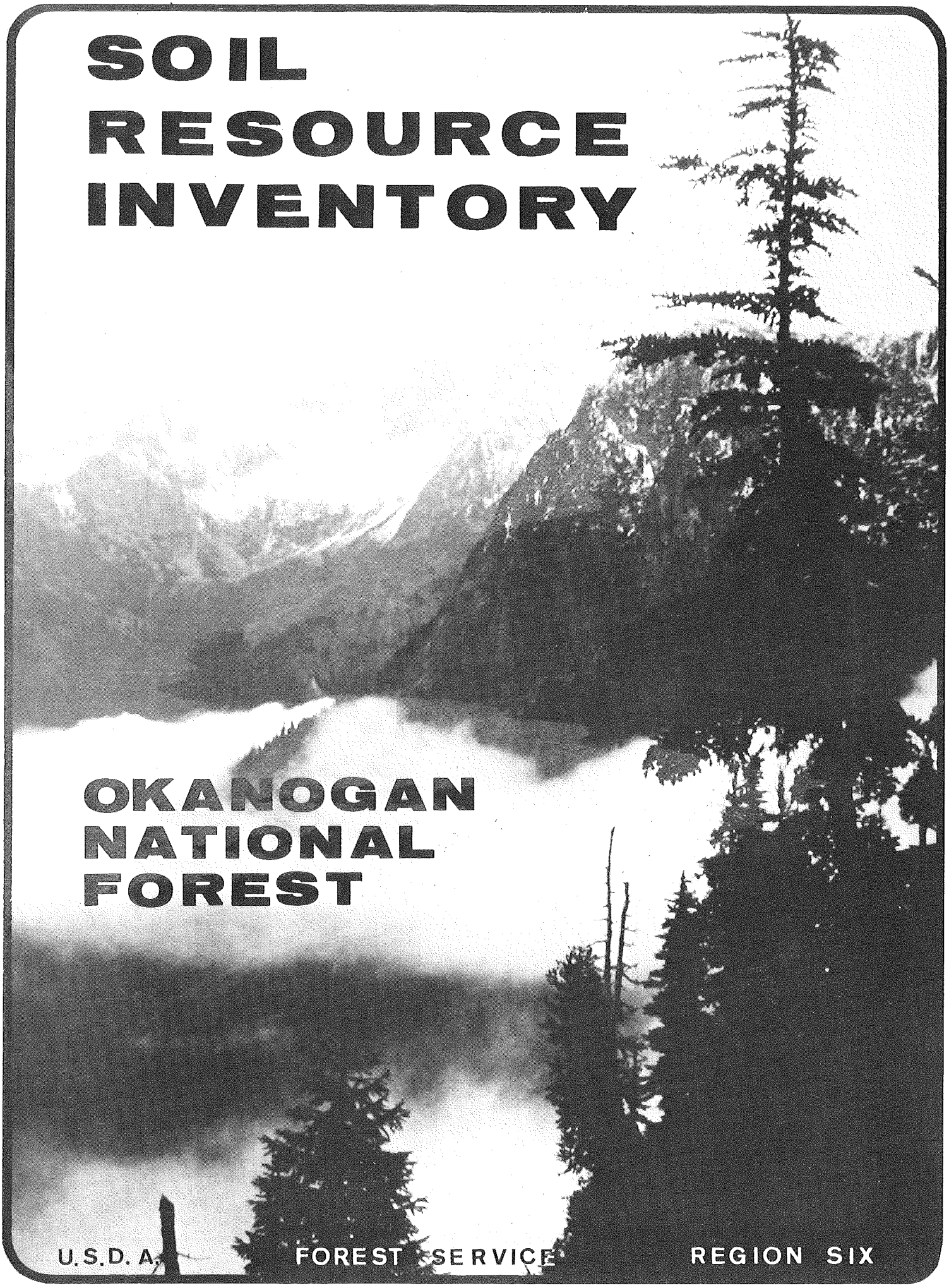
SOIL RESOURCE INVENTORY



OKANOGAN NATIONAL FOREST

U.S.D.A. FOREST SERVICE REGION SIX

PREFACE

This Soil Resource Inventory is a report containing reconnaissance level soil survey information that includes soil maps, soil mapping unit descriptions and selected interpretations for forest and rangeland management. The report also contains generalized information on geology, topography, climate and vegetation of the survey area.

The soil survey project was accomplished by the author during the period between November 1971 and June 1976. Technical supervision was provided by Loren Herman and Robert Snyder. Valuable assistance, advice and cooperation received from Forest personnel during the course of the survey project is sincerely appreciated.

The survey area is located in North Central Washington. It extends from the Canadian border south to the Methow-Chelan Divide and from the Cascade Range near Ross Lake to the Okanogan-Ferry County line. The survey area includes some 1.7 million acres of National Forest System lands under administration of the Okanogan National Forest.

The survey area contains a wide range of topographic, vegetative, geologic and climatic features. Lowest point in the area is Alta Lake at 1163 feet and highest point is the 8978-foot summit of North Gardner Mountain. Average annual precipitation ranges from about 12 to 120 inches. Most precipitation falls during the winter months as snow. Winters are cold and summers are hot and dry. Vegetative community types range from low elevation bunchgrass and sagebrush fields through several forest communities to alpine meadows. Geology and geologic history is complex. Numerous rock types are represented in the area. Both continental and alpine glaciation has occurred throughout the survey area. The last episode of continental glaciation existed up to about 15,000 years ago (Waitt, 1972). The numerous glacial episodes, occurring over the last 2 million years, have caused much of the soft, erodable bedrock to be worn away. Most of the exposed bedrock is both hard and competent. Glaciation has had a significant impact on the soils. Parent material for most soils in the area consists of glacial till and much of the till is derived from granitoid rocks. The combination of coarse textured and slowly weatherable parent materials, dry climatic regime, steep topography and short length of time since the last glacial period has created young soils. Typically, soils are coarse textured with little to no horizon development.

SOIL RESOURCE INVENTORY

OKANOGAN NATIONAL FOREST

JULY 1977

SURVEY AND REPORT BY
EARLE W. ROTHER
SOIL SCIENTIST

REGION SIX
FOREST SERVICE
USDA

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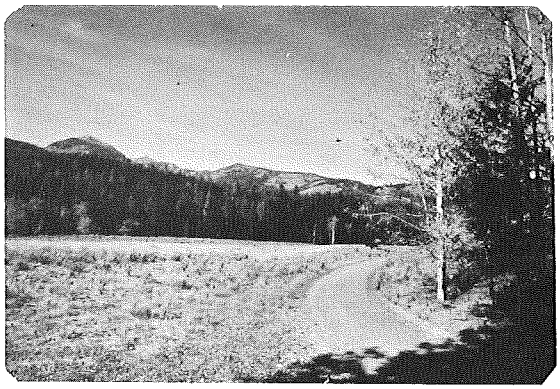
SECTION 1

INTRODUCTION

This Soil Resource Inventory (SRI) of the Okanogan National Forest and parts of the Mt. Baker-Snoqualmie and Wenatchee National Forests was made to provide some basic soil and landform information and interpretations for land management decisions. The inventory is part of the Regional soils program developed by the Soils Group of the Division of Watershed Management to assist forest land managers in applying multiple use principles.

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



OBJECTIVE

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

For to all Americans, wherever they live, soil is a basic treasure. Soils produce good yields and keep on doing so if they are well managed. The management of soil is among the oldest of the arts, but none is changing more rapidly than it. We know more about taking care of soil than our fathers and grandfathers did. There is much more that we should know.

Ezra Taft Benson
Soil, 1957 Yearbook of Agriculture

VALUE

The value of the Soil Resource Inventory process and the resultant report is threefold.

1. To define soil and landform properties and describe mapping units.
2. To locate mapping units and display units on maps.
3. To predict soil and landform behavior when subjected to specific management activities.

The SRI is by design, a reconnaissance level project. The average map delineation is 50 to 400 acres. The map base is a set of one inch equals one mile topographic quadrangle maps.

Information of the scale presented on the soil map sheets is of sufficient intensity to help develop resource management policies and sound land management procedures. Due to the reconnaissance nature of this survey, it lacks detail for use in high-intensity, small-area projects. These projects require additional on site study by various technical specialists, including soil scientists.

LAND USE PLANNING

The information contained in this report can serve as the basis for land planning. Activities can be selected for areas where they are most suited to the soil and other resources. Responses to activities can be predicted for each mapping unit.

HYDROLOGIC ANALYSIS

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

TRANSPORTATION PLAN

This report identifies, on a broad scale, areas where road construction will be difficult and expensive. Landslides, avalanche chutes and steep, highly dissected areas are identified for easy reference.

TIMBER MGMT. PLAN

The soils information can suggest direction and support policy for allowable cut determinations, logging systems, slash disposal methods, operating season, and deferred cutting areas. With a better understanding of problems and their location, harvest can be planned so that at a given time the majority of cutting is not taking place in critical areas. By spreading out and deferring the more critical areas, more time is available for proper road location and design on these areas.

IMPACT REPORTS

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

PREMISES

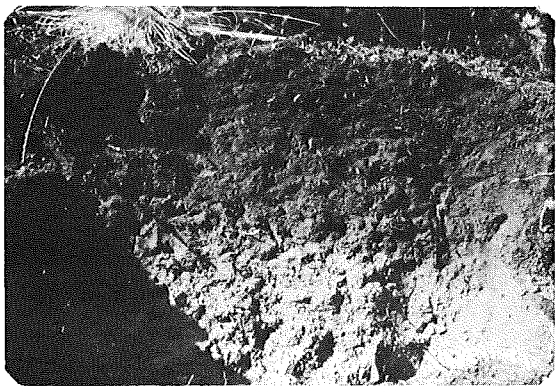
Plants and animals living on the earth's surface depend upon soil for sustenance and survival. It is imperative, therefore, that proper soil preservation and conservation measures are practiced by land managers.

Soils are three dimensional. They have breadth, width and depth. Soils have distinct individual properties. They can be defined by observable and measurable characteristics such as texture, structure, depth and color.

Groups of soils with similar characteristics and similar responses to manipulation can be identified.

Interaction of the five principle factors of soil formation - topography, geology, climate, organisms, and time cause differences in soils. These factors vary according to geographic location. Some support lush vegetation; others are sparsely vegetated.

A difficult concept to understand is the recognition that geologic, landform, and soil development are extremely long term processes when measured against the human life span.

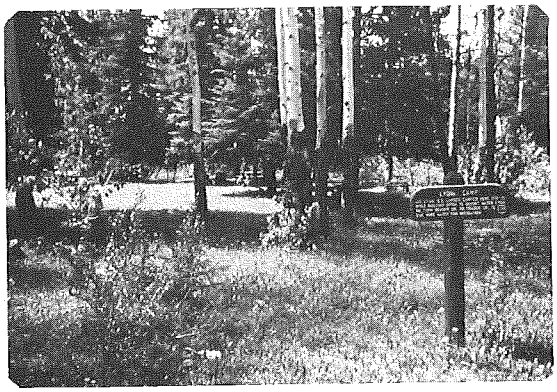


Processes are constantly occurring in and acting on soils. These are processes of additions, subtractions, transfers and transformations. Examples of these processes include addition of water, weathering of rock, changing vegetation to organic matters, transferring clay and releasing nutrients.

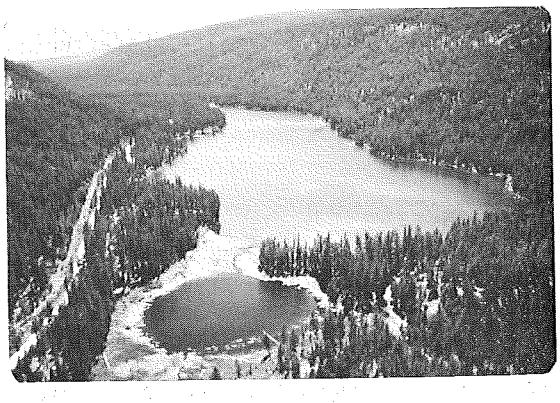
Most land management activities relate directly to the soil resource. Timber harvest, road construction, recreation development and forage production are activities that have an effect on the soil resource. Soils respond to these activities in a predictable manner.

ENVIRONMENTAL SETTING

The survey area contains a wide variety of landscape features, climatic conditions, geologic rock types, vegetative communities and complex soil patterns. Landforms range from flat river valleys to steep, highly dissected mountain sideslopes. Temperature and precipitation patterns vary widely throughout the area. Low elevation, south exposure slopes experience long hot and dry summers with an annual precipitation of 12 to 15 inches occurring as winter snow. High elevations along the Cascade Crest encounter short cool summers and long cold winters with 80 to 120 inches of annual precipitation. Most of the precipitation falls in the form of snow. Geology is complex. Numerous rock types are represented. Uplift of the Cascade Range has resulted in extensive folding and faulting of the rocks. More recently, numerous episodes of alpine and continental glaciation have molded the existing topography. The wide range of environmental conditions has produced an equally wide range of vegetative communities. Eight broadly defined plant communities have been recognized within the survey area.



The western part of the survey area is known as the Northern Cascades Physiographic Section. It is characterized by deep, U-shaped valleys carved between steep, highly dissected Alp-like ridges and peaks. Most peaks and ridges have typical alpine glacial features such as cirques, cirque lakes, knife-edged ridges, and steep, pointed peaks. Avalanche chutes are common along valley sideslopes near the Cascade Crest.



The eastern part of the area lies in the Okanogan Highlands Physiographic Section. The landscape is characterized by moderate slopes and broad, rounded summits. It is a striking contrast to the rugged topography of the Northern Cascades. Virtually all of the Section was affected by the grinding action of glacial ice which left deep deposits of glacial drift in some areas and bare bedrock in others.

The next several pages contain more detailed descriptions of the climate, plant communities, topography and geology of the survey area.

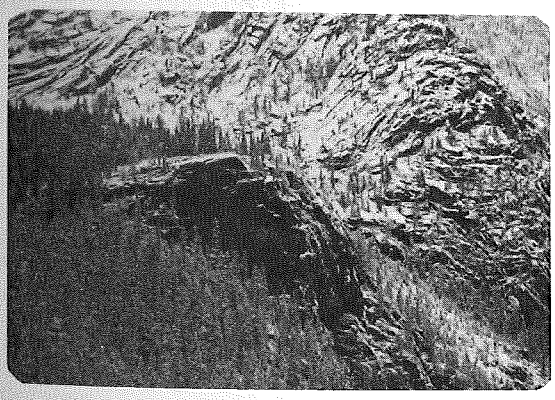
CLIMATE

The survey area includes both the eastern and western slopes of the Cascade Range. The climate varies from near desert conditions at Alta Coulee to a cool, moist alpine type along the Cascade Crest. The area possesses climate of both maritime and continental characteristics. This is because the high ridges of the Cascades intercept prevailing westerly winds and disrupt the path of Pacific storm systems. Topography and distance from the ocean influences the local climatic regime. Precipitation is greatest and temperatures are more moderate west of the crest. Average annual precipitation on the west slopes ranges from 60 inches near Ross Lake to 120 inches west of Rainy Pass. Precipitation drops off rapidly eastward to about ten inches near Alta Lake.

The primary air flow is easterly but it is occasionally broken, especially during winter months, by cold arctic air moving through the north-south trending valleys. Normally, warm and moist air moves eastward toward the Cascade Crest. As it reaches the high elevations, it cools and drops rain along the windward slopes. Air descending along the leeward slope is warmed by compression. This causes a sharp decrease in precipitation eastward.

Winter Climatic Regime

During an average winter, snowfall ranges from 10 to 20 inches at lower elevations to 300 to 500 inches near the crest. Snow usually covers the ground from mid-December until late February or March in



the lower elevations. At high elevations snow can be expected to remain on the ground from October to June. Density of the snow pack usually starts out at about 25 percent and increases to 45 percent in the spring.

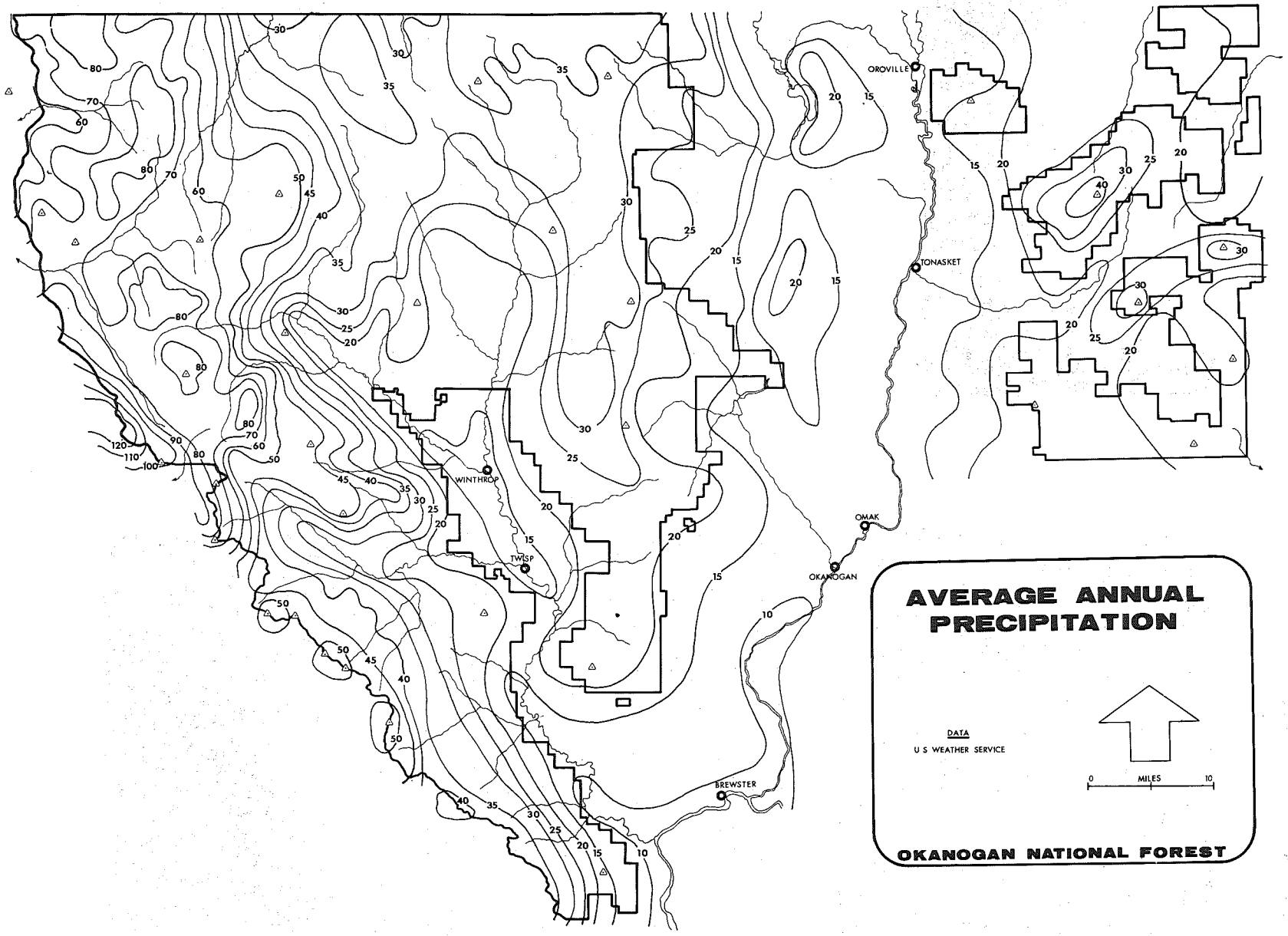
Normal eastward moving air masses are frequently interrupted by outbreaks of cold air from Canada. The outbreaks are usually of short duration. Occasionally very cold arctic air will settle in the area and unusually cold temperatures will prevail for two to three weeks.

Average maximum temperatures range from 25 to 35°F. Minimum temperatures are from 5 to 15°F. Below freezing temperatures, -15 to -25°F, can be expected.

Spring, Summer and Fall Climates

During these periods, prevailing air flow is from the northwest and west. Warmer and drier air masses generally begin in May, peak in July and August, and continue until late August or early September. Thunderstorms can be expected throughout the period. Rainfall frequently accompanies the thunderstorms.

Average maximum temperatures are in the 60's and 70's with occasional 80+ degree days at higher elevations. At lower elevations, temperatures range from 80 to 95°F. Occasionally, temperatures over 100°F are recorded. Minimums at higher elevations are in the 40's and 50's and at lower elevations minimums are in the 50's and 60's.


OROVILLE
TONASKET
WINTHROP
TWISP
OMAK
OKANOGAN
BREWSTER
AVERAGE ANNUAL PRECIPITATION
DATA
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0 MILES 10
OKANOGAN NATIONAL FOREST

Station: Winthrop
Elevation: 1,755 Feet
Period: 1931-1952

Month	Mean Temp. °F	Precipitation (Inches)
January	17.0	1.84
February	24.3	1.46
March	36.2	.84
April	47.6	.69
May	55.2	1.05
June	61.9	1.33
July	69.7	.43
August	68.6	.44
September	58.0	.66
October	48.2	1.05
November	33.7	1.91
December	21.6	2.60
ANNUAL	45.2	14.30

Station: Okanogan
Elevation: 910 Feet
Period: 1931-1947

Month	Mean Temp. °F	Precipitation (Inches)
January	24.2	1.23
February	29.5	1.23
March	42.5	.77
April	53.1	.88
May	60.9	.77
June	67.2	1.45
July	75.0	.28
August	73.3	.26
September	64.6	.58
October	51.8	.89
November	37.0	1.50
December	29.2	1.81
ANNUAL	50.7	11.65

Station: Chesaw
Elevation: 2,900 Feet
Period: 1931-1951

Month	Mean Temp. °F	Precipitation (Inches)
January	18.0	1.03
February	23.7	.87
March	32.8	.81
April	43.5	.94
May	51.3	1.28
June	57.0	2.03
July	63.6	.83
August	62.3	.86
September	54.9	.91
October	43.3	1.35
November	29.7	1.26
December	22.6	1.24
ANNUAL	41.9	13.41

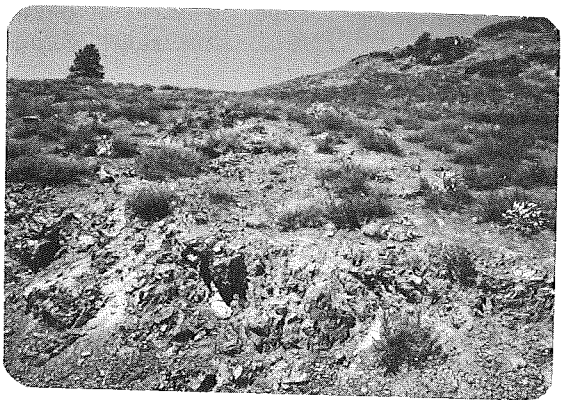
Sources: Columbia-North Pacific Region Framework Study; Appendix V; Water Resources; 1967, pp 3-7.

U.S. Weather Service; Climatic Summary of the United States; Supplement for 1931 through 1952.

VEGETATION

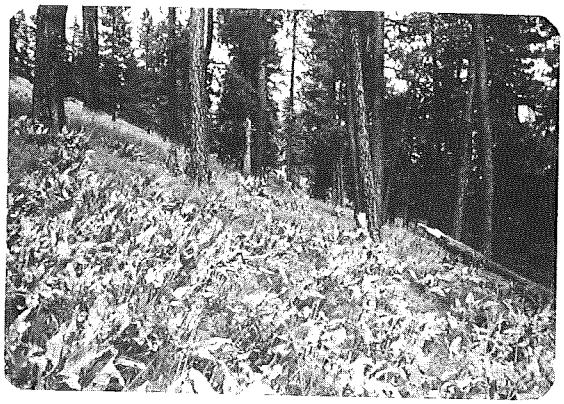
Eight major vegetation associations were recognized during field mapping for the SRI project. These broadly defined groupings reflect the variety of geologic, climatic and topographic conditions existent in the survey area.

1. Grass-Shrub Zone
2. Ponderosa Pine Zone
3. Lodgepole Pine Forest
4. Douglas-fir Zone
5. Subalpine Fir Zone
6. Alpine Zone
7. Mountain Hemlock Zone
8. Western Hemlock Zone



The Grass-Shrub Zone is found in the lowest and driest part of the Area. Climate is semi-arid; average annual precipitation is less than 25 inches. Summers are dry and hot. Winters are cold. Most precipitation occurs as snow during the winter months. Primary plant types include big sagebrush, three tip sagebrush, bitterbrush, gray rabbit brush, bluebunch wheatgrass, Idaho fescue and Sandburg bluegrass. Other plants include arrowleaf balsamroot, lupine and western yarrow.

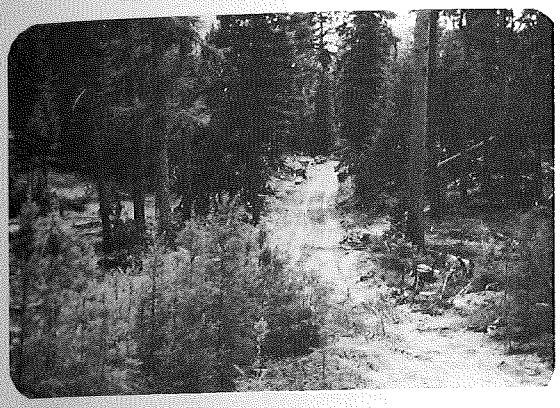
The Ponderosa Pine Zone occurs in a semi-arrid climate characterized by warm to hot, dry summers and cold winters. Most precipitation occurs as snow during the winter months. The modal plant community consists of ponderosa pine overstory dominated by a bitterbrush understory and an Idaho fescue, pinegrass, bluebunch wheatgrass, elk sedge, arrowleaf balsamroot ground cover. An exception to this occurs in the Tonasket District where bitterbrush is not normally found in the understory. Groves of quaking aspen are found in wet areas and quaking aspen, alder, and Rocky Mountain maple occur along moist stream banks. Douglas-fir and western larch are found in the upper, cooler and more moist parts of the Zone. Ceanothus occurs in the understory in some areas as a result of past fires.



The Lodgepole Pine Forest consists of pure or nearly pure stands created by fire. These stands are seral, meaning they will eventually return to the climax species that inhabited the site prior to being burned. For the purposes of this report, the clearly identifiable, even aged stands of lodgepole pine are mapped separately under the following conditions:

1. Less than 30 to 40% climax species are present.
2. Climax species are young and management emphasis for the next 25 to 50 years will be directed toward the lodgepole pine.

The Lodgepole Pine Forest is rather broad in terms of its elevations and climate ranges. It is found in all other forest zones except the Ponderosa Pine Zone.



The Douglas-fir Zone occurs between the Subalpine Fir Zone and Ponderosa Pine Zones. It is found in a temperate climate. Summers are dry and warm and winters are cold. Precipitation is mostly in the form of snow. Average annual rainfall ranges between 20 and 50 inches. Elevation range of the Zone is 3,000 to 5,600 feet.

Primary tree species include Douglas-fir, ponderosa pine and western larch. Western larch is absent west of the Methow-Okanogan divide. Other tree species occurring in the Zone include Engelmann spruce, western red cedar, Pacific silver fir and quaking aspen. Shrubs include snowberry, pine mat manzanita, tall whortleberry, buffaloberry, and alder. Ground cover consists of pinegrass, lupine, myrtle pachistima, and grouse whortleberry.

No Grand Fir Forest Zone has been recognized within the Survey Area. The upper boundary of the Douglas-fir Zone merges rapidly with the Subalpine Forest Zone.

The typical tree species of the Subalpine Fir Zone includes subalpine fir, Engelmann spruce, Douglas-fir and lodgepole pine. Whitebark pine and subalpine larch occur at the upper reaches of the Zone. Mountain hemlock and Pacific silver fir are secondary associates. Understory and groundcover are typically dominated by grouse whortleberry, pine mat manzanita, pinegrass and dryland sedge.

Meadow openings typically have a plant community consisting of green fescue, lupine sedge and subalpine big sagebrush. The Zone is the coolest and most moist part of the Eastern Washington Forested Zones. Climate consists of cool summers and cold winters. It is a more continental climate than its counterpart to the west. In this Zone, temperature extremes are greater and precipitation is lower than the Mountain Hemlock Zone that occurs west of the Crest. Rainfall averages 35 to 65 inches per year. Elevation range of the Zone is about 5,000 to 7,400 feet.

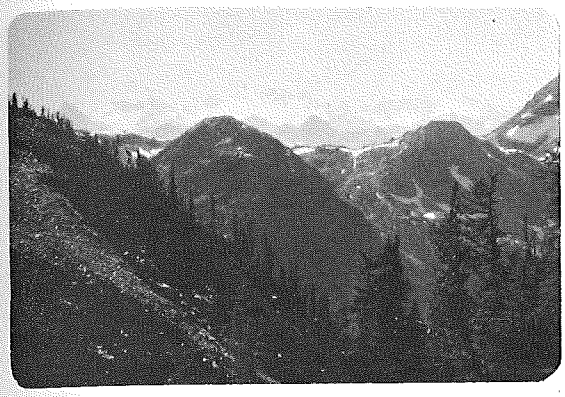
The Alpine Zone includes those areas dominated by high elevation meadows, snow and ice patches, rock outcrops, avalanche chutes and scattered small patches of trees. Tree species are limited to subalpine fir, white bark pine and subalpine larch. Very rarely lodgepole pine and Engelmann spruce are present at the lower margins of the Zone.

The Mountain Hemlock Zone is found lying immediately below the Alpine Zone on the western side of the Cascade Crest. Precipitation is greater and temperature extremes are less than on the east side of the Crest. Primary tree species include Pacific silver fir, mountain hemlock, western red cedar, Douglas-fir, Engelmann spruce and lodgepole pine. Subalpine fir, subalpine larch and whitebark pine are found at the upper margins. Understory vegetation includes oxalis, deerfern, Oregon grape, salal, vanillaleaf and beargrass. Precipitation in this Zone is the highest of the forested zones in the Survey Area; 70 to 110 inches.

The Western Hemlock Forest Zone is the westernmost Zone in the Survey Area. Climate is marine. Precipitation ranges from 55 to 75 or more inches. Primary tree species include western hemlock, Douglas-fir, Pacific silver fir, western red cedar and lodgepole pine. Understory vegetation includes Oregon grape, salal, oxalis, vinemaple and swordfern.

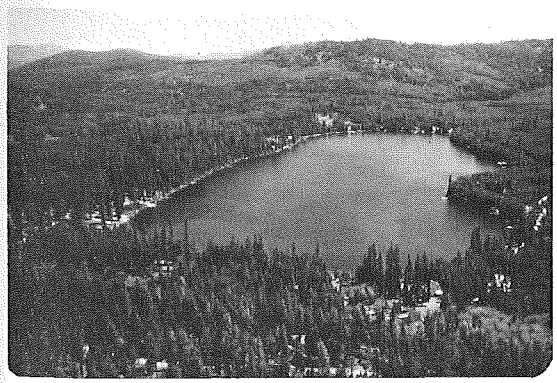
Source: Franklin, J.F. and Dyrness, C.T.; Vegetation of Oregon and Washington; U.S. Department of Agriculture; 1969.

TOPOGRAPHY



Topography is the detailed description of the relief features or surface configuration of the earth's surface. Topographic features are developed by erosional processes, both chemical and physical, acting on the underlying geology. Geology refers to both the bedrock type and the framework or structure in which the bedrock is found. Landscape formation takes a very long time and the rate of formation is governed by the geology of an area and the intensity of the erosional processes.

In the Survey Area, water and ice have been the primary erosion agents. They have sculptured the surface into a variety of topographic features. Mapping units have been designed to correspond with this variety.



Mapping units in granitic, volcanic, and sedimentary bedrock areas have been divided into three topographic categories:

0 to 35% slopes - Gently sloping
35 to 80+% slopes - Moderate to steeply sloping; nondissected to slightly dissected
50 to 100% slopes - Steeply sloping; highly dissected

Mapping units in glacial drift areas have been divided into two divisions:

0 to 35% slopes - Gently sloping
35 to 60% slopes - Moderate to steeply sloping

Mapping units in pumice and ash materials have also been divided into two divisions:

0 to 20% slopes - Flat to gently sloping
20 to 40% slopes - Moderately steep sloping

Mapping units in alluvial plain areas fall into a single slope category.

5 to 40% slopes - Gentle to moderately steep sloping

Mapping units in alluvial fan deposits also fall into a single slope category.

0 to 10% slopes - Flat

Slopes of miscellaneous landtypes vary widely both between and within each unit.

GEOLOGY

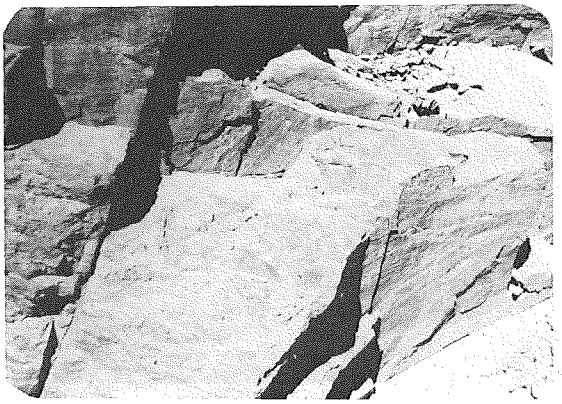
Rocks and parent materials of many kinds are found in the Survey Area. Some are soft and easily broken, others are extremely hard. Some are loose and fall apart easily, others are tightly cemented. Some are old, others are quite young.

