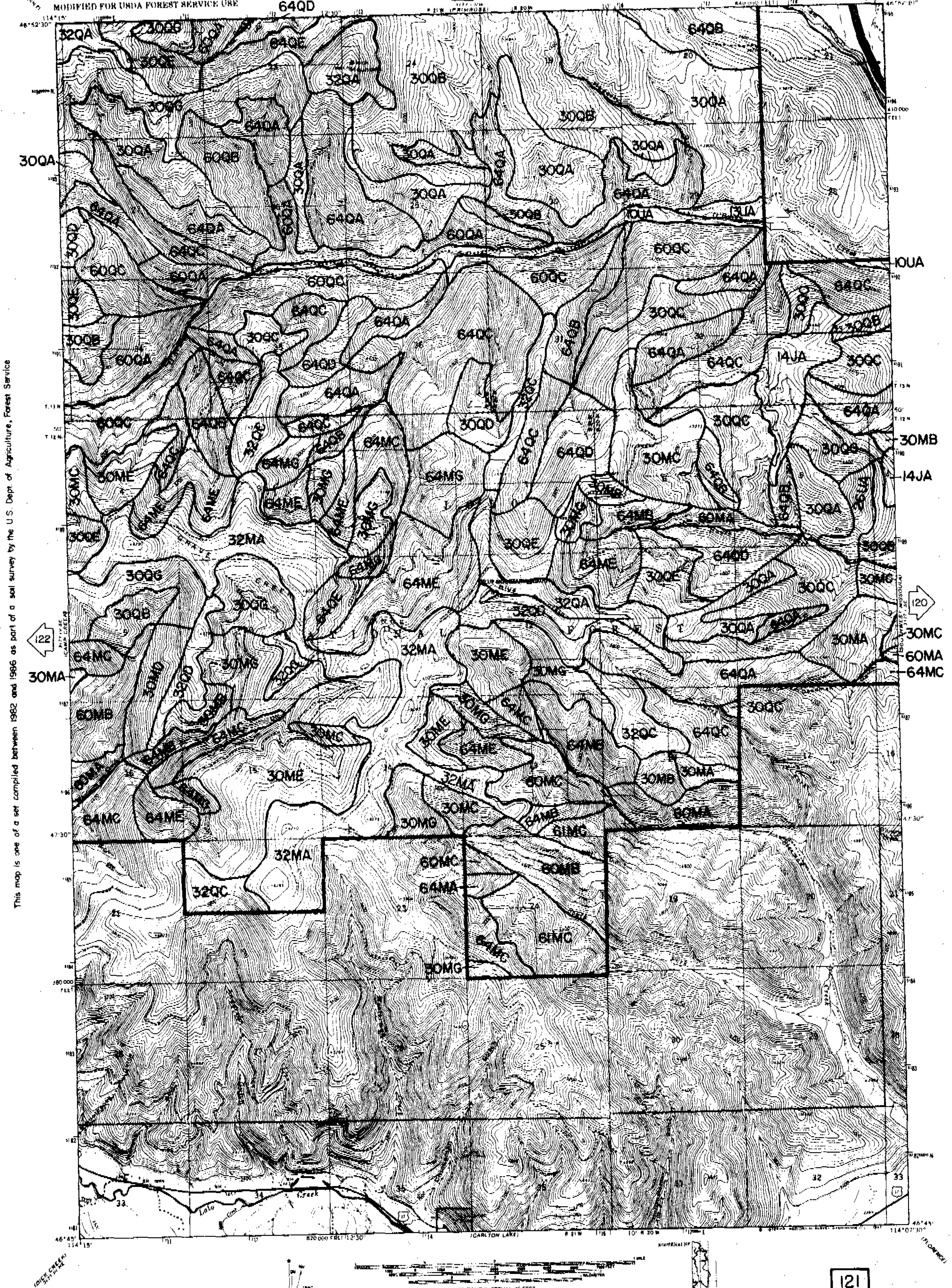
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

BLUE MOUNTAIN QUADRANGLE
MONTANA - MISSOULA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service



121

BLUE MOUNTAIN, MONT.
N4645 - W11407.5/7.5
1964
DMA 3177 I SW - SERIES V894

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

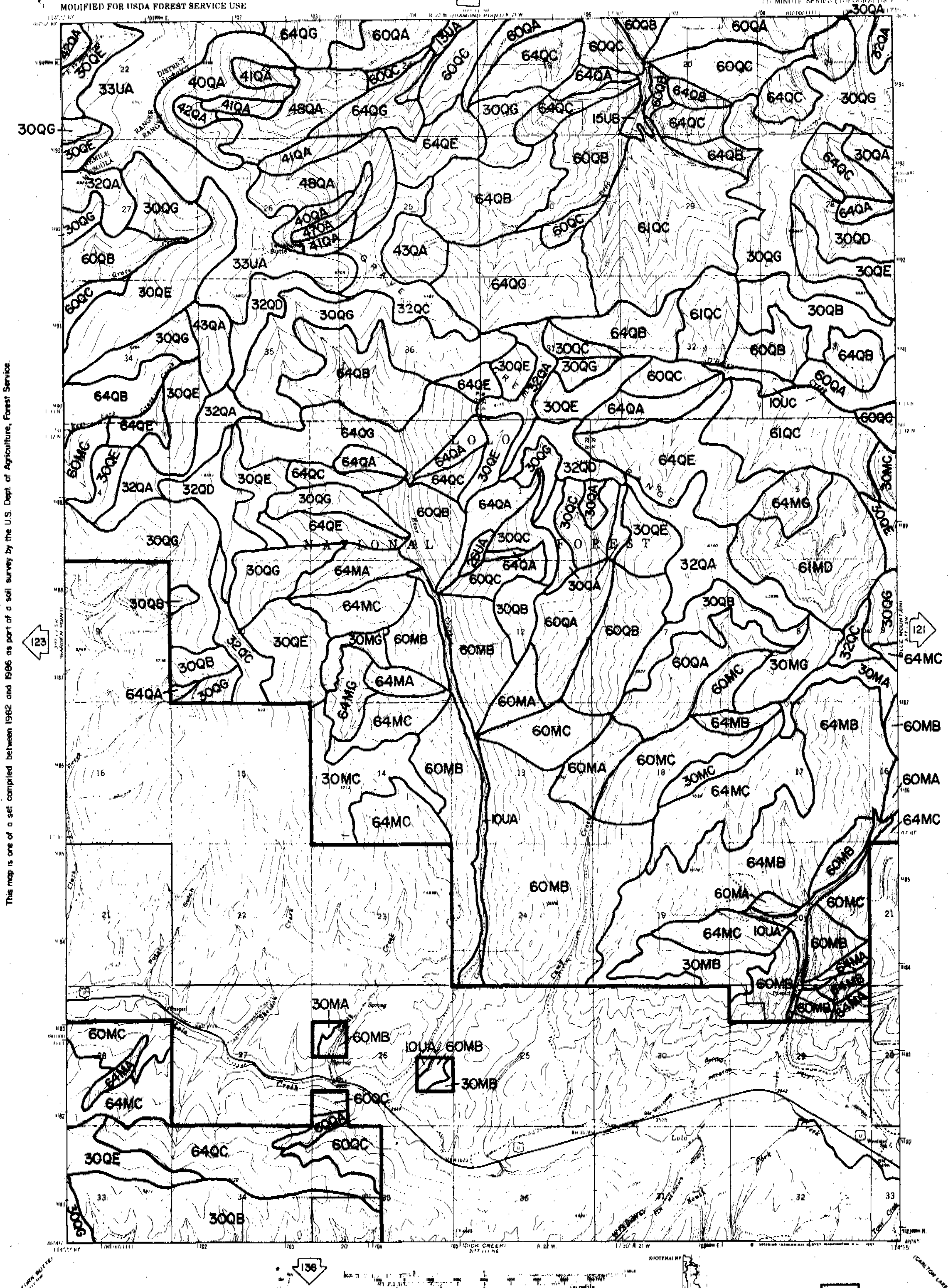
W Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

CAMP CREEK QUADRANGLE
MONTANA



CONTOUR INTERVAL 40 FEET

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

122

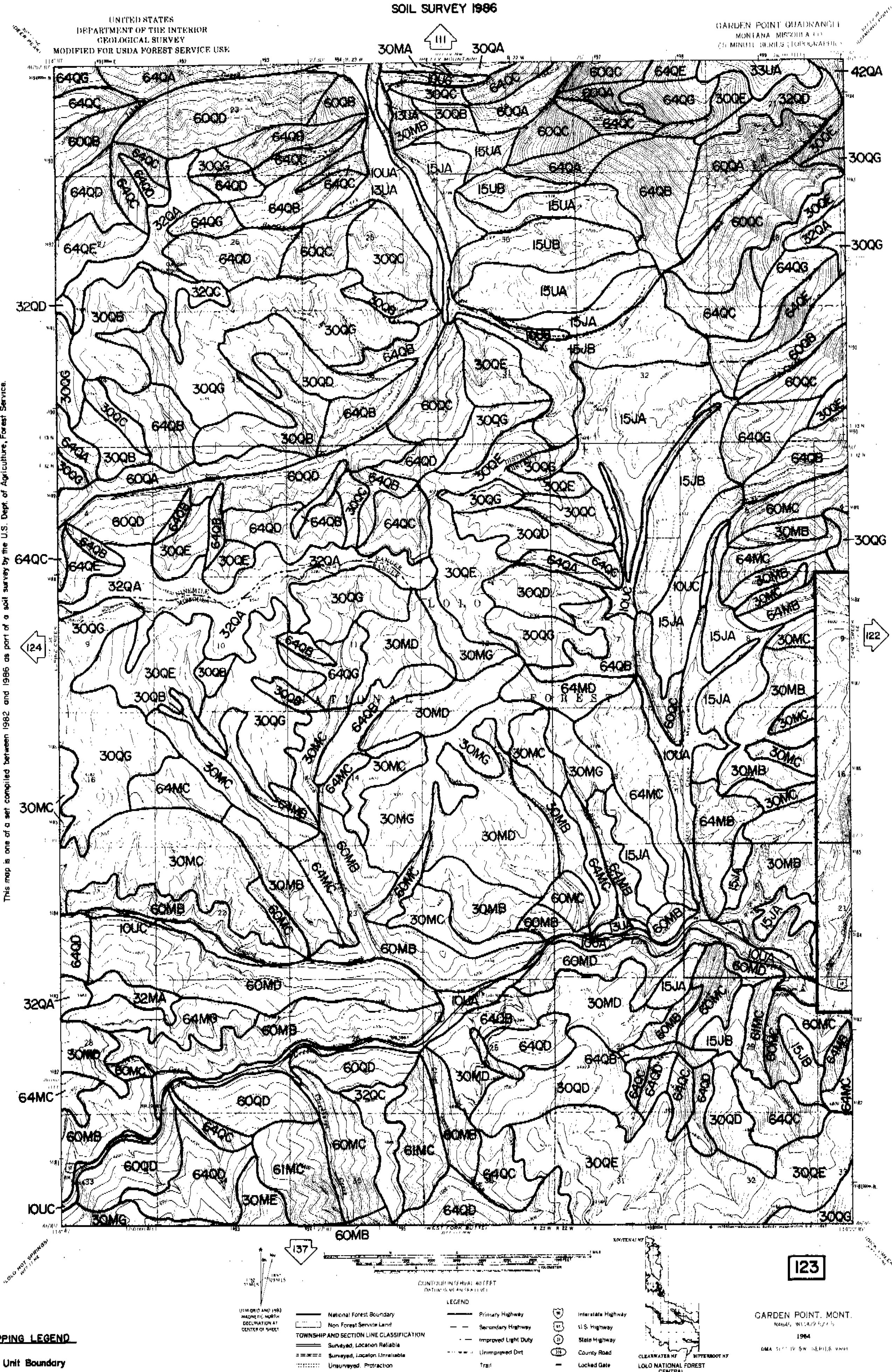
CAMP CREEK, MONT.
N4645—W11415/7.5
1964
DMA 3177 IV SE—SERIES V894

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986



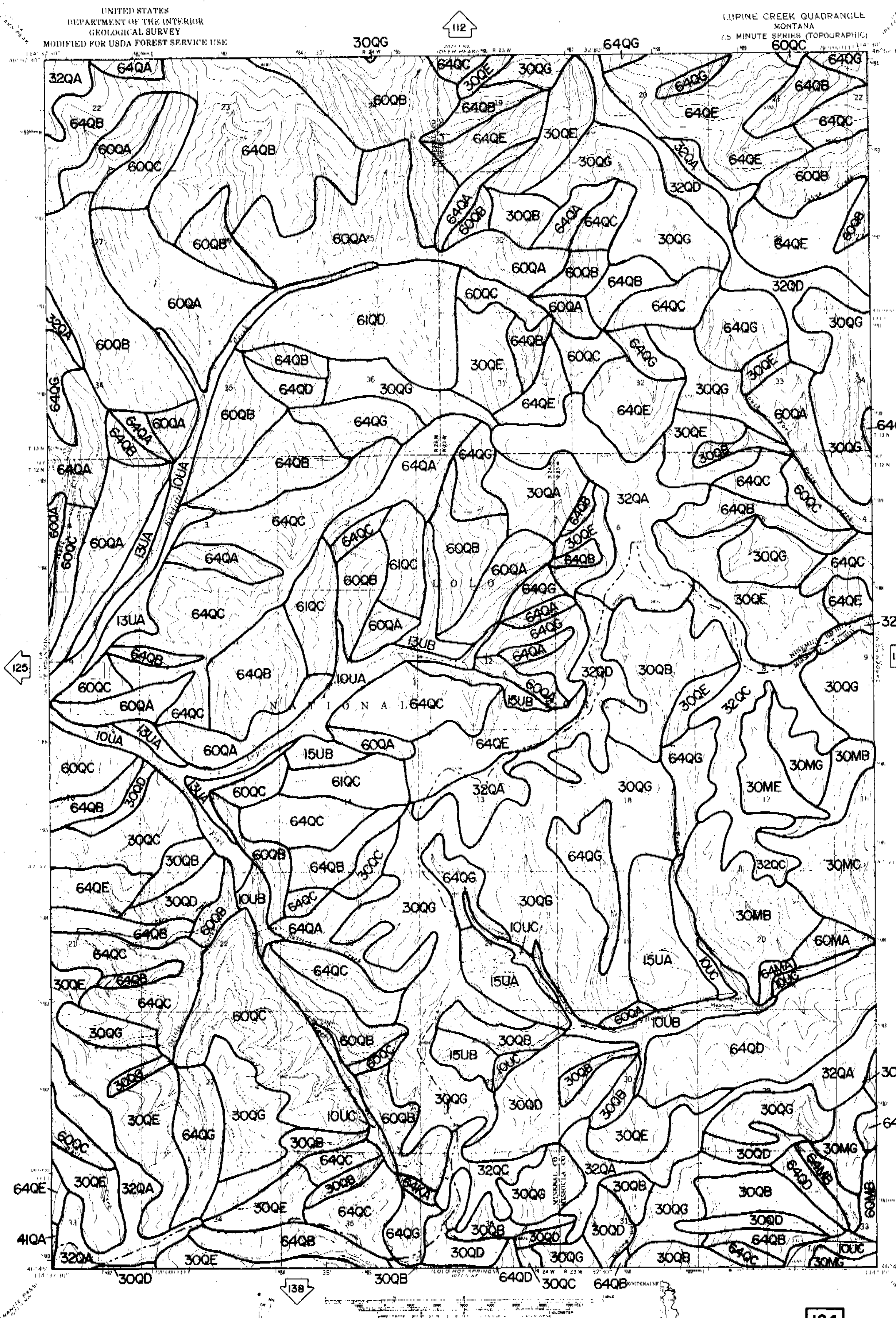
SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

w Water

LOLO NATIONAL FOREST
SOIL SURVEY 1986



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

LUPINE CREEK, MONT.