To make some sense out of the wide variety of rocks and rock formations in the area, several broad groupings of rocks and parent materials have been defined. The groups have been defined by their mode of origin and significance to management.

All intrusive igneous rocks have been lumped together and labelled Granitic Rocks. For those more geologically inclined, specific rock types include quartz diorite, diorite, granite, granodiorite, quartz monzonite, and at least one small area of plagioclase porphyry. For convenience and simplicity, metamorphic rocks of similar origin have also been included. Metamorphosed intrusive rocks include granodiorite gneiss, gneissic quartz diorite and hornblende gneiss.

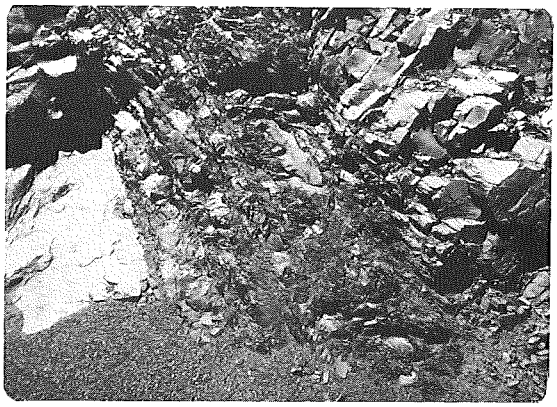
Mapping Unit numbers 40 through 59 have been assigned to the Granitic Rocks. Mapping Unit 40 represents outcroppings of Granitic Rock. Mapping Unit number 50 is not used.

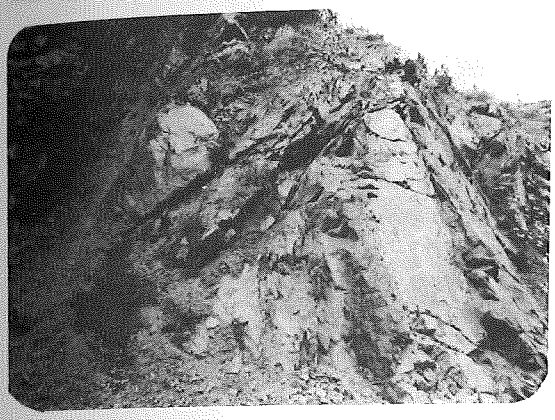
All extrusive igneous rocks have been grouped into a single category under the name of Volcanic Rocks. Again, for simplicity, many similar rock types are included. They are andesite, basalt, dacite, rhyolite, and trachyte. Minor areas of tuffs and flow breccias have also been admitted into this group.



Mapping Unit numbers 60 through 79 have been set aside to accommodate these rocks. Mapping Unit 60 is restricted to volcanic rock outcrops. Mapping Unit number 70 has not been recognized.

The third major rock group consists of the Sedimentary Rocks. Rocks of this type are typically layered. They consist of cemented fragments of other rocks or organic structures which have been moved individually from their places of origin. Examples of sedimentary rocks found in the area include sandstone, siltstone, shale, arkose, conglomerate and limestone. Metamorphosed sedimentary rocks of similar origin are marble, quartzite, agrillite and slate.





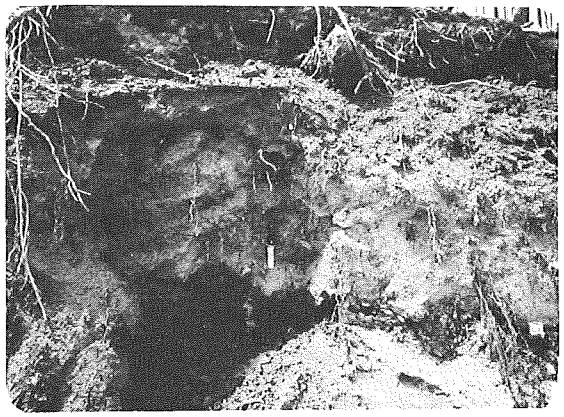
Mapping Unit numbers 80 through 99 define soils and landforms derived from sedimentary rocks. Rock outcrops of sedimentary origin are labelled Mapping Unit 80. Mapping Unit number 90 is not used.

Four types of unconsolidated materials cover large areas with sufficient depth to be significant to landform and soil formation. They are also significant to management. The materials are Glacial Drift, Pumice and Ash Deposits, Alluvial Plain Deposits, and Alluvial Fan Deposits.

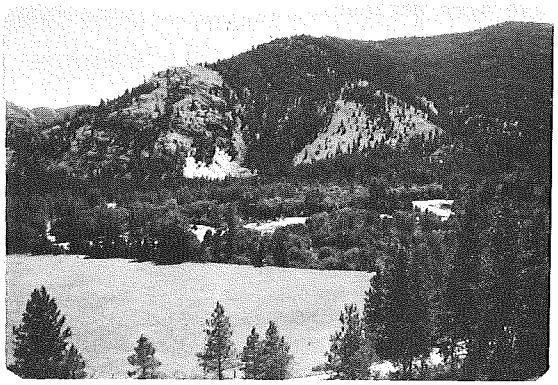
Glacially deposited materials are widespread throughout the Survey Area. So much so, in fact, that it is often difficult to tell the difference between soils and parent material developing in glacial drift and those developing in weathered bedrock materials. This is especially true with the weathered granitic materials and the glacial drift of granitic origin.

Mapping Unit numbers 21 through 33 have been designated to handle soils and landforms developing from Glacial Drift. Mapping Unit number 20 and 30 are not used since no hard rock outcroppings of glacial materials exist. The term glacial drift is used because it is a general term which encompasses an assortment of deposits of glacial origin. Some are wholly ice deposited while others are ice marginal and have been reworked by the action of water. Also included in this group are areas of lake (lacustrine) deposited layers of silt and fine sand. Members of the Glacial Drift group are splattered across the Survey Area since virtually all of the area has been affected by both continental and mountain glaciation. To reflect this close association between glacially deposited materials and local bedrock materials, a number of Mapping Unit Complexes have been defined.

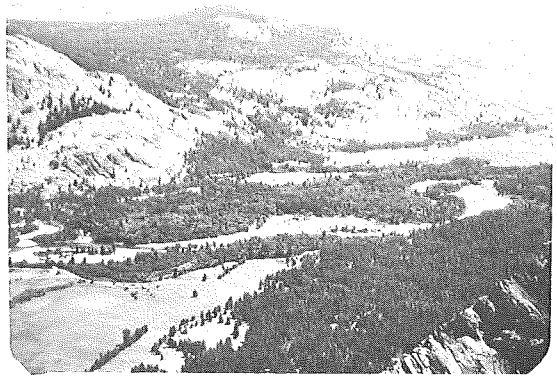
Mapping Unit numbers 34 through 39 are used for Pumice and Ash Deposits. Pumice and ash, possibly ejected from Glacier Peak, were blown eastward and deposited in the Antoine, Black Canyon, McFarland, Gold Creek areas of the Twisp District. The pumice and ash layer is considered significant when it is greater than 30 inches thick.

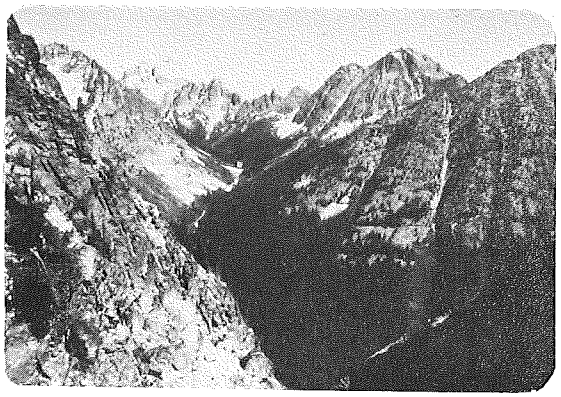


Mapping Unit numbers 17, 18 and 19 have been set up to delineate areas of recent stream deposited and reworked materials. They are Alluvial Plain Deposits. These deposits occur in the bottom of the larger streams in the Survey Area. Some areas where these units are mapped are subject to occasional flooding during the spring snowmelt season.



Mapping Units 11 through 15 define Alluvial Fan Deposits. They are fans of alluvial materials deposited along the margins of stream valleys. They are only mapped in the larger stream valleys where they are of significant size. Valley margins, identifiable as unconsolidated materials but not clearly distinguishable as alluvial fans, are mapped as Alluvial Plain Deposits.



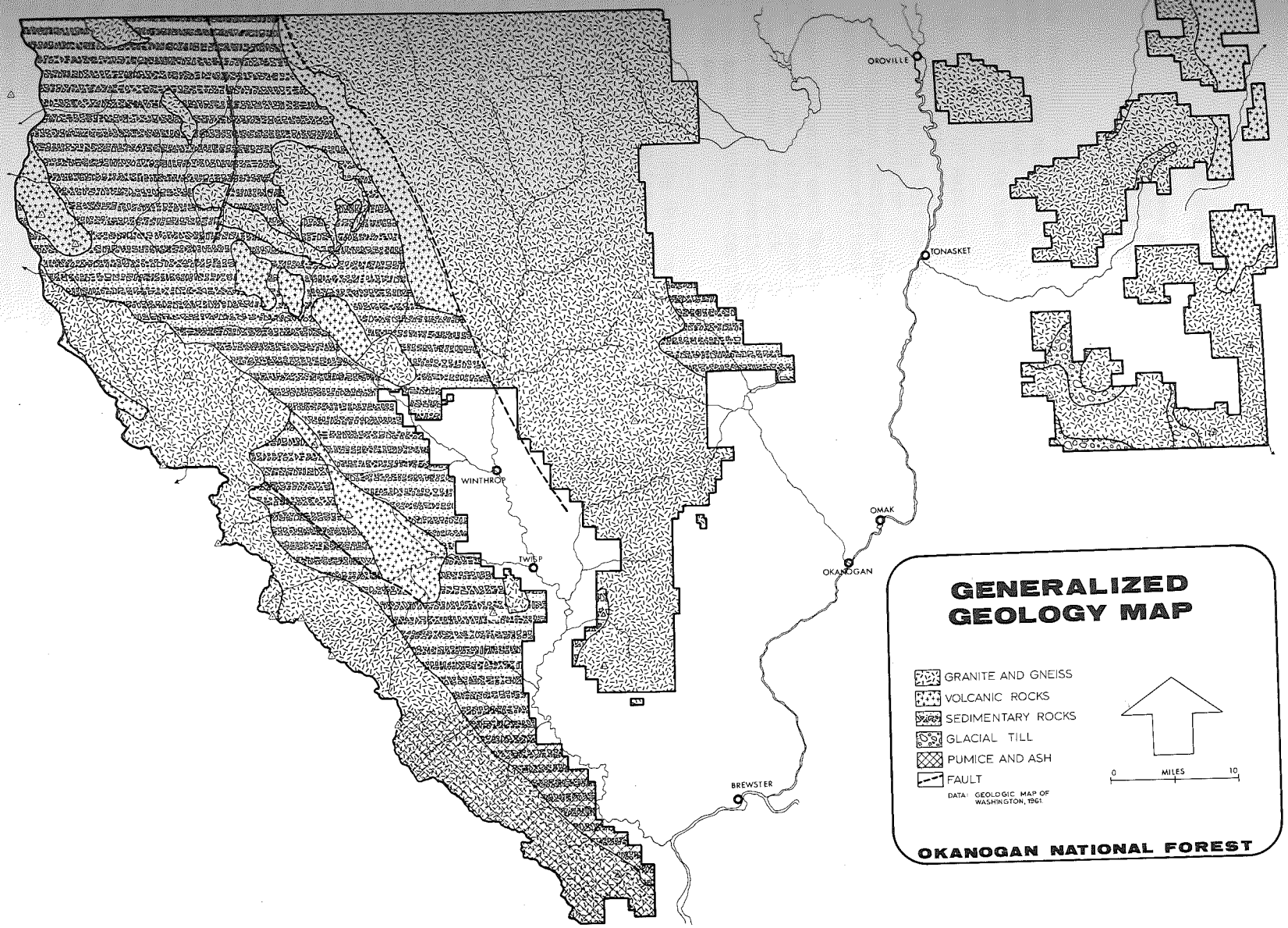


Finally, Mapping Unit number 1, 2, 3, 4, 5, 6 and 9 are Miscellaneous Landtypes. These are units that have significant features which require them to be mapped separately. Each is set up to recognize a single important and unique topographic, vegetative or geologic situation that has management implications.

For instance, it is important to know where large masses of bedrock outcrops exist in the alpine zone but it isn't important to know the specific rock type of each outcropping. Another example is avalanche chutes. It is much more important to know a whole series of chutes exist within a short distance than to know what vegetation is growing in the chute or the type of geology underlying it.

Sources: Geologic Map of Washington; State of Washington Department of Natural Resources; 1:500,000 scale; 1961.

Staatz, M.H., et al; Mineral Resources of the Pasayten Wilderness Area; WA. USGS; 1971.


OROVILLE
TONASKET
WINTHROP
TWISP
OMAK
OKANOGAN
BREWSTER
GENERALIZED GEOLOGY MAP
GRANITE AND GNEISS
VOLCANIC ROCKS
SEDIMENTARY ROCKS
GLACIAL TILL
PUMICE AND ASH
FAULT
DATA: GEOLOGIC MAP OF WASHINGTON, 1961.
0 MILES 10
OKANOGAN NATIONAL FOREST

SECTION 2

MAPPING UNIT DESCRIPTIONS

This section is the first of three which constitute the main body of the Soil Resource Inventory Report. Arrangement of the section is in the following order:

Explanation of Mapping Unit page arrangement
List of Mapping Unit Complexes and Their Composition
Miscellaneous Landtype Descriptions
Mapping Unit Descriptions

The description of each Mapping Unit has been placed on a single page to make reference simple and quick. On each page similar types of information are arranged in the same location, except Mapping Units 40, 60 and 80.

The box opposite the Mapping Unit number stresses the importance of recognizing that each Mapping Unit represents a unique soil-site relationship. The box also contains a statement defining the most common inclusions in the Mapping Unit.

The four small boxes grouped together give the environmental setting characteristics of the Mapping Unit. The Vegetation box contains examples, by common name, of the major constituents in the overstory, understory and ground cover vegetative layers. The vegetative zone heading is based on the climax communities identified in Vegetation of Oregon and Washington, by Jerry F. Franklin and C. T. Dyrness, 1969. Site index data follows the tree species for which the data was taken. Ecoclass designations are from the booklets Pacific Northwest Ecoclass Identification and Codes For Pacific Northwest Ecoclass Identification, F. C. Hall, 1974. Only the Formation Association identifiers have been designated.

The Geology box contains a heading naming the major rock or parent material type. A brief description of the geology is found under the heading. A list of sources of geologic information is found in the bibliography part of the Appendix.

The Climate box contains three types of information; average annual precipitation, soil temperature class, and mean annual soil temperature. Source of precipitation data is an isohyetal map prepared by the U.S. Weather Bureau River Forecast Center, Portland, Oregon in 1965 covering the period 1930-1957. Soil temperature data is based on temperature measurements made by the author in 1972 and 1973. Both English and metric units are provided.

The Topography box describes the range of slopes that characterize the Mapping Unit. Relative amount of dissection, if important, appears below the slope range. Aspect or exposure relative to compass directions are given if relevant. Range of elevation above mean sea level in which the Mapping Unit occurs is given in both English and metric units.

The bottom large box contains the range of soil profile characteristics. At least three profile descriptions are used to develop the range.

The litter or duff layer is the mat of plant residues lying on the mineral soil surface. It consists of decomposed, partly decomposed and fresh organic matter. Its major constituants and range of thickness are noted.

The surface layers are the uppermost mineral layers or soil horizons. Ranges of the most important properties are given. Dominant moist soil color is given first. It is followed by texture, structure, rock fragment content (if observed), consistence, pH (acidity or alkalinity) and thickness of the layer or layers.

The subsoil layers occur below the surface layers. Ranges of subsoil characteristics are given in the same order as for the surface soil layers.

One profile is selected as a modal site. Its location is noted below the range of soil profile depth. The classification of each soil, based on the 7th Approximation, Soil Conservation Service, 1967 and Selected Chapters of Soil Taxomony, Soil Conservation Service, 1970 is estimated. Due to the extensive nature of the inventory, definitive soil series designations have not been made.

MAPPING UNIT COMPLEXES

MAPPING UNIT COMPLEX	MAPPING UNIT COMPONENTS
124	30% Unit 17 and 70% Unit 24
126	40% Unit 18 and 60% Unit 26
129	50% Unit 19 and 50% Unit 29
131	40% Unit 19 and 60% Unit 31
144	30% Unit 17 and 70% Unit 44
146	40% Unit 18 and 60% Unit 46
152	50% Unit 19 and 50% Unit 52
153	40% Unit 19 and 60% Unit 53
226	60% Unit 25 and 40% Unit 26
231	60% Unit 29 and 40% Unit 31
241	70% Unit 21 and 30% Unit 41
242	50% Unit 22 and 50% Unit 42
243	70% Unit 23 and 30% Unit 43
244	50% Unit 24 and 50% Unit 44
245	70% Unit 25 and 30% Unit 45
246	40% Unit 26 and 60% Unit 46
247	30% Unit 26 and 70% Unit 47
248	40% Unit 28 and 60% Unit 48
249	30% Unit 28 and 70% Unit 49
251	40% Unit 29 and 60% Unit 51
352	60% Unit 31 and 40% Unit 52
353	50% Unit 31 and 50% Unit 53
262	40% Unit 22 and 60% Unit 62
264	50% Unit 24 and 50% Unit 64
265	70% Unit 25 and 30% Unit 65
266	60% Unit 26 and 40% Unit 66
267	30% Unit 26 and 70% Unit 67
268	60% Unit 28 and 40% Unit 68
372	50% Unit 31 and 50% Unit 72
373	40% Unit 31 and 60% Unit 73
282	70% Unit 22 and 30% Unit 82
284	60% Unit 24 and 40% Unit 84
285	70% Unit 25 and 30% Unit 85
286	50% Unit 26 and 50% Unit 86
287	30% Unit 26 and 70% Unit 87
288	70% Unit 28 and 30% Unit 88

MAPPING UNIT COMPLEX	MAPPING UNIT COMPONENTS
392	60% Unit 31 and 40% Unit 92
393	50% Unit 31 and 50% Unit 93
402	40% Unit 40 and 60% Unit 42
404	40% Unit 40 and 60% Unit 44
405	30% Unit 40 and 70% Unit 45
406	30% Unit 40 and 70% Unit 46
407	30% Unit 40 and 70% Unit 47
408	40% Unit 40 and 60% Unit 48
409	40% Unit 40 and 60% Unit 49
451	30% Unit 40 and 70% Unit 51
452	40% Unit 40 and 60% Unit 52
453	50% Unit 40 and 50% Unit 53
456	30% Unit 40 and 70% Unit 56
602	50% Unit 60 and 50% Unit 62
604	50% Unit 60 and 50% Unit 64
605	30% Unit 60 and 70% Unit 65
606	40% Unit 60 and 60% Unit 66
607	50% Unit 60 and 50% Unit 67
608	30% Unit 60 and 70% Unit 68
609	40% Unit 60 and 60% Unit 69
662	60% Unit 66 and 40% Unit 62
672	50% Unit 60 and 50% Unit 72
673	60% Unit 60 and 40% Unit 73
802	60% Unit 80 and 40% Unit 82
804	50% Unit 80 and 50% Unit 84
805	30% Unit 80 and 70% Unit 85
806	40% Unit 80 and 60% Unit 86
807	70% Unit 80 and 30% Unit 87
808	30% Unit 80 and 70% Unit 88
809	60% Unit 80 and 40% Unit 89
862	60% Unit 86 and 40% Unit 82
892	30% Unit 80 and 70% Unit 92
893	40% Unit 80 and 60% Unit 93
895	60% Unit 80 and 40% Unit 95
896	70% Unit 80 and 30% Unit 96

MAPPING UNITS 1-9

Mapping Units 1 through 9 are sometimes referred to as Miscellaneous Landtypes because they are either limited in extent or quite variable in composition. The concept of each unit is described by a short statement in the boxes on this page.

1 UNDIFFERENTIATED ROCK OUTCROPS, TALUS SLOPES AND ICE FIELDS

The unit consists of continuous to nearly continuous rock outcroppings of mixed geologic origin, talus slopes and ice fields. Soils, when present, are very shallow and patchy. Vegetation is mostly lichens and hearty subalpine and alpine shrubs. Slopes range from flat to vertical but are commonly over 60 percent.

2 LANDSLIDE AREAS

This mapping unit consists of several forms of landslides. Most common types are debris slides, debris avalanches, rock fragment flows and slumps. The unit includes all parts of the landslide from the main scarp at the upper end to the toe.

3 RUGGED ALPINE AND SUBALPINE SLOPES, AVALANCHE CHUTES AND ALPINE MEADOWS

Areas of rock outcrops interrupted by avalanche chutes, alpine meadows and patches of trees characterize this unit. Subalpine fir, whitebark pine and alpine larch are the principal tree species. Slopes range from flat to nearly vertical.

4 COALESCING AVALANCHE CHUTE DEPOSITS

This mapping unit consists of the lower portions of steep, highly dissected sideslopes that are continuous or nearly continuous fans of rock and soil detritus at the base of avalanche chutes. Vegetation consists of alder, willow, quaking aspen, vinemaple, forbs, ferns and mosses. Pacific silver fir, Englemann spruce, hemlock and subalpine fir reproduction of all age classes are found in the unit. Slopes range from 15 to 60 percent.

5 TALUS AND SCREE SLOPES

Deposits of fallen rock fragments of all sizes occurring at the foot of steep rock slopes and headwalls characterize this mapping unit. The unit is devoid of vegetation except for mosses and lichens. Slopes range from 15 to 60 percent.

6 DRY AND MOIST SUBALPINE MEADOWS

The mapping unit encompasses both dry and moist non-forested areas supporting various grasses, forbs, sedges and shrubs. Soils have dark brown loam and gravelly loam profiles. Springs, small streams and boggy areas are found in the unit. Slopes range from 5 to 60 percent.

7 MOIST HARDWOOD GROVES

This unit consists of groves of hardwoods, primarily quaking aspen, growing on dark brown to black soils in moist areas. Slopes range from 5 to 35 percent.

8 SUBALPINE TIMBER AND MEADOW MOSAIC AREAS

The unit consists of subalpine forb meadows broken by groups of trees. The unit is found in cirque basin and saddle positions. Soils are dark brown gravelly loams to sandy loams. Slopes range from 5 to 35 percent.

9 WET MEADOWS

This mapping unit consists of depressional areas that are seasonally to permanently ponded. The soils are slowly permeable and imperfectly to poorly drained. Vegetation consists of rushes, sedges, grasses and willow. Slopes are less than 5 percent.

11

MAPPING UNIT

Mapping Unit 11 consists of Soil 11 and the environmental setting in which it occurs. Both are described in the boxes below. Soils 12, 16 and 21 are common inclusions in the mapping unit. The unit is mapped in several tributary valleys of the lower Methow River.

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: Few scattered ponderosa pine

UNDERSTORY: Big sagebrush, bitterbrush Riparian communities are found in wetter positions and along stream banks.

GROUND COVER: Idaho fescue, bluebunch wheatgrass, yarrow, balsamroot, knapweed

ECOCLASS: GB

GEOLOGY

ALLUVIAL FAN DEPOSITS

Unconsolidated mixtures of silt to boulder sized rock fragments occurring in the form of alluvial fans. Single fans are mapped in the larger stream valleys and groups of fans are mapped in the smaller valleys.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 5 to 40 percent

ASPECT: All aspects

ELEVATION: 1000 to 2500 feet
305 to 760 meters

SOIL 11

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None

SURFACE LAYERS: Dark brown to black silt loam to gravelly silt loam; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; pH ranges from 6.6 to 6.7; 9 to 14 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly loam to gravelly silt loam; weak medium subangular blocky structure to structureless; 35 to 50 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.5 to 7.0; 14 to 31 inches thick.

RANGE OF SOIL DEPTH: 23 to 45 inches. Depth to bedrock is 8 to 15 feet.

MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec. 32, T.31N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy, loamy, sandy-skeletal and loamy-skeletal, mixed, mesic families of Typic and Fluventic Haploxerolls and Typic Xerofluvents.

MAPPING UNIT

Mapping Unit 12 consists of Soil 12 and the environmental setting in which it occurs. Both are described in the boxes below. Soils 11, 13 and 24 are common inclusions in the mapping unit.

12

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70), aspen, willow, alder

UNDERSTORY: Ceanothus, bearberry
Riparian communities are found in wetter positions and along stream banks.

GROUND COVER: Pinegrass, Oregon grape, whortleberry, forbs

ECOCLASS: CP

GEOLOGY

ALLUVIAL FAN DEPOSITS

Unconsolidated mixtures of silt to boulder sized rock fragments occurring in the form of alluvial fans. Single fans are mapped in the larger stream valleys and groups of fans are mapped in the smaller valleys.

CLIMATE

PRECIPITATION: 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 5 to 40 percent

ASPECT: All aspects

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 12

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Conifer needles, leaves, twigs and root mat, 1/4 to 1 inch thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam, silt loam and stony sandy loam textures; weak fine and medium subangular blocky structure to structureless; nongravelly to 55 percent rock fragments by volume; soft to loose, friable and very friable, nonsticky and nonplastic; pH ranges from 6.6 to 6.9; 7 to 8 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown loam to stony loamy sand; structureless to weak medium subangular blocky structure; nongravelly to 55 percent rock fragments by volume; loose, friable and very friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.7; 14 to 38 inches thick.

RANGE OF SOIL DEPTH: 21 to 46 inches. Depth to bedrock is 8 to 10 feet.
MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec. 2, T.33N., R.19E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy, loamy, sandy-skeletal and loamy-skeletal, mixed, mesic families of Typic and Fluventic Haploxerolls and Typic Xerofluvents.

13

MAPPING UNIT

Mapping Unit 13 consists of Soil 13 and the environmental setting in which it occurs. Both are described in the boxes below. Soils 12, 25 and 27 are common inclusions in the Mapping Unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY : Douglas fir (Site index 70-110), ponderosa pine, Englemann spruce, Pacific silver fir
UNDERSTORY : Willow, aspen, alder, snowberry Riparian communities are found in wetter positions and along stream banks.
GROUND COVER : Pinegrass, kinnikinnick, grouse whortleberry, fern
ECOCLASS: CD, CE & CH

GEOLOGY

ALLUVIAL FAN DEPOSITS

Unconsolidated mixtures of silt to boulder sized rock fragments occurring in the form of alluvial fans. Single fans are mapped in the larger stream valleys and groups of fans are mapped in the smaller valleys.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS : Frigid

MEAN ANNUAL SOIL TEMPERATURE : 44° F
7° C

TOPOGRAPHY

SLOPE: 5 to 40 percent

ASPECT: All aspects

ELEVATION : 3000 to 5600 feet
915 to 1710 meters

SOIL 13

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Dark brown to dark yellowish brown fine sandy loam to stony loam; weak fine and medium subangular blocky structure; nongravelly to 45 percent rock fragments by volume; soft and loose, friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.6; 18 to 19 inches thick.

SUBSOIL LAYERS: Light olive brown to dark yellowish brown fine sandy loam to stony loamy sand; nongravelly to 55 percent rock fragments by volume; soft and loose, friable; nonsticky and nonplastic; pH ranges from 6.3 to 6.4; 54 to 119 inches thick.

RANGE OF SOIL DEPTH: 72 to 138 inches
MODAL SITE LOCATION: SE 1/4, SE 1/4, Sec. 25, T.36N., R.16E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy, loamy, sandy-skeletal and loamy-skeletal, mixed, frigid families of Typic Xerofluvents.

MAPPING UNIT

Mapping Unit 14 consists of Soil 14 and the environmental setting in which it is found. Both are described in the boxes below. Soils 11, 15 and 21 are common inclusions in the mapping unit.

14

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Sagebrush, bitterbrush
Riparian communities are found in wetter positions and along stream banks.
GROUND COVER: Idaho fescue, bluebunch wheatgrass, Sandberg bluegrass, yarrow, balsamroot
ECOCLASS: GB

GEOLOGY

ALLUVAIL PLAIN DEPOSITS

Deposits of unconsolidated stream transported materials of mixed geologic origin found in alluvial plains. Both recent low flood plains are included in the mapping unit. Materials are mixtures of silt to boulder sized rock fragments.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 0 to 15 percent

ASPECT: No aspect

ELEVATION: 800 to 2000 feet
245 to 1070 meters

SOIL 14

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed grass debris and root mat; 1/4 to 1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam to loamy sand textures; structureless to weak fine and medium subangular blocky structure; 0 to 10 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.7 to 6.9; 7 to 10 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown fine sandy loam to gravelly loamy sand; structureless to weak fine and medium subangular blocky structure; 10 to 35 percent rock fragments by volume; loose, friable to very friable; nonsticky and nonplastic; pH ranges from 6.5 to 6.6; 16 to 32 inches thick.

RANGE OF SOIL DEPTH: 23 to 42 inches. Depth to bedrock is 8 to 15 feet.
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec. 10, T.35N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Fragmental, sandy, loamy, sandy-skeletal and loamy-skeletal, mixed, mesic families of Typic and Fluventic Haloxerolls and Typic Xerofluvents.

REMARKS: Range of soil characteristics is based on two profile descriptions. Mapping Unit is of limited extent within the survey area.

15

MAPPING UNIT

Mapping Unit 15 consists of Soil 15 and the environmental setting in which it is found. Both are described in the boxes below. Soils 12, 14 and 23 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas fir (Site index 70-110), ponderosa pine, Englemann spruce

UNDERSTORY: Common snowberry, spirea, rose Riparian communities area found in wetter positions and along stream banks.
GROUND COVER: Pinegrass, sedge, kinnikinnick, grouse whortleberry
ECOCLASS: CD

GEOLOGY

ALLUVIAL PLAIN DEPOSITS

Deposits of unconsolidated stream transported materials of mixed geologic origin found in alluvial plains. Both recent low flood plains and higher, older alluvial plains are included in the mapping unit. Materials are mixtures of silt to boulder sized rock fragments.

CLIMATE

PRECIPITATION: 25 to 50 inches
635 to 1270 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 46° F
8° C

TOPOGRAPHY

SLOPE: 0 to 15 percent

ASPECT: No aspect

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 15

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and pine needles, 1/2 to 1 inch thick.
SURFACE LAYERS: Very dark grayish brown to dark brown gravelly sandy loam to sandy loam; weak to moderate subangular blocky structure; 5 to 35 percent rounded rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.6 to 6.9; 8 to 12 inches deep.

SUBSOIL LAYERS: Brown to dark yellowish brown stony loamy sand to fine sandy loam; structureless to moderate medium subangular blocky structure; 15 to 45 percent rounded rock fragments by volume; loose to very loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.8; 12 to 20 inches thick.

RANGE OF SOIL DEPTH: 20 to 32 inches. Depth to bedrock is 6 to 10 feet.
MODAL SITE LOCATION: SE 1/4, SE 1/4, Sec. 10, T.33N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Fragmental, sandy, loamy, sandy-skeletal and loamy-skeletal, mixed, mesic families of Typic and Fluventic Haploxerolls and Typic Xerofluvents.

MAPPING UNIT

Mapping Unit 16 consists of Soil 16 and the environmental setting in which it occurs. Both are described in the boxes below. Soils 11, 12 and 23 are common inclusions in the mapping unit.

16

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70)

UNDERSTORY: Bitterbrush, sagebrush

GROUND COVER: Bluebunch wheatgrass, Idaho fescue Sandberg bluegrass, balsamroot

ECOCLASS: CP

GEOLOGY

ALLUVIAL TERRACE DEPOSITS

Deep deposits of unconsolidated silt to boulder sized rock fragments of mixed geologic origin occurring in the form of broad alluvial terraces. The terraces are found near the mouths of several lower Methow River tributaries.

CLIMATE

PRECIPITATION: 15 to 25 inches
380 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 0 to 10 percent

ASPECT: All aspects

ELEVATION: 1500 to 2500 feet
460 to 760 meters

SOIL 16

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Needles, twigs and grass root mat. 1/2 inch thick.
SURFACE LAYERS: Dark brown to dark yellowish brown loam to fine sandy loam; weak to moderate fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; pH ranges from 6.7 to 6.8; 12 to 14 inches thick.

SUBSOIL LAYERS: Dark yellowish brown loam to sandy loam; weak fine to medium subangular blocky structure; loose, friable to very friable, nonsticky and nonplastic consistence; pH ranges from 6.4 to 6.7; 21 to 26 inches thick.

RANGE OF SOIL DEPTH: 33 to 40 inches. Depth to bedrock is 12 to 15 feet.
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec. 2, T.30N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, mixed, mesic family of Typic Haploxerolls.

17

MAPPING UNIT

Mapping Unit 17 consists of Soil 17 and the environmental setting in which it occurs. Both are described below. Soils 12, 19 and 23 are common inclusions in the mapping unit.

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70)

UNDERSTORY: Ceanothus, bitterbrush

GROUND COVER: Pinegrass, lupine, balsamroot

ECOCLASS: CP

GEOLOGY

PUMICE AND ASH

Loose, wind-borne deposits consisting of a thin layer of volcanic ash overlying a two to three foot layer of 2-5 MM pumice particles.