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

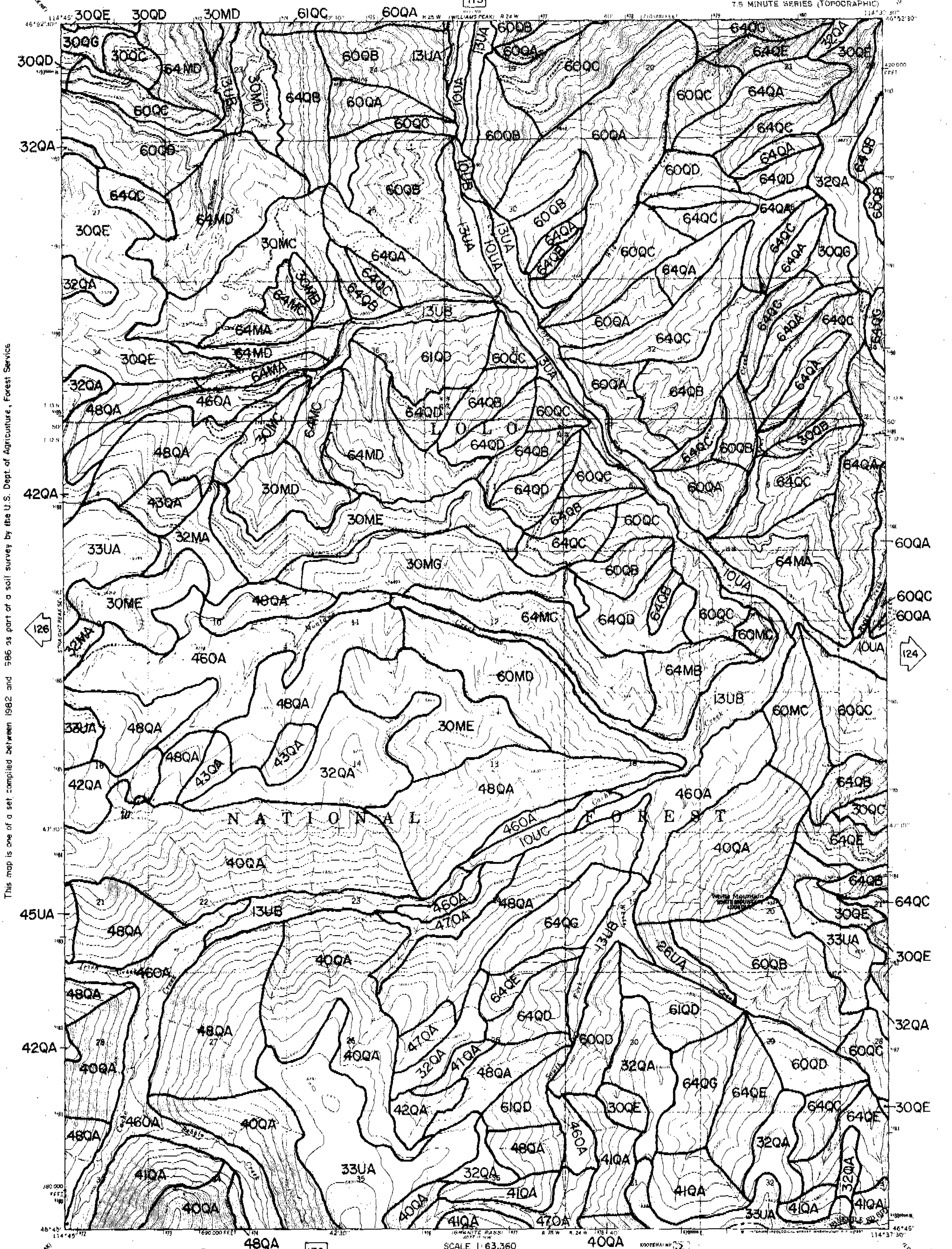
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WHITE MOUNTAIN QUADRANGLE
MONTANA – MINERAL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

125

SOILS MAPPING LEGEND

Map Unit Boundary
Limit of Soil Survey
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

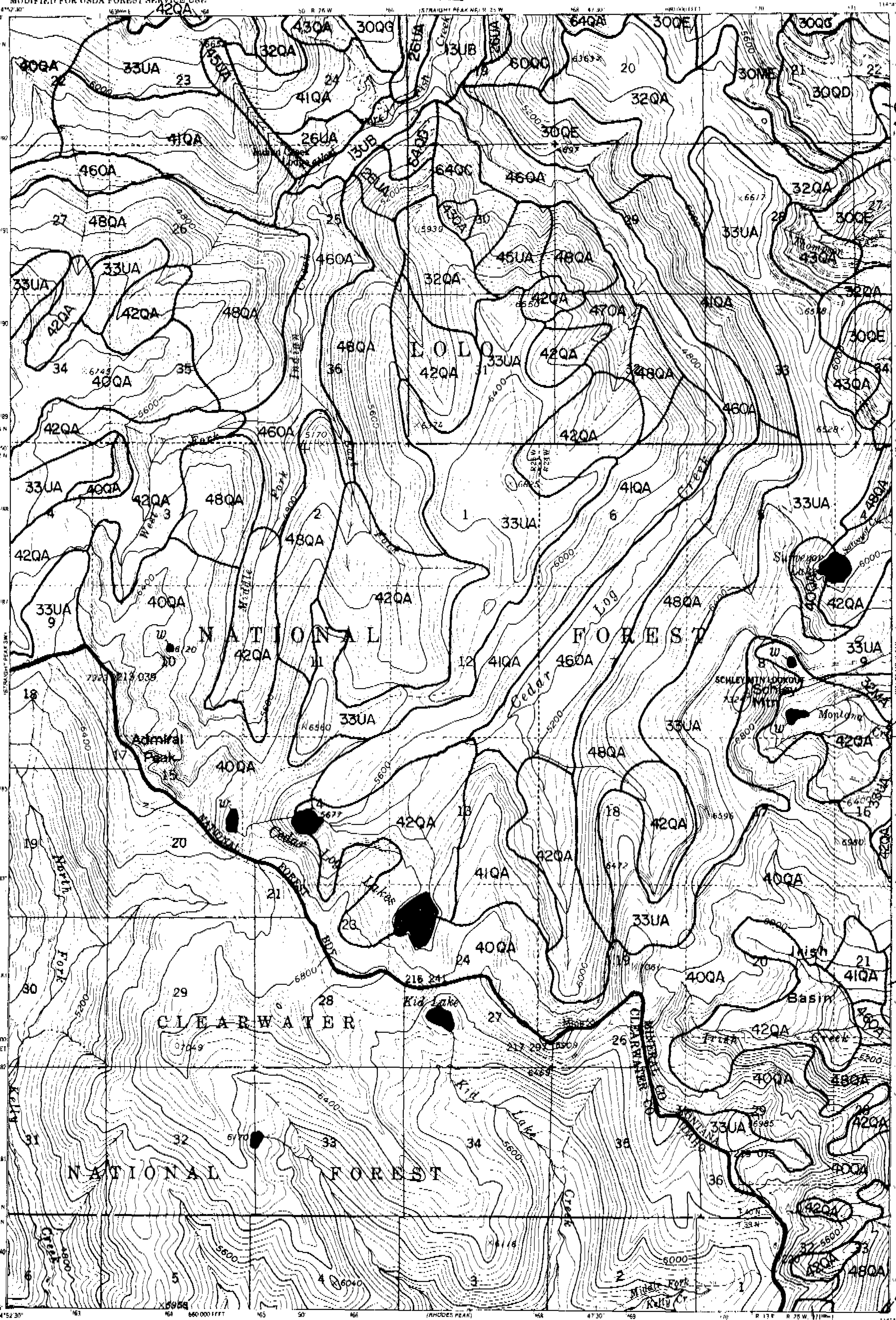
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST
CENTRAL

WHITE MOUNTAIN, MONT.
N4645—W11437.5/7.5
1964
DMA 3077 I SW—SERIES V894

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

STRAIGHT PEAK SE QUADRANGLE
IDAHO-MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- w Water
- 125 Adjoining Sheet Number

CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail

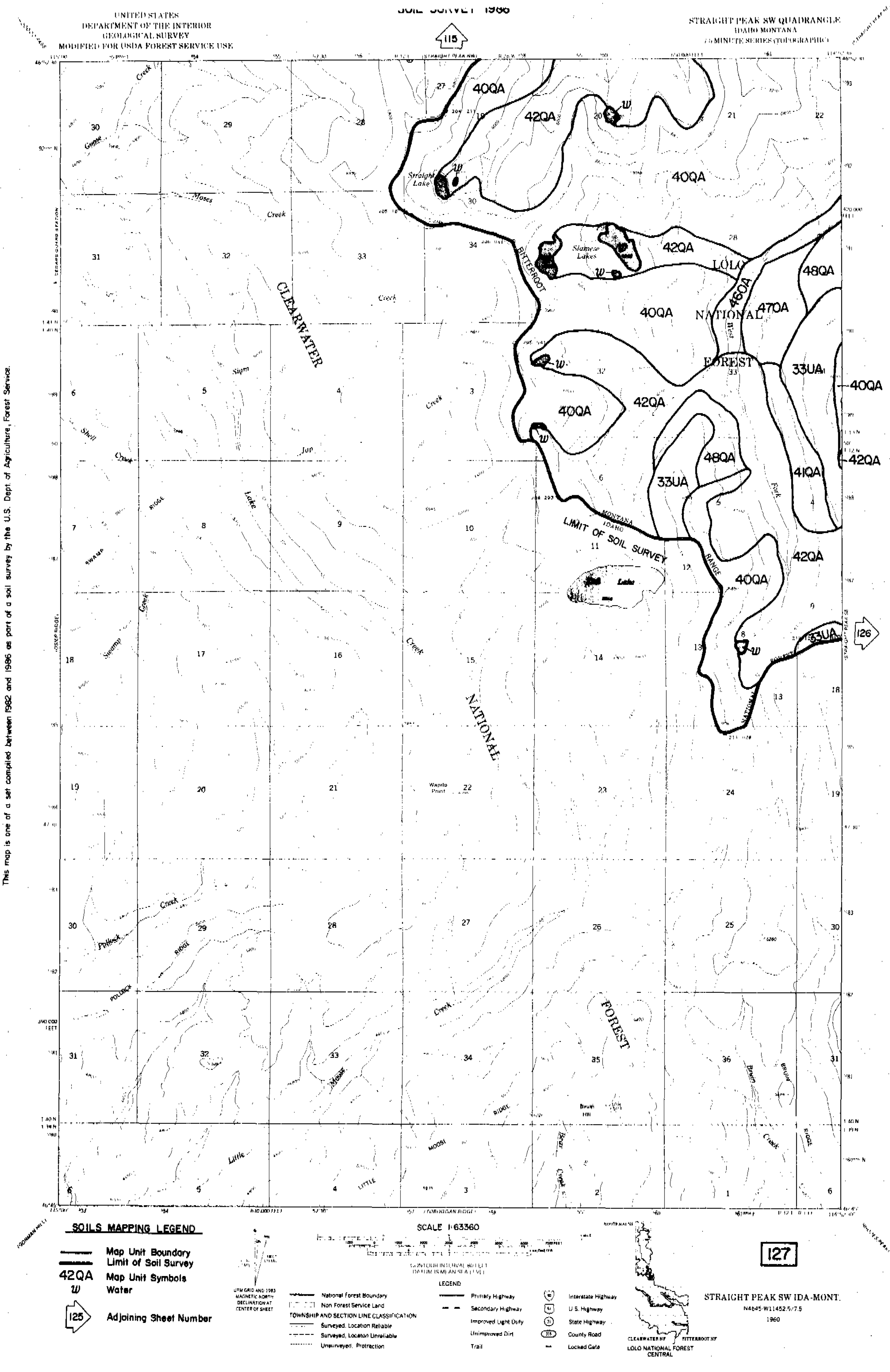
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

126

STRAIGHT PEAK SE, IDA-MONT.
N4645-W11445/7.5
1960

LOLO NATIONAL FOREST
CENTRAL

This map is one of a set compiled between 1962 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service

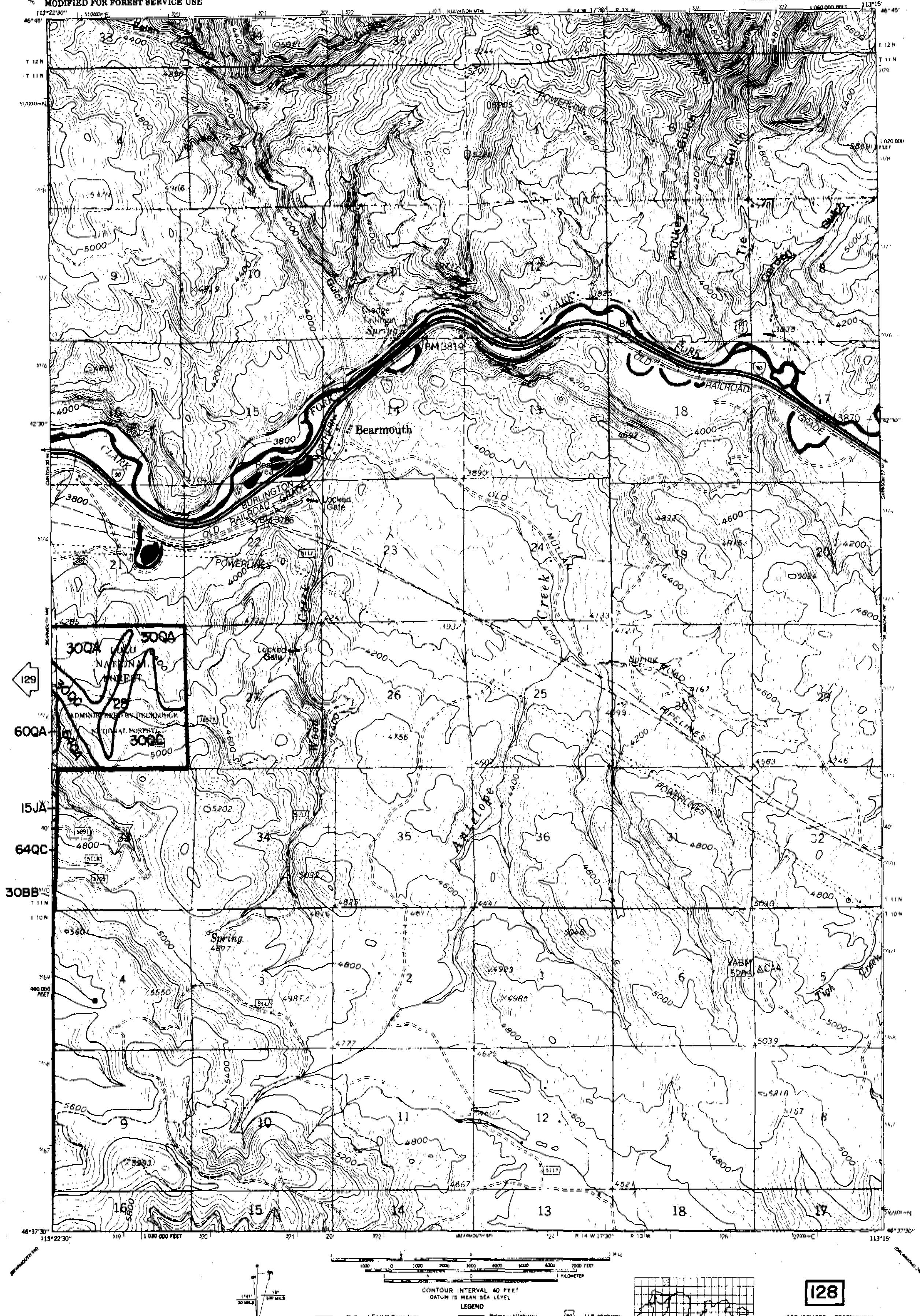


This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

BEARMOUTH N.E. QUADRANGLE
GRANITE COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