CLIMATE

PRECIPITATION: 15 to 25 inches
380 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 0 to 25 percent

ASPECT: All aspects

ELEVATION: 1500 to 3000 feet
460 to 915 meters

SOIL 17

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Pine needles, twigs, leaves and root mat; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Dark brown fine sandy loam texture; weak fine and medium subangular blocky structure to structureless; very loose, very friable, nonsticky and nonplastic consistence; pH ranges from 6.8 to 7.2; 9 to 12 inches thick.

SUBSOIL LAYERS: Brown to light brownish gray gravelly sand textures; single grained; 35 to 50 percent 2 to 5 mm pumice particles by volume; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 33 to 38 inches thick.

RANGE OF SOIL DEPTH: 43 to 47 inches
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec. 33, T.30N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy and medial over sandy or sandy-skeletal, mixed, mesic families of Mollic and Typic Vitrandepts.

MAPPING UNIT

Mapping Unit 18 consists of Soil 18 and the environmental setting in which it occurs. Both are described below. Soils 17, 19 and 25 are common inclusions in the mapping unit.

18

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas fir (Site index 80-130), ponderosa pine

UNDERSTORY: Snowberry, alder

GROUND COVER: Pinegrass, lupine, Myrtle pachistima, grouse whortleberry

ECOCLASS: CD

GEOLOGY

PUMICE AND ASH

Loose, wind-borne deposits consisting of a thin layer of volcanic ash overlying a two to three foot layer of 2-5 MM pumice particles.

CLIMATE

PRECIPITATION: 20 to 35 inches
510 to 890 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 0 to 25 percent

ASPECT: All aspects

ELEVATION: 2500 to 5000 feet
760 to 1525 meters

SOIL 18

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and conifer needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam to sandy loam; structureless to weak medium subangular blocky structure; up to 5 percent 2-5 mm pumice particles; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.9 to 7.1; 6 to 9 inches thick.

SUBSOIL LAYERS: Brown to dark yellowish brown gravelly sand to loamy sand; structureless; 10 to 40 percent 2-5 mm pumice particles; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.5 to 7.0; 26 to 34 inches thick.

RANGE OF SOIL DEPTH: 33 to 40 inches
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec. 27, T.30N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy and medial over sandy or sandy-skeletal, mixed, frigid families of Mollic and Typic Vitrandepts.

19

MAPPING UNIT

Mapping Unit 19 consists of Soil 19 and the environmental setting in which it occurs. Both are described below. Soils 17, 18 and 29 are common inclusions in the mapping unit.

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine

UNDERSTORY: Ceanothus, snowberry

GROUND COVER: Pinegrass, grouse whortleberry, Myrtle pachistima, lupine

ECOCLASS: CL

GEOLOGY

PUMICE AND ASH

Loose, wind-borne deposits consisting of a thin layer of volcanic ash overlying a two to three foot layer of 2-5 MM pumice particles.

CLIMATE

PRECIPITATION: 15 to 35 inches
380 to 890 MM

SOIL TEMPERATURE CLASS: Mesic to frigid

MEAN ANNUAL SOIL TEMPERATURE: 44 to 48° F
7 to 9° C

TOPOGRAPHY

SLOPE: 0 to 25 percent

ASPECT: All aspects

ELEVATION: 1500 to 5000 feet
460 to 1525 meters

SOIL 19

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and conifer needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Dark brown to dark yellowish brown silt loam to fine sandy loam; weak fine and medium subangular blocky structure; nongravelly to 10 percent 2 to 5 mm pumice fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.8; 7 to 12 inches thick.

SUBSOIL LAYERS: Yellowish brown to light yellowish brown gravelly sandy loam to fine gravel; 35 to 60 percent 2 to 5 mm pumic fragments by volume; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.9 to 7.3. 25 to 49 inches thick.

RANGE OF SOIL DEPTH: 40 to 60 inches
MODAL SITE LOCATION: NE 1/4, SE 1/4, Sec. 36, T.30N., R.21E., W.M.

ESTIMATED SOIL TAXONOMY: Sandy and medial over sandy or sandy-skeletal, mixed, mesic and frigid families of Mollic and Typic Vitrandepts.

MAPPING UNIT

Mapping Unit 21 consists of Soil 21 and the environmental setting in which it exists. Both are described below. Soils 11 and 22 are common inclusions in the mapping unit.

21

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Sagebrush, bitterbrush, knapweed

GROUND COVER: Idaho fescue, Sandberg bluegrass, bluebunch wheatgrass, balsamroot, yarrow

ECOCLASS: GB

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet deep.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 21

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None

SURFACE LAYERS: Very dark grayish brown to brown fine sandy loam to loamy sand textures; weak medium subangular blocky structure to single grained; 5 to 25 percent rounded gravel to cobble sized rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.2 to 7.0; 2 to 6 inches thick.

SUBSOIL LAYERS: Brown to yellowish brown sandy loam to loamy sand textures; weak medium subangular blocky structure to single grained; 0 to 25 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.0 to 7.5; 42 to 240 inches thick.

RANGE OF SOIL DEPTH: 44 to 246 inches

MODAL SITE LOCATION: SW 1/4, SW 1/4, Sec. 29, T.33N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy and sandy, mixed, mesic families of Typic Haploxerolls and Xerochrepts.

22

MAPPING UNIT

Mapping Unit 22 consists of Soil 22 and the environmental setting in which it exists. Both are described in the boxes below. Soils 21 and 24 are common inclusions in the mapping unit.

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Sagebrush, bitterbrush, knapweed

GROUND COVER: Idaho fescue, Sandberg bluegrass, bluebunch wheatgrass, balsamroot, yarrow

ECOCLASS: GB

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized material deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 35 to 60 percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 22

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None
SURFACE LAYERS: Very dark grayish brown to brown sandy loam to loamy sand; structureless to weak fine and medium subangular blocky structure; 5 to 20 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 7.2; 2 to 18 inches thick.

SUBSOIL LAYERS: Dark grayish brown to brown sandy loam to loamy sand; structureless to weak medium subangular blocky structure; 5 to 20 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.2 to 7.5; 31 to 120 inches thick.

RANGE OF SOIL DEPTH: 33 to 138 inches. Depth to bedrock is 8 to 20 feet.
MODAL SITE LOCATION: SW 1/4, SW 1/4, Sec. 29, T.33N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy and sandy, mixed mesic families of Typic Haploxerolls and Xerochrepts.

MAPPING UNIT

Mapping Unit 23 is made up of Soil 23 and the environmental setting in which it exists. Both soil and setting are described below. Soils 21 and 24 are common inclusions in the mapping unit.

23

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY : Ponderosa pine (site index 50-70)

UNDERSTORY : None

GROUND COVER : Pinegrass, Idaho fescue, currant, balsamroot, yarrow

ECOCLASS: CP

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION : 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS : Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: South, southeast and southwest

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 23

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Pine needles, twigs and grass root mat; 1/2 to 1 inch thick.
SURFACE LAYERS: Very dark brown to dark grayish brown fine sandy loam to loam textures; weak medium subangular blocky to granular structure; loose, friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.5; 6 to 8 inches thick.

SUBSOIL LAYERS: (1) Dark brown to brown fine sandy loam to sandy loam textures; weak medium subangular blocky structure to structureless; up to 10 percent rounded gravel by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 24 to 32 inches thick.
(2) Brown gravelly sand to gravelly sandy loam textures; structureless; 40 percent rounded gravel and cobbles by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.8 to 7.2; 54 to 88 inches thick.
RANGE OF SOIL DEPTH: 84 to 128 inches
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec. 36, T.35N., R.30E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy, coarse-loamy and sandy, mixed, mesic families of Typic Haploxerolls and Xerochrepts.

24

MAPPING UNIT

Mapping Unit 24 consists of Soil 24 and the environmental setting in which it is found. Both soil and setting are described below. Soils 22, 23 and 26 are common inclusions in the unit.

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70)

UNDERSTORY: None

GROUND COVER: Pinegrass, Idaho fescue, currant, balsamroot, yarrow
ECOCLASS: CP

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION: 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 35 to 60 percent

ASPECT: South, southeast and southwest

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 24

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1/4 to 1/2 inch thick.
SURFACE LAYERS: Very dark brown to brown loam to sandy loam; weak to moderate subangular blocky structure; loose, friable, nonsticky and nonplastic; pH ranges from 6.2 to 6.6; 6 to 14 inches thick.

SUBSOIL LAYERS: (1) Dark brown to brown silt loam to gravelly sand; structureless to weak medium subangular blocky structure; 10 to 40 percent rock fragments by volume; loose to very loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 7.0; 23 to 58 inches thick.
(2) Dark grayish brown to brown fine sandy loam to loamy sand; structureless to moderate medium subangular blocky structure; up to 25 percent rock fragments by volume; loose to very loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.5 to 8.0; 56 to 168 inches thick.
RANGE OF SOIL DEPTH: 75 to 240 inches
MODAL SITE LOCATION: SW 1/4, NE 1/4, Sec. 25, T.35N., R.30E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy, coarse-loamy, sandy and sandy-skeletal families of Typic Haploxerolls and Xerochrepts.

MAPPING UNIT

Mapping Unit 25 includes Soil 25 and the environmental setting in which it is found. Both are described below. Soils 13, 23 and 29 are common inclusions in the mapping unit.

25

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY : Douglas fir (Site index 80-130), ponderosa pine, lodgepole pine, western larch

UNDERSTORY : Snowberry, rose, spirea

GROUND COVER : Pinegrass, elk sedge, kinnikinnick, lupine

ECOCLASS: CD

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS : Frigid

MEAN ANNUAL SOIL TEMPERATURE : 44° F
7° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT : All aspects

ELEVATION : 3000 to 5600 feet
915 to 1710 meters

SOIL 25

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Conifer needles, leaves and dead grass. 1/2 inch thick.
SURFACE LAYERS: Very dark grayish brown to yellowish brown fine sandy loam to sandy loam textures (1/2 to 1" layer of white volcanic ash immediately below litter layer); weak fine to medium subangular blocky structure; up to 10 percent rounded gravel; soft, very friable nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 14 to 24 inches thick.

SUBSOIL LAYERS: (1) Dark yellowish brown to brown fine sandy loam to loamy sand textures; weak medium subangular blocky structure to single grained; 10 to 20 percent rounded gravel and cobbles by volume, soft, very friable, nonsticky and nonplastic; pH ranges from 6.8 to 6.9; 16 to 19 inches thick. (2) Light yellowish brown to pale brown gravelly sand; single grained; 50 to 60 percent gravel and cobbles by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 7.0 to 7.1; greater than 14 inches thick.
RANGE OF SOIL DEPTH: 44 to 240 inches
MODAL SITE LOCATION: NE 1/4, NW 1/4, Sec. 1, T.33N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY : Loamy and sandy, mixed, frigid families of Typic Haploxerolls and Xerochrepts.

26

MAPPING UNIT

Mapping Unit 26 includes Soil 26 and the environmental setting which it occurs. Both soil and setting are described in the boxes below. Soils 25 and 31 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas fir (Site index 80-130), ponderosa pine, lodgepole pine, western larch

UNDERSTORY: Snowberry, rose, spirea

GROUND COVER: Pinegrass, elk sedge, kinnikinnick, lupine

ECOCLASS: CD

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsoldated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 60 percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 26

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Conifer needles, leaves and decomposing grass; 1/2 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam to sandy loam; weak fine and medium subangular blocky structure; up to 20 percent rock fragments by volume; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.7; 8 to 12 inches thick.

SUBSOIL LAYERS: Grayish brown to brown sandy loam and gravelly sandy loam to loamy sand; 15 to 40 percent rock fragments by volume; structureless to weak fine and medium subangular blocky structure; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 6.2 to 6.5; 13 to 32 inches thick.

RANGE OF SOIL DEPTH: 21 to 44 inches. Depth to bedrock is 10 to 20 feet.
MODAL SITE LOCATION: SE 1/4, NE 1/4, Sec. 8, T.36N., R.24E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy and loamy-skeletal, mixed, frigid families of Typic Haploxerolls and Xerochrepts.

MAPPING UNIT

Mapping Unit 27 consists of Soil 27 and its associated environmental setting. Both soil and setting are described in the boxes below. Soils 25, 28 and 29 are common inclusions in the mapping unit.

27

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY : Subalpine fir, Englemann spruce (Site index 50-80), lodgepole pine, Pacific silver fir

UNDERSTORY : Serviceberry

GROUND COVER : Pinegrass, grouse whortleberry, elk sedge, kinnikinnick

ECOCLASS: CE

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION : 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS : Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION : 5000 to 7400 feet
1525 to 2260 meters

SOIL 27

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Dark yellowish brown to brown fine sandy loam to sandy loam; structureless to weak fine and medium subangular blocky structure; 5 to 10 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.6; 8 to 12 inches thick.

SUBSOIL LAYERS: Grayish brown gravelly fine sandy loam to loamy sand; structureless to weak medium subangular blocky structure; 20 to 35 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.4; 35 to 45 inches thick.

RANGE OF SOIL DEPTH: 43 to 57 inches. Depth to bedrock is 4 to 10 feet.
MODAL SITE LOCATION: SW 1/4, SE 1/4, Sec. 30, T.37N., R.24E., W.M.

ESTIMATED SOIL TAXONOMY : Loamy and sandy, mixed families of Typic Cryoborolls, Typic and Andic Cryochrepts and Typic Cryandepts.

28

MAPPING UNIT

Mapping Unit 28 encompasses Soil 28 and the environmental setting in which it is found. Both are described in the boxes below. Soils 26, 27 and 31 are common inclusions in the mapping unit.

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (Site index 50-80), lodgepole pine, Pacific silver fir
UNDERSTORY: Serviceberry

GROUND COVER: Pinegrass, grouse whortleberry, elk sedge, kinnikinnick
ECOCLASS: CE

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 60 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 28

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to olive brown and dark yellowish brown loam to fine sandy loam; weak fine and medium subangular blocky structure; 5 to 10 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 5.5 to 6.3; 13 to 15 inches thick.

SUBSOIL LAYERS: Brown and olive brown loam to sandy loam; structureless to moderate medium subangular blocky structure; 10 to 20 percent rock fragments by volume; soft to loose, friable to firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 5.8 to 6.0; 22 to 35 inches thick.

RANGE OF SOIL DEPTH: 35 to 50 inches. Depth to bedrock may range up to 10 feet.
MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec. 11, T.34N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy and sandy, mixed families of Typic Cryoborolls, Typic and Andic Cryochrepts and Typic Cryandepts.

MAPPING UNIT

Mapping Unit 29 consists of Soil 29 and the environmental setting in which it exists. Both are described in the boxes below. Soils 25, 27 and 31 are common inclusions in the mapping unit.

29

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY : Lodgepole pine (Site index 50-100)

UNDERSTORY : Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires.

GROUND COVER :

ECOCLASS: CL

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION : 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS : Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE : 0 to 35 percent

ASPECT : All aspects

ELEVATION : 2000 to 7400 feet
610 to 2260 meters

SOIL 29

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves and conifer needles; 1/4 to 1-1/2 inches thick.
SURFACE LAYERS: Dark brown to dark yellowish brown silt loam to gravelly fine sandy loam; weak fine to medium subangular blocky structure; 0 to 35 percent rock fragments by volume; thin layer of white volcanic ash in upper part; soft, very friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.5; 5 to 10 inches thick.

SUBSOIL LAYERS: Brown and light olive brown to pale brown fine sandy loam to gravelly coarse sand; Structureless to weak medium subangular blocky structure; 0 to 50 percent rock fragments by volume; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.5; 10 to 13 inches thick.

RANGE OF SOIL DEPTH: 15 to 23 inches. Depth to bedrock is 4 to 12 feet.
MODAL SITE LOCATION: NW 1/4, NE 1/4, Sec. 24, T.34N., R.23 E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy, coarse-loamy, sandy, loamy-skeletal and sandy-skeletal, mixed, frigid families of Typic Haploxerolls and Xerochrepts. Also the above particle and mineralogy classes of Typic Cryoborolls, Typic and Andic Cryochrepts and Typic Cryandepts.

31

MAPPING UNIT

Mapping Unit 31 consists of Soil 31 and the environmental setting in which it is found. Both soil and setting descriptions are found below. Soils 26, 28 and 29 are mapped as inclusions in the unit.

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine (Site index 50-100)

UNDERSTORY: Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

GLACIAL TILL AND DRIFT

Unconsolidated silt to boulder sized materials deposited by continental and mountain glaciers. Materials are of mixed geologic origin. Deposits vary in thickness from several inches to several hundred feet thick.

CLIMATE

PRECIPITATION: 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 60 percent

ASPECT: All aspects

ELEVATION: 2000 to 7400 feet
610 to 2260 meters

SOIL 31

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed grass and lodgepole pine needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Dark brown to brown fine sandy loam to gravelly sandy loam; structureless to weak medium subangular blocky structure; 0 to 35 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.9; 6 to 10 inches thick.

SUBSOIL LAYERS: Brown to light brownish gray sandy loam to stony loamy sand; structureless; 5 to 50 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 5.9 to 6.7; 46 to 134 inches thick.

RANGE OF SOIL DEPTH: 52 to 144 inches
MODAL SITE LOCATION: NE 1/4, NW 1/4, Sec. 24, T.39N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, sandy, and sandy-skeletal, mixed, frigid families of Typic Xerochrepts. Coarse-loamy, sandy and sandy-skeletal, mixed families of Typic and Andic Cryochrepts and Typic Cryandepts.

MAPPING UNIT

40

pping Unit 40 consists of rock outcroppings granite and other rocks of similar mineralogy d origin. Rock types included in the unit and eir characteristics are described below.

Several rock types are grouped together under the heading GRANITIC ROCKS. They are all members of the granite clan of rocks. Quartz diorite, granodiorite and granodiorite gneiss are the most extensive rock types found in the survey area. There are several reasons for grouping the various rock types together. They are: (1) granitic bedrock of whatever specific composition is generally hard, massive and competent throughout the survey area, (2) soils forming in residuum and colluveim derived from the various members of the GRANITIC ROCKS are uniformly young with very little expression of horizon development.

Granitic Rocks are found underlying approximately forty percent of the survey area. There is a four to six-mile wide area paralleling the western Forest boundary from lower Granite Creek south that contains granitic rocks. The second area containing granitic rocks occurs east of a line drawn from where the Pasayten River intersects the International Boundary southward along Eightmile Creek to a point where Beaver Creek intersects the Forest boundary. This area includes almost all of the Chewack and Ashnola River watersheds. Also included are the North Summit and South Summit areas of the Twisp Ranger District and all of the Conconully Ranger District except North Fork Salmon Creek. The third area where Granitic Rocks are found is the Tonasket Ranger District except the northeastern portion north of Fir Mountain.

Typically, Granitic Rocks are coarsely crystalline and are hard and competent. They are often massive but sometimes display moderate fracturing and jointing in outcrops. Colors of the freshly broken rocks are often light gray to light brown but can also appear light yellowish gray, white, or pink. Weathering of the rock surface yields brown to orange colors.

Hand specimens often appear speckled with dark ferromagnesiam minerals such as augite, biotite and hornblende contrasting with the light colored feldspars and quartz.

Formation designations Mzg, Tg and Tkg found on the Geologic Map of Washington; Huntting, Marshall T., et al; 1:500,000; 1961, were used to define the areas of granitic rocks. Two other publications, Mineral Resources of the Pasayten Wilderness Area, Washington; Staatz, M. A., et al; U. S. Geological Survey Bulletin 1325; 1971, and Geology of the Methow Valley, Okanogan County, Washington; Julian D. Barksdale; Division of Geology and Earth Resources Bulletin No. 68, Washington State Department of Natural Resources; 1975, were used to further define extent and geographic location of the intrusive bodies.

41

MAPPING UNIT

Mapping Unit 41 consists of Soil 41 and the environmental setting in which it occurs. Both soil and setting are described below. Rock outcrops and soils 21 and 42 are common inclusions in the mapping unit.

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Bitterbrush, sagebrush

GROUND COVER: Idaho fescue, Sandberg bluegrass, bluebunch wheatgrass, balsamroot, yarrow

ECOCLASS: GB

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 41

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Decomposed grass and leaves; 1/2 inch thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam to fine sandy loam; weak fine to medium subangular blocky structure; 0 to 5 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.5; 7 to 9 inches thick.

RANGE OF SOIL DEPTH: 7 to 9 inches.
MODAL SITE LOCATION: SE 1/4, NE 1/4, Sec. 24, T.35N., R.30E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy and coarse-loamy, mixed mesic families of Lithic Haploxerolls.

MAPPING UNIT

42

Mapping Unit 42 encompasses Soil 42 and the environmental setting in which it exists. Both are described in the boxes below. Rock outcrops and soils 22 and 41 are common inclusions in the mapping unit.

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY : None

UNDERSTORY : Bitterbrush, sagebrush

GROUND COVER : Idaho fescue, Sandberg bluegrass, bluebunch wheatgrass, balsamroot, yarrow

ECOCLASS: GB

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS : Mesic

MEAN ANNUAL SOIL TEMPERATURE : 50° F
10° C

TOPOGRAPHY

SLOPE : 35 to 60 percent

ASPECT : South, southeast and southwest

ELEVATION : 800 to 3500 feet
245 to 1070 meters

SOIL 42

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Thin and patchy litter layer composed of dead grass and grass root mat; up to 1/2 inch thick.

SURFACE LAYERS: Very dark grayish brown to dark brown gravelly fine sandy loam to gravelly sandy loam; structureless to weak fine and medium subangular blocky structure; 35 to 50 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.2 to 6.6; 3 to 9 inches thick.

SUBSOIL LAYERS: Dark brown to brown gravelly sandy loam to gravelly loamy sand; structureless; 45 to 60 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.1 to 6.4; 11 to 13 inches thick.

RANGE OF SOIL DEPTH : 9 to 18 inches.

TYPICAL SITE LOCATION : SW 1/4, SW 1/4, Sec. 21, T.33N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY : Loamy-skeletal and sandy-skeletal mixed, mesic families of Typic and Lithic Haploxerolls and Typic Xerochrepts.

43

MAPPING UNIT

Mapping Unit 43 includes Soil 43 and its associated environmental setting. Both soil and setting are described in the boxes below. Soils 23 and 45 are common inclusions in the mapping unit.

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70)

UNDERSTORY: Bitterbrush, sagebrush

GROUND COVER: Idaho fescue, wheatgrass, balsamroot, yarrow

ECOCLASS: CP

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: South, southeast and southwest

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 43

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and pine needles; 1/2 to 1 inch thick.
SURFACE LAYERS: Dark brown to brown fine sandy loam to sandy loam; structureless to weak fine and medium subangular blocky structure; 5 to 20 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.7 to 7.1; 5 to 11 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown sandy loam to gravelly sandy loam and gravelly loamy sand; structureless to weak medium subangular blocky structure; 15 to 40 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.8; 12 to 20 inches thick.

RANGE OF SOIL DEPTH: 27 to 37 inches.
MODAL SITE LOCATION: NW 1/4, SE 1/4, Sec. 14, T.35N., R.31E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, sandy, loamy-skeletal and sandy-skeletal, mixed, mesic families of Typic Haploxerolls and Xerochrepts. Andic Xerochrepts occur in the lower Methow River area.

MAPPING UNIT

Mapping Unit 44 includes Soil 44 and the environmental setting in which it occurs. Both soil and setting are described in the boxes below. Rock outcrops and soils 24 and 43 are common inclusions in the mapping unit.

44

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY : Ponderosa pine (Site index 50-70)

UNDERSTORY : Bitterbrush, sagebrush

GROUND COVER : Idaho fescue, wheatgrass, balsamroot, yarrow

ECOCLASS: CP

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS : Mesic

MEAN ANNUAL SOIL TEMPERATURE : 48° F
9° C

TOPOGRAPHY

SLOPE : 35 to 60 percent

ASPECT : South, southeast and southwest

ELEVATION : 2000 to 4000 feet
610 to 1220 meters

SOIL 44

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Thin and patchy litter layer composed of grass and pine needles.
SURFACE LAYERS: Very dark grayish brown to dark brown gravelly loam to gravelly loamy sand; structureless to weak fine and medium subangular blocky structure; 40 to 50 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.9; 8 to 18 inches thick.

RANGE OF SOIL DEPTH: 8 to 18 inches
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.13, T.34N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal and sandy-skeletal mixed, mesic families of Typic and Lithic Haploxerolls.

45

MAPPING UNIT

Mapping Unit 45 consists of Soil 45 and its associated environmental setting. Both soil and setting are described below. Soils 25, 43, 46 and 51 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, Englemann spruce

UNDERSTORY: Bearberry, serviceberry

GROUND COVER: Pinegrass, arnica, elk sedge, kinnikinnick, lupine

ECOCLASS: CD

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 45

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1/2 inch thick.
SURFACE LAYERS: Dark brown to brown fine sandy loam to gravelly fine sandy loam; structureless to weak fine and medium subangular blocky structure; up to 35 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.9; 7 to 11 inches thick.

SUBSOIL LAYERS: Dark yellowish brown to yellowish brown sandy loam and gravelly sandy loam to gravelly loamy sand; structureless to moderate medium subangular blocky structure; 5 to 50 percent rock fragments by volume; loose to slightly hard, very friable to firm, nonsticky and nonplastic; pH ranges from 6.5 to 7.3; 8 to 17 inches thick.

RANGE OF SOIL DEPTH: 19 to 25 inches.
MODAL SITE LOCATION: SW 1/4, SE 1/4, Sec. 7, T.35N., R.24E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy, loamy-skeletal and sandy-skeletal, mixed, frigid families of Typic Xerochrepts and Haploxerolls.

MAPPING UNIT

Mapping Unit 46 includes Soil 46 and its associated environmental setting. Both soil and setting descriptions are found in the boxes below. Rock outcrops and soils 26, 45 and 52 are common inclusions in the mapping unit.

46

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY : Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, Englemann spruce

UNDERSTORY : Bearberry, serviceberry

GROUND COVER : Pinegrass, elk sedge, arnica, kinnikinnick, lupine

ECOCLASS: CD

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE : 44° F
7° C

TOPOGRAPHY

SLOPE : 35 to 80+ percent

ASPECT : All aspects

ELEVATION : 3000 to 5600 feet
915 to 1710 meters

SOIL 46

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1/4 to 1 inch thick.

SURFACE LAYERS: Dark and very dark grayish brown to dark yellowish brown fine sandy loam and sandy loam to gravelly fine sandy loam; weak fine and medium subangular blocky structure; 5 to 50 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.8; 4 to 10 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown fine sandy loam to sandy loam; structureless to weak medium subangular blocky structure; 5 to 40 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.1 to 6.9; 15 to 22 inches thick.

RANGE OF SOIL DEPTH: 10 to 32 inches thick.
TYPICAL SITE LOCATION: NW 1/4, NW 1/4, Sec. 16, T.34N., R.24E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy and loamy-skeletal, mixed, frigid families of Typic and Pachic Haploxerolls and Typic Xerochrepts.

47

MAPPING UNIT

Mapping Unit 47 consists of Soil 47 and the environmental setting in which it is found. Both soil and setting are described below. Rock outcrops and soils 46 and 53 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, Englemann spruce

UNDERSTORY: Bearberry, serviceberry, pachistima

GROUND COVER: Pinegrass, arnica, elk sedge, kinnikinnick, lupine

ECOCLASS: CD

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 47

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1-1/2 to 2 inches thick.
SURFACE LAYERS: Dark brown to dark yellowish brown fine sandy loam to gravelly sandy loam; weak medium subangular blocky structure; 15 to 35 rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 7 to 10 inches thick.

SUBSOIL LAYERS: Dark brown to yellowish brown stony sandy loam to stony loamy sand; structureless to weak medium subangular blocky structure; 30 to 50 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.5; 16 to 23 inches thick.

RANGE OF SOIL DEPTH: 23 to 33 inches.
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec.23, T.36N., R.22E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy, loamy-skeletal and sandy-skeletal, mixed, frigid families of Typic and Lithic Haploxerolls and Xerochrepts.

MAPPING UNIT

Mapping Unit 48 includes Soil 48 and the environmental setting in which it is found. Both soil and setting are described in the boxes below. Soils 13, 27, 49 and 51 are common inclusions in the mapping unit.

48

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY : Subalpine fir, Englemann spruce (Site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY : Beargrass, huckleberry

GROUND COVER : Grouse whortleberry, pinegrass, Myrtle pachistima, lupine, pinemat manzanita
ECOCLASS: CE

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS : Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 48

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Dark brown to very dark grayish brown loam; weak medium subangular blocky structure; 5 to 10 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.6 to 6.9; 7 to 10 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly loam; structureless to weak medium subangular blocky structure; 35 to 40 percent rock fragments by volume; loose, friable to very friable; nonsticky and nonplastic; pH ranges from 6.4 to 6.6; 33 to 40 inches thick.

RANGE OF SOIL DEPTH: 42 to 50 inches.
MODAL SITE LOCATION: SW 1/4, SW 1/4, Sec.20, T.35N., R.18E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy and loamy-skeletal, mixed families of Typic Cryoborolls and Cryochrepts with intergrades to Andepts and Orthods.

49

MAPPING UNIT

Mapping Unit 49 consists of Soil 49 and the environmental setting in which it is found. Both soil and setting are described below. Rock outcrops and soils 28, 48 and 52 are common inclusions in the mapping unit.

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (Site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY: Beargrass, huckleberry

GROUND COVER: Grouse whortleberry, pinegrass, Myrtle pachistima, lupine, rose, pinemat manzanita ECOCLASS: CE

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent
Highly dissected

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 49

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Dark brown to dark yellowish brown silt loam to gravelly fine sandy loam; weak fine and medium subangular blocky structure; 10 to 35 percent rock fragments by volume; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 6.1 to 6.4; 10 to 12 inches thick.

SUBSOIL LAYERS: Dark yellowish brown to yellowish brown fine sandy loam to gravelly loamy sand; structureless to weak medium subangular blocky structure; 20 to 50 percent rock fragments by volume; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 5.6 to 6.3; 10 to 28 inches thick.

RANGE OF SOIL DEPTH: 28 to 50 inches.
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.19, T.35N., R.18E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy and sandy-skeletal, mixed families of Typic Cryoborolls and Cryochrepts with intergrades to Andepts and Orthods.

MAPPING UNIT

Mapping Unit 51 includes Soil 51 and its associated environmental setting. Both the soil and the setting in which it exists are described below. Soils 29, 45, 47 and 52 are common inclusions in the mapping unit.

51

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY : Lodgepole pine (Site index 50-100)

UNDERSTORY : Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS : Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE : 0 to 35 percent

ASPECT : All aspects

ELEVATION : 2000 to 7400 feet
610 to 2260 meters

SOIL 51

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Layer of fresh and decomposed organic debris; 1/4 to 1 inch thick.
SURFACE LAYERS: Dark brown to brown sandy loam to gravelly sandy loam; weak fine and medium subangular blocky structure; 5 to 35 percent rock fragments by volume; soft to loose, very friable, nonsticky and nonplastic; pH ranges from 6.2 to 6.7; 14 to 16 inches thick.

SUBSOIL LAYERS: Brown loamy sand to gravelly loamy sand; structureless; 15 to 50 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.5; 9 to 46 inches thick.

RANGE OF SOIL DEPTH: 30 to 60 inches
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.14, T.37N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy and sandy-skeletal, mixed, frigid families of Typic Haploxerolls and Xerochrepts at lower elevations and loamy, sandy and sandy-skeletal, mixed families of Typic Cryoborolls and Cryochrepts.

52

MAPPING UNIT

Mapping Unit 52 includes Soil 52 and the environmental setting in which it occurs. Both soil and setting are described in the boxes below. Soils 31, 46, 49 and 53 are common inclusions in the mapping unit.

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY : Lodgepole pine (Site index 50-100)

UNDERSTORY : Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS : Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE : 35 to 80+ percent

ASPECT : All aspects

ELEVATION : 2000 to 7400 feet
610 to 2260 meters

SOIL 52

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Layer of fresh to decomposed organic debris; 1 inch thick.
SURFACE LAYERS: Dark brown to dark yellowish brown stony and nonstony fine sandy loam to gravelly loamy sand; structureless to weak fine subangular blocky structure; 5 to 45 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.5; 4 to 14 inches thick.

SUBSOIL LAYERS: Dark brown to yellowish brown stony and nonstony fine sandy loam to gravelly loamy sand; structureless to weak fine and medium subangular blocky structure; 10 to 55 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 5.7 to 6.7; 14 to 17 inches thick.

RANGE OF SOIL DEPTH : 19 to 31 inches.
MODAL SITE LOCATION : NW 1/4, SE 1/4, Sec.23, T.36N., R.23E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy, sandy and sandy-skeletal, mixed, frigid families of Typic Haploxerolls and Xerochrepts at lower elevations and loamy, sandy and sandy-skeletal, mixed families of Typic Cryoborolls and Cryochrepts.

MAPPING UNIT

Mapping Unit 53 encompasses Soil 53 and its associated environmental setting. Both soil and setting are described in the boxes below. Rock outcrops and soils 47, 49 and 52 are common inclusions in the mapping unit.

53

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY : Lodgepole pine (Site index 50-100)

UNDERSTORY : Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surface appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION : 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 2000 to 7400 feet
610 to 2260 meters

SOIL 53

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of lodgepole pine needles, leaves and twigs; 1/2 to 1 inch thick.
SURFACE LAYERS: Dark brown to dark yellowish brown sandy loam; weak fine and medium subangular blocky structure; 15 to 25 rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.9; 6 to 15 inches thick.

SUBSOIL LAYERS: Yellowish brown gravelly to stony loamy sand; structureless to weak medium subangular blocky structure; 35 to 50 percent rock fragments by volume; loose to very loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.7; 10 to 36 inches thick.

RANGE OF SOIL DEPTH: 18 to 42 inches.
MODAL SITE LOCATION: SE 1/4, SW 1/4, Sec.10, T.40N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, mixed, frigid family of Typic Xerochrepts at lower elevations and coarse-loamy, mixed family of Typic Cryochrepts.

55

MAPPING UNIT

Mapping Unit 55 includes Soil 55 and the environmental setting in which it occurs. Both soil and setting are described below. Rock outcrops and soils 52 and 58 are common inclusions in the mapping unit.

VEGETATION

WESTERN HEMLOCK ZONE

OVERSTORY: Western hemlock, Douglas-fir (Site index 50-70), lodgepole pine, Pacific silver fir

UNDERSTORY: Big huckleberry, Devils club alder

GROUND COVER: Numerous forbs, fern, salal, grouse whortleberry

ECOCLASS: CH

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Ourcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 55 to 75 inches
1400 to 1905 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 2000 to 5600 feet
610 to 1710 meters

SOIL 55

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris consisting of leaves, twigs and conifer needles; 1-1/2 to 2 inches thick.
SURFACE LAYER: Dark brown to brown sandy loam to gravelly sandy loam; structureless to weak medium subangular blocky structure; 20 to 35 percent rock fragment by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.8 to 7.2; 6 to 11 inches thick.

SUBSOIL LAYERS: Brown to dark yellowish brown gravelly to stony sandy loam; structureless to weak medium subangular blocky structure; 35 to 50 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.9; 28 to 35 inches thick.

RANGE OF SOIL DEPTH: 35 to 41 inches.
MODAL SITE LOCATION: SW 1/4, NE 1/4, Sec.8, T.35N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Typic Haploxerolls and Xerochrepts.

MAPPING UNIT

Mapping Unit 56 consists of Soil 56 and its associated environmental setting. Both the soil and its setting are described in the boxes below. Rock outcrops and soils 53 and 59 are common inclusions in the mapping unit.

56

VEGETATION

WESTERN HEMLOCK ZONE

OVERSTORY: Western hemlock, Douglas-fir (Site index 50-70), lodgepole pine, Pacific silver fir

UNDERSTORY : Vinemaple, alder

GROUND COVER: Grouse whortleberry, salal, Oregon grape, numerous forbs, moss

ECOCLASS: CH

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 55 to 75 inches
1400 to 1900 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 2000 to 5600 feet
610 to 1710 meters

SOIL 56

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris consisting of leaves, twigs, wood and conifer needles; 2 to 3 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam to gravelly loam; structureless to weak fine subangular blocky structure; 20 to 50 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.2 to 6.5; 7 to 9 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly to stony sandy loam; structureless to weak medium subangular blocky structure; 40 to 70 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.5; 13 to 21 inches thick.

RANGE OF SOIL DEPTH : 22 to 28 inches.
MODAL SITE LOCATION : NE 1/4, SW 1/4, Sec.12, T.37N., R.15E., W.M.

ESTIMATED SOIL TAXONOMY : Loamy-skeletal, mixed, frigid family of Typic Haploxerolls and Xerochrepts.

REMARKS: Range of Soil Profile characteristics is based on two instead of three or more profile descriptions due to inaccessibility of the soil.

57

MAPPING UNIT

Mapping Unit 57 consists of Soil 57 and its associated environmental setting. Both the soil and the setting in which it exists are described below. Rock outcrops and soils 51 and 58 are common inclusions in the mapping unit.

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY : Mountain hemlock, subalpine fir, lodgepole pine, Englemann spruce (Site index 50-70)
UNDERSTORY : Bearberry

GROUND COVER : Salal, prince's pine, grouse whortleberry, forbs
ECOCLASS: CM & CA

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE : 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 57

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris composed of leaves, twigs and conifer needles; 3 inches thick.
SURFACE LAYERS: White volcanic ash layer, 3 inches thick. Brown sandy loam; structureless to weak medium subangular blocky structure; 20 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH 6.3; 6 inches thick.

SUBSOIL LAYERS: Yellowish brown gravelly loamy sand; structureless; 35 percent rock fragments by volume; very loose, very friable, nonsticky and nonplastic; pH 6.3; 18 inches thick.

RANGE OF SOIL DEPTH: 27 inches.
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.10, T.35N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed family of Typic Cryochrepts.

REMARKS: Due to remoteness of the soil, only one profile description was obtained.

MAPPING UNIT

58

Mapping Unit 58 consists of Soil 58 and the environmental setting in which it occurs. Both soil and setting are described below. Rock outcrops and soils 52 and 59 are common inclusions in the mapping unit.

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY : Mountain hemlock, subalpine fir, lodgepole pine, Englemann spruce (Site index 50-70)
UNDERSTORY : Bearberry

GROUND COVER : Salal, prince's pine, grouse whortleberry, forbs
ECOCLASS: CM & CA

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 58

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris composed of leaves, twigs, wood and conifer needles; 1 to 3 inches thick.
SURFACE LAYERS: Brown to yellowish brown gravelly sandy loam to gravelly loamy sand; structureless to weak medium subangular blocky structure; 40 to 45 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.8; 9 to 42 inches thick.

SUBSOIL LAYERS: Grayish brown stony sandy loam; structureless; 60 percent rock fragments by volume; loose, very friable, nonsticky and nonplastic; pH 6.6; 24 inches thick.

RANGE OF SOIL DEPTH : 33 to 44 inches.
MODAL SITE LOCATION : NW 1/4, SW 1/4, Sec.36, T.36N., R.16E., W.M.

ESTIMATED SOIL TAXONOMY : Loamy-skeletal and sandy-skeletal, mixed families of Typic Cryochrepts.

REMARKS: Range of soil profile characteristics is based on two profile descriptions due to inaccessibility of the soil.

59

MAPPING UNIT

Mapping Unit 59 consists of Soil 59 and the environmental setting in which it exists. Both soil and setting are described in the boxes below. Rock outcrops and soils 53 and 58 are common inclusions in the mapping unit.

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY: Mountain hemlock, subalpine fir, lodgepole pine, Englemann spruce (Site index 50-70)
UNDERSTORY: Huckleberry, azalea, bearberry, alder

GROUND COVER: Prince's pine, salal, grouse whortleberry, forbs, fern, moss
ECOCLASS: CM & CA

GEOLOGY

GRANITIC ROCKS

Granitic bedrock in this report includes a variety of hard, massive and competent rocks of similar mineralogy and origin. Outcroppings of these igneous intrusive rocks appear light gray to light brown. Weathered surfaces appear brown to orange. Hand specimens quite often have a speckled white and black look. Rock types common to the survey area include granodiorite, quartz diorite and granodiorite gneiss.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 59

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic matter consisting of leaves, twigs and conifer needles; 1-1/2 inches thick.
SURFACE LAYERS: White volcanic ash layer, 2 to 4 inches thick overlying surface soil. Dark brown to dark yellowish brown stony to nonstony fine sandy loam to sandy loam; structureless to weak fine and medium subangular blocky structure; 20 to 35 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH 5.8; 8 to 17 inches thick.
SUBSOIL LAYERS: Dark yellowish brown to yellowish brown stony sandy loam to loamy sand; structureless to weak medium subangular blocky structure; 40 to 45 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH 6.0; 10 to 28 inches thick.

RANGE OF SOIL DEPTH: 24 to 45 inches
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.20, T.36N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal and sandy-skeletal, mixed families of Typic Cryochrepts and Cryoborolls.

MAPPING UNIT 60

Mapping Unit 60 consists of rock outcroppings of andesite, basalt and other rocks of similar origin. Rock types included in the mapping unit and their characteristics are described below.

The VOLCANIC ROCKS include andesite and basalt lava flows and small areas of interlayered tuffs and breccias. Most exposed volcanic rocks are hard and unweathered. Recent episodes of alpine and continental glaciation have removed the softer and more easily weathered materials. The last influx of glaciation occurred about 14,000 years ago. It is estimated that the entire survey area up to 7,000 feet above present mean sea level was covered by ice.

Volcanic Rocks are found in four areas: in the northeastern corner of the survey area, north of the Methow River between Goat Peak and Robinson Creek, in the Twisp River area between Little Bridge Creek and Buttermilk Creek and along the western margin of Eightmile Creek.

Most rock types in the Volcanic Rock unit are hard, massive and resistant to weathering. Colors vary widely. Typically, colors are dark brown and dark grayish brown but some strata are colored in shades of purple, red and green. The rocks are generally competent but fracturing intensity and pattern is highly variable.

Primary Formations include:

1. Midnight Peak Formation (Kmp)

   Well indurated andesite flows with interbedded tuffs and breccias. The formation is found on both sides of the Upper Methow Valley.

2. Buck Mountain Formation (Knbm)

   Andesitic breccias with interbedded sedimentary rocks of volcanic origin. The formation occurs in a thin band along the west side of Upper Eightmile Creek.

3. Sanpoil Volcanics (Tsf)

   Andesitic lava flows with minor tuffaceous rocks. Occurs in the Nicholson Creek-Marias Creek area of northeast Tonasket District.

4. Klondike Mountain Formation (Tkg, Tkv, Tkb, and Tki)

   Lava flows, flow breccias, tuffaceous sandstones and dikes and sills of volcanic origin. Also found in the northeastern part of Tonasket District.

61

MAPPING UNIT

Mapping Unit 61 includes Soil 61 and the environmental setting in which it exists. Both soil and setting are described in the boxes below. Soils 21 and 62 are common inclusions in the mapping unit.

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY : None

UNDERSTORY : Sagebrush, bitterbrush

GROUND COVER: Idaho fescue, wheatgrass, balsamroot

ECOCLASS: GB

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 61

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None
SURFACE LAYERS: Very dark grayish brown to dark brown gravelly loam to gravelly sandy loam; weak medium to weak fine and medium subangular blocky structure. 35 to 50 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.7 to 7.0; 16 to 19 inches thick.

RANGE OF SOIL DEPTH: 16 to 19 inches
MODAL SITE LOCATION: SE 1/4, SE 1/4, Sec.21, T.36N., R.21E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, mesic family of Lithic Haploxerolls.

MAPPING UNIT

Mapping Unit 62 consists of Soil 62 and the environmental setting in which it is found. Both soil and setting are described in the boxes below. Rock outcrops and soils 22 and 61 are common inclusions in the mapping unit.

62

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Sagebrush, bitterbrush

GROUND COVER: Idaho fescue, wheatgrass, balsamroot

ECOCLASS: GB

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 62

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None
SURFACE LAYERS: Dark brown loam to fine sandy loam; weak to moderate fine and medium subangular blocky structure; 15 to 25 percent rock fragments by volume; soft to hard, friable to firm, nonsticky and nonplastic; pH ranges from 6.4 to 7.0; 8 to 16 inches thick.

RANGE OF SOIL DEPTH: 8 to 16 inches.
MODAL SITE LOCATION: SW 1/4, SW 1/4, Sec.34, T.36N., R.21E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, mixed, mesic families of Lithic Haploxerolls.

64

MAPPING UNIT

Mapping Unit 64 includes Soil 64 and its associated environmental setting. Both soil and setting are described in the boxes below. Rock outcrops and soils 24 and 66 are common inclusions in the mapping unit.

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY: Ponderosa pine (Site index 50-70)

UNDERSTORY: Bitterbrush, ninebark, ceanothus

GROUND COVER: Idaho fescue, wheatgrass, pinegrass, balsamroot

ECOCLASS: CP

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: South, southeast and southwest

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 64

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic layer composed of leaves, twigs and pine needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Very dark brown to very dark grayish brown loam to gravelly fine sandy loam; weak to moderate fine and medium subangular blocky structure; 10 to 40 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.5 to 7.2; 8 to 17 inches thick.
SUBSOIL LAYERS: Dark brown stony and nonstony loam to clay loam; moderate medium subangular blocky structure; 15 to 50 percent rock fragments by volume; slightly hard, firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.7 to 6.8; 11 to 26 inches thick.

RANGE OF SOIL DEPTH: 21 to 37 inches.
MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec.34, T.36N., R.21E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy, coarse-loamy and loamy-skeltal, mixed, mesic families of Pachic Haploxerolls.

MAPPING UNIT

Mapping Unit 65 includes Soil 65 and the environmental setting in which it occurs. Both soil and setting are described below. Soils 25 and 66 are common inclusions in the mapping unit.

65

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (site index 70-110), ponderosa pine, western larch, lodgepole pine

UNDERSTORY: Serviceberry, whortleberry

GROUND COVER: Pinegrass, lupine, Myrtle pachistima

ECOCLASS: CD

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS : Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 65

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris consisting of leaves, twigs and conifer needles; 1 to 2-1/2 inches thick.
SURFACE LAYERS: Dark brown to dusky red loam to silt loam; weak fine and medium subangular blocky structure; 15 to 25 percent rock fragments by volume; soft, friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.7; 9 to 11 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly fine sandy loam to gravelly clay loam; weak to moderate medium subangular blocky structure; 40 to 50 percent rock fragments by volume; soft, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.2 to 6.5; 25 to 36 inches thick.

RANGE OF SOIL DEPTH: 35 to 45 inches.
MODAL SITE LOCATION: NW 1/4, SE 1/4, Sec.13, T.37N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Typic and Pachic Haploxerolls.

66

MAPPING UNIT

Mapping Unit 66 consists of Soil 66 and the environmental setting in which it exists. Both the soil and its setting are described below. Rock outcrops and soils 26, 65 and 67 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY : Douglas-fir (site index 70-110), ponderosa pine, western larch, lodgepole pine

UNDERSTORY : Serviceberry, ceanothus, wild rose, bearberry

GROUND COVER : Pinegrass, lupine, kinnikinnick

ECOCLASS: CD

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS : Frigid

MEAN ANNUAL SOIL TEMPERATURE : 44° F
7° C

TOPOGRAPHY

SLOPE : 35 to 80+ percent

ASPECT : All aspects

ELEVATION : 3000 to 5600 feet
915 to 1710 meters

SOIL 66

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of organic debris composed of leaves, twigs and conifer needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark reddish brown loam to fine sandy loam; weak fine and moderate subangular blocky structure; 20 to 25 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.0 to 6.7; 5 to 9 inches thick.
SUBSOIL LAYERS: Dark brown to dark reddish brown and reddish brown gravelly loam to gravelly and nongravelly clay loam; weak to moderate medium subangular blocky structure; soft to loose, friable; nonsticky and nonplastic to sticky and plastic; pH ranges from 6.2 to 6.9; 9 to 19 inches thick.

RANGE OF SOIL DEPTH: 17 to 24 inches
MODAL SITE LOCATION: NW 1/4, SE 1/4, Sec.33, T.34N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy, coarse-loamy and loamy-skeletal mixed, frigid families of Typic and Pachic Haploxerolls.

MAPPING UNIT

Mapping Unit 67 consists of Soil 67 and the environmental setting in which it is found. Both soil and setting are described below. Rock outcrops and soil 66 are common inclusions in the mapping unit.

67

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (site index 70-110), ponderosa pine, western larch, lodgepole pine

UNDERSTORY: Bearberry, ninebark, sumac

GROUND COVER : Pinegrass, pinemat manzanita, grouse whortleberry

ECOCLASS: CD

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 67

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: An organic debris layer consisting of leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown loam to silt loam; weak medium subangular blocky structure; 10 to 15 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 7 to 10 inches thick.

SUBSOIL LAYERS: Dark brown fine sandy loam to silty clay loam; weak medium subangular blocky structure; 25 to 35 percent rock fragments by volume; loose, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.3 to 6.4; 13 to 16 inches thick.

RANGE OF SOIL DEPTH : 21 to 26 inches.
MODAL SITE LOCATION : NE 1/4, SE 1/4, Sec.27, T.40N., R.31E., W.M.

ESTIMATED SOIL TAXONOMY : Fine-loamy, coarse-loamy and loamy-skeletal mixed, frigid families of Typic and Pachic Haploxerolls.

68

MAPPING UNIT

Mapping Unit 68 consists of soil 68 and the environmental setting in which it is found. Both soil and setting are described in the boxes below. Soils 27 and 69 are common inclusions in the mapping unit.

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY: Bearberry, huckleberry

GROUND COVER: Pinegrass, kinnikinnick, various forbs

ECOCLASS: CE

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 68

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of organic material consisting of leaves, twigs and conifer needles; 2 to 2-1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam; weak to moderate fine and medium subangular blocky structure; 10 to 25 percent rock fragments by volume; soft, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.4 to 6.8; 7 to 9 inches thick.

SUBSOIL LAYERS: Dark brown clay loam to gravelly clay loam; moderate to strong medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic to sticky and plastic; pH ranges from 6.2 to 6.6; 21 to 31 inches thick.

RANGE OF SOIL DEPTH: 28 to 38 inches.
MODAL SITE LOCATION: SW 1/4, NE 1/4, Sec.14, T.37N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy and loamy-skeletal, mixed families of Typic and Pachic Cryoborolls and Typic Cryochrepts.

MAPPING UNIT

Mapping Unit 69 encompasses Soil 69 and its associated environmental setting. Both soil and setting are described in the boxes below. Rock outcrops and soils 68 and 72 are common inclusions in the mapping unit.

69

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY: Bearberry, huckleberry

GROUND COVER: Pinegrass, kinnikinnick, various forbs

ECOCLASS: CE

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 69

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh to decomposed organic material composed of leaves, twigs and conifer needles; 1-1/2 to 2-1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam; weak to moderate fine and medium subangular blocky structure; 5 to 20 percent rock fragments by volume; soft, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH 6.6; 5 to 9 inches thick.

SUBSOIL LAYERS: Dark brown to brown clay loam to gravelly loam and gravelly clay loam; moderate medium subangular blocky structure; 25 to 40 percent rock fragments by volume; soft to slightly hard, friable to firm, slightly sticky and slightly plastic; pH 6.4; 7 to 17 inches thick.

RANGE OF SOIL DEPTH: 21 to 27 inches.
MODAL SITE LOCATION: SW 1/4, SE 1/4, Sec.8, T.38N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy and loamy-skeletal, mixed families of Typic and Pachic Cryoborolls and Typic Cryochrepts.

72

MAPPING UNIT

Mapping Unit 72 consists of Soil 72 and the environmental setting in which it is found. Both soil and setting are described below. Soils 65, 68 and 73 are common inclusions in the mapping unit.

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine (Site index 50-100)

UNDERSTORY: Understory and ground cover vegetation varies according to prefire condition and the number, intensity and frequency of the fires.
GROUND COVER

ECOCLASS: CL

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 30 to 80 inches
760 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid and Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 3000 to 7400 feet
915 to 2260 meters

SOIL 72

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic material consisting of leaves, twigs and needles; 1 to 1-1/2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam to sandy loam; weak medium to weak fine and medium subangular blocky structure; 5 to 25 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.6; 6 to 9 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown loam to gravelly loam; weak medium to weak fine and medium subangular blocky structure; 20 to 40 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.2; 14 to 27 inches thick.

RANGE OF SOIL DEPTH: 22 to 33 inches.
MODAL SITE LOCATION: SE 1/4, SW 1/4, Sec.9, T.38N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy and loamy-skeletal, mixed, frigid families of Typic Xerochrepts to loamy and loamy-skeletal, mixed families of Typic Cryochrepts.

MAPPING UNIT

Mapping Unit 73 includes Soil 73 and the environmental setting in which it exists. Both soil and setting are described below. Rock outcrops and soils 69 and 72 are common inclusions in the mapping unit.

73

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine (Site index 50-100)

UNDERSTORY: Understory and ground cover vegetation varies according to prefire condition and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

VOLCANIC ROCKS

Igneous extrusive or volcanic rocks found in the survey area are primarily hard and massive andesite and basalt lava flows. Outcroppings and hand specimens appear dark gray to dark grayish brown. Some minor amounts of tuffs, indurated mudflows and breccias are included in this group of parent materials.

CLIMATE

PRECIPITATION: 30 to 80 inches
760 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid and Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 3000 to 7400 feet
915 to 2260 meters

SOIL 73

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and needles; 1 inch thick.
SURFACE LAYERS: Dark brown to brown loam to gravelly sandy loam; weak fine and medium subangular blocky structure; 10 to 35 percent rock fragments by volume; soft to loose, friable to very friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.6; 6 to 8 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly loam to gravelly clay loam; weak to moderate medium subangular blocky structure; 40 to 45 percent rock fragments by volume; soft to slightly hard, friable to firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.1 to 6.3; 10 to 13 inches thick.

RANGE OF SOIL DEPTH: 18 to 19 inches.
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec.12, T.36N., R.19E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Lithic Xerochrepts to loamy-skeletal, mixed family of Lithic Cryochrepts.

REMARKS: Range of soil characteristics is based on two profile descriptions due to inaccessibility of the soil.

80

MAPPING UNIT

Mapping Unit 80 consists of rock outcroppings of sedimentary and metasedimentary origin. Rock types included in the unit and their characteristics are described below.

Several rock types are grouped together under the heading SEDIMENTARY ROCKS. Conglomerates, sandstones, siltstones and shales are the commonest occurring rock types. Of the four, sandstone, and particularly arkosic sandstone, is the type most generally found in the survey area. Metamorphosed sedimentary rocks such as argillite and quartzite have also been included in this group since they are closely related to the Sedimentary Rocks and are of limited extent.

The Sedimentary Rocks are found in a NW-SE trending belt about 15 to 25 miles wide that extends from the Canadian border southward to the Pateros-Alta Lake area. This belt roughly parallels the Methow River valley between Winthrop and the mouth of Lost River. The thick section of sedimentary rocks is broken by numerous granitic intrusions and interbedded layers of volcanic rocks.

The two most extensive formations in the Methow Valley area are the Winthrop Sandstone (Kw) and the Virginian Ridge Formation (Kvr). They are described by Barksdale in Geology of the Methow Valley, 1975. The Winthrop Sandstone is a thick section of massive light gray to greenish gray sandstones with minor interbedded buff-colored siltstone and shale. The Virginian Ridge Formation consists of steeply dipping interbedded black mudstone, siltstone, chertgrained sandstone and chert pebble conglomerate. Other formations include the Harts Pass Formation (Khp) which is an arkosic sandstone with black shale interbeds, the Panther Creek Formation, a black shale with conglomerate lenses, the Goat Creek Formation which is also an arkosic sandstone and the Twisp Formation, a complexly folded and faulted section of thin-bedded shales and sandstones.

A smaller area of metamorphosed sedimentary and igneous rocks occurring in the North Fork Salmon Creek area has been included in the Sedimentary Rocks unit. Rock types are schist and amphibolite with minor amounts of marble, quartzite and metaconglomerate.

MAPPING UNIT

Mapping Unit 82 includes Soil 82 and its associated environmental setting. Both soil and setting are described below. Rock outcrops and soils 22 and 84 are common inclusions in the mapping unit.

82

VEGETATION

GRASS-SHRUB ZONE

OVERSTORY: None

UNDERSTORY: Bitterbrush, sagebrush

GROUND COVER: Idaho fescue, wheatgrass, balsamroot, yarrow

ECOCLASS: GB

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shale occurs in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 10 to 25 inches
255 to 635 MM

SOIL TEMPERATURE CLASS: Mesic

MEAN ANNUAL SOIL TEMPERATURE: 50° F
10° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: South, southeast and southwest

ELEVATION: 800 to 3500 feet
245 to 1070 meters

SOIL 82

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: None

SURFACE LAYERS: Very dark grayish brown to dark brown gravelly loam to gravelly sandy loam; weak to moderate fine and medium subangular blocky structure; 30 to 45 percent rock fragments by volume; soft to slightly hard, friable to very friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.5 to 7.8; 6 to 13 inches thick.

RANGE OF SOIL DEPTH: 9 to 14 inches.

MODAL SITE LOCATION: NE 1/4, SE 1/4, Sec.26, T.34N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, mesic family of Lithic Haploxerolls.

84

MAPPING UNIT

Mapping Unit 84 consists of Soil 84 and the environmental setting in which it is found. Both soil and setting are described in the boxes below. Rock outcrops and soils 24 and 82 are common inclusions in the mapping unit.

VEGETATION

PONDEROSA PINE ZONE

OVERSTORY : Ponderosa pine (Site index 50-70)

UNDERSTORY : Bitterbrush, sagebrush

GROUND COVER : Pinegrass, Idaho fescue, wheatgrass, balsamroot, yarrow, lupine

ECOCLASS: CP

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION : 15 to 30 inches
380 to 760 MM

SOIL TEMPERATURE CLASS : Mesic

MEAN ANNUAL SOIL TEMPERATURE: 48° F
9° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: South, southeast and southwest

ELEVATION: 2000 to 4000 feet
610 to 1220 meters

SOIL 84

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of organic debris consisting of leaves, twigs and conifer needles; 1/2 to 1-1/2 inches thick.
SURFACE LAYERS: Very dark gray to dark grayish brown loam to silty clay loam and clay loam; weak to moderate fine and medium subangular blocky structure; 15 to 30 percent rock fragments by volume; soft to hard, friable to firm, slightly sticky and slightly plastic; pH 6.0; 6 to 11 inches thick.

SUBSOIL LAYERS: Very dark grayish brown to brown loam to clay loam and clay; moderate to strong medium and coarse subangular blocky structure; 10 to 30 percent rock fragments by volume; slightly hard to very hard, firm, slightly sticky and slightly plastic to sticky and plastic; pH 6.5; 9 to 24 inches thick.

RANGE OF SOIL DEPTH: 15 to 35 inches.
MODAL SITE LOCATION: NE 1/4, NW 1/4, Sec.24, T.36N., R.24E., W.M

ESTIMATED SOIL TAXONOMY: Fine-loamy, mixed, mesic family of Typic and Pachic Haploxerolls and Typic Argixerolls.

MAPPING UNIT

Mapping Unit 85 includes Soil 85 and the environmental setting in which it exists. Both soil and setting are described below. Soils 25 and 86 are common inclusions in the mapping unit.

85

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, western larch, Englemann spruce
UNDERSTORY: Huckleberry, snowberry

GROUND COVER: Pinegrass, Myrtle pachistima, grouse whortleberry
ECOCLASS: CD

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 85

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed layer of leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam to silty clay loam; weak to moderate fine and medium subangular blocky structure; 5 to 25 percent rock fragments by volume; loose to slightly hard, friable to firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.4 to 7.0; 4 to 12 inches thick.

SUBSOIL LAYERS: Dark reddish brown to dark brown fine sandy loam to clay loam; weak to moderate fine, medium and coarse subangular blocky structure; 10 to 40 percent rock fragments by volume; slightly hard to hard, friable to firm, nonsticky and nonplastic to sticky and plastic; pH ranges from 6.6 to 7.2; 9 to 26 inches thick.

RANGE OF SOIL DEPTH: 23 to 54 inches.
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec.35, T.37N., R.19E., W.M.

ESTIMATED SOIL TAXONOMY: Fine-loamy and loamy-skeletal, mixed, frigid families of Typic Haploxerolls, Typic Argixerolls and Typic Haploxeralfs.

86

MAPPING UNIT

Mapping Unit 86 includes Soil 86 and its associated environmental setting. Both soil and setting are described below. Rock outcrops and soils 26, 85 and 92 are common inclusions in the mapping unit.

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, western larch, Englemann spruce
UNDERSTORY: Huckleberry, snowberry

GROUND COVER : Pinegrass, Myrtle pachistima, grouse whortleberry
ECOCLASS: CD

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglo... ate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION : 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 86

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam to gravelly loam; weak to moderate fine and medium subangular blocky structure; 15 to 40 percent rock fragments by volume; loose to hard, friable to firm, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 6 to 8 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown loam and gravelly sandy loam to stony clay loam; weak, fine subangular blocky to moderate medium subangular blocky structure; 40 to 60 percent rock fragments by volume; loose to hard, friable to firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.2 to 6.4; 12 to 26 inches thick.

RANGE OF SOIL DEPTH: 19 to 34 inches
MODAL SITE LOCATION: NW 1/4, SW 1/4, Sec.25, T.34N., R.20E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid families of Typic Haploxeralfs and Typic Xerochrepts.

MAPPING UNIT

Mapping Unit 87 includes Soil 87 and the environmental setting in which it occurs. Both soil and its setting are described below. Rock outcrops and soils 86 and 93 are common inclusions in the mapping unit.

87

VEGETATION

DOUGLAS FIR ZONE

OVERSTORY: Douglas-fir (Site index 70-110), ponderosa pine, lodgepole pine, western larch, Englemann spruce
UNDERSTORY: Huckleberry, snowberry

GROUND COVER: Pinegrass, Myrtle pachistima, grouse whortleberry
ECOCLASS: CD

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 20 to 50 inches
510 to 1270 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent

ASPECT: All aspects

ELEVATION: 3000 to 5600 feet
915 to 1710 meters

SOIL 87

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris composed of leaves, twigs and conifer needles; 1-1/2 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam and gravelly loam to fine sandy loam; weak fine and medium subangular blocky to moderate medium subangular blocky structure; 10 to 25 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.5; 7 to 16 inches thick.
SUBSOIL LAYERS: Dark brown and dark yellowish brown to yellowish brown loam and gravelly loam to stony sandy loam; weak medium subangular blocky to moderate medium and coarse subangular blocky structure; 35 to 50 percent rock fragments by volume; soft to slightly hard, firm, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 6.2 to 6.8; 15 to 20 inches thick.

RANGE OF SOIL DEPTH: 22 to 36 inches.
MODAL SITE LOCATION: NE 1/4, SW 1/4, Sec.36, T.37N., R.18E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid families of Typic Xerochrepts.

88

MAPPING UNIT

Mapping Unit 88 consists of Soil 88 and its associated environmental setting. Both soil and setting are described in the boxes below. Soils 27, 89 and 92 are common inclusions in the mapping unit.

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (Site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY: Serviceberry, bearberry

GROUND COVER: Pinegrass, lupine, pinemat manzanita, green fescue, various forbs
ECOCLASS: CE

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 88

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic debris consisting of leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam to gravelly loam; weak to moderate fine and medium subangular blocky structure; 10 to 35 percent rock fragments by volume; loose, friable, nonsticky and nonplastic to slightly sticky and slightly plastic; pH ranges from 5.6 to 6.7; 7 to 18 inches thick.
SUBSOIL LAYERS: Dark grayish brown to dark yellowish brown loam and gravelly loam to gravelly clay loam; weak to moderate medium subangular blocky to moderate medium and coarse subangular blocky structure; 15 to 45 percent rock fragments by volume; loose, friable, nonsticky and nonplastic to sticky and plastic; pH ranges from 5.8 to 6.5; 26 to 42 inches thick.

RANGE OF SOIL DEPTH: 38 to 60 inches.
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec.28, T.37N., R.18E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy and loamy-skeletal, mixed families of Typic and Pachic Cryoborolls and Typic Cryochrepts.

MAPPING UNIT

Mapping Unit 89 consists of Soil 89 and the environmental setting in which it is found. Both soil and its associated setting are described below. Rock outcrops and soils 28, 88 and 93 are common inclusions in the mapping unit.

89

VEGETATION

SUBALPINE FIR ZONE

OVERSTORY: Subalpine fir, Englemann spruce (Site index 40-70), lodgepole pine, Pacific silver fir
UNDERSTORY: Serviceberry, bearberry

GROUND COVER: Pinegrass, lupine, pinemat manzanita, green fescue, various forbs
ECOCLASS: CE

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 35 to 65 inches
890 to 1650 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 89

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and conifer needles; 1/2 to 1 inch thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam to gravelly loam; weak fine and medium subangular blocky structure; 30 to 55 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 5.8 to 6.5; 12 to 18 inches thick.

RANGE OF SOIL DEPTH: 12 to 18 inches.
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec. 18, T.37N., R.18E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy and loamy-skeletal, mixed families of Typic and Lithic Cryoborolls or Cryochrepts.

92

MAPPING UNIT

Mapping Unit 92 includes Soil 92 and the environmental setting in which it occurs. Both soil and setting are described in the boxes below. Rock outcrops and soils 86 and 89 are common inclusions in the mapping unit.

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine (Site index 50-100)

UNDERSTORY: Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires
GROUND COVER

ECOCLASS: CL

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 2000 to 7400 feet
610 to 2260 meters

SOIL 92

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed organic material consisting of leaves, twigs and needles; 1/2 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown fine sandy loam; weak fine and medium subangular blocky structure; 15 to 25 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.5 to 6.7; 9 to 11 inches thick.

SUBSOIL LAYERS: Dark brown to brown gravelly sandy loam; weak medium subangular blocky structure; 35 to 40 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.3; 16 to 32 inches thick.

RANGE OF SOIL DEPTH: 27 to 43 inches.
MODAL SITE LOCATION: NW 1/4, NE 1/4, Sec.8, T37N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Typic Haploxerolls and Xerochrepts to loamy-skeletal, mixed family of Typic Cryoborolls and Cryochrepts.

MAPPING UNIT

Mapping Unit 93 includes Soil 93 and the environmental setting in which it is found. Both soil and setting are described in the boxes below. Rock outcrops and soils 87 and 89 are common inclusions in the mapping unit.