128

(ORTHOPHOTO. BEARMOUTH)
BEARMOUTH N.E., MONTANA
1959
613-1-3-1

SOILS MAPPING LEGEND

Map Unit Boundary

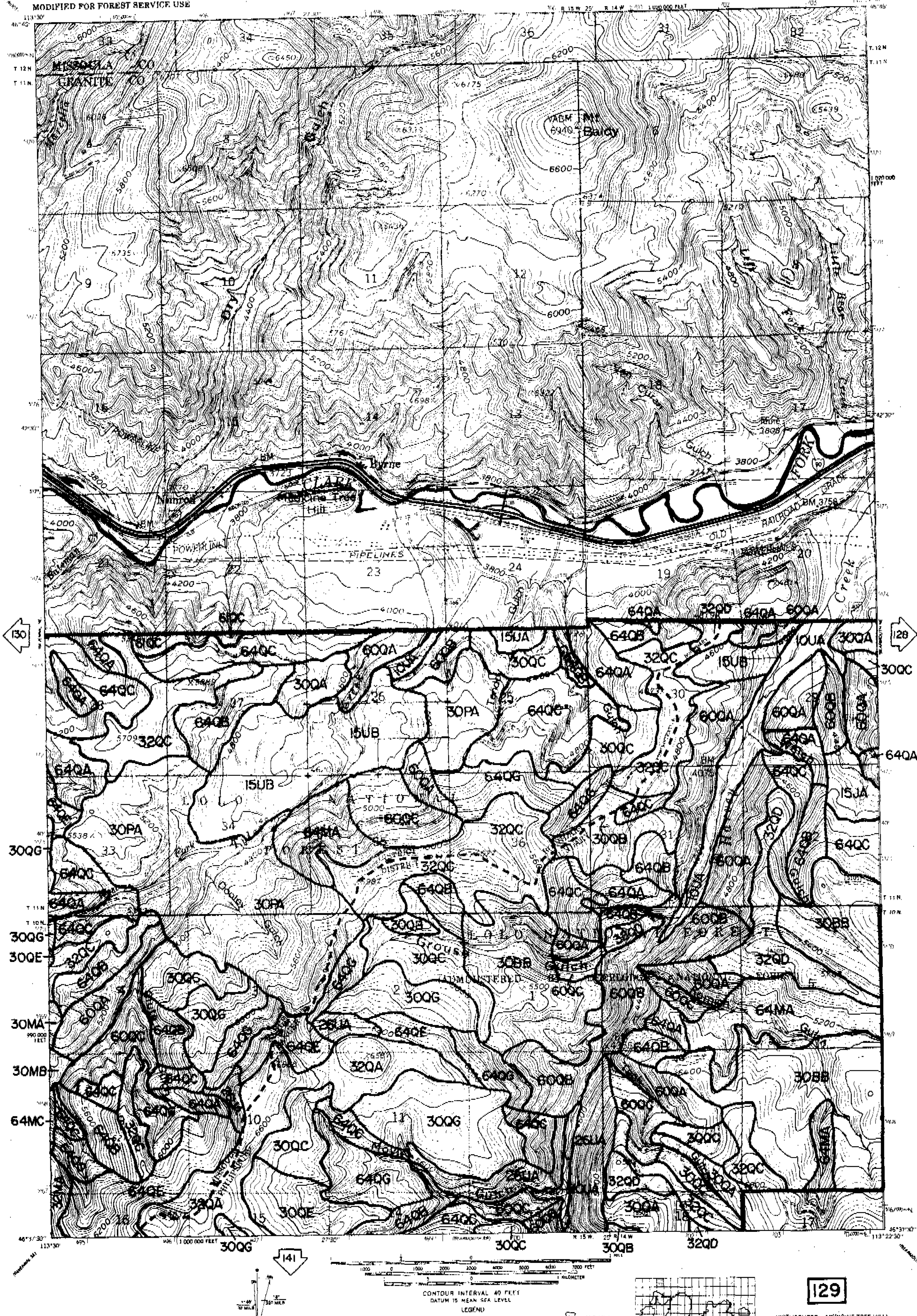
42QA Map Unit Symbols
W Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

BEARMOUTH N.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



(ORTHOPHOTO: MEDICINE TREE HILL)
BEARMOUTH N.W., MONTANA
1959
613-1-3-2

SOILS MAPPING LEGEND

Map Unit Boundary

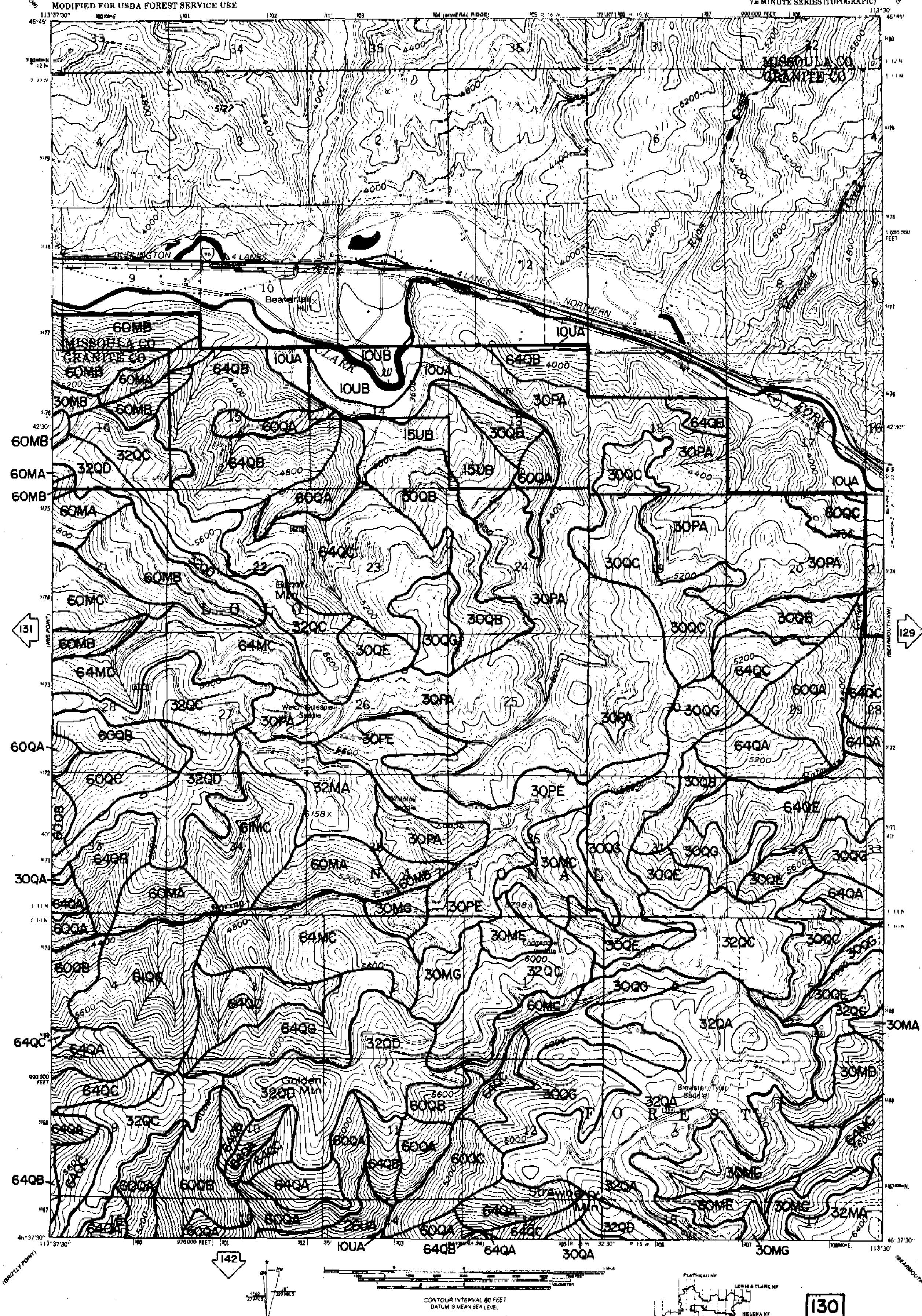
42QA Map Unit Symbols
W Water

125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

SOIL SURVEY 1986

RAVENNA N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



130

RAVENNA N.E., MONTANA
N4637.5-W11330/7.5
1979

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

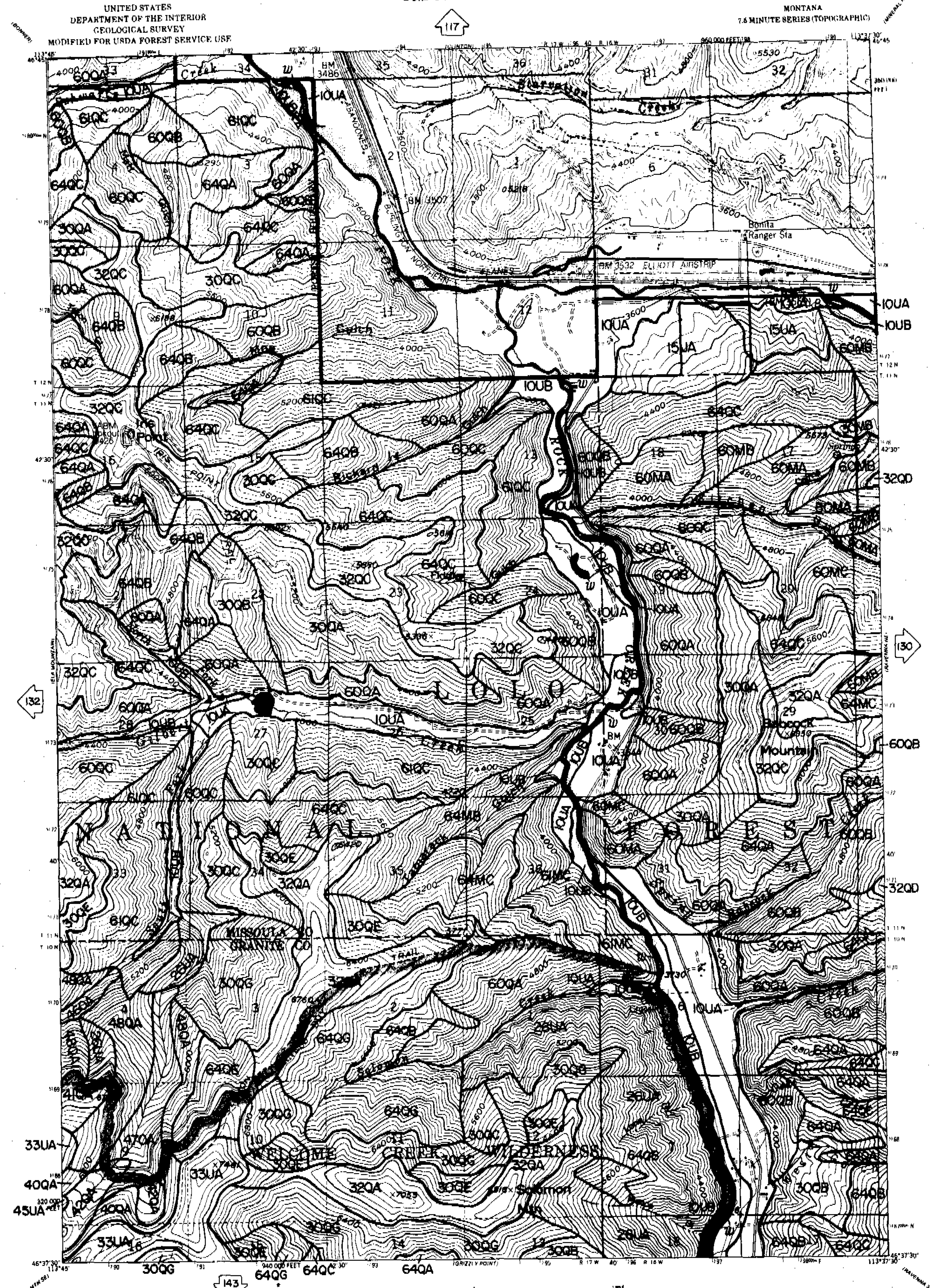
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

RAVENNA N.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



131

UTM GRID AND 1985 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Service Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Unreliable
Unsurveyed, Protraction

LEGEND
Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Interstate Highway
U.S. Highway
State Highway
County Road
Locked Gate

LOLO NATIONAL FOREST EAST

RAVENNA N.W., MONT

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

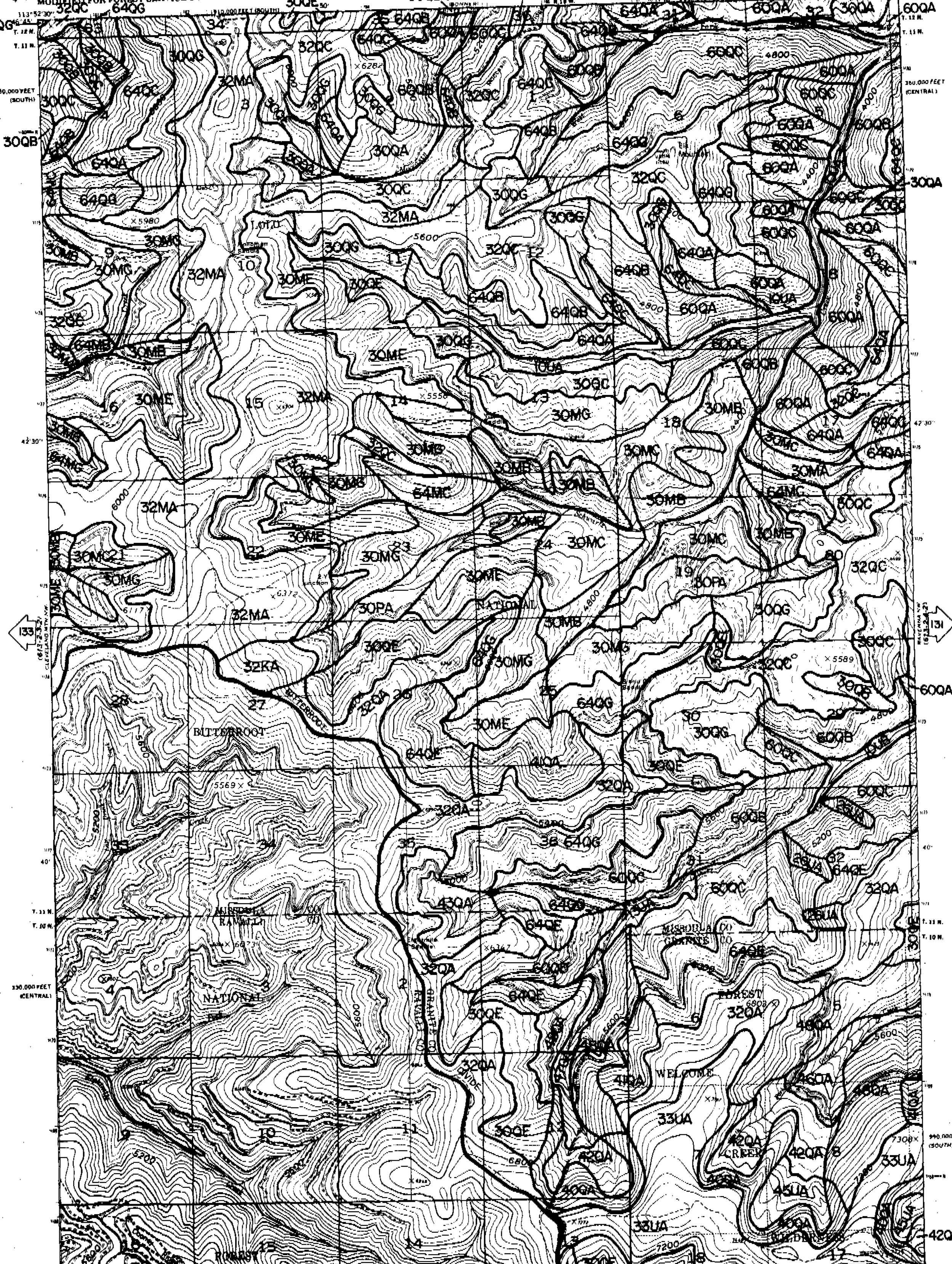
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

CLEVELAND MTN N.E. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location reliable
Surveyed, Location Approximate
Unsurveyed, Protraction
Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier
U.S. Highway
State Highway
County Road
Forest Road
Forest Trail
Locked Gate

BITTERROOT AND LOLO NATIONAL FORESTS

132

CLEVELAND MTN N.E., MONTANA

1959

613-2-3-1

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

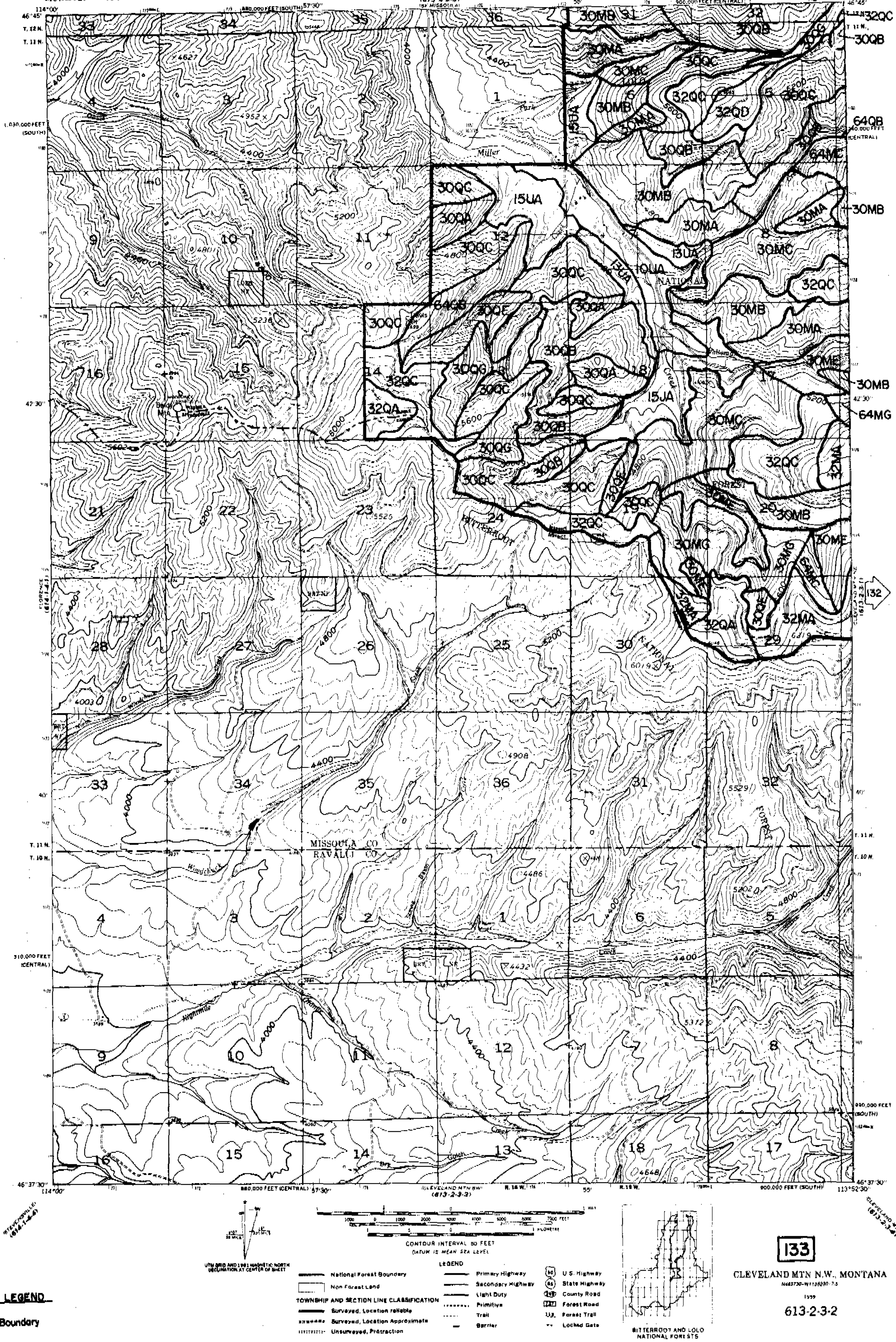
W Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

CLEVELAND MTN N.W., QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



133

CLEVELAND MTN N.W., MONTANA

1959

613-2-3-2

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

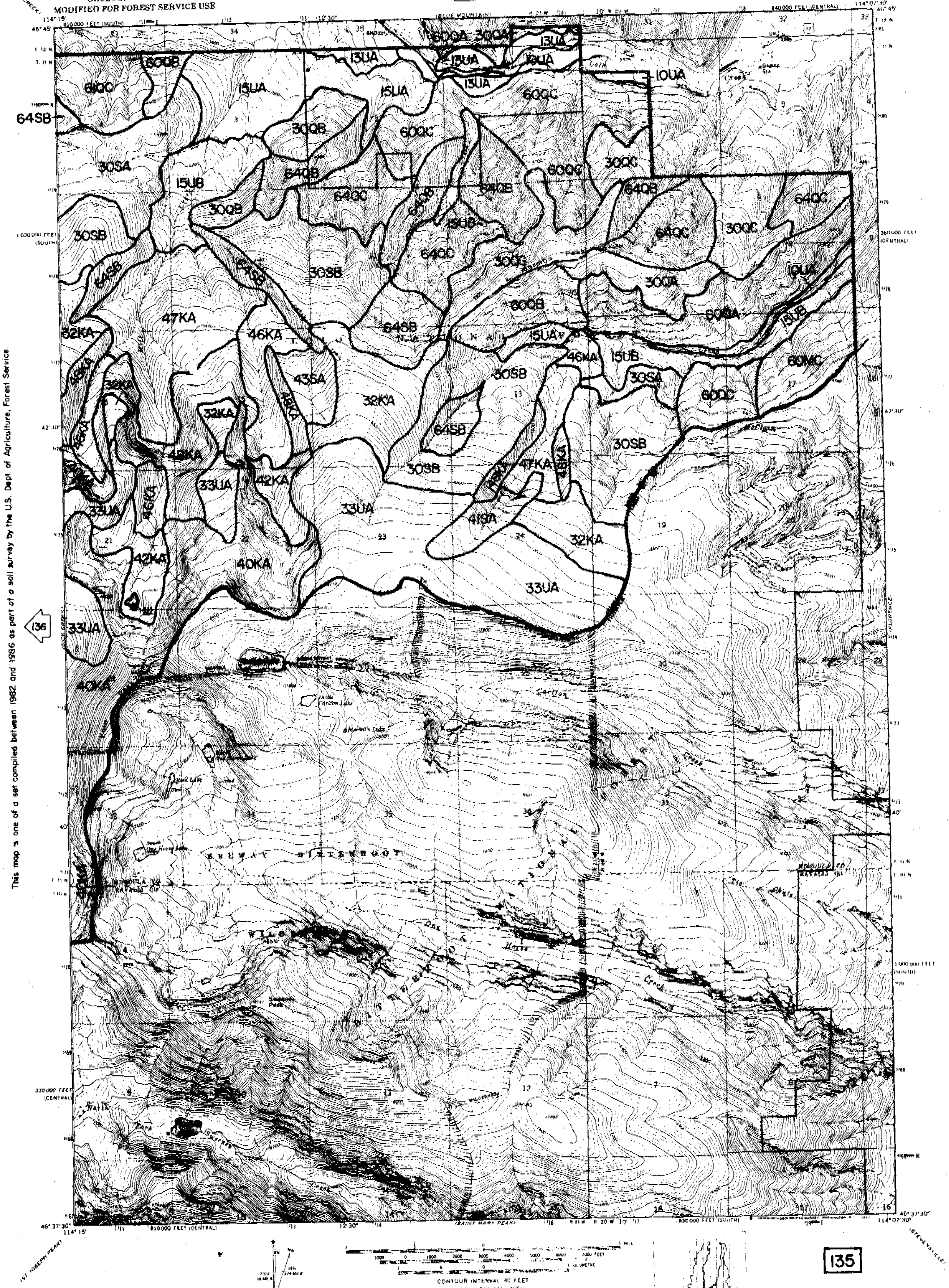
W Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

CARLTON LAKE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

- National Forest Boundary
- Non-Forest Land
- TOWNSHIP AND SECTION LINE CLASSIFICATION
- Surveyed, Location reliable
- Surveyed, Location Approximate
- Unsurveyed, Protraction
- Primary Highway
- Secondary Highway
- Light Duty
- Primitive
- Trail
- Barrier
- U.S. Highway
- State Highway
- County Road
- Forest Road
- Forest Trail
- Locked Gate

BITTERROOT NATIONAL FOREST

135

CARLTON LAKE, MONT.
N4637.5—W11407.5/7.5
1967
AMS 3177 II NW—SERIES V894
614-1-4-2

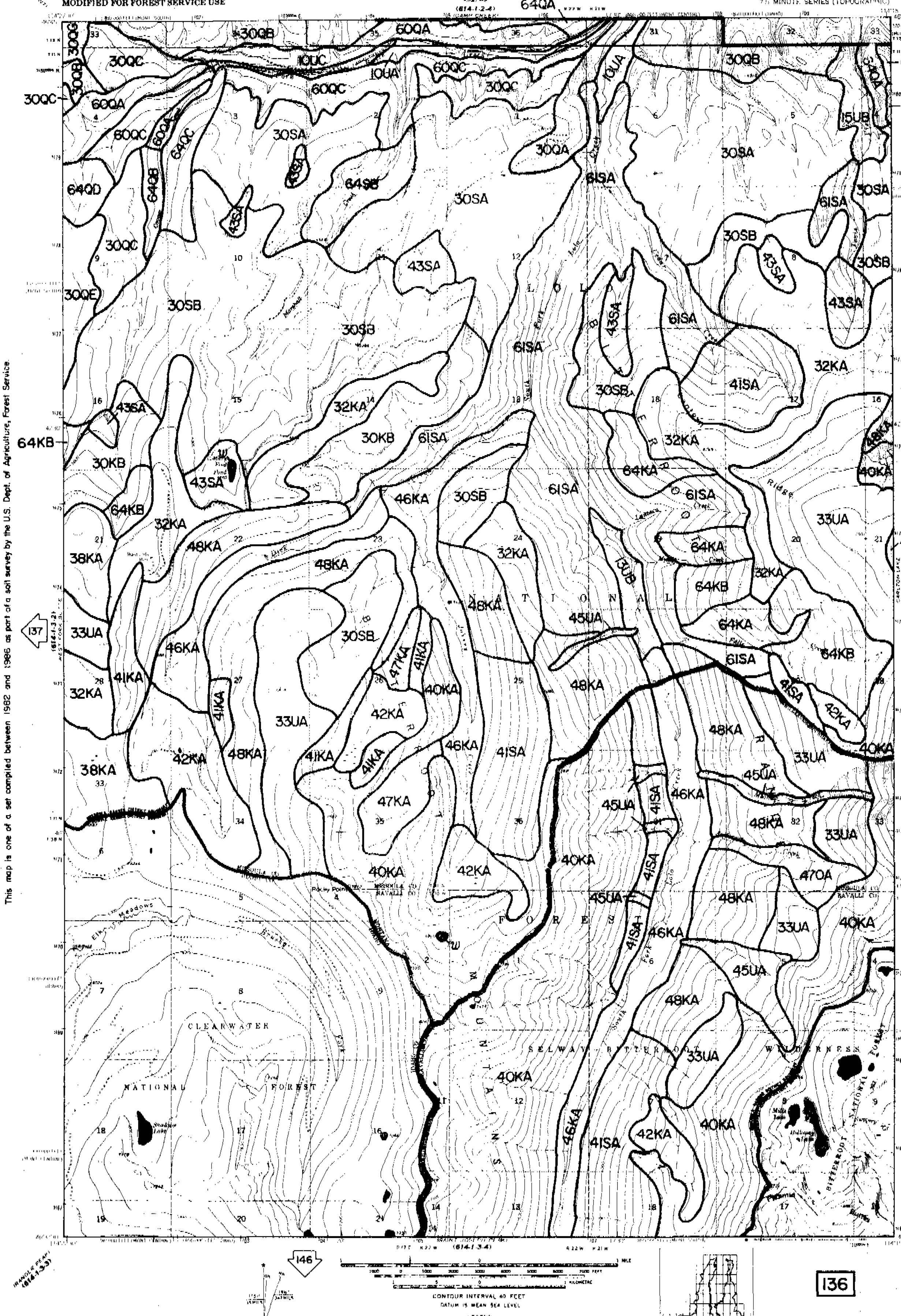
SOILS MAPPING LEGEND

- Map Unit Boundary
- 42QA Map Unit Symbols
- *w* Water
- 125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

DICK CREEK QUADRANGLE
MONTANA IDAHO
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