93

VEGETATION

LODGEPOLE PINE ZONE

OVERSTORY: Lodgepole pine (site index 50-100)

UNDERSTORY: Understory and ground cover vegetation varies according to prefire conditions and the number, intensity and frequency of the fires

GROUND COVER

ECOCLASS: CL

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 20 to 80 inches
510 to 2030 MM

SOIL TEMPERATURE CLASS: Frigid to Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42 to 45° F
6 to 7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent

ASPECT: All aspects

ELEVATION: 2000 to 7400 feet
610 to 2260 meters

SOIL 93

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Fresh and decomposed leaves, twigs and needles; 3/4 to 1-1/2 inches thick.
SURFACE LAYERS: Dark brown fine sandy loam to stony fine sandy loam; weak fine and medium subangular blocky structure; 15 to 35 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 6.3 to 6.8; 8 to 11 inches thick.

SUBSOIL LAYERS: Brown gravelly to stony sandy loam; weak medium subangular blocky structure; 40 to 50 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 5.8 to 6.5; 15 to 23 inches thick.

RANGE OF SOIL DEPTH: 23 to 34 inches.
MODAL SITE LOCATION: NW 1/4, NW 1/4, Sec.18, T.37N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Typic Haploxerolls and Xerochrepts to loamy-skeletal, mixed family of Typic Cryoborolls and Cryochrepts.

95

MAPPING UNIT

Mapping Unit 95 consists of Soil 95 and its associated environmental setting. Both soil and setting are described below. Rock outcrops and soils 92 and 97 are common inclusions in the mapping unit.

VEGETATION

WESTERN HEMLOCK ZONE

OVERSTORY: Western hemlock, Englemann spruce, Douglas-fir (Site index 50-70), lodgepole pine

UNDERSTORY: Vinemaple

GROUND COVER: Salal, Oregon grape, whortleberry, fern, moss

ECOCLASS: CH

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 55 to 75 inches
1400 to 1905 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 2000 to 5600 feet
610 to 1710 meters

SOIL 95

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and needles; 1 to 3 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown sandy loam to gravelly sandy loam; weak moderate subangular blocky structure; 20 to 40 percent rock fragments by volume; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.7 to 7.0; 4 to 6 inches thick.

SUBSOIL LAYERS: Brown to dark yellowish brown gravelly fine sandy loam; structureless to weak medium subangular blocky structure; 35 to 50 percent rock fragments by volume; very loose, very friable, nonsticky and nonplastic; pH ranges from 6.4 to 6.6; 17 to 20 inches thick.

RANGE OF SOIL DEPTH: 21 to 26 inches.
MODAL SITE LOCATION: NE 1/4, NE 1/4, Sec.17, T.37N., R.16E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal; mixed, frigid family of Typic Xerochrepts.

MAPPING UNIT

Mapping Unit 96 includes Soil 96 and the environmental setting in which it occurs. Both soil and setting are described in the boxes below. Rock outcrops and soils 93 and 95 are common inclusions in the mapping unit.

96

VEGETATION

WESTERN HEMLOCK ZONE

OVERSTORY: Western hemlock, Englemann spruce, Douglas fir (site index 50-70), lodgepole pine

UNDERSTORY: Vinemaple

GROUND COVER: Salal, Oregon grape, whortleberry, fern, moss

ECOCLASS: CH

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 55 to 75 inches
1400 to 1905 MM

SOIL TEMPERATURE CLASS: Frigid

MEAN ANNUAL SOIL TEMPERATURE: 44° F
7° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 2000 to 5600 feet
610 to 1710 meters

SOIL 96

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs and conifer needles; 1 to 2 inches thick.
SURFACE LAYERS: Very dark brown and dark brown gravelly loam and very gravelly loam; weak fine and medium subangular blocky structure; 35 to 60 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 5.7 to 6.6; 6 to 16 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly loam; weak medium subangular blocky structure; 50 to 60 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 5.9 to 7.0; 13 to 22 inches thick.

RANGE OF SOIL DEPTH: 12 to 38 inches.
MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec.10, T.37N., R.15E., W.M.

ESTIMATED SOIL TAXONOMY: Loamy-skeletal, mixed, frigid family of Typic and Lithic Haploxerolls and Typic Xerochrepts.

97

MAPPING UNIT

Mapping Unit 97 consists of Soil 97 and the environmental setting in which it is found. Both soil and setting are described below. Soil 92 and 96 are common inclusions in the mapping unit.

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY: Mountain hemlock, Englemann spruce (site index 50-70), lodgepole pine, subalpine fir
UNDERSTORY: Mountain ash, alder, huckleberry, spirea

GROUND COVER: Whortleberry, skunk cabbage, forbs, ferns, mosses
ECOCLASS: CM and CA

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 0 to 35 percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 97

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs, needles and plant debris; 2 inches thick.
SURFACE LAYERS: Dark brown fine sandy loam; weak fine and medium subangular blocky structure; 20 percent rock fragments by volume; soft, friable, nonsticky and nonplastic; pH 6.3; 9 inches thick.

SUBSOIL LAYERS: Dark yellowish brown fine sandy loam; weak medium subangular blocky structure; 30 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH 5.8; 8 inches thick.

RANGE OF SOIL DEPTH: 40 to 50 inches.
MODAL SITE LOCATION: SW 1/4, SW 1/4, Sec.34, T.39N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, mixed family of Typic Cryochrepts.

REMARKS: Due to inaccessibility of soil, only one profile description was obtained.

MAPPING UNIT

Mapping Unit 98 includes Soil 98 and the environmental setting in which it occurs. Both soil and its associated setting are described below. Rock outcrops and soils 92 and 97 are common inclusions in the mapping unit.

98

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY: Mountain hemlock, Englemann spruce (site index 50-70), lodgepole pine, subalpine fir

UNDERSTORY: Mountain ash, alder, huckleberry, spirea

GROUND COVER: Whortleberry, skunk cabbage, forbs, ferns, mosses

ECOCLASS: CM and CA

GEOLOGY

SEDIMENTARY ROCKS

Extensive area of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 80+ percent

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 98

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Moss, leaves, twigs, needles and plant debris; 1 to 2 inches thick.
SURFACE LAYERS: White volcanic ash layer, 1 to 1-1/2 inches thick. Very dark grayish brown to dark brown loam to fine sandy loam; weak fine and medium subangular blocky structure; 5 to 20 percent rock fragments by volume; soft to loose, friable, nonsticky and nonplastic; pH ranges from 6.0 to 6.3; 6 to 8 inches thick.

SUBSOIL LAYERS: Dark brown to yellowish brown fine sandy loam; weak medium subangular blocky structure; 20 to 30 percent rock fragments by volume; loose, friable, nonsticky and nonplastic; pH ranges from 5.8 to 6.0; 15 to 27 inches thick.

RANGE OF SOIL DEPTH: 28 to 45 inches.
MODAL SITE LOCATION: SE 1/4, NW 1/4, Sec.34, T.37N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy, mixed family of Typic Cryoborolls and Cryochrepts.

99

MAPPING UNIT

Mapping Unit 99 includes Soil 99 and the environmental setting in which it occurs. Both soil and setting are described in the boxes below. Rock outcrops and soils 93 and 98 are common inclusions in the mapping unit.

VEGETATION

MOUNTAIN HEMLOCK ZONE

OVERSTORY: Mountain hemlock, Englemann spruce (Site index 50-70), lodgepole pine, subalpine fir
UNDERSTORY: Mountain ash, alder, huckleberry, spirea

GROUND COVER: Whortleberry, skunk cabbage, forbs, ferns, mosses
ECOCLASS: CM and CA

GEOLOGY

SEDIMENTARY ROCKS

Extensive areas of clastic or sedimentary rocks occur in the western part of the survey area. These rocks are found in a NW-SE trending belt roughly twenty miles wide in the upper Methow River Valley area. Predominant rock types include sandstone, siltstone and conglomerate. Interbedded black shales occur in some areas. Most rocks are only slightly weathered because of the recent history of glaciation. The sedimentary rocks vary greatly in color.

CLIMATE

PRECIPITATION: 70 to 110 inches
1780 to 2790 MM

SOIL TEMPERATURE CLASS: Cryic

MEAN ANNUAL SOIL TEMPERATURE: 42° F
6° C

TOPOGRAPHY

SLOPE: 35 to 100 percent
Highly dissected

ASPECT: All aspects

ELEVATION: 5000 to 7400 feet
1525 to 2260 meters

SOIL 99

RANGE OF SOIL PROFILE CHARACTERISTICS

LITTER: Leaves, twigs, needles and other fresh and decomposed plant materials; 1-1/2 to 2 inches thick.
SURFACE LAYERS: Very dark grayish brown to dark brown loam and fine sandy loam to stony sandy loam; weak fine and medium subangular blocky structure; 25 to 35 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 5.7 to 6.5; 6 to 10 inches thick.

SUBSOIL LAYERS: Dark brown to dark yellowish brown gravelly fine sandy loam to stony sandy loam; weak to moderate medium subangular blocky structure; 45 to 50 percent rock fragments by volume; loose, friable to very friable, nonsticky and nonplastic; pH ranges from 5.5 to 6.2; 9 to 13 inches thick.

RANGE OF SOIL DEPTH: 17 to 19 inches.
MODAL SITE LOCATION: NW 1/4, NE 1/4, Sec.19, T.37N., R.17E., W.M.

ESTIMATED SOIL TAXONOMY: Coarse-loamy to loamy-skeletal, mixed families of Lithic Cryoborolls and Cryochrepts.

SECTION 3

SOIL MAPS

This section contains the soil map sheets. The base maps are U. S. Geological Survey topographic quadrangle maps. Lines, which separate Mapping Units, spot symbols and Mapping Unit numbers have been transferred to the topographic map sheets from aerial photographs. Mapping was accomplished using aerial photographic interpretation techniques and field checking. Early in 1974 high altitude color infrared photography was obtained from NASA. This photography substantially aided recognition of ground features.

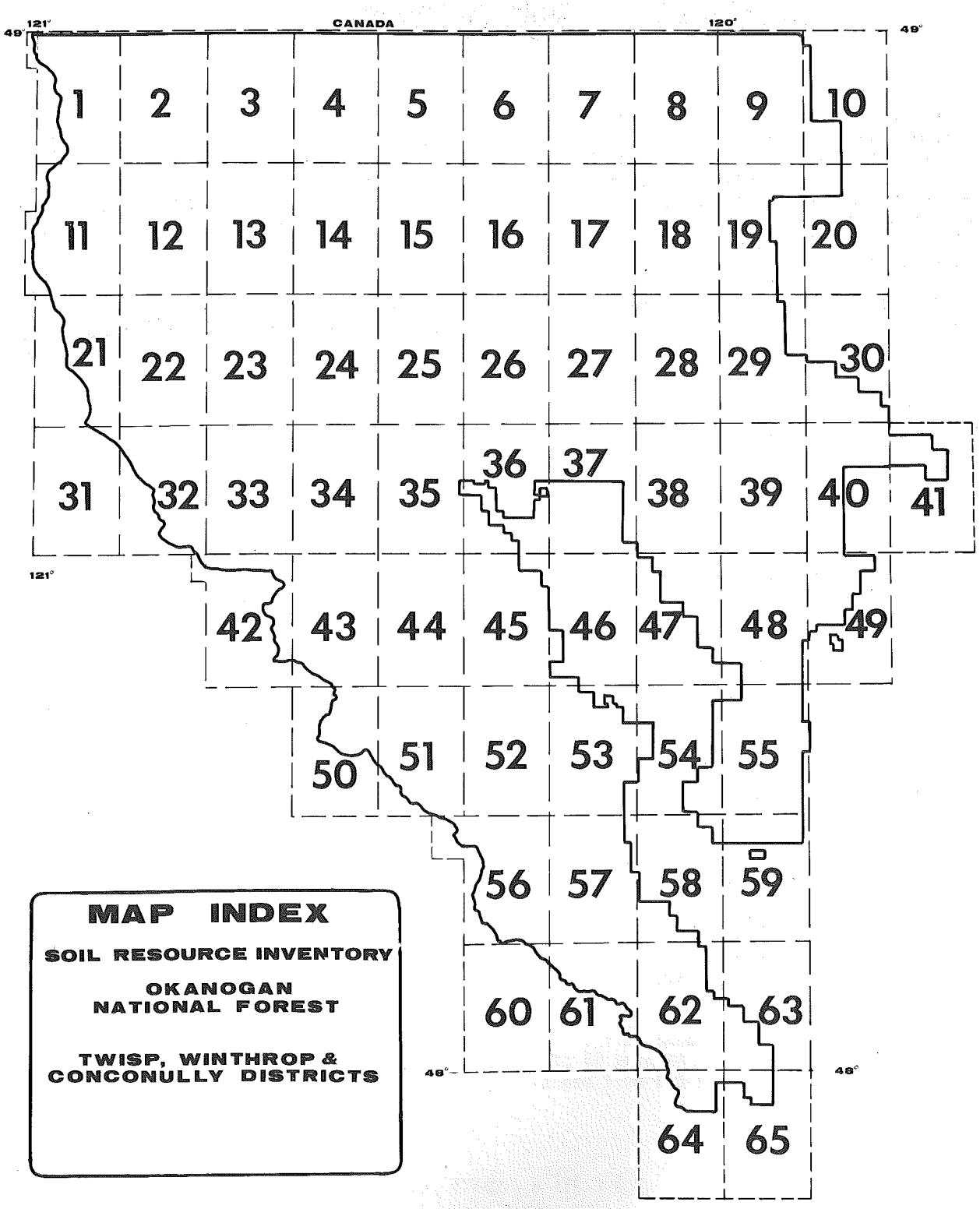
Each delineation on the soil maps is identified by a one, two or three digit number. This number is referred to by the general term "Mapping Unit." Two digit mapping units represent "monolandtypes" or single soil-site units. Single digit numbers represent Miscellaneous Landtypes. These are mapping units that are non-soil, i.e., ice and snow fields, or contain highly variable soils such as in subalpine meadows. Mapping unit complexes, three digit numbers, represent areas where two or more monolandtypes are present in an arrangement too complex to separate at the mapping scale used.

Monolandtypes, the two-digit mapping units, represent conceptual units that are defined by specific vegetative, geologic, climatic, topographic, and soil criteria. Each unit contains a dominant soil which accounts for at least 70 percent of the delineation. The dominant soil of the mapping unit is described in the mapping unit description section and identified by the same number on the soil maps. Mapping units are often not as pure as described. They contain small areas of other soil and site conditions. These areas are called inclusions. Inclusions account for no more than 30 percent of the delineated monolandtype.

Spot symbols are used to represent important land features which are too small to delineate with a surrounding line, yet are important for management purposes. The following spot symbols are used in this report:

✓	Rock outcrop
⸙	Wet spot or marsh
	Slump or slide scarp
	Avalanche track
M	Modal site location
S	Soil sample location

The soil maps are numbered sequentially from west to east starting in the northwestern corner of the Forest. Tonasket District map sheets are found separately at the back of the section.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31 32 33 34 35 36 37 38 39 40 41
121°
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50 51 52 53 54 55
56 57 58 59
60 61 62 63
48°
48°
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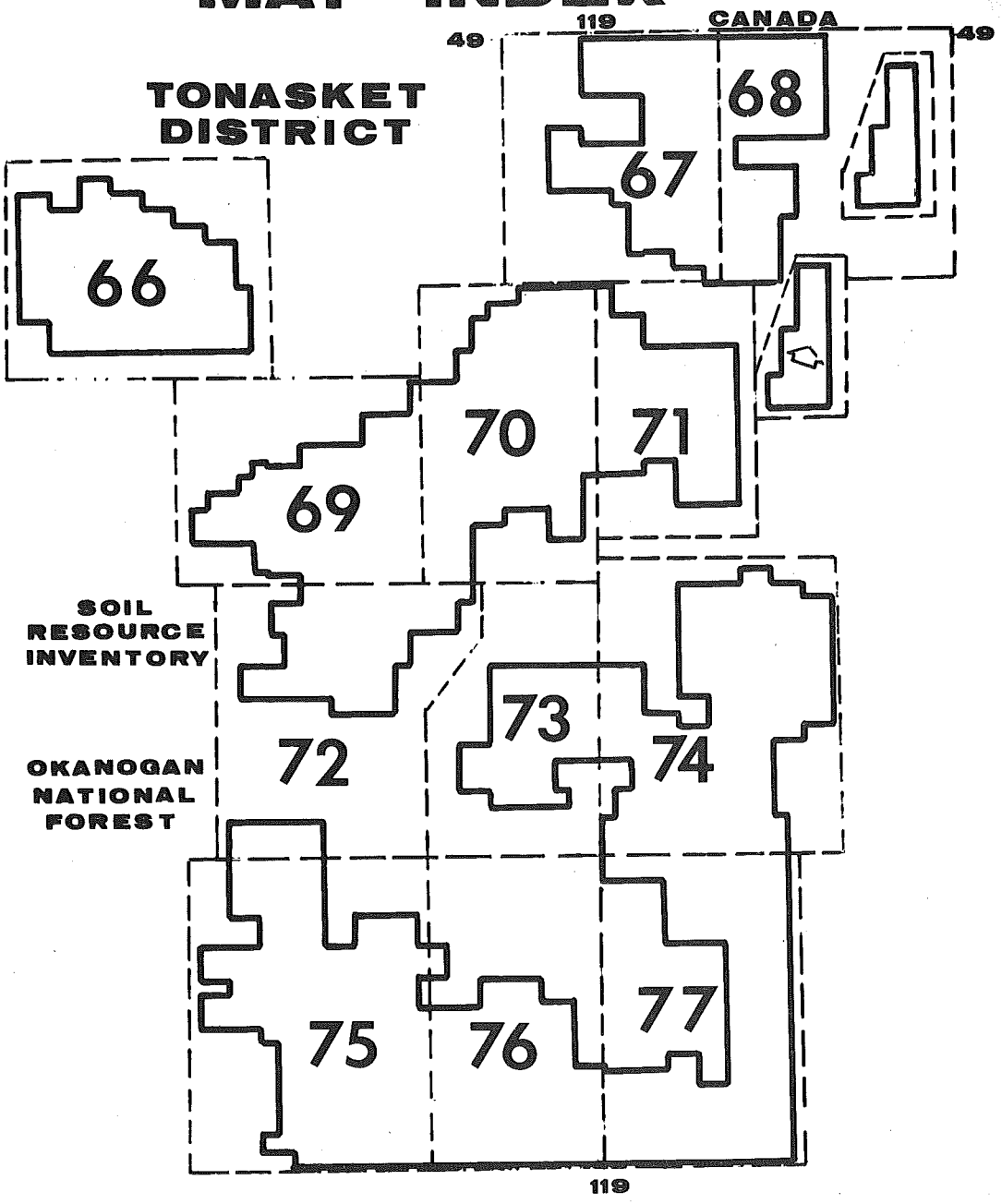
MAP INDEX
SOIL RESOURCE INVENTORY
OKANOGAN
NATIONAL FOREST
TWISP, WINTHROP &
CONCONULLY DISTRICTS

MAP INDEX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119
CANADA
49
TONASKET
DISTRICT
68
67
66
70
71
69
SOIL
RESOURCE
INVENTORY
73
72
74
OKANOGAN
NATIONAL
FOREST
75
76
77
119


CANADA
BRITISH COLUMBIA
WASHINGTON
Willow Lake
Elbow Basin
Three Fools Creek
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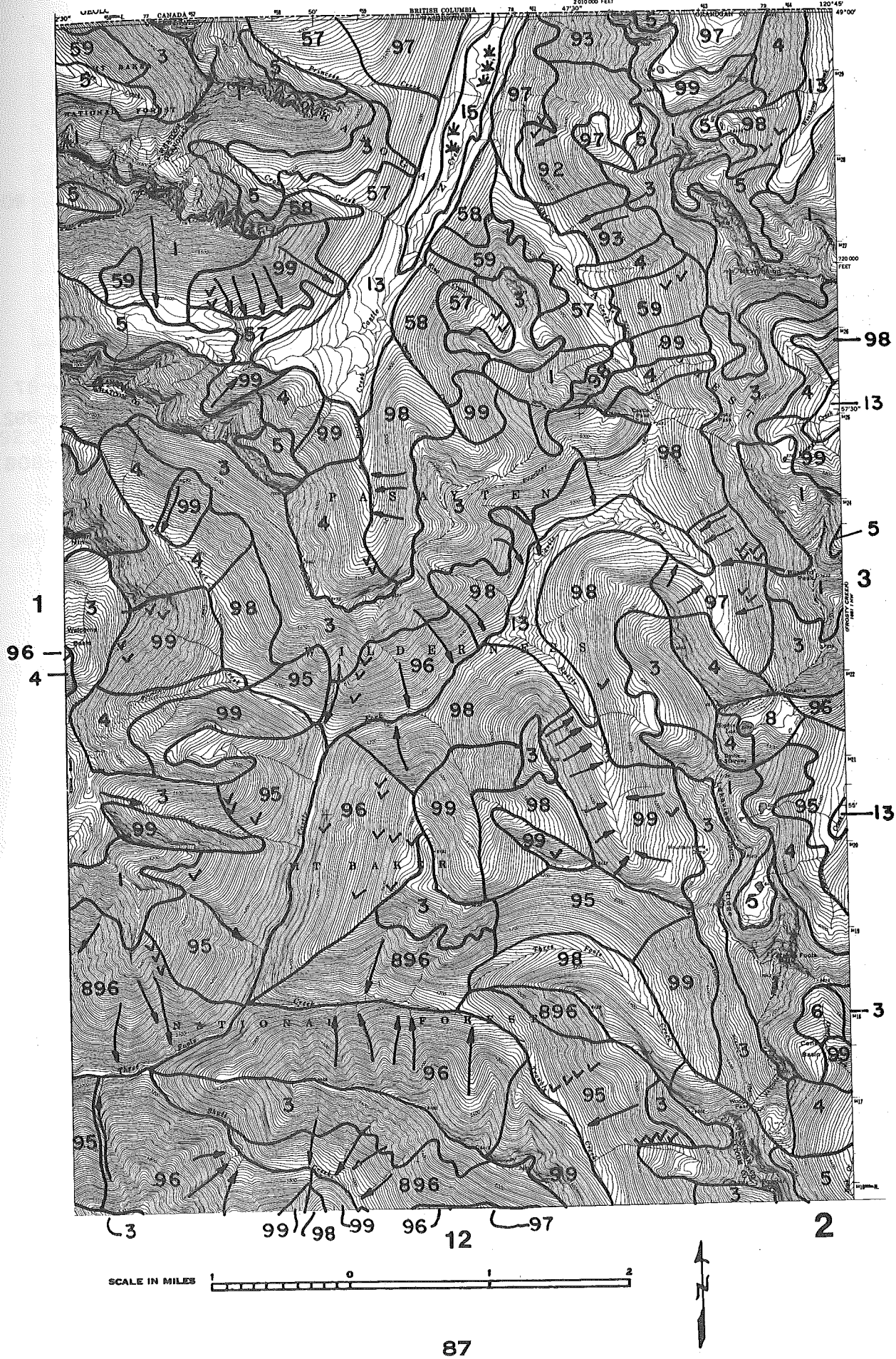
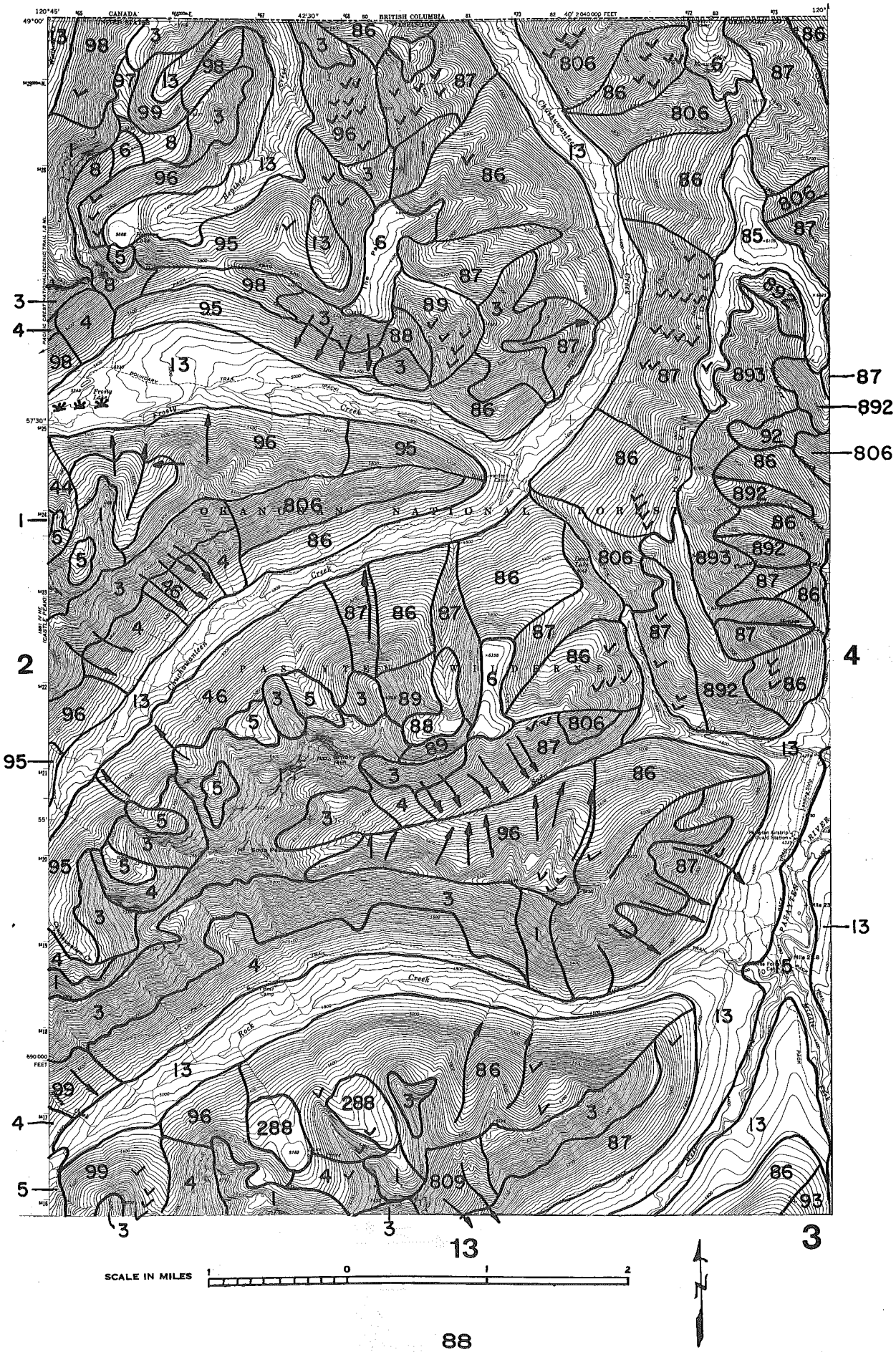
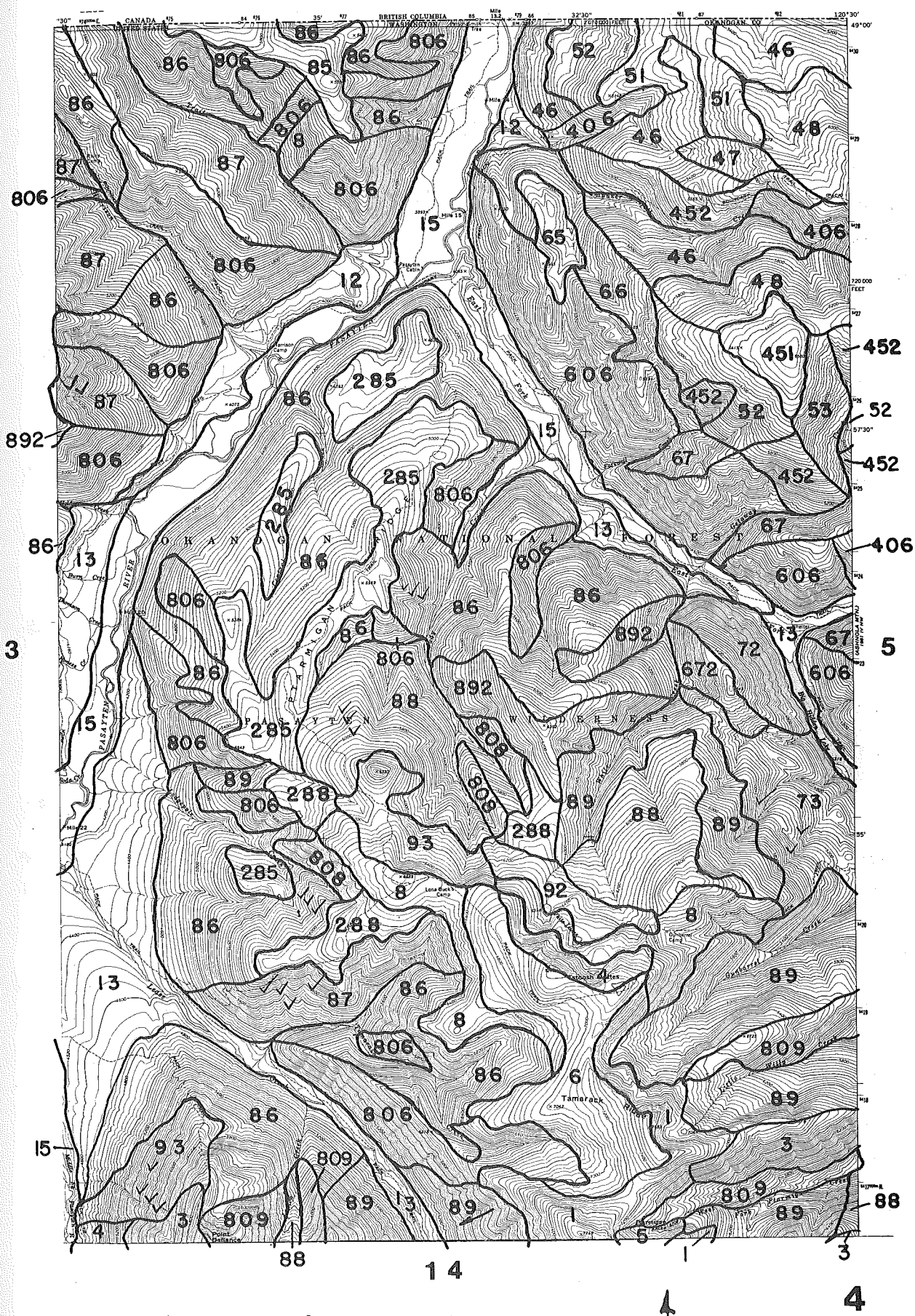
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST



SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST

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BRITISH COLUMBIA
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57'30"
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OKANOGAN NATIONAL FOREST
PASAYTEN WILDERNESS
PASAYTEN RIVER
Tamarack
Point Defiance
Lone Buck Camp
Pasayten Cabin
Harrison Camp
East Fork
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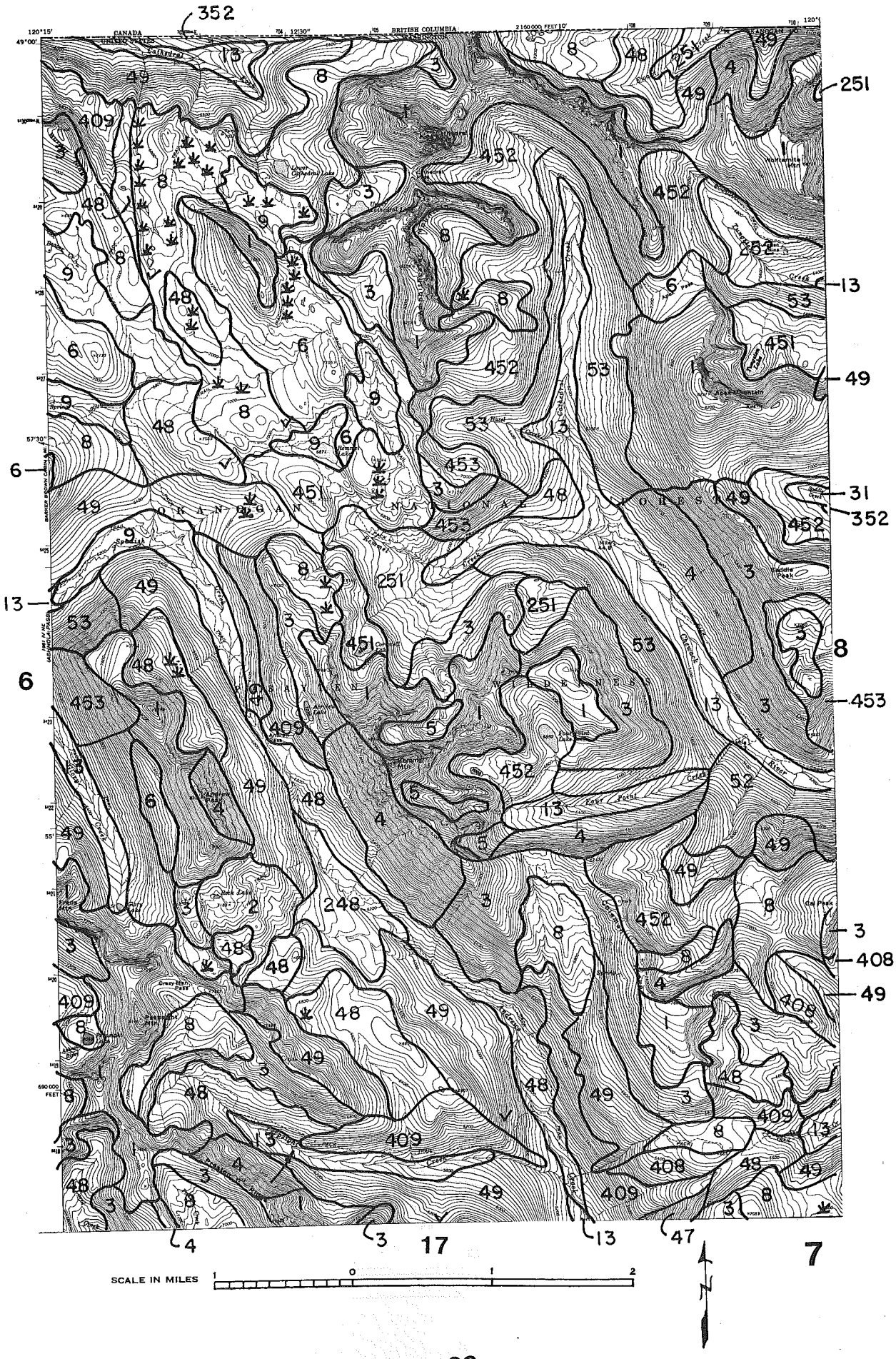
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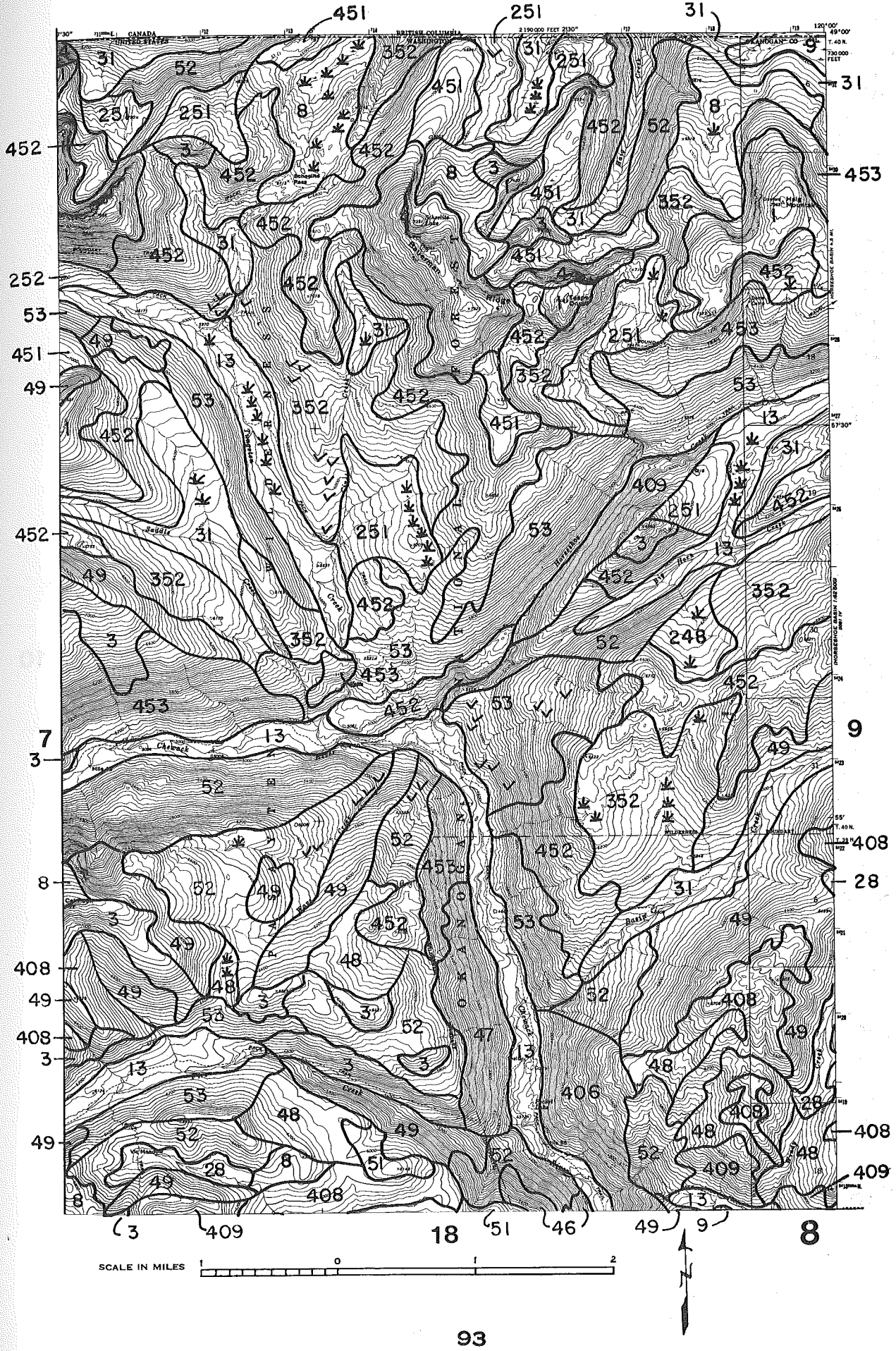
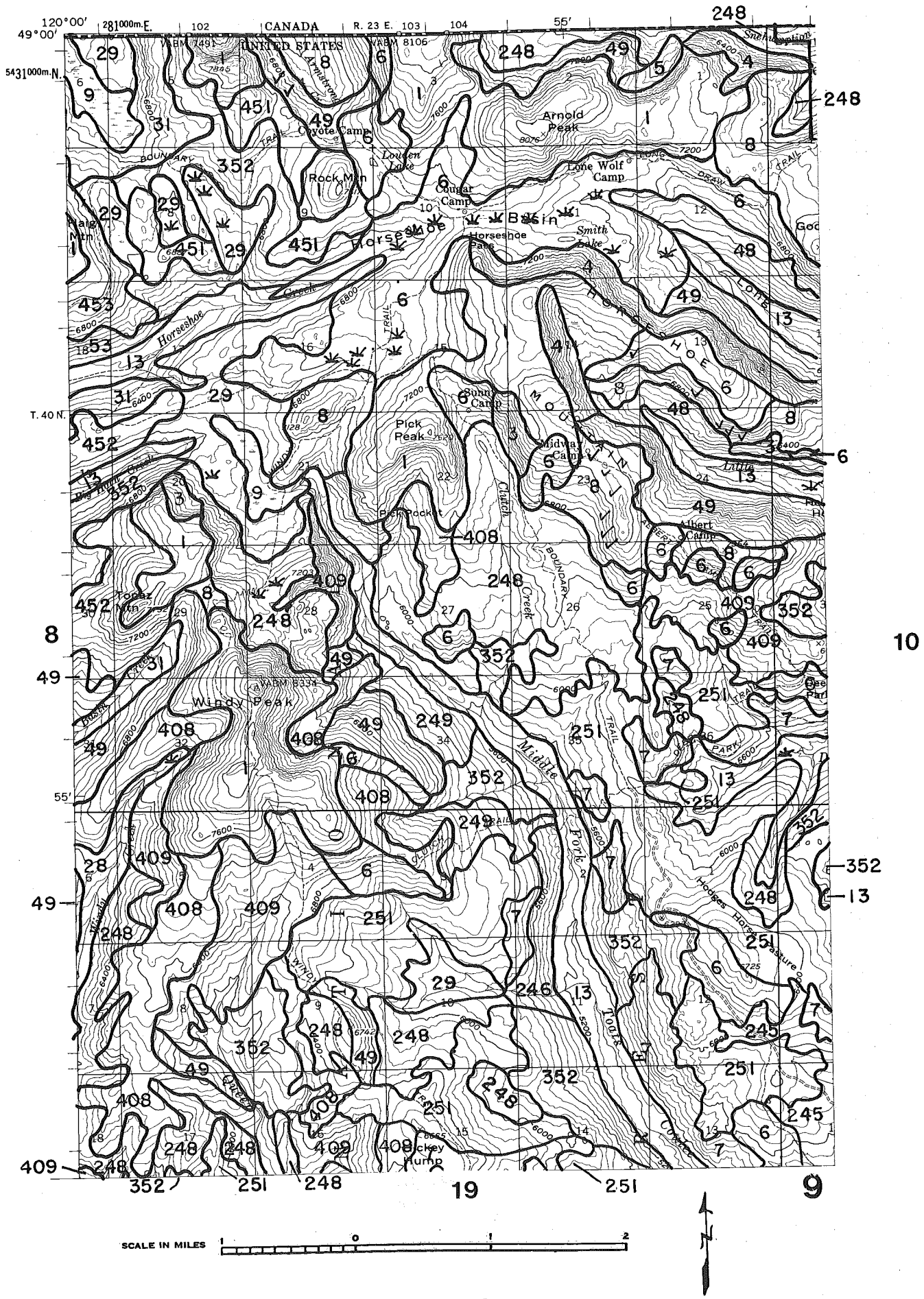
WILDERNESS

SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST

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CANADA
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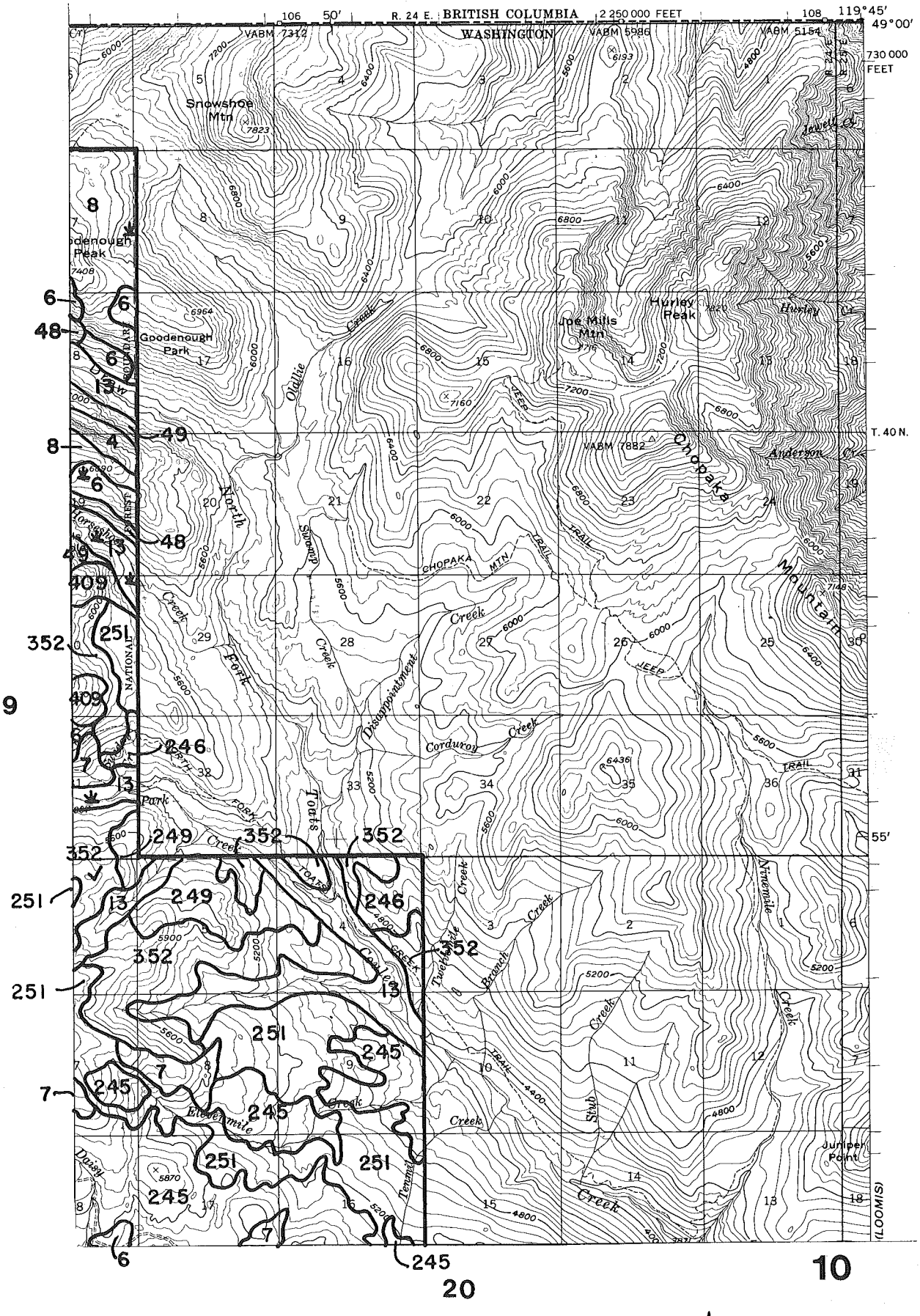
R. 23 E.
T. 40 N.
Arnold Peak
Coyote Camp
Louden Lake
Rock Mtn
Cougar Camp
Lone Wolf Camp
Horseshoe Basin
Horseshoe Lake
Smith Lake
Horseshoe Creek
Sunny Camp
Pick Peak
Midway Camp
Albert Camp
Pick Pocket
Clutch Creek
Topaz Mtn
Windy Peak
Middle Fork
Hodges Horse Pasture
Dickey Hump
SCALE IN MILES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Snowshoe Mtn
Goodenough Peak
Goodenough Park
Joe Mills Mtn
Hurley Peak
Chopaka Mountain
Oldtire Creek
North Fork Toats Park Creek
Disappointment Creek
Coraluron Creek
Twelvemile Creek
Ninemile Creek
Stub Creek
Daisy Creek
Jewell Cr.
Hurley Cr.
Anderson Cr.
Chopaka Mtn. Trail
Jeep Trail
Juniper Point
(LOOMIS)
VABM 7312
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VABM 5184
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SCALE IN MILES
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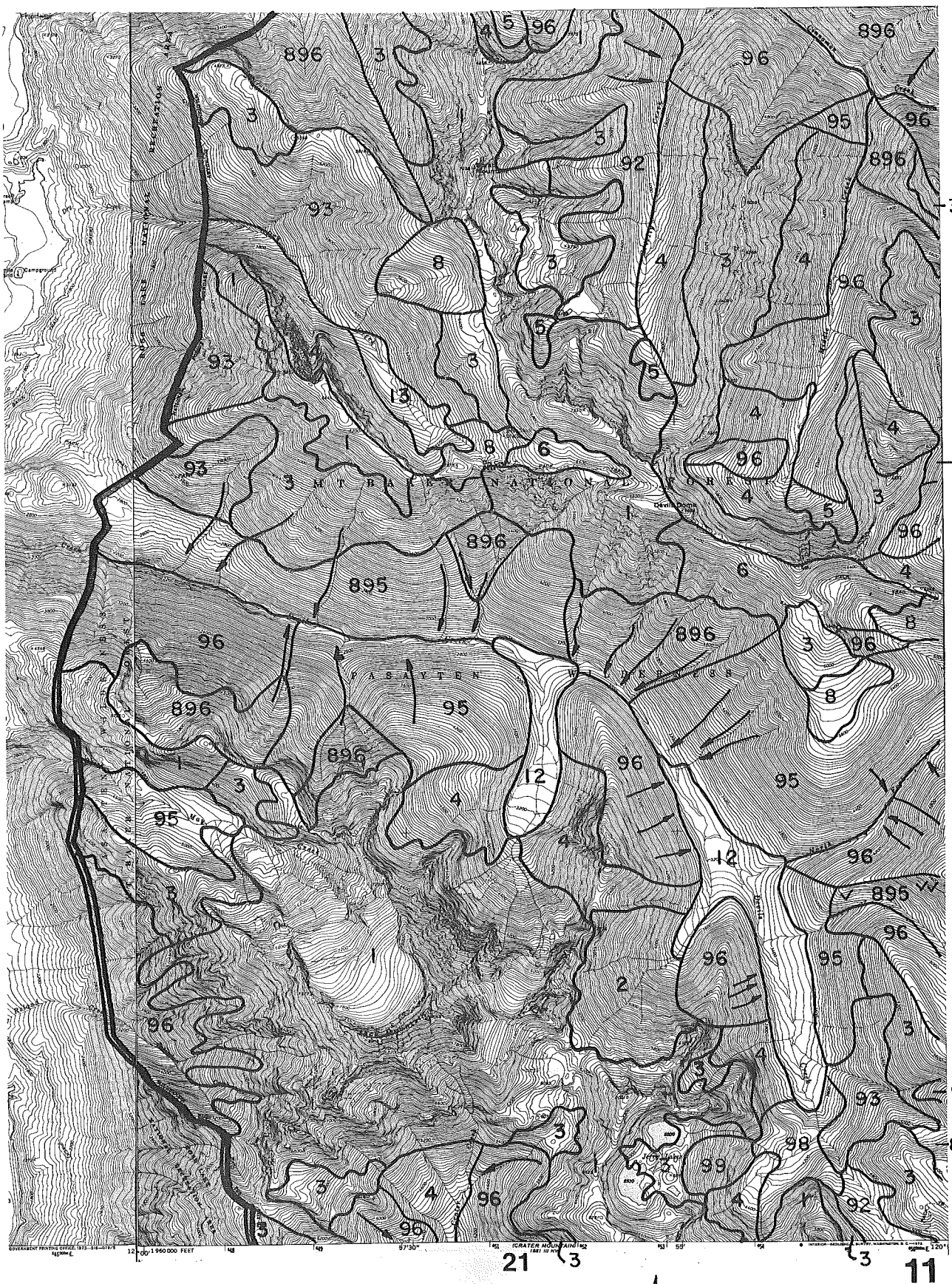
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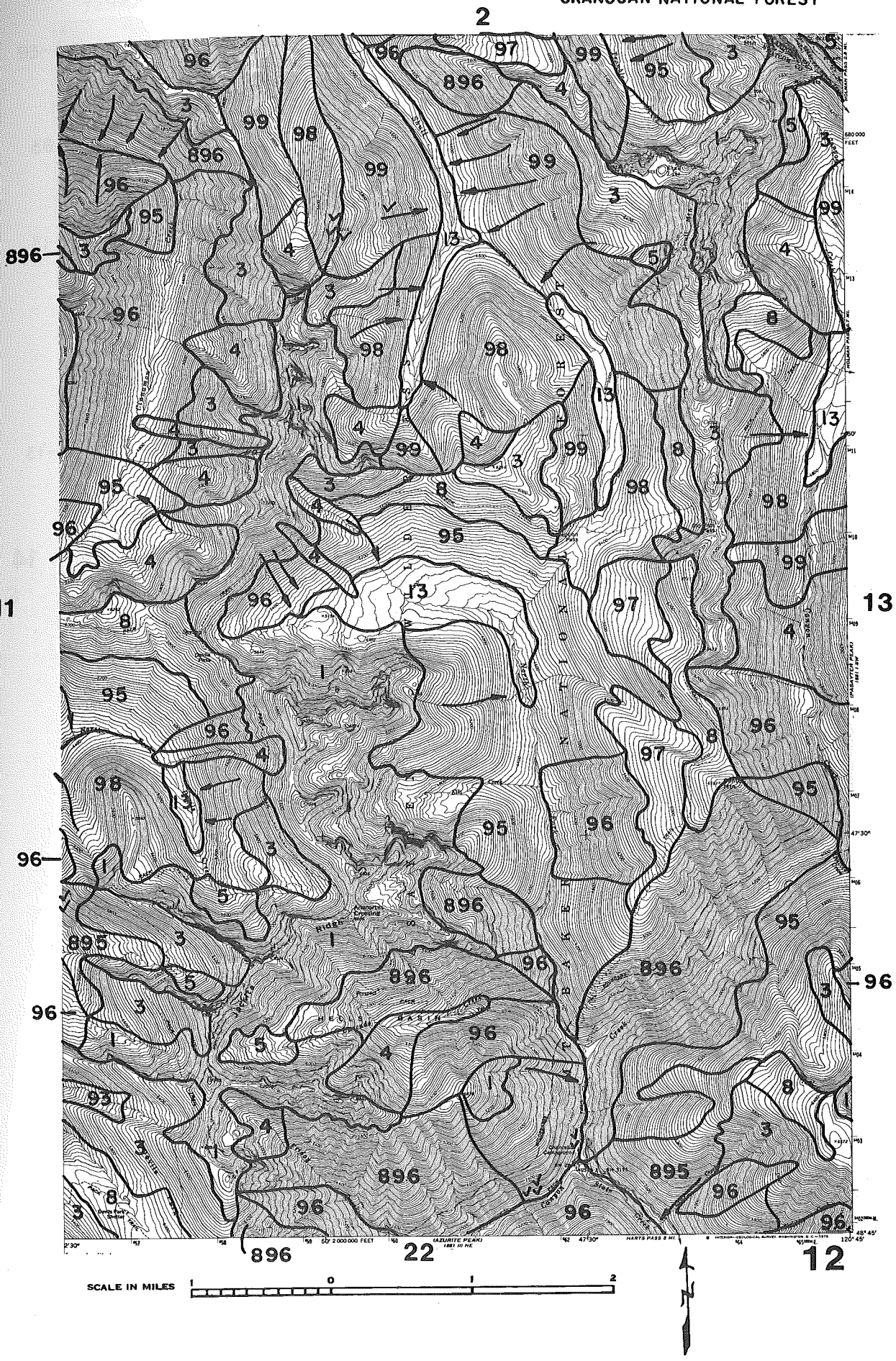
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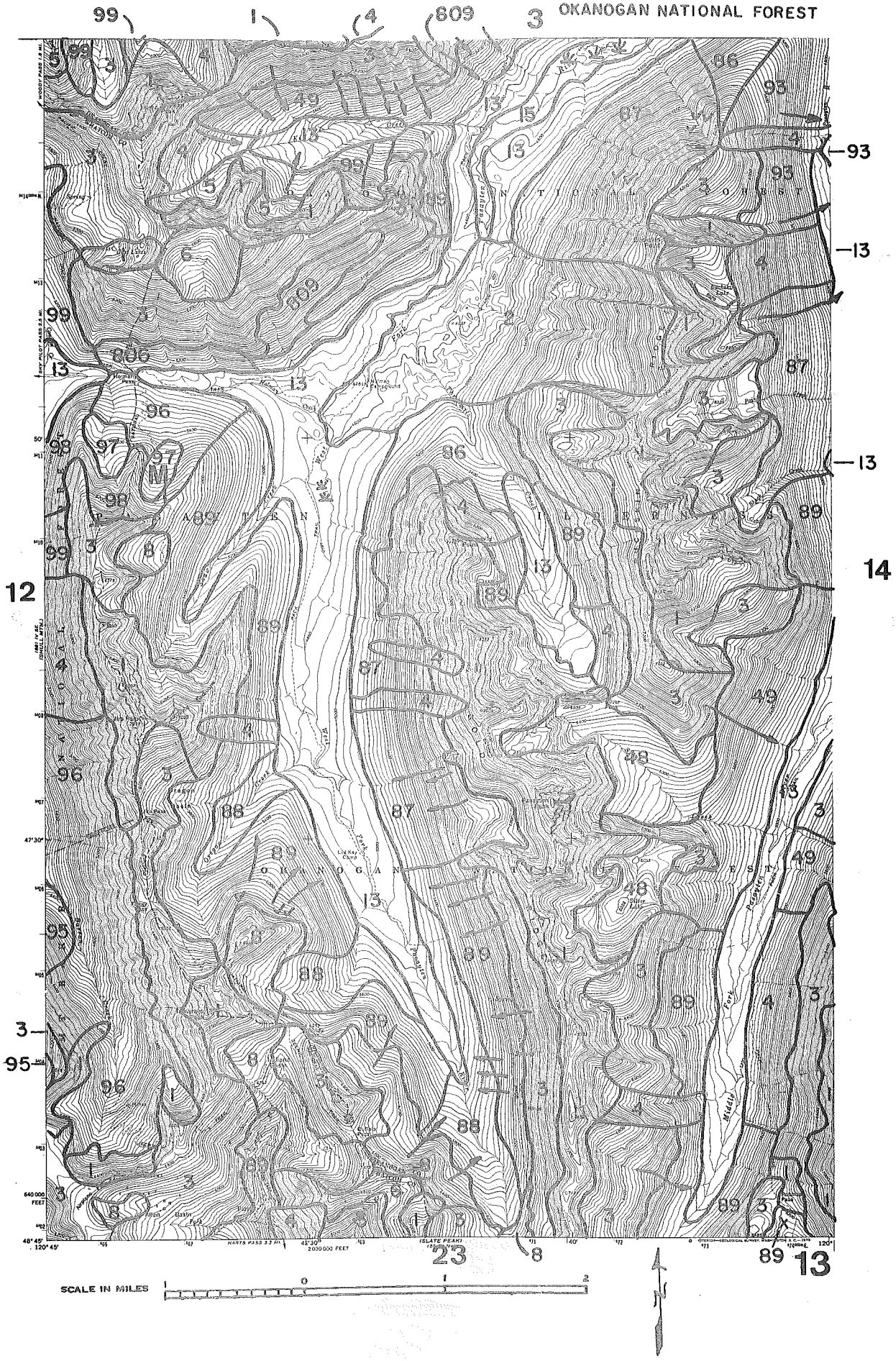
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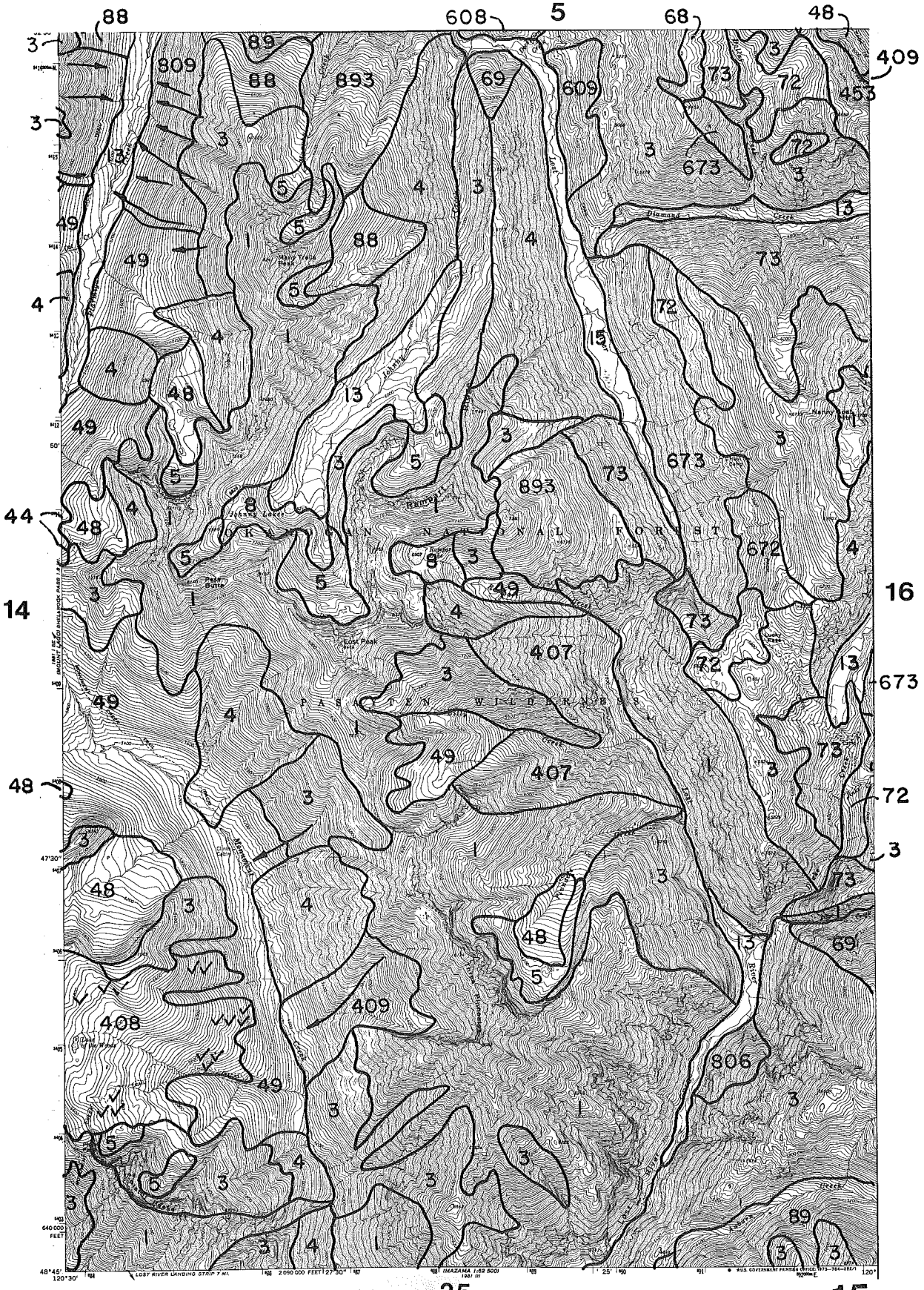
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Johnny Lakes
Mary Ynes Peak
Poland Butte
Diamond Creek
Monumental Creek
Lost River
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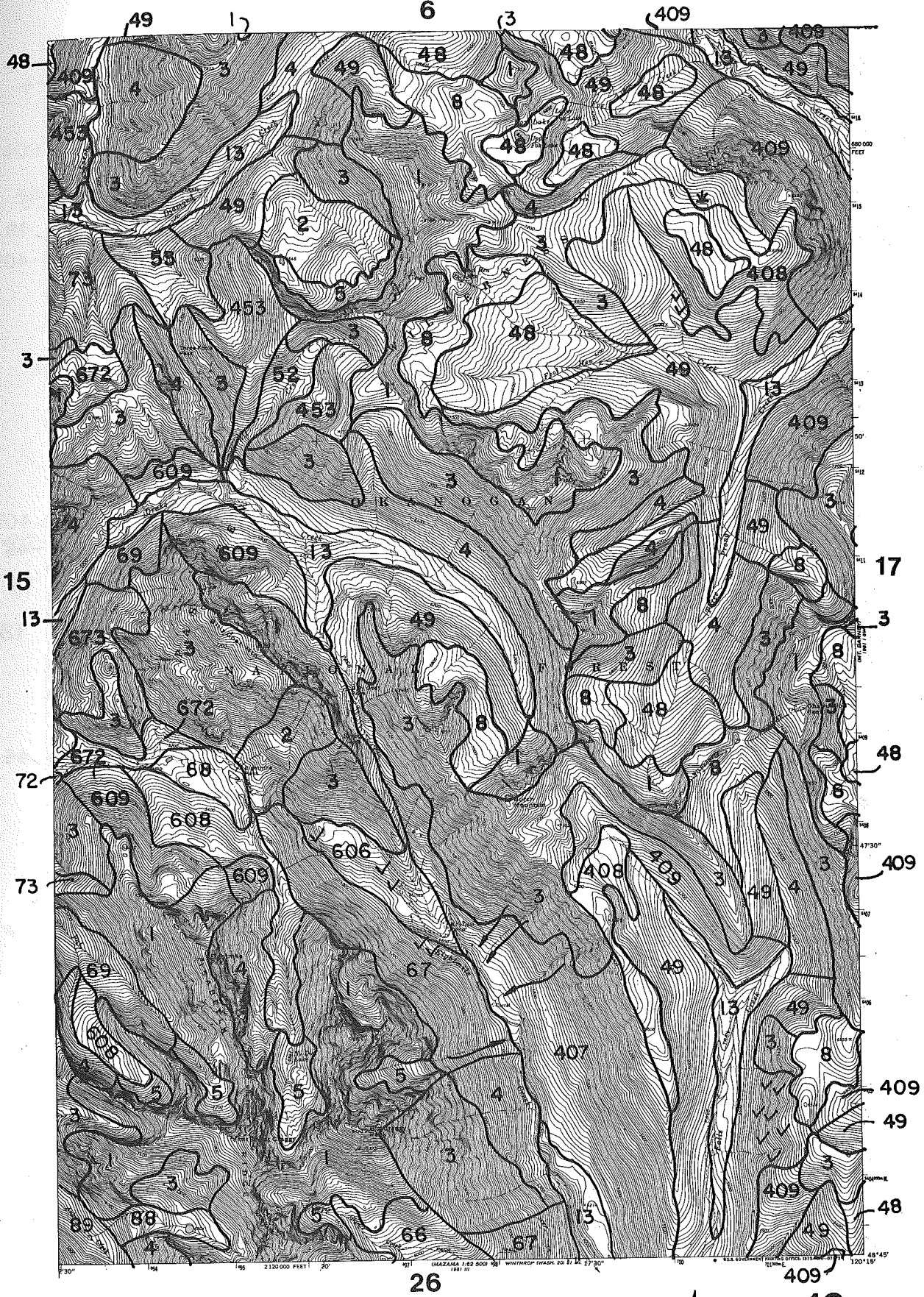
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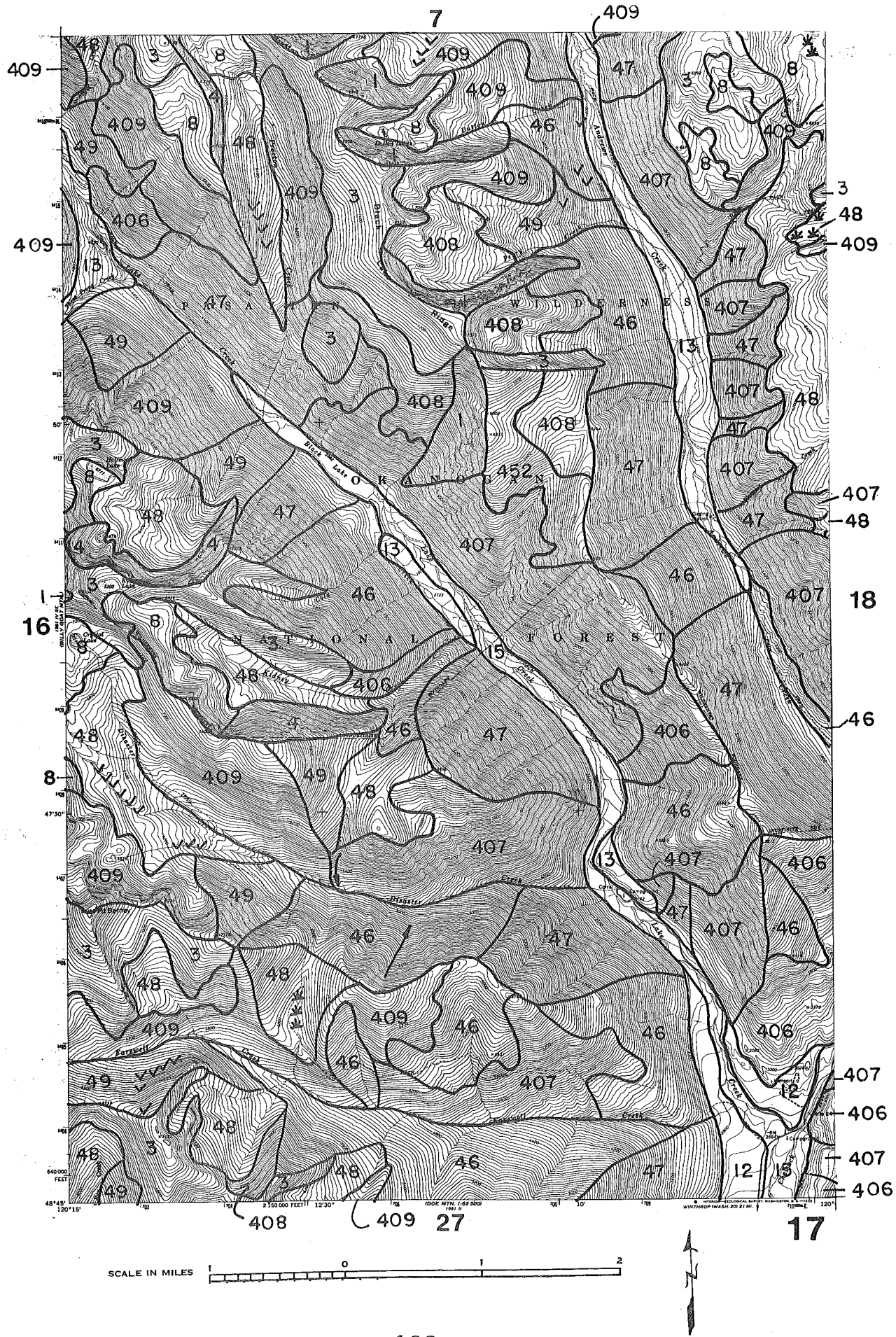
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408
409
Black Lake
Black Lake