136

DICK CREEK MONT.-IDAHO

1964

614-1-3-1

SOILS MAPPING LEGEND

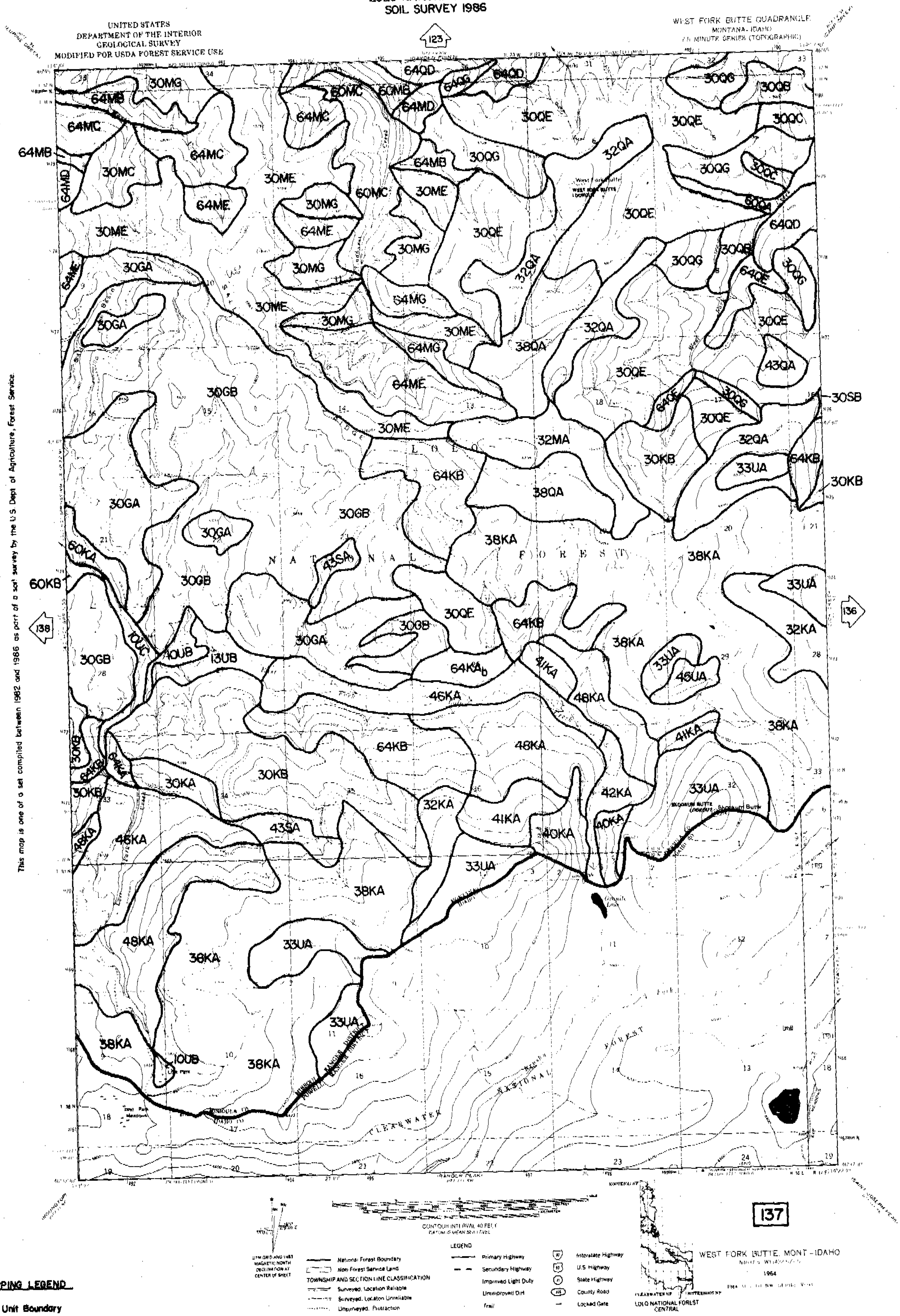
Map Unit Boundary

42QA Map Unit Symbols

w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986



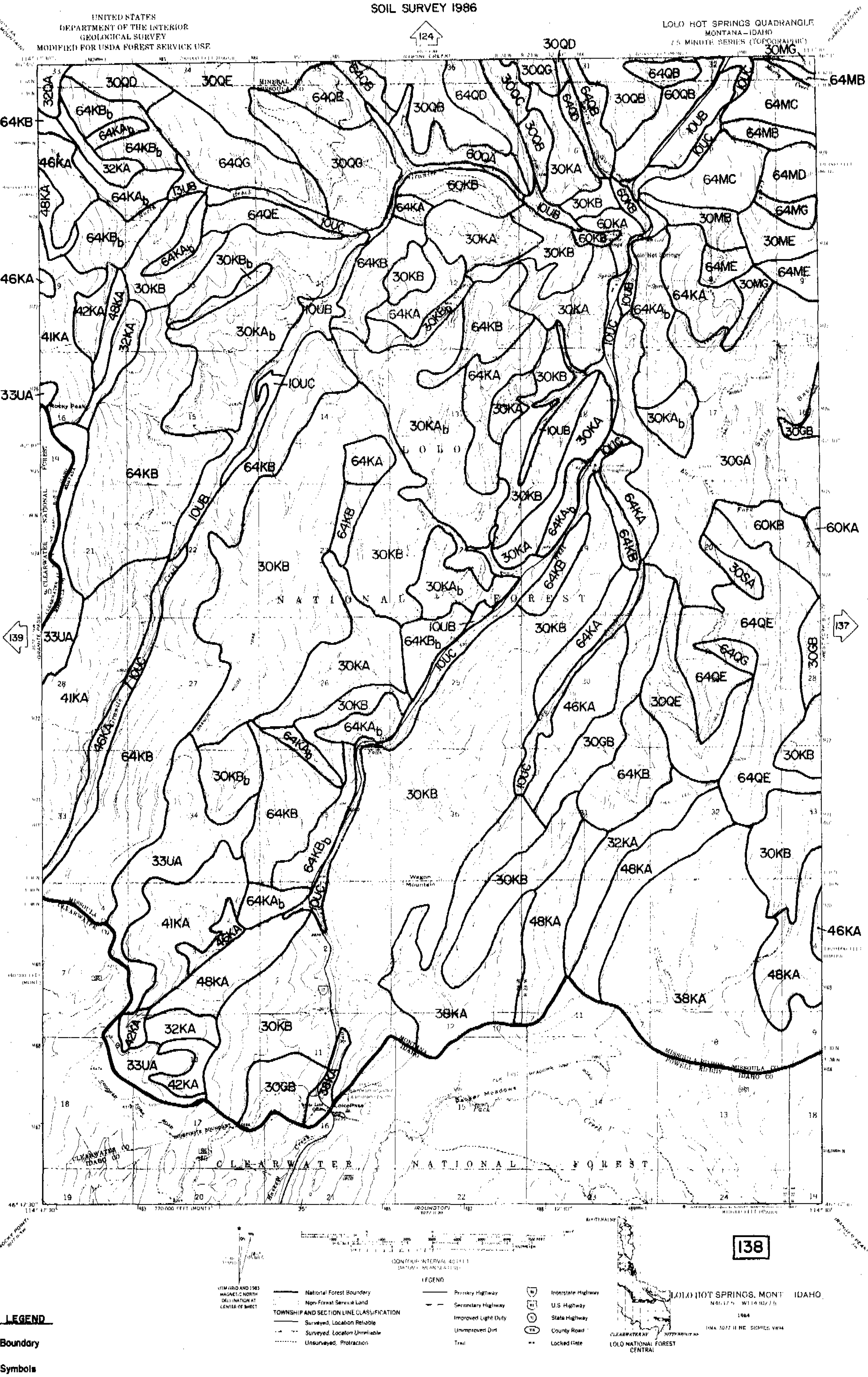
SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

W Water

LOLO NATIONAL FOREST
SOIL SURVEY 1986



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept of Agriculture, Forest Service

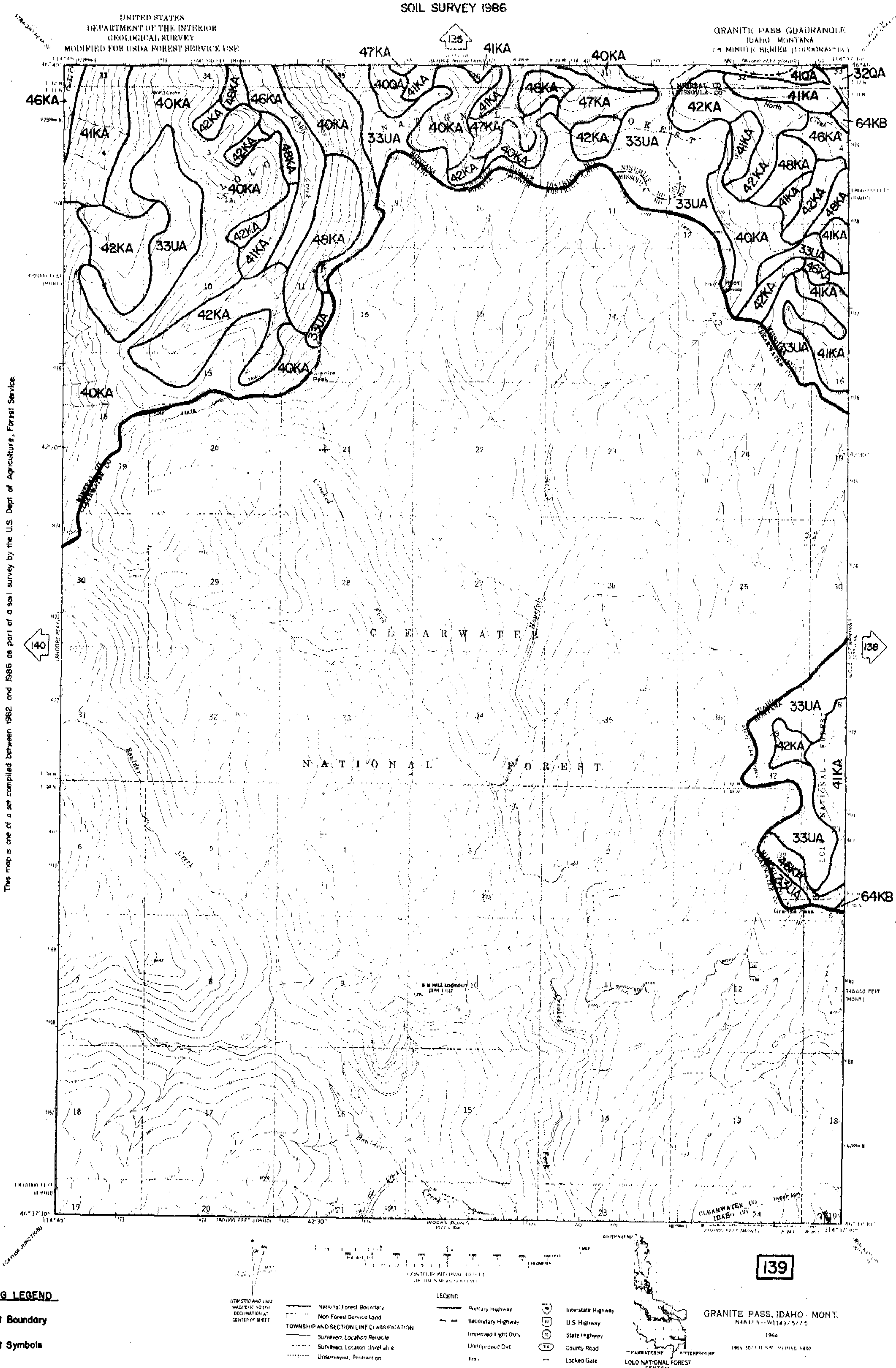
SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

W Water

LOLO NATIONAL FOREST
SOIL SURVEY 1986



139

SOILS MAPPING LEGEND

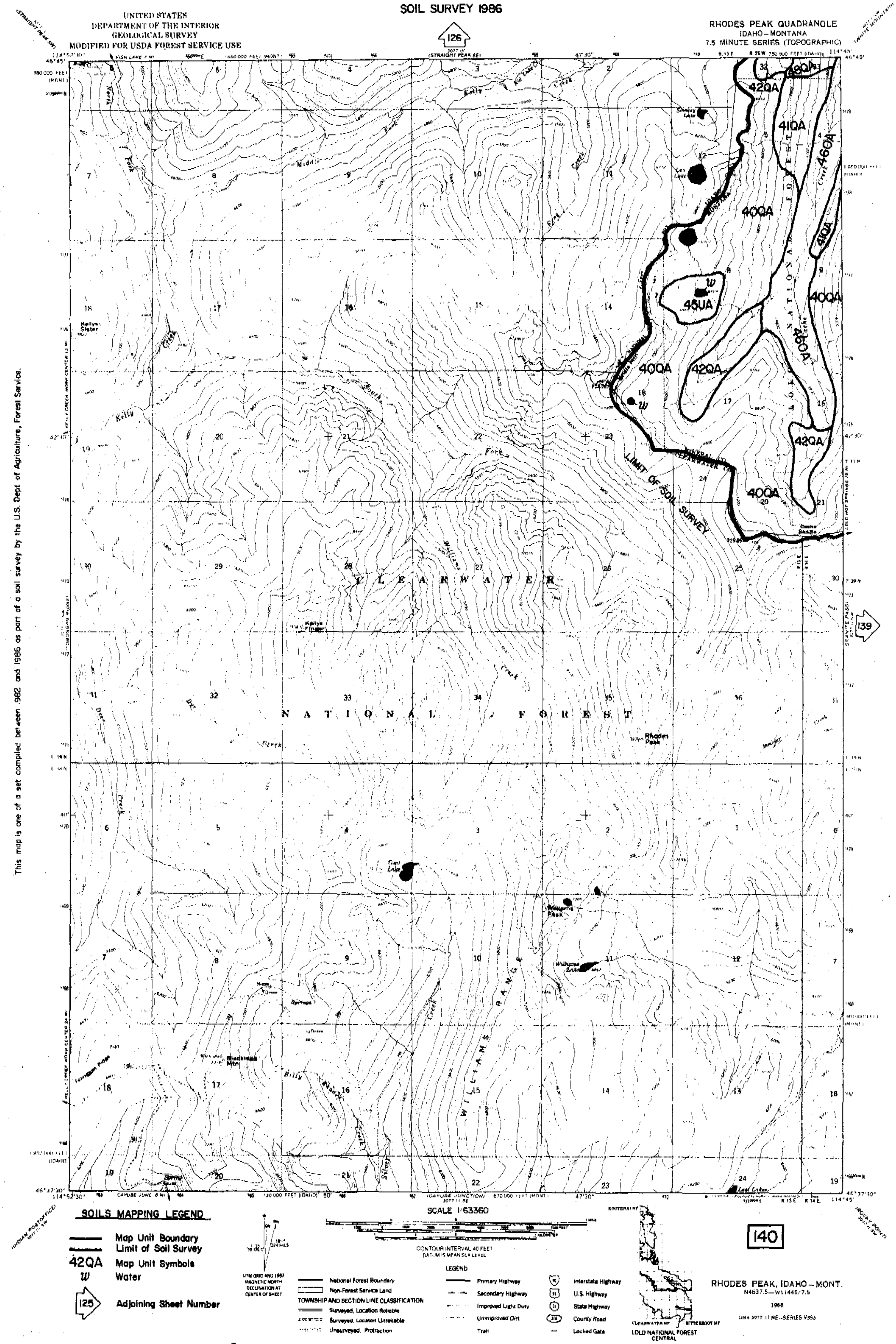
Map Unit Boundary

42QA Map Unit Symbols

w Water

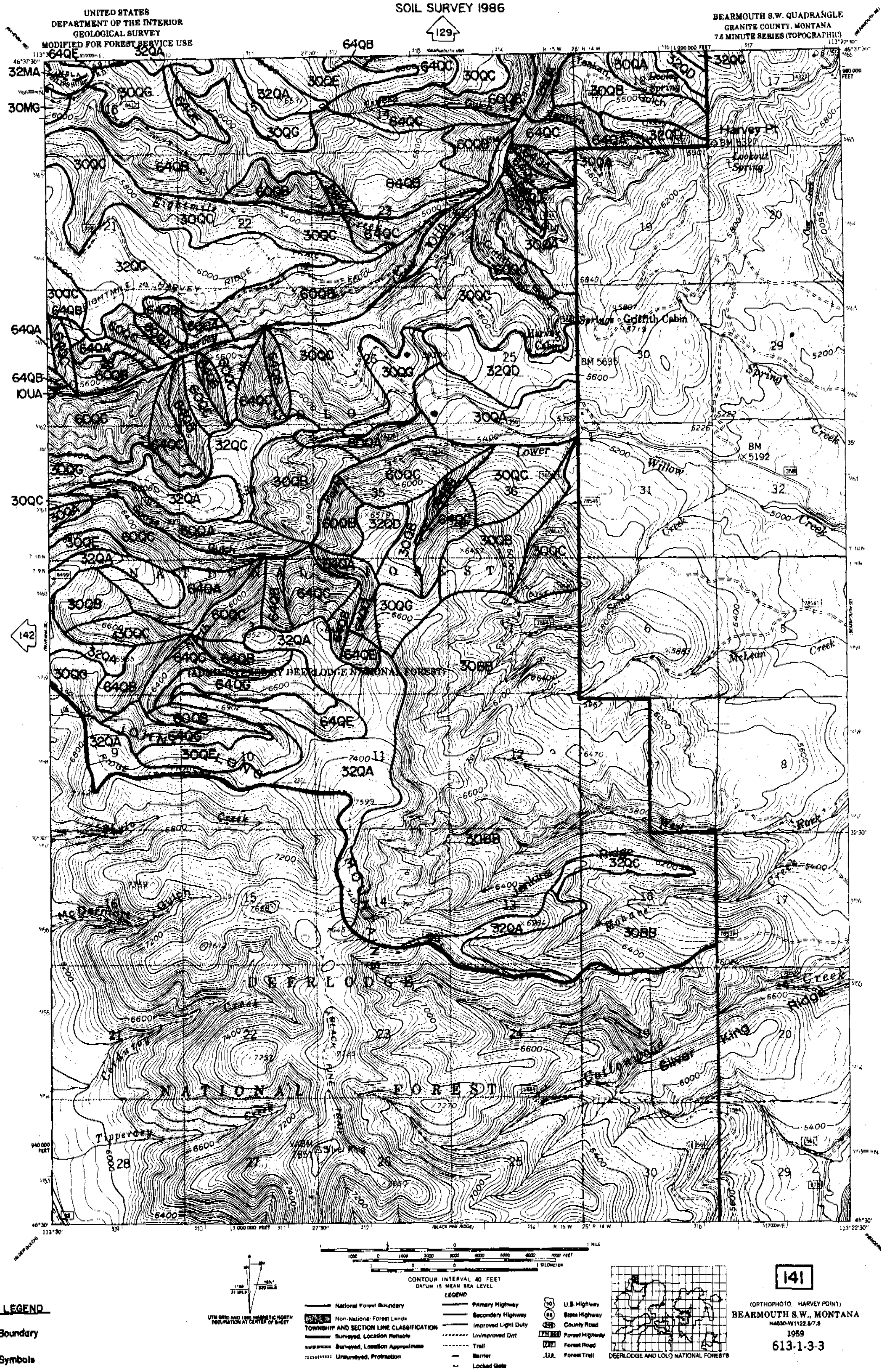
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

LOLO NATIONAL FOREST
SOIL SURVEY 1986



SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

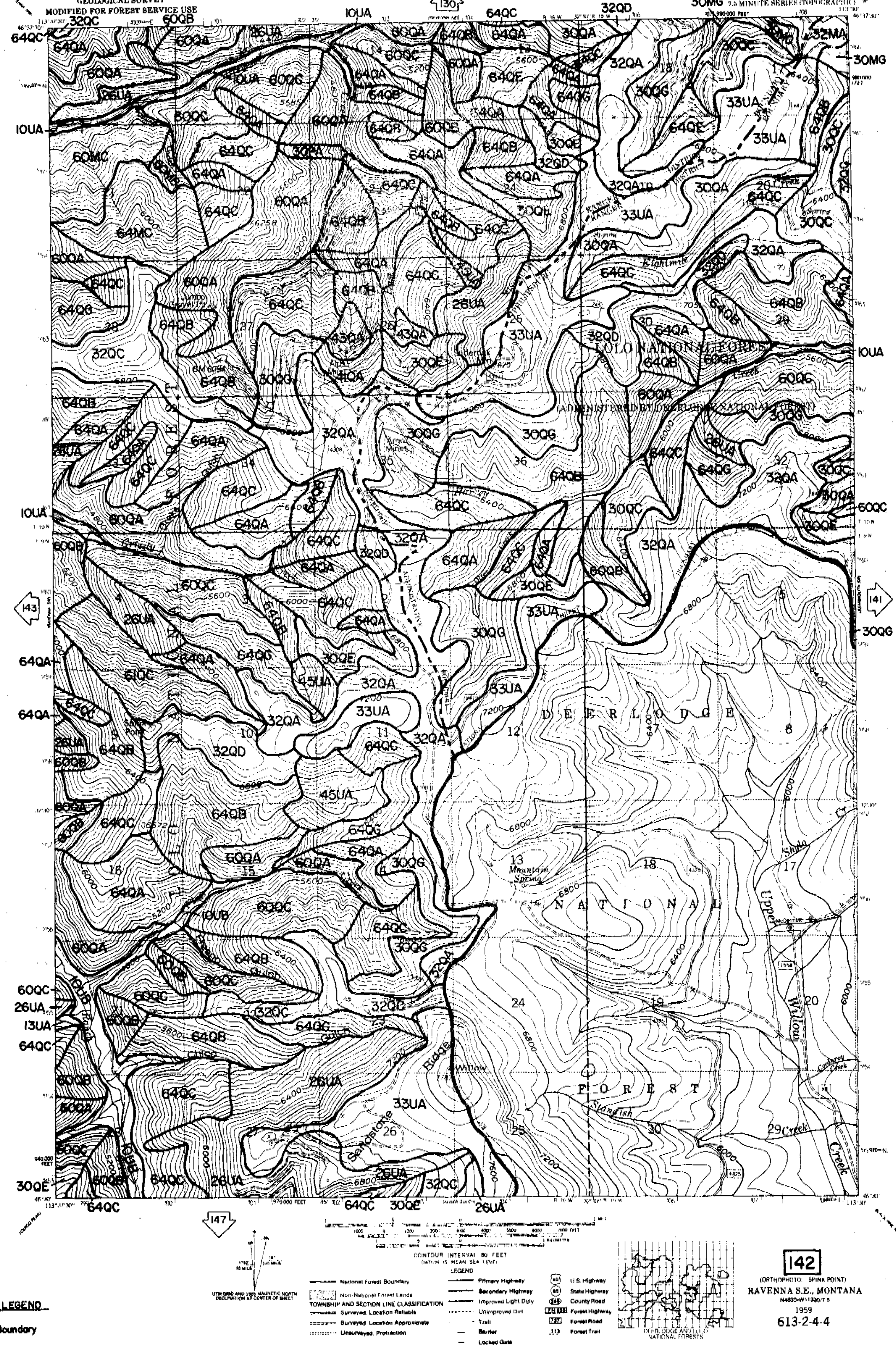
w Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

RAVENNA S.E. QUADRANGLE
GRANITE COUNTY, MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