Andrews Creek
Lake Creek
Ridge
Kidney
Disaster Creek
Farewell Creek
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50′
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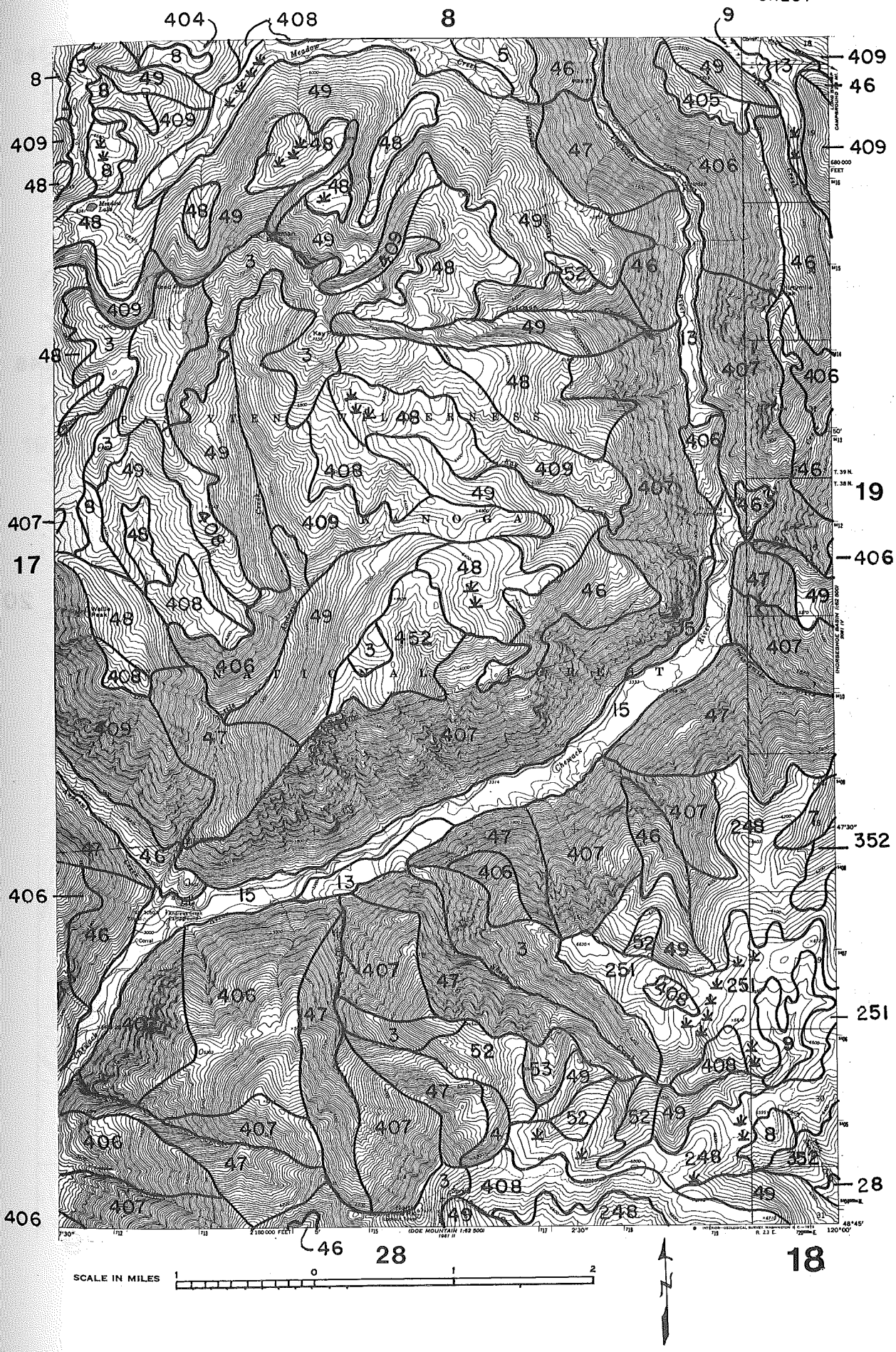
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Chewack
Okanogan
Pasayten
Doe Mountain
Meadow Lake
Frosty Creek
Oval
Oreg
Ridge
Trail
Pass
Peak
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Lake
Mountain
Campground
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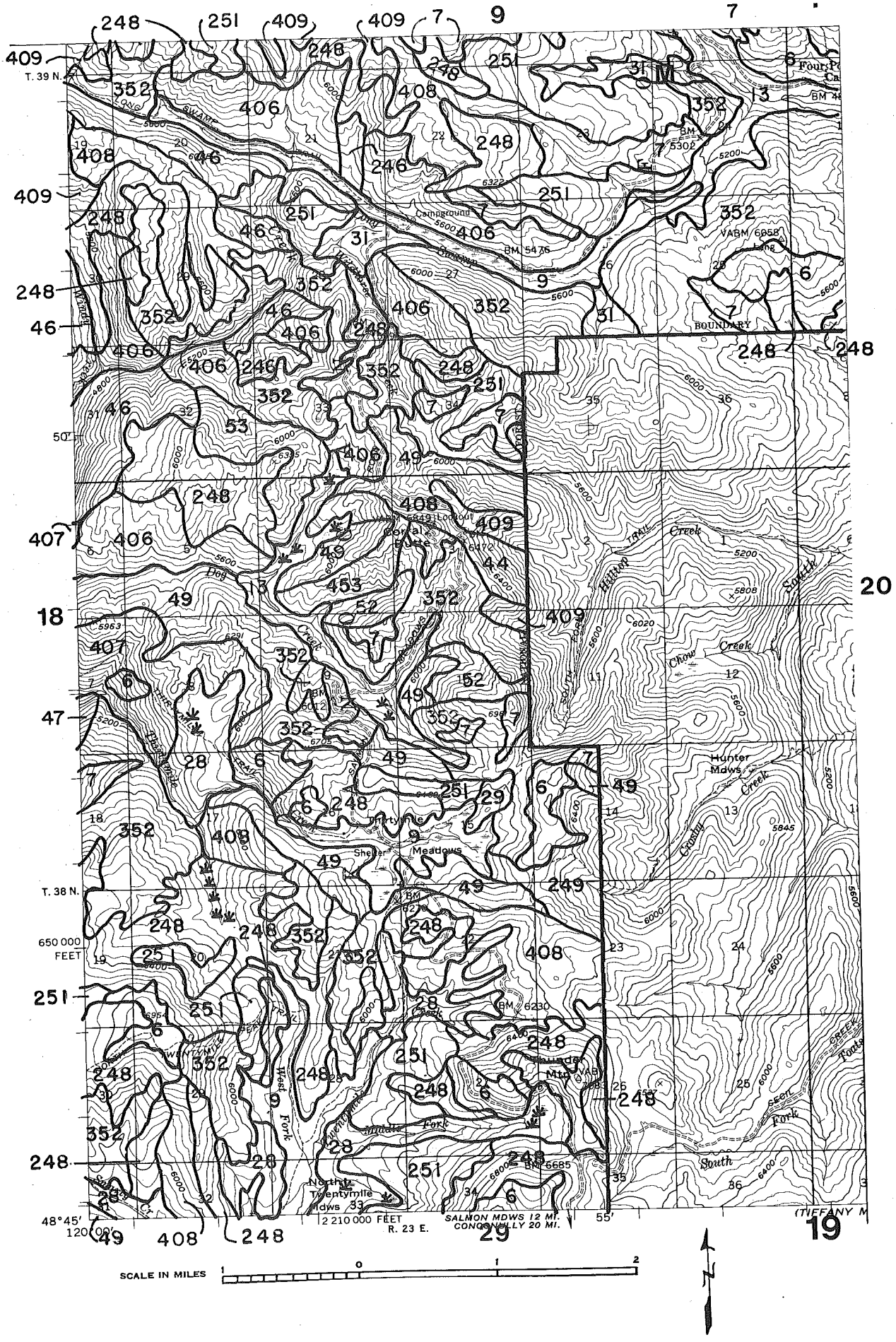
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T. 38 N.
R. 23 E.
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2 210 000 FEET
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120°00'
SALMON MDWS 12 MI.
CONCRETE 20 MI.
SCALE IN MILES
BOUNDARY
Campground
Lookout
Shelter
Meadows
Creek
Fork
Mtn
Ridge
Trail
Swamp
Hunter Mdws
Chow Creek
Heather Trail
Dog Creek
Crosby Creek
Twentymile Creek
West Fork
Middle Fork
South Fork
North Twentymile Mdws
Twentymile Mdws
(TIFFANY M
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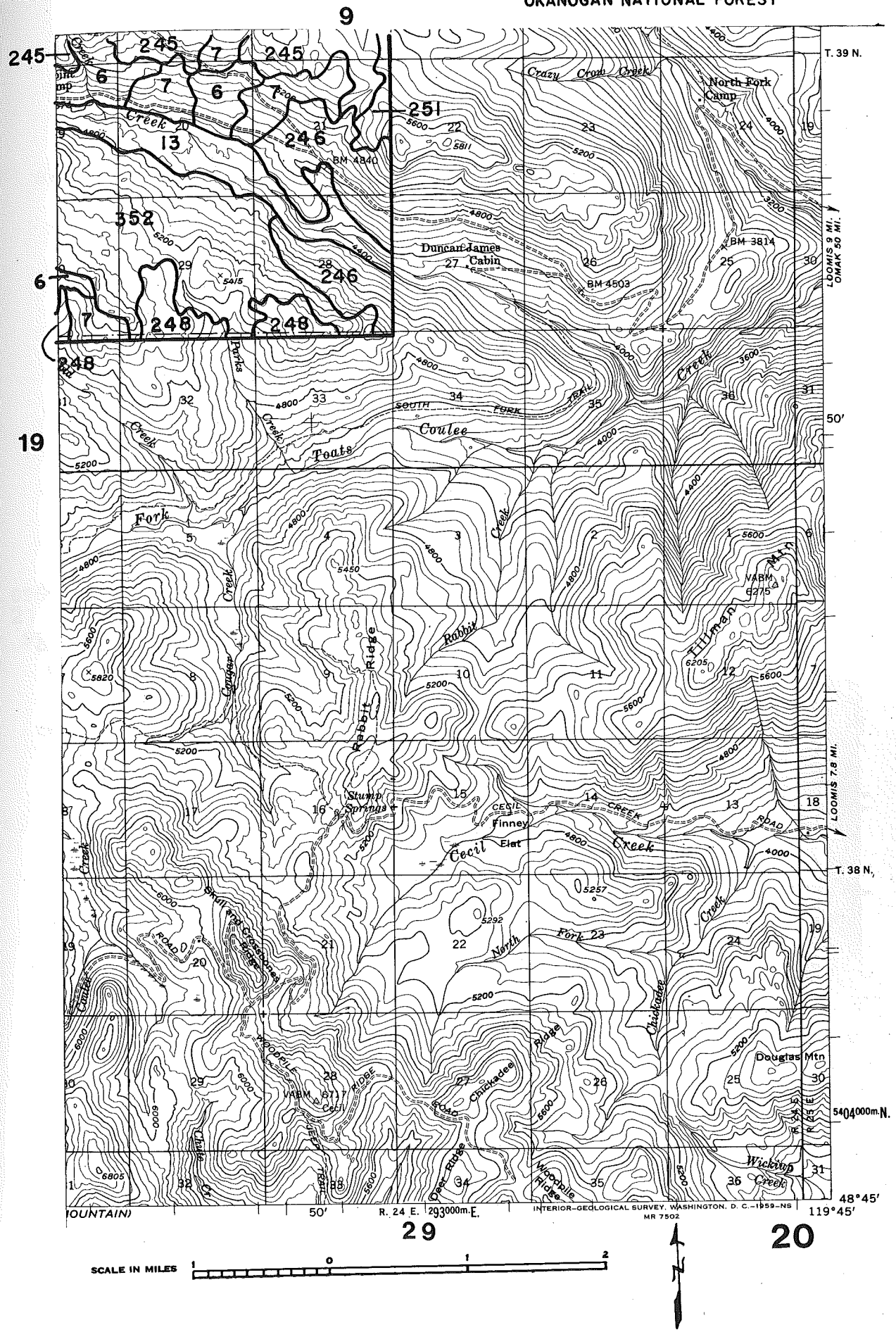
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Creek
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5415
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246
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248
248
Parks
Creek
19
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34
35
36
31
SOUTH FORK TRAIL
Coulee
Toats
Creek
Fork
Creek
Crazy Creek
North Fork Camp
23
24
19
22
5811
5600
5200
4800
4000
3600
Duncan James Cabin
27
26
25
30
BM 3814
BM 4503
LOOMIS 9 MI.
OMAK 50 MI.
T. 39 N.
50'
5450
Rabbit Ridge
Rabbit Creek
Stump Springs
Cecil Finney Flat
CECIL CREEK ROAD
Cecil Creek
Fillman Mtn.
VABM 6275
6205
5820
5257
5292
North Fork Creek
Skull Rock Crossroads
ROAD
Coulee Creek
Woodpile Ridge
VABM 6717
Cecil
Chickadee Ridge
ROAD
Douglas Mtn
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LOOMIS 7.8 MI.
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6805
Deer Ridge
Wickiup Creek
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119°45'
(OUNTAIN)
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INTERIOR-GEOLOGICAL SURVEY, WASHINGTON, D. C.-1959-NS
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SCALE IN MILES
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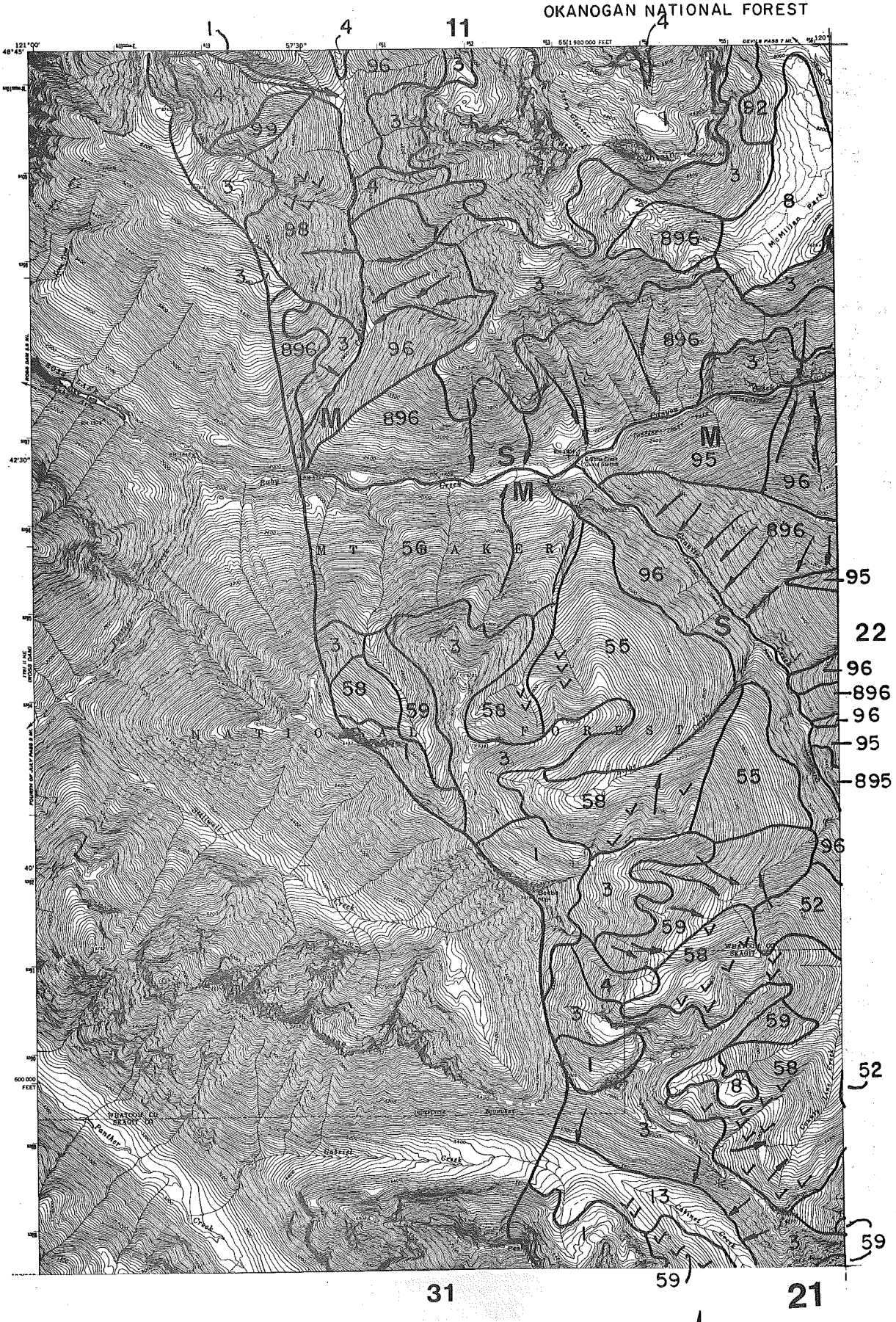
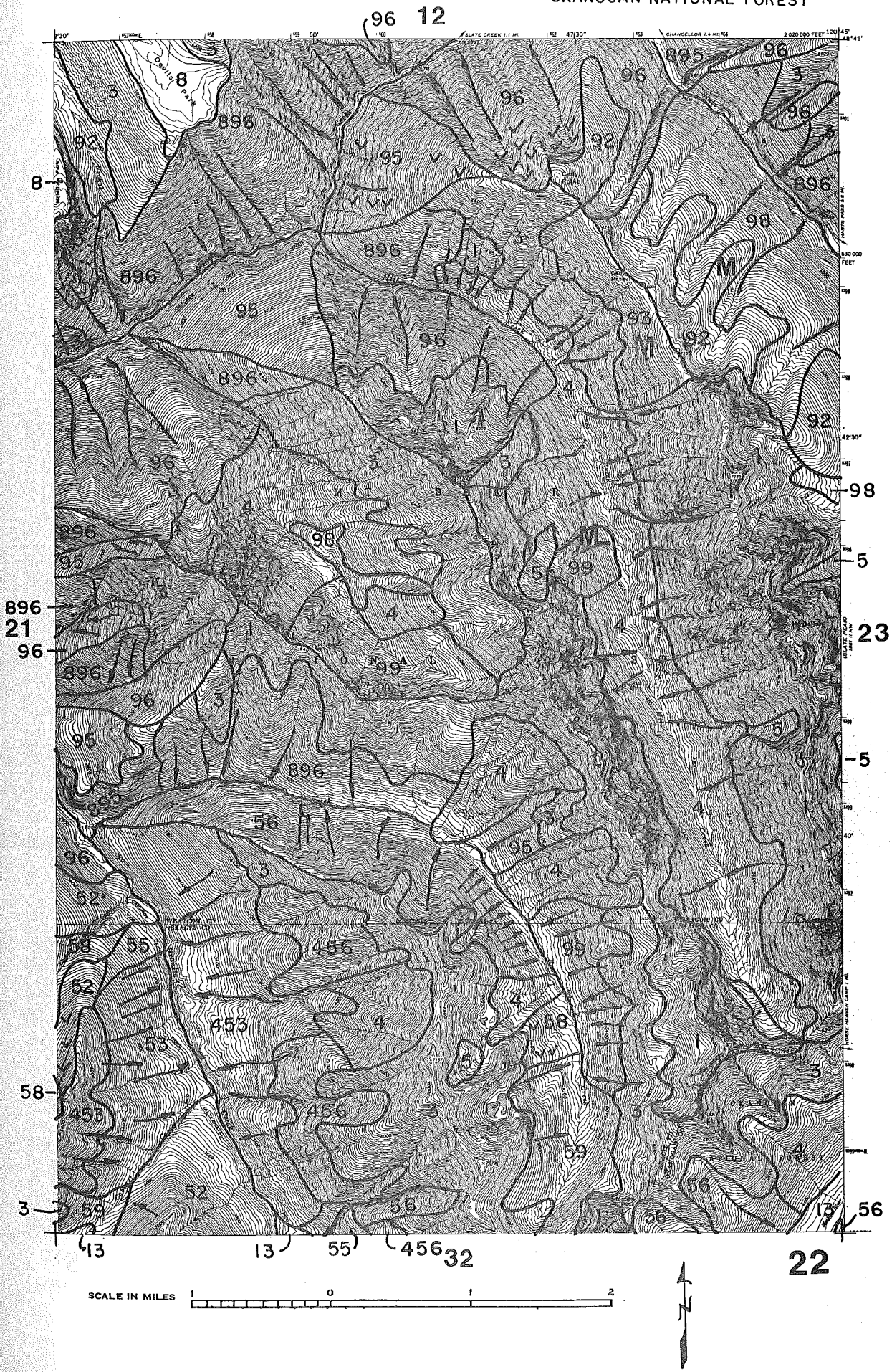
2
N