SOILS MAPPING LEGEND

Map Unit Boundary

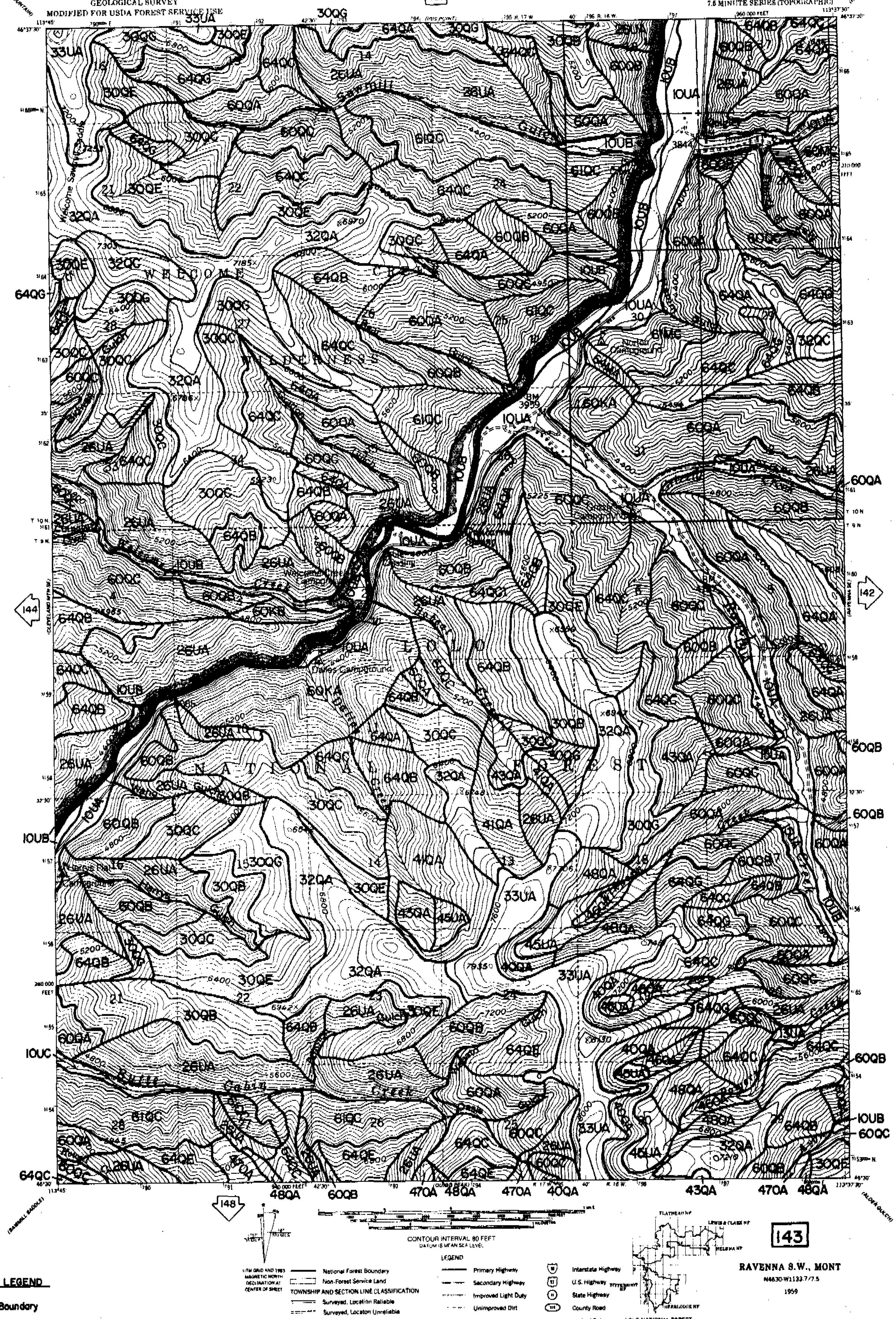
42QA Map Unit Symbols

W Water

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

RAVENNA S.W. QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

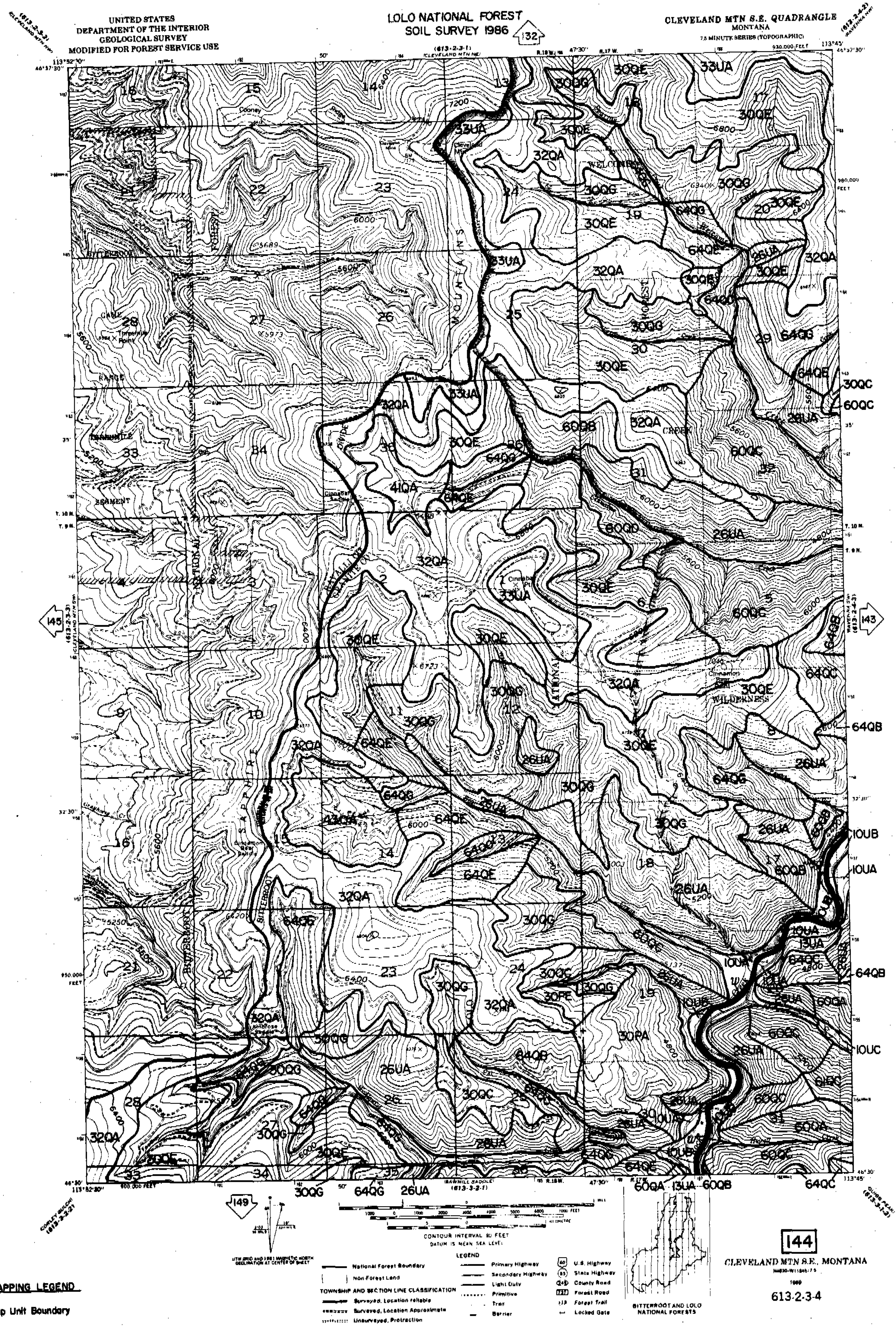


SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

w Water



SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

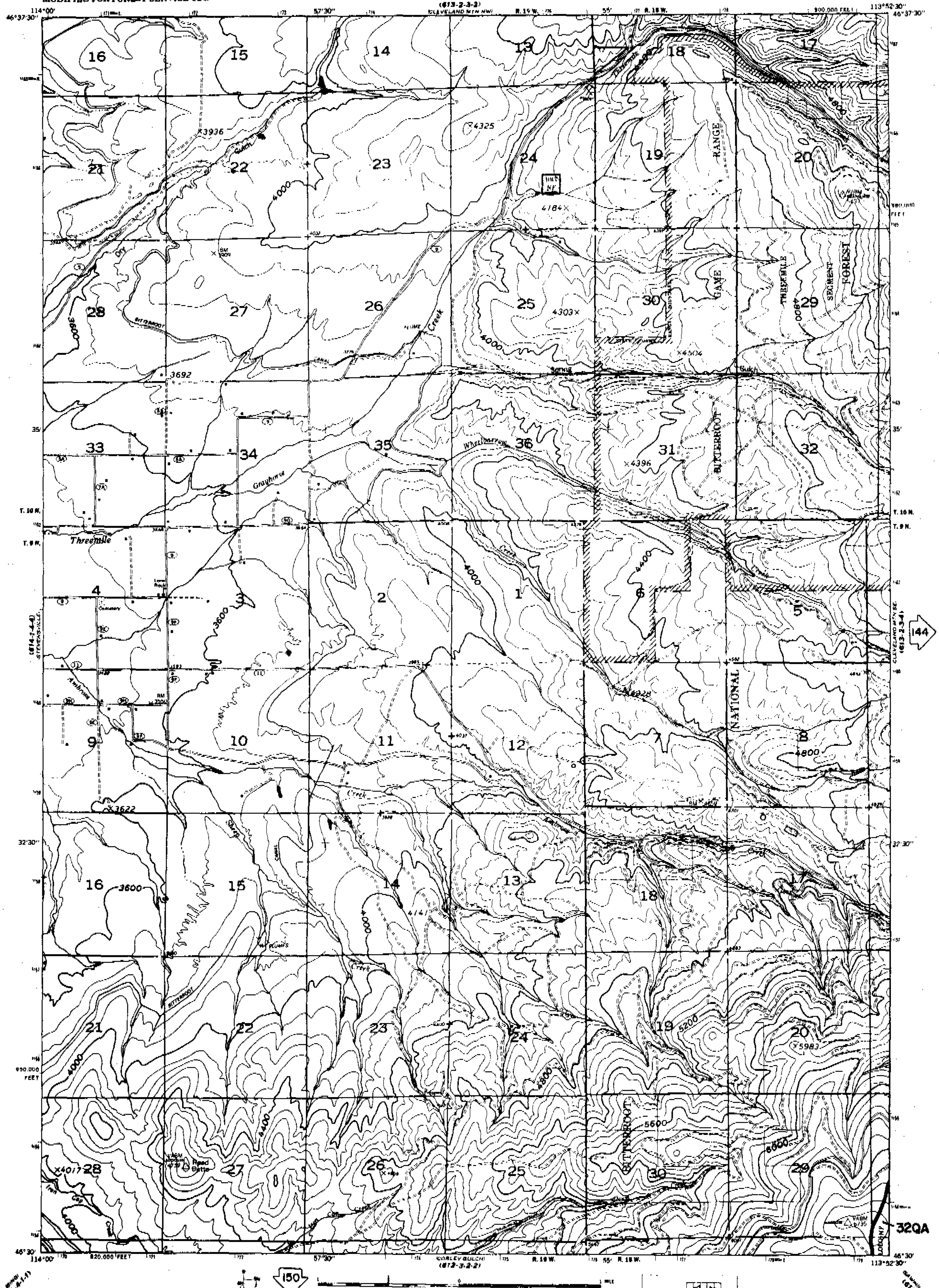
w Water

125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

SOIL SURVEY 1986

CLEVELAND MTN S.W., QUADRANGLE
MONTANA
7.5 MINUTE SERIES



LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier

U.S. Highway
State Highway
County Road
Forest Road
Forest Trail
Locked Gate

BITTERROOT AND LOLO NATIONAL FORESTS

145

CLEVELAND MTN S.W., MONTANA

613-2-3-3

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

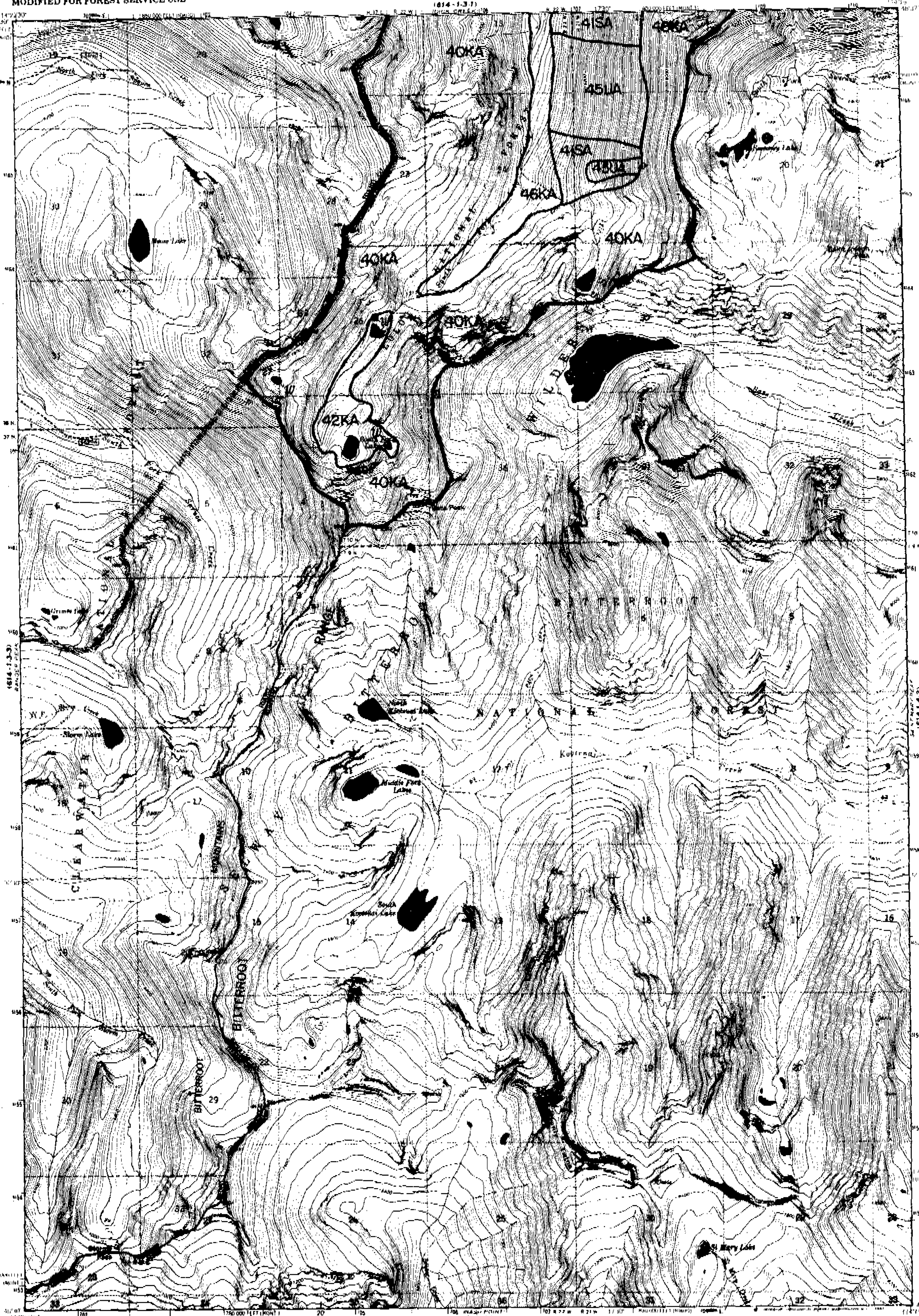
w Water

125 Adjoining Sheet Number

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

LOLO NATIONAL FOREST
SOIL SURVEY 1986

SAINT JOSEPH PEAK QUADRANGLE
MONTANA-IDAHO
7.5 MINUTE SERIES (TOPOGRAPHIC)



This map is one of a set compiled between 1982 and 1986 as part of a soil survey by the U.S. Dept. of Agriculture, Forest Service.

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-Forest Land
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier

U.S. Highway
State Highway
County Road
Forest Road
Forest Trail
Locked Gate

BITTERROOT, CLEARWATER AND LOLO NATIONAL FORESTS

146

SAINT JOSEPH PEAK
MONTANA-IDAHO

614-1-3-4

SOILS MAPPING LEGEND

Map Unit Boundary

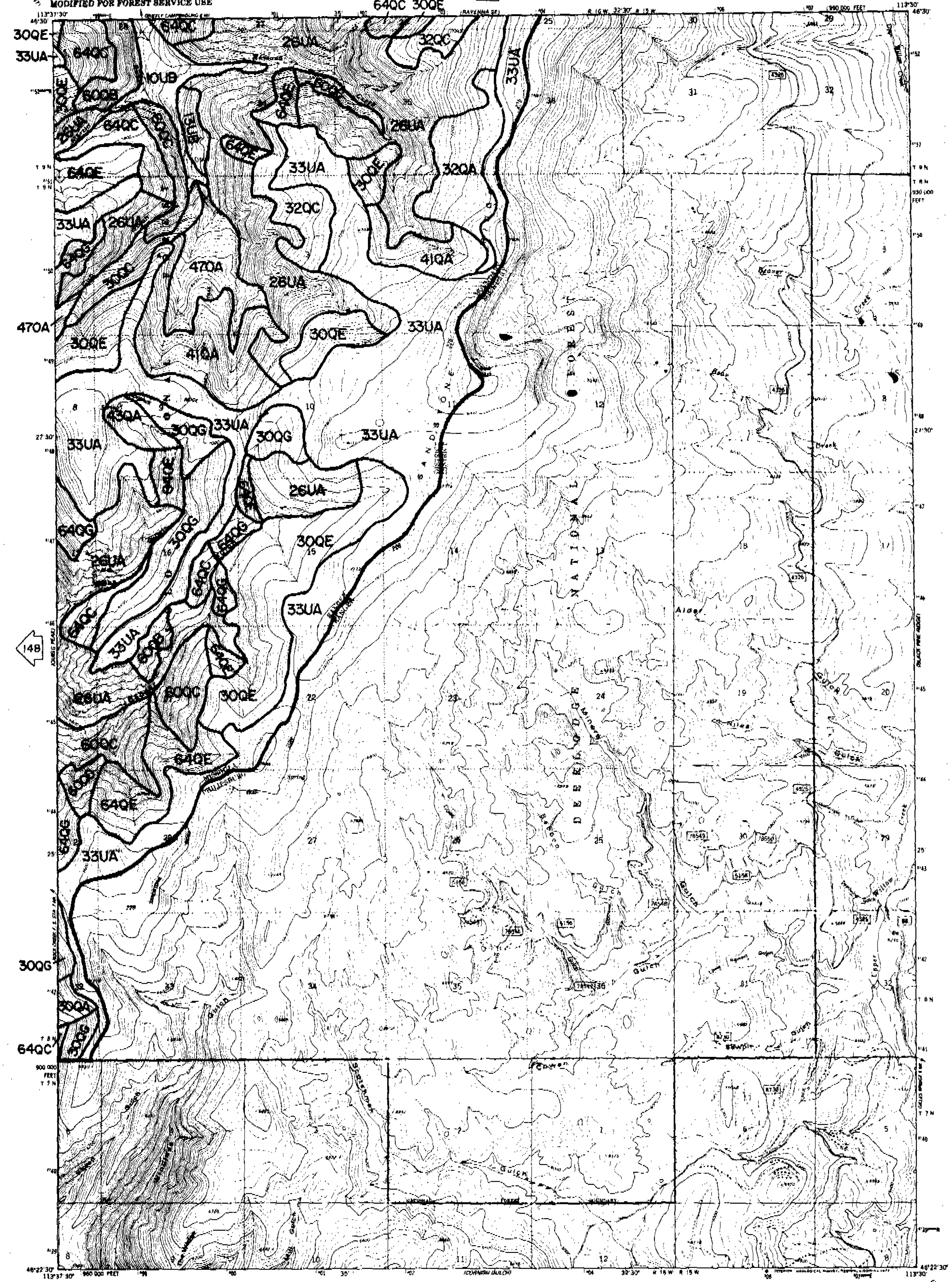
42QA Map Unit Symbols
W Water

125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

ALDER GULCH QUADRANGLE
MONTANA—GRANITE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-National Forest Lands
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Barrier
Locked Gate

U.S. Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail

DEERLODGE AND LOLO NATIONAL FOREST

147

ALDER GULCH, MONT.
N4622.5—W11330/7.5
1975

613-3-1-1

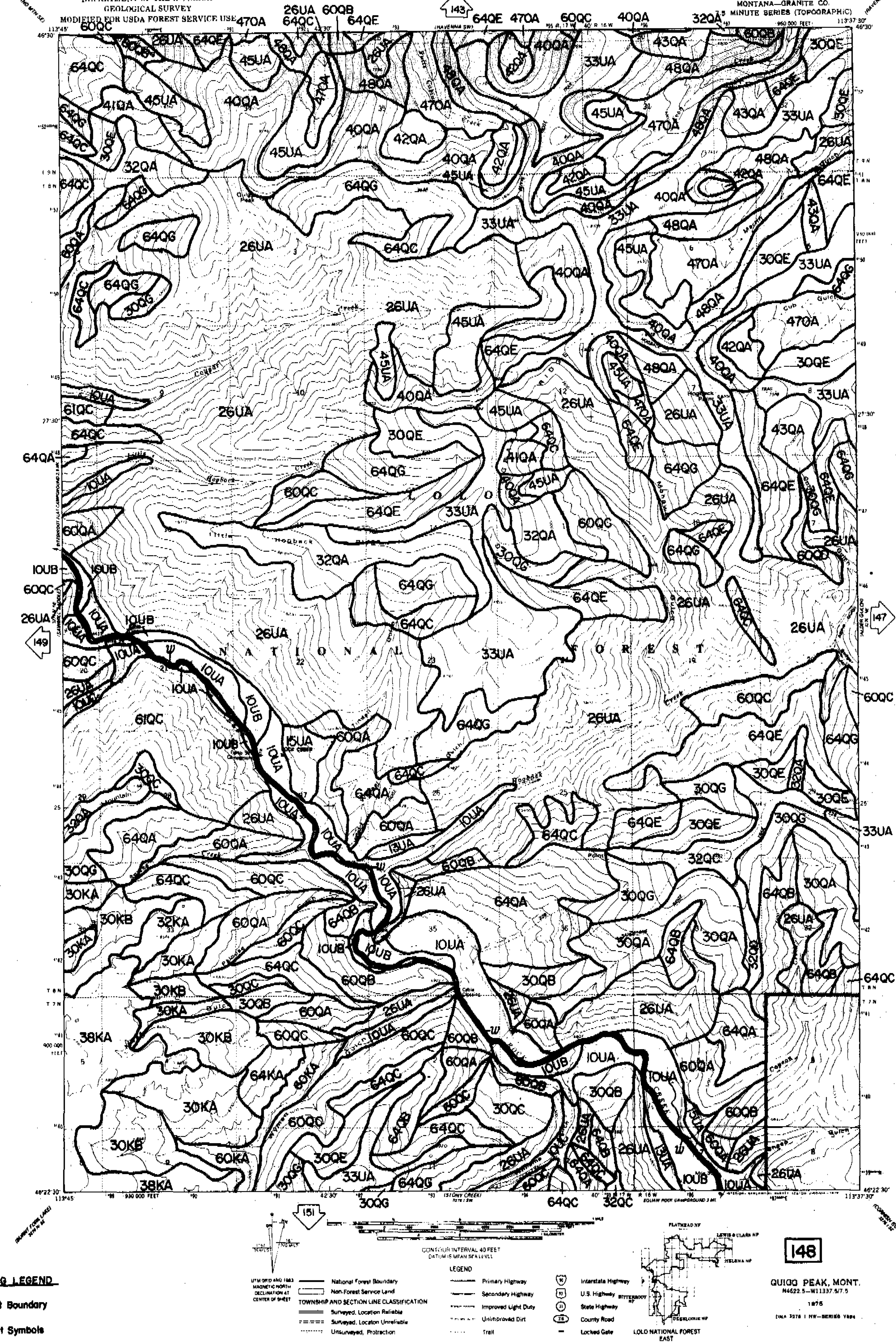
SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE

QUIGG PEAK QUADRANGLE
MONTANA—GRANITE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



148

QUIGG PEAK, MONT.
N4622.5—W11337.5/7.5
1976

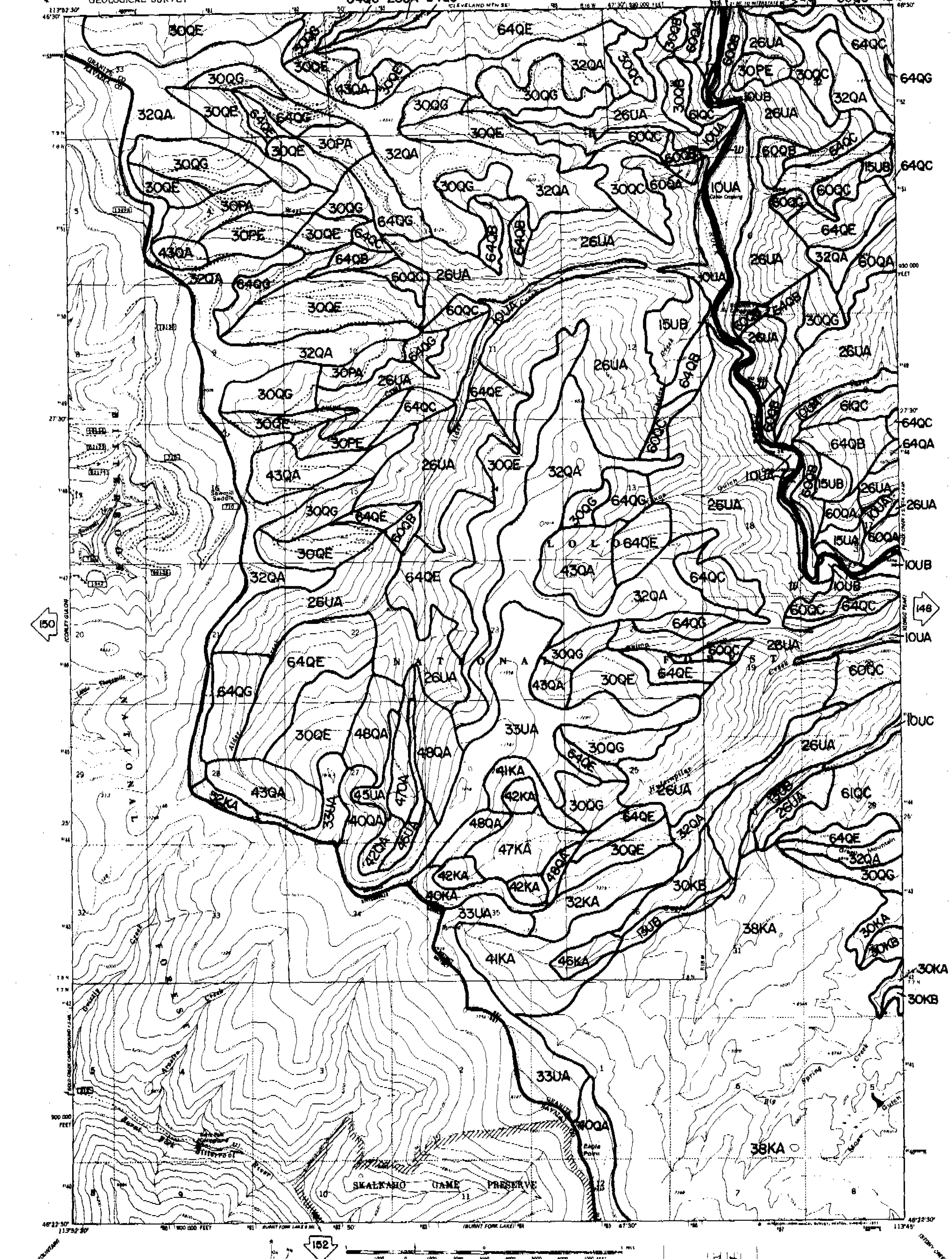
SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
w Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SAWMILL SADDLE QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



BITTERROOT AND LOLO NATIONAL FORESTS

149

SAWMILL SADDLE, MONT.

1974

613-3-2-1

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

W Water

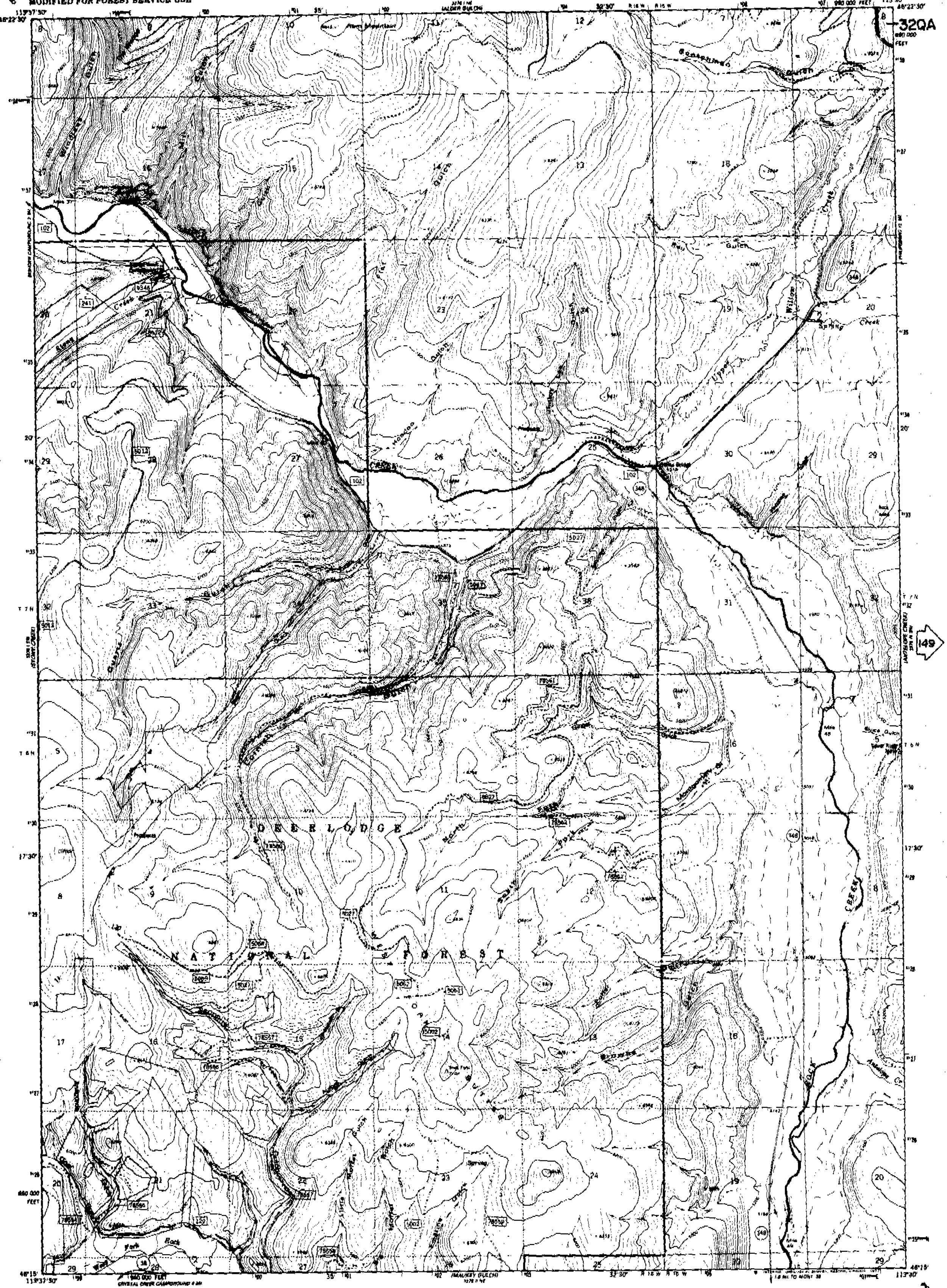
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

145

CORNISH GULCH QUADRANGLE
MONTANA—GRANITE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

National Forest Boundary
Non-National Forest Lands
TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Improved Light Duty
Unimproved Dirt
Trail
Barrier
Locked Gate

U.S. Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail

DEERLODGE NATIONAL FOREST

150

CORNISH GULCH, MONT.
N4615—W11330/7.5
1975
613-3-1-4

SOILS MAPPING LEGEND

Map Unit Boundary
42QA Map Unit Symbols
W Water
125 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

STONY CREEK QUADRANGLE
MONTANA
7.5 MINUTE SERIES (TOPOGRAPHIC)

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

151

STONY CREEK, MONT.
N4615—W11337.5/7.5
1974
613-3-1-3

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols

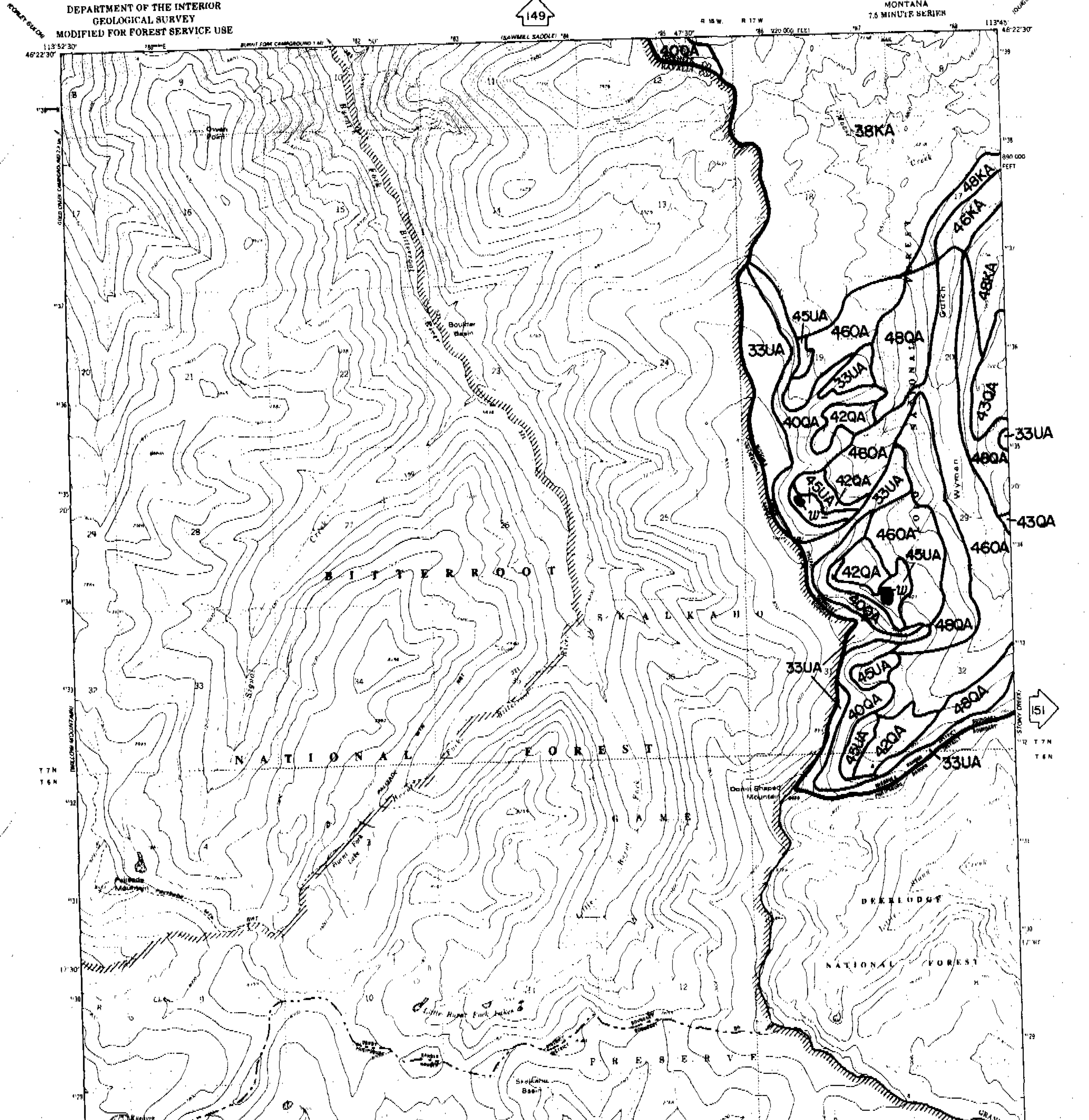
w Water

128 Adjoining Sheet Number

LOLO NATIONAL FOREST
SOIL SURVEY 1986

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR FOREST SERVICE USE

BURNT FORK LAKE QUADRANGLE
MONTANA
7.5 MINUTE SERIES



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

LEGEND

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

National Forest Boundary
Non-Forest Land

TOWNSHIP AND SECTION LINE CLASSIFICATION
Surveyed, Location Reliable
Surveyed, Location Approximate
Unsurveyed, Protraction

Primary Highway
Secondary Highway
Light Duty
Primitive
Trail
Barrier
Locked Gate

U.S. Highway
State Highway
County Road
Forest Highway
Forest Road
Forest Trail

BITTERROOT DEERLODGE AND LOLO NATIONAL FORESTS

152

BURNT FORK LAKE, MONT.
N4615—W11345/7.5
1974

613-3-2-4

SOILS MAPPING LEGEND

Map Unit Boundary

42QA Map Unit Symbols
w Water

128 Adjoining Sheet Number