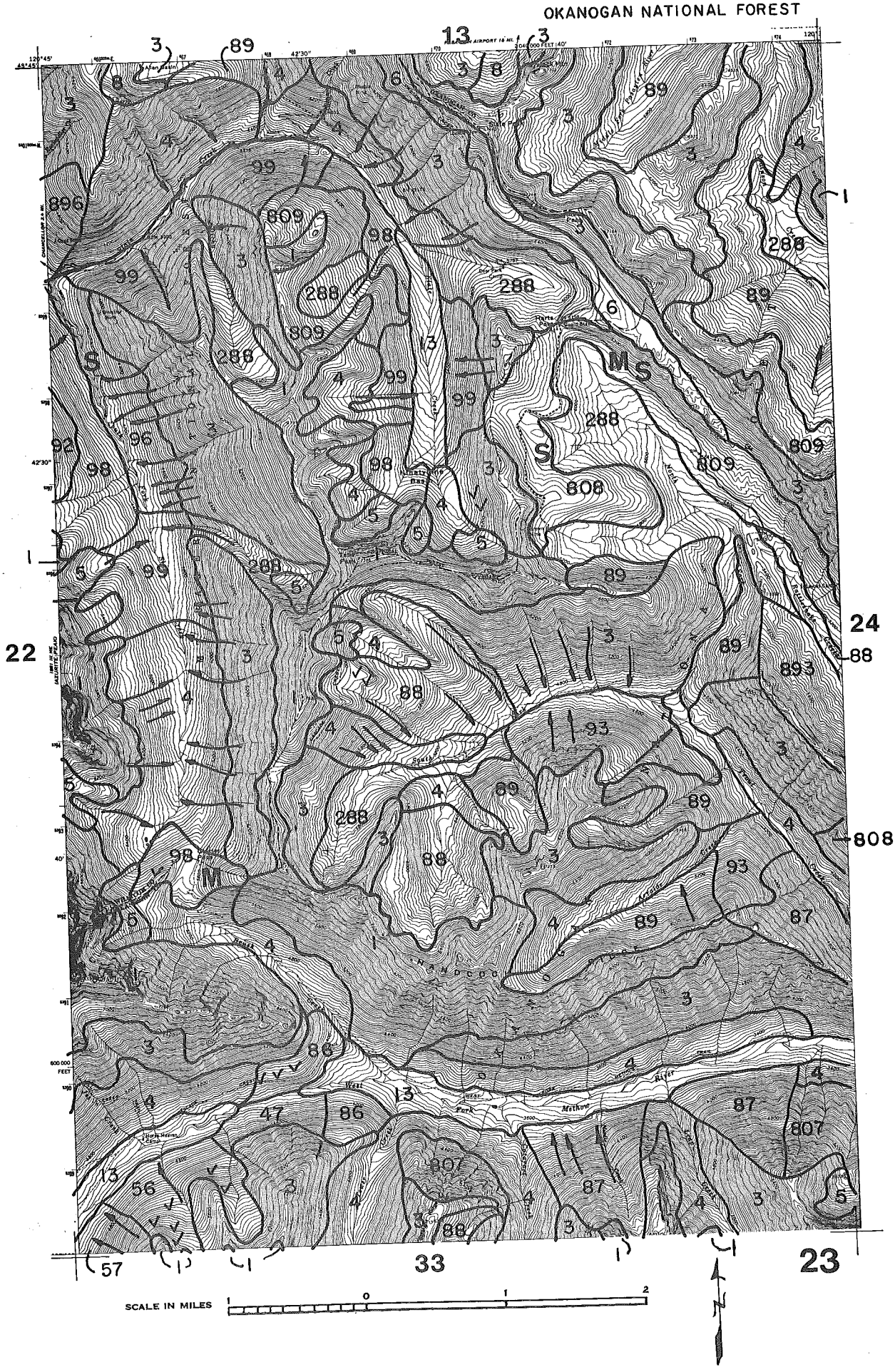


SCALE IN MILES 1 0 1 2

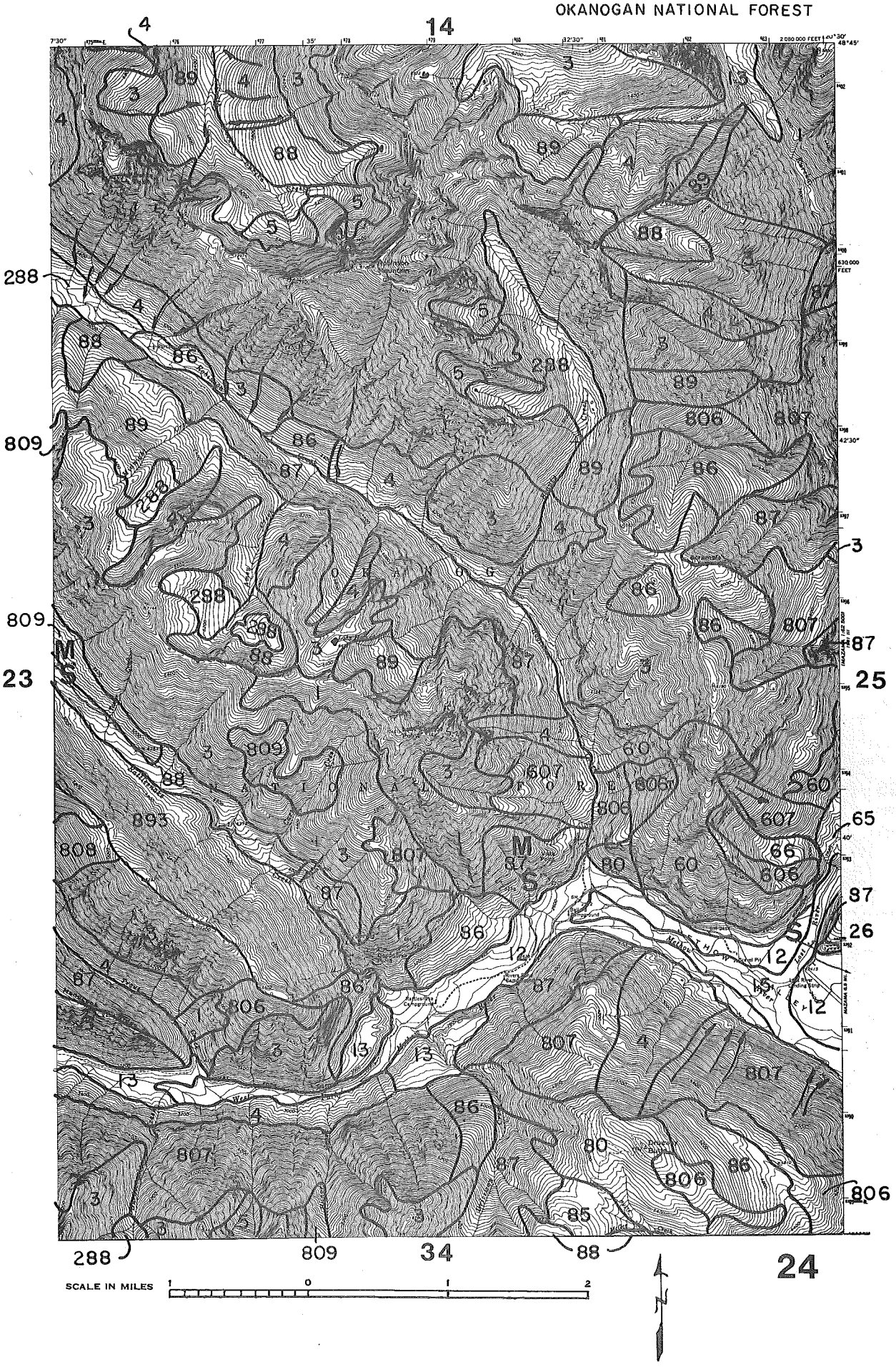
N

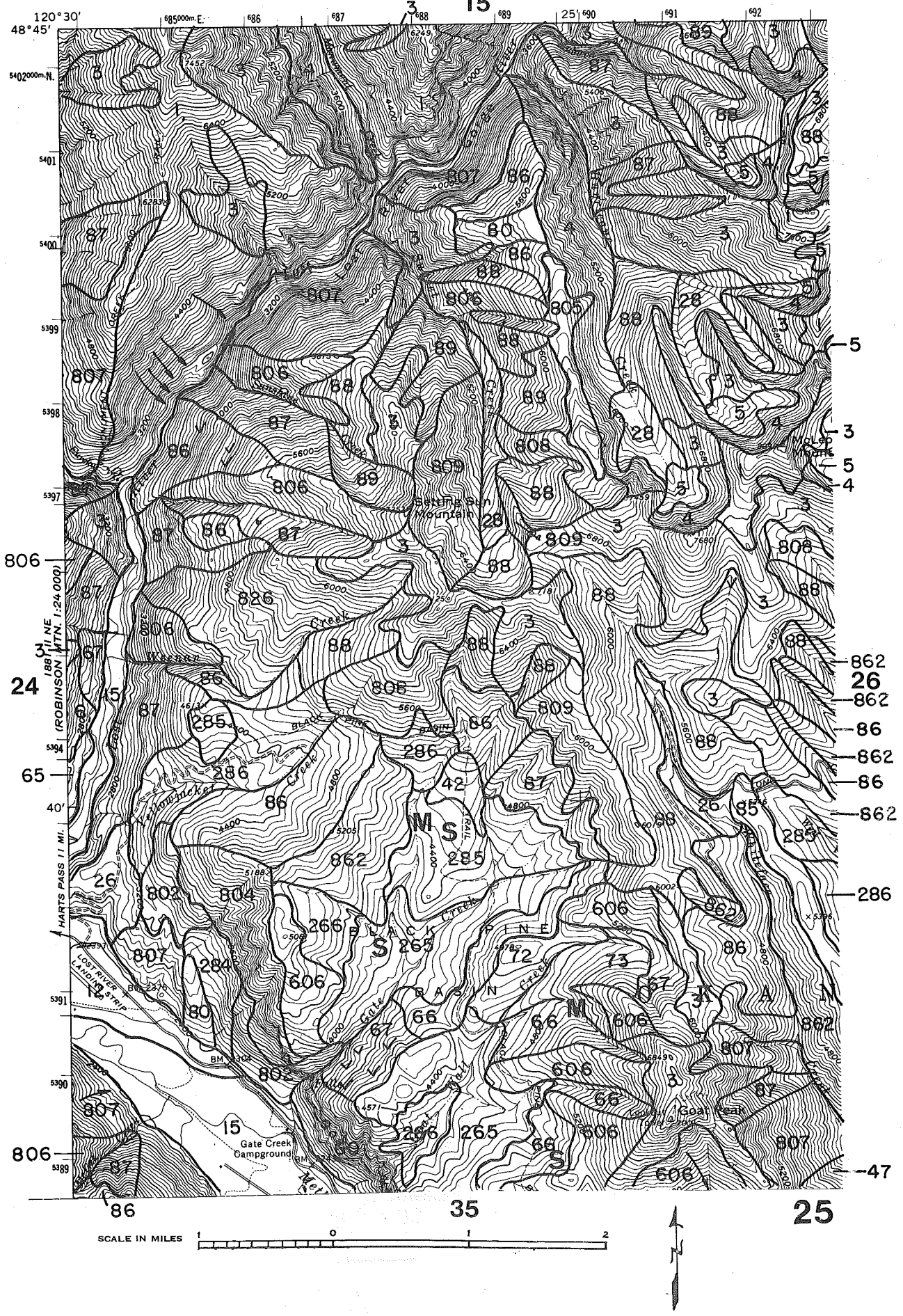

96 12
8
896
21
96
58
3
13
13
55
456
32
22
23
5
98
SCALE IN MILES
1 0 1 2
N

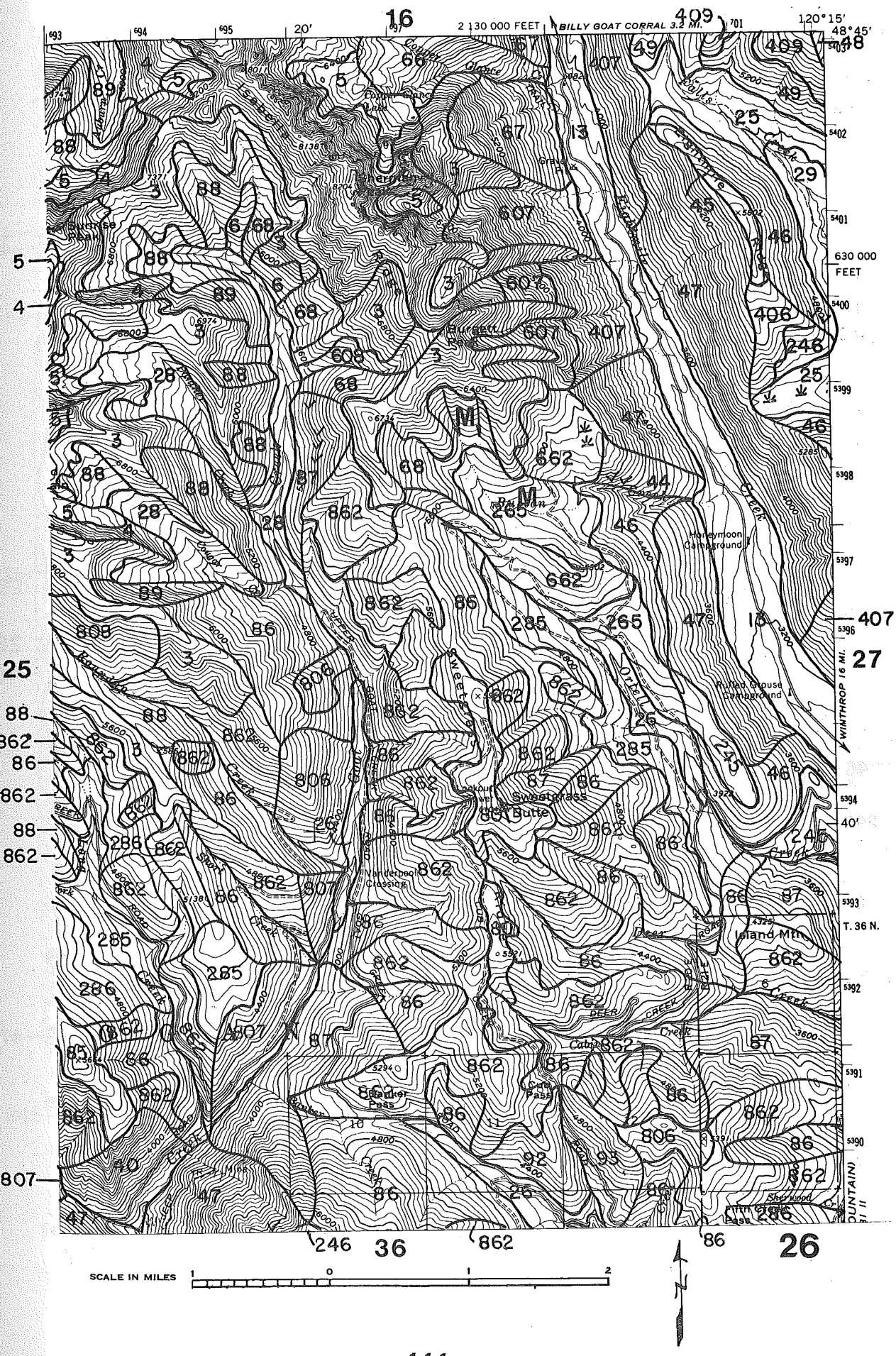
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST

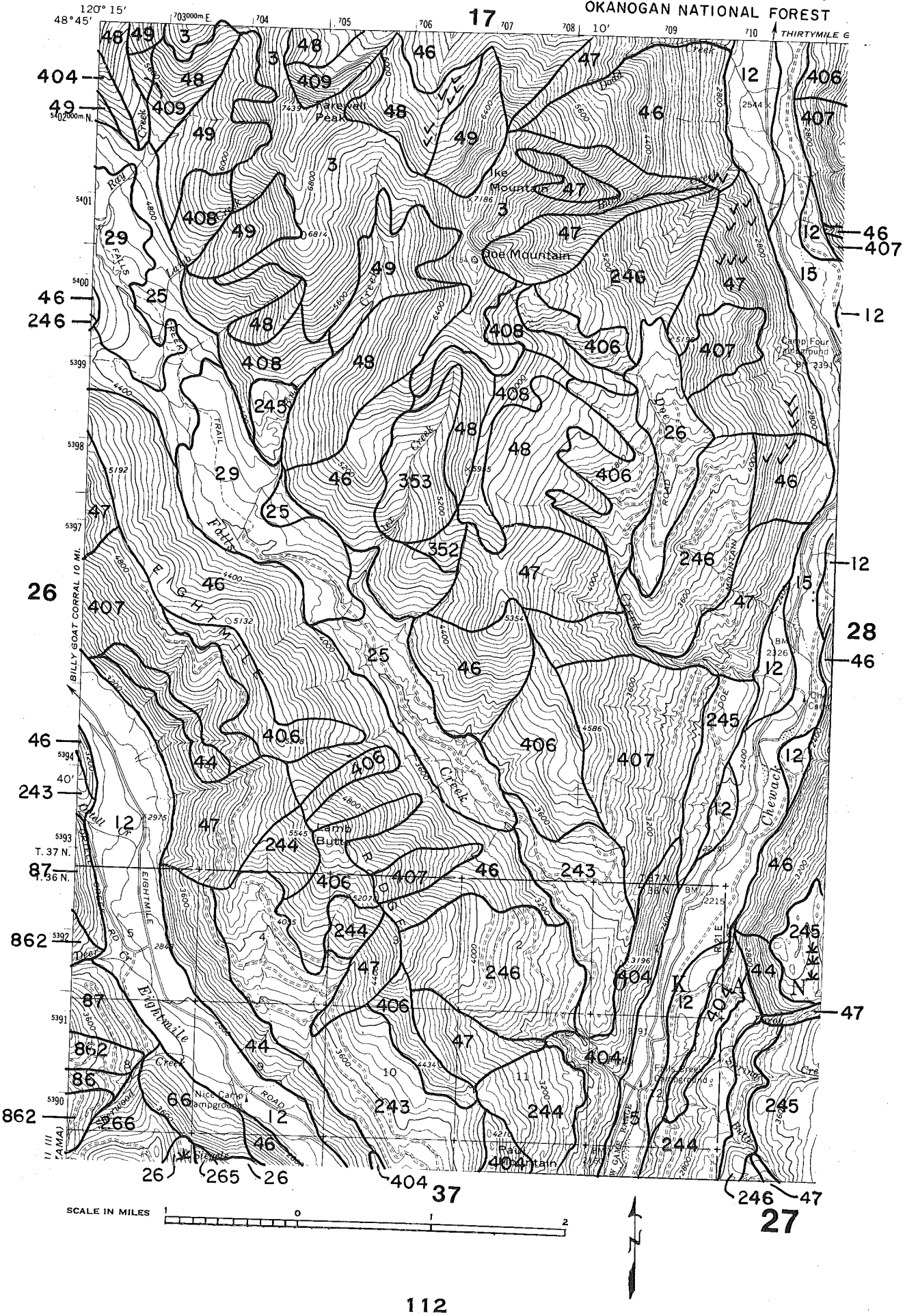


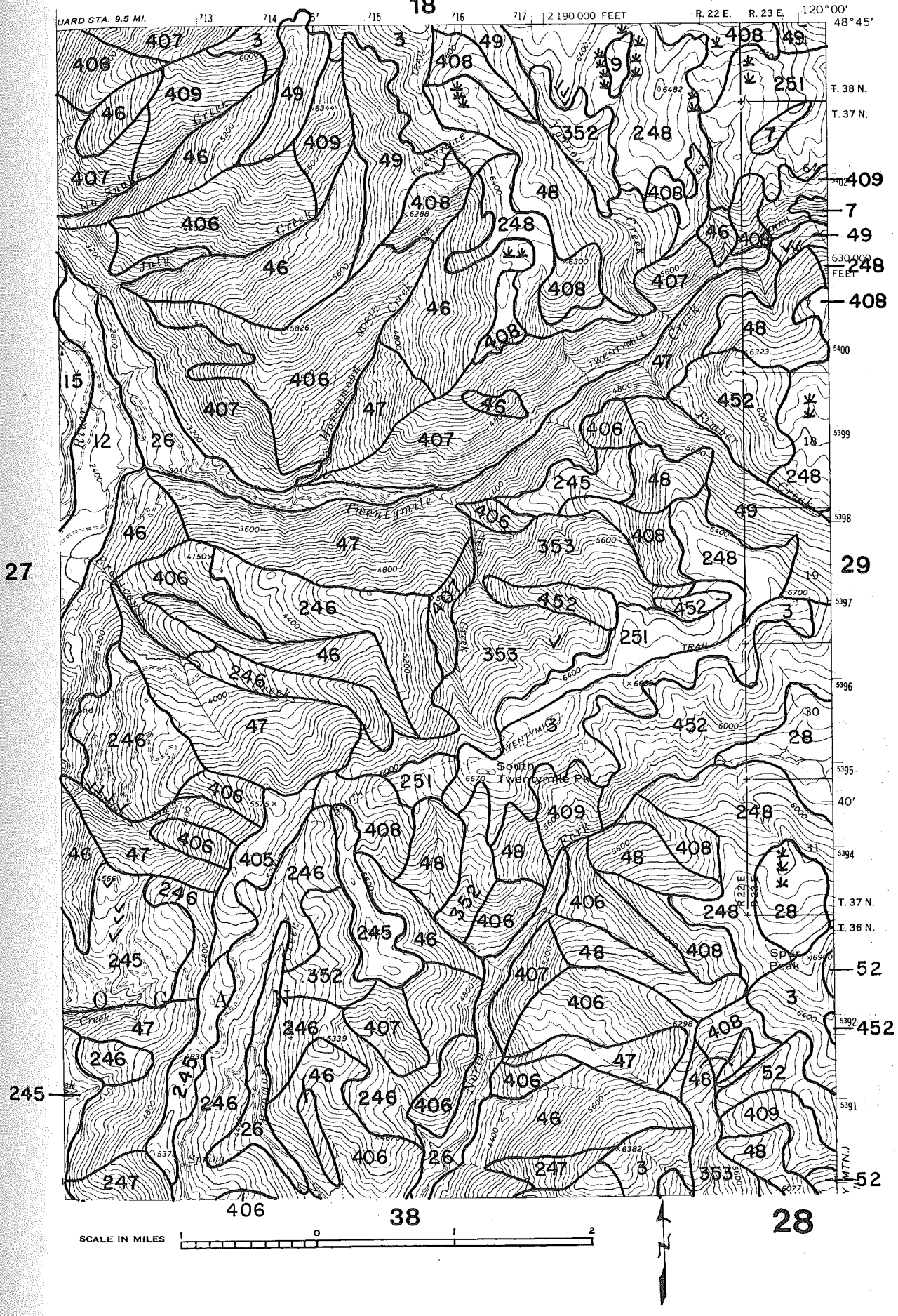
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST



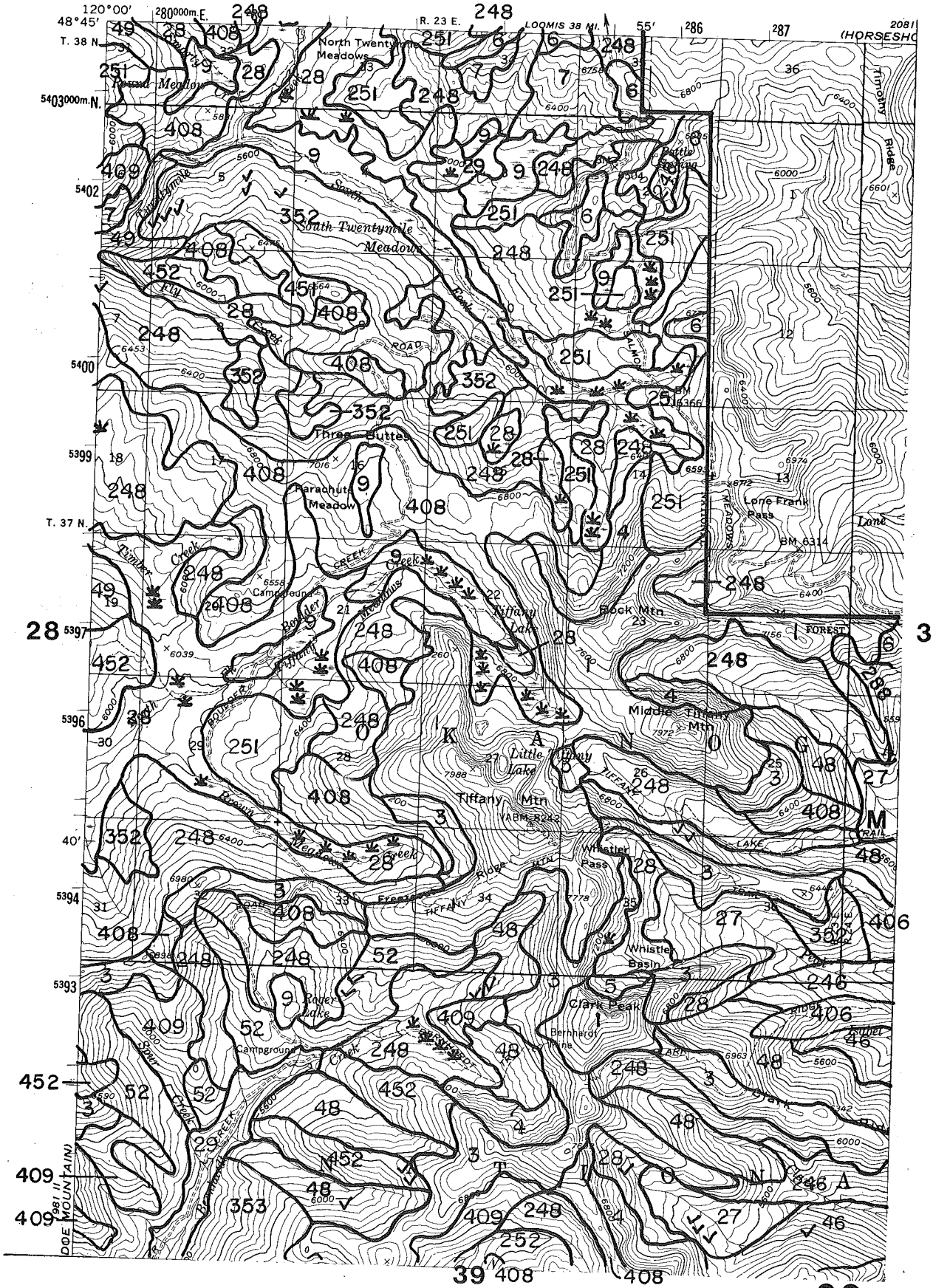

120°30'
48°45'
685000m.E.
686
687
688
689
690
691
692
5402000m.N.
5401
5400
5399
5398
5397
5396
5395
5394
5393
5392
5391
5390
5389
15
25'
24
26
65
40'
35
25
86
Setting Sun Mountain
Gate Creek Campground
BLACK PINE BASIN
HARTS PASS 11 MI.
LOST RIVER LANDING STRIP
(ROBINSON MTN. 1:24 000)
188 II NE
SCALE IN MILES
0
1
2

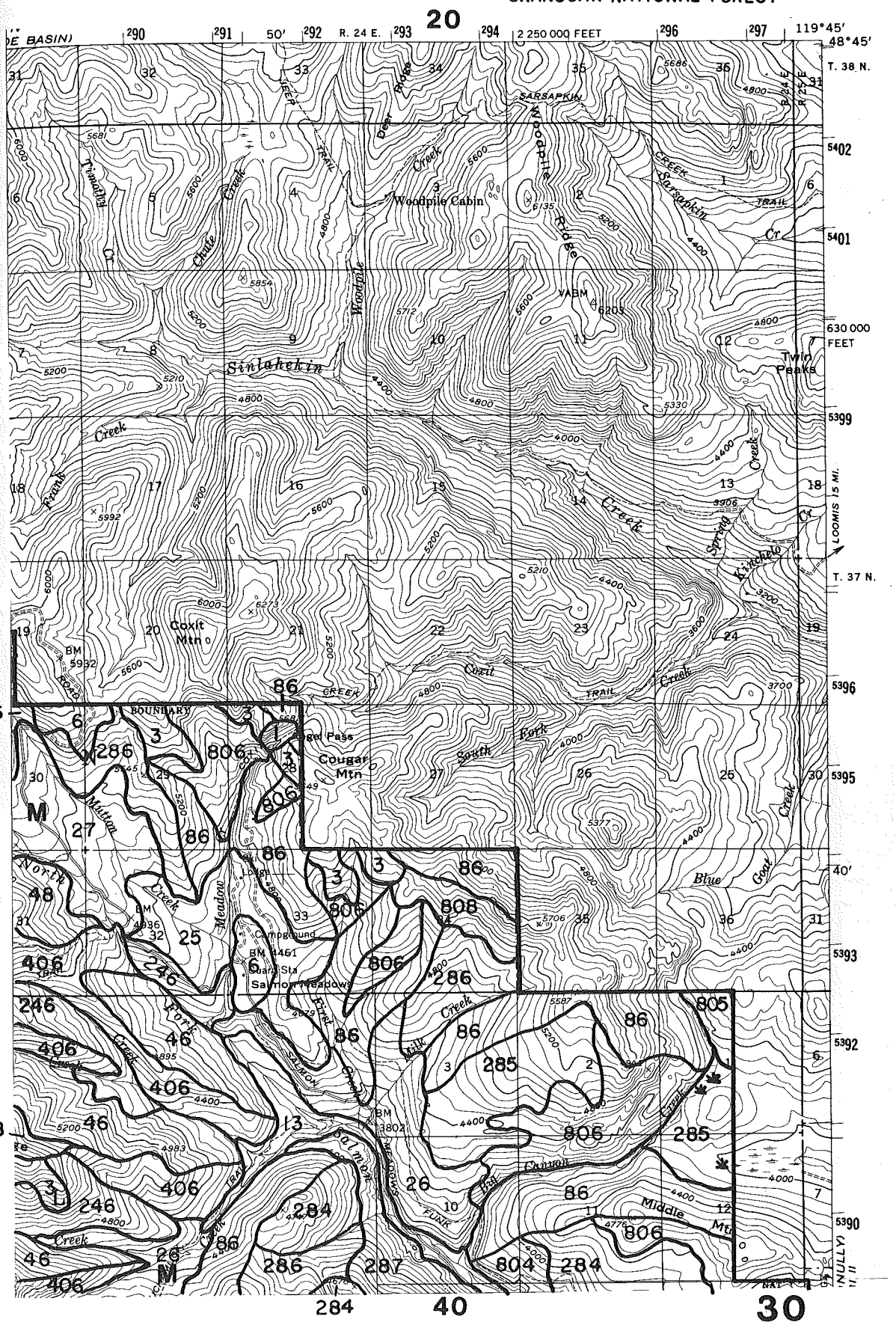

16
2 130 000 FEET
BILLY GOAT CORRAL 3.2 MI.
120°15'
48°45'
630 000 FEET
Sweetgrass Butte
Island Mtn.
Harlequin Mtn.
Sherwood Peak
Honeymoon Campground
Ruffed Grouse Campground
WINTHROP 16 MI.
T. 36 N.
SCALE IN MILES
25
27
36
26


120° 15'
48°45'
17
THIRTYMILE C
Harewell Peak
Ike Mountain
Doe Mountain
Camp Four Campground
Lamb Butte
Nice Camp Campground
Fawn Creek Campground
Eightmile Creek
Billy Goat Corral 10 Mi.
T. 37 N.
T. 36 N.
SCALE IN MILES
26
27
37


18
27
29
38
28
R. 22 E.
R. 23 E.
120°00'
48°45'
T. 38 N.
T. 37 N.
T. 36 N.
2 190 000 FEET
630 000 FEET
Twentymile Creek
South Twentymile Pk.
Spuhl Peak
SCALE IN MILES
1 0 1 2

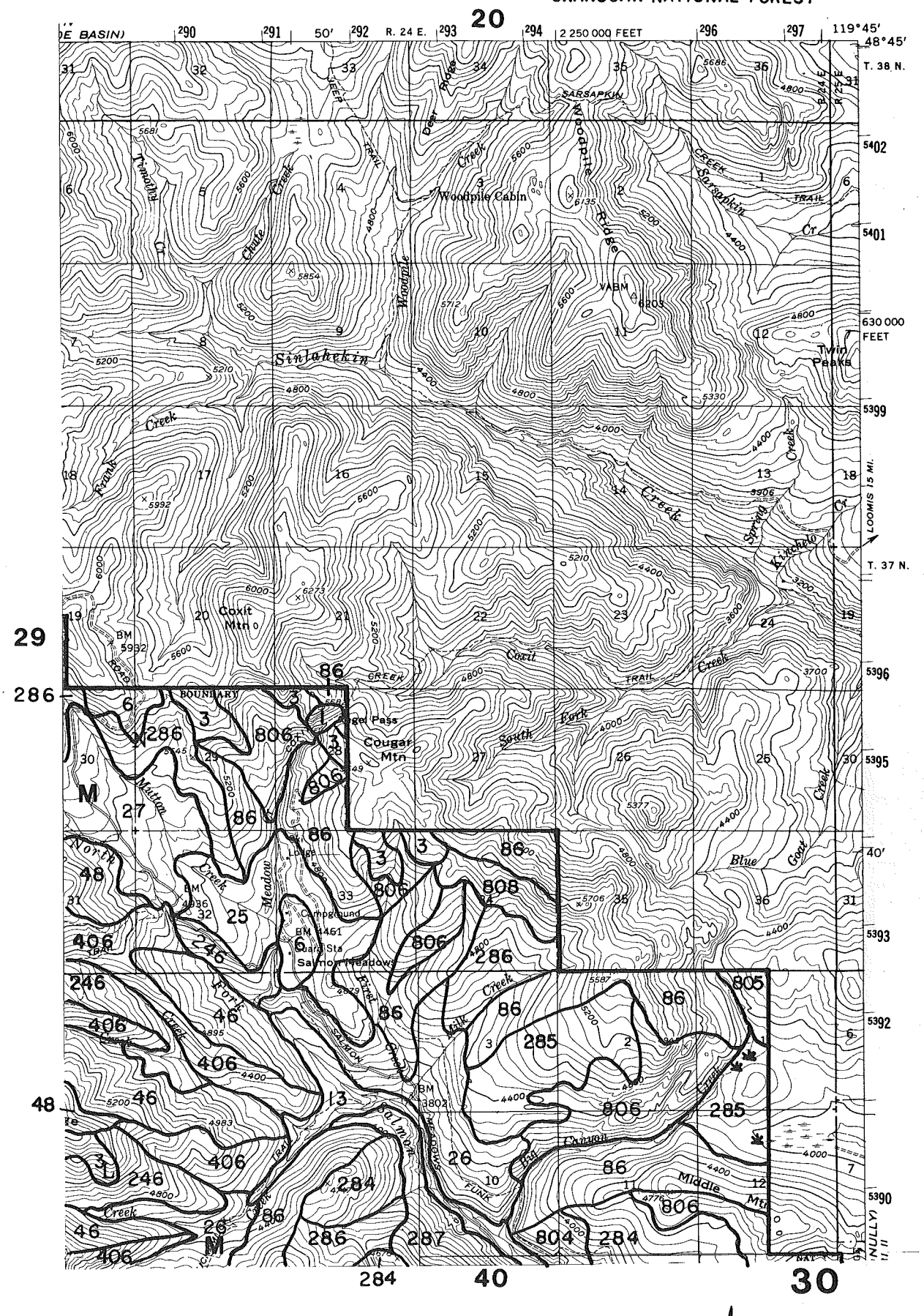
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST



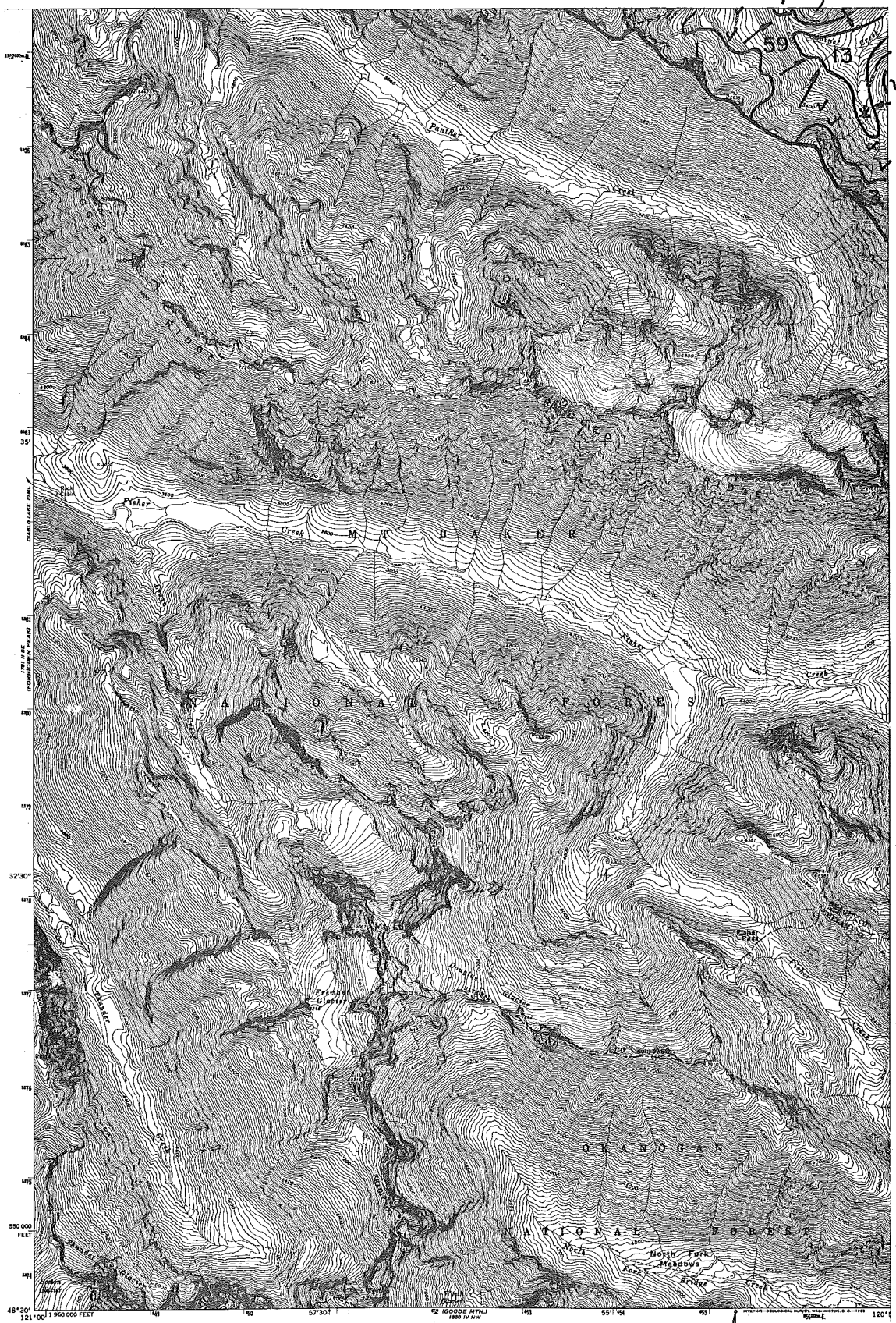


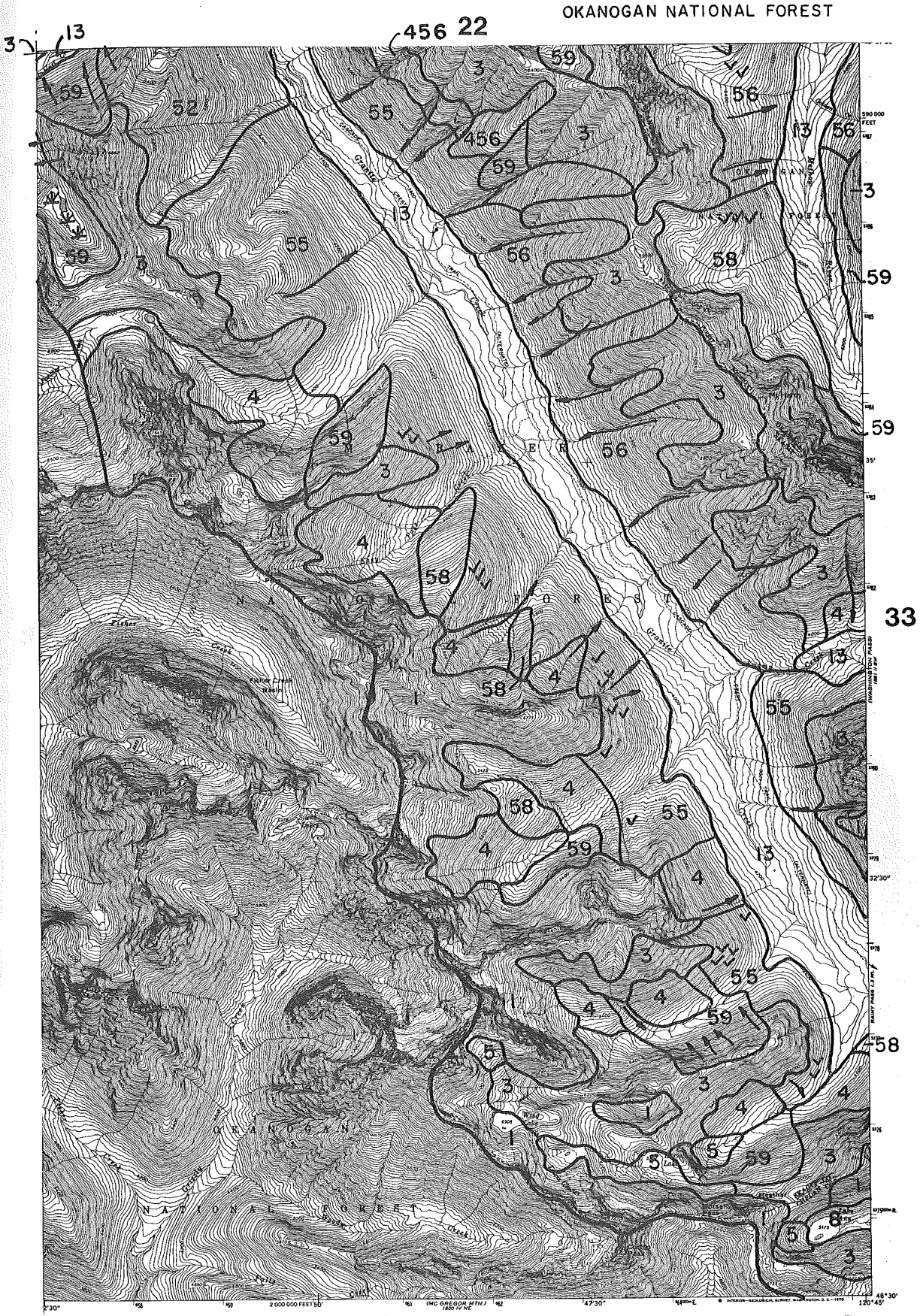
SCALE IN MILES 1 0 1 2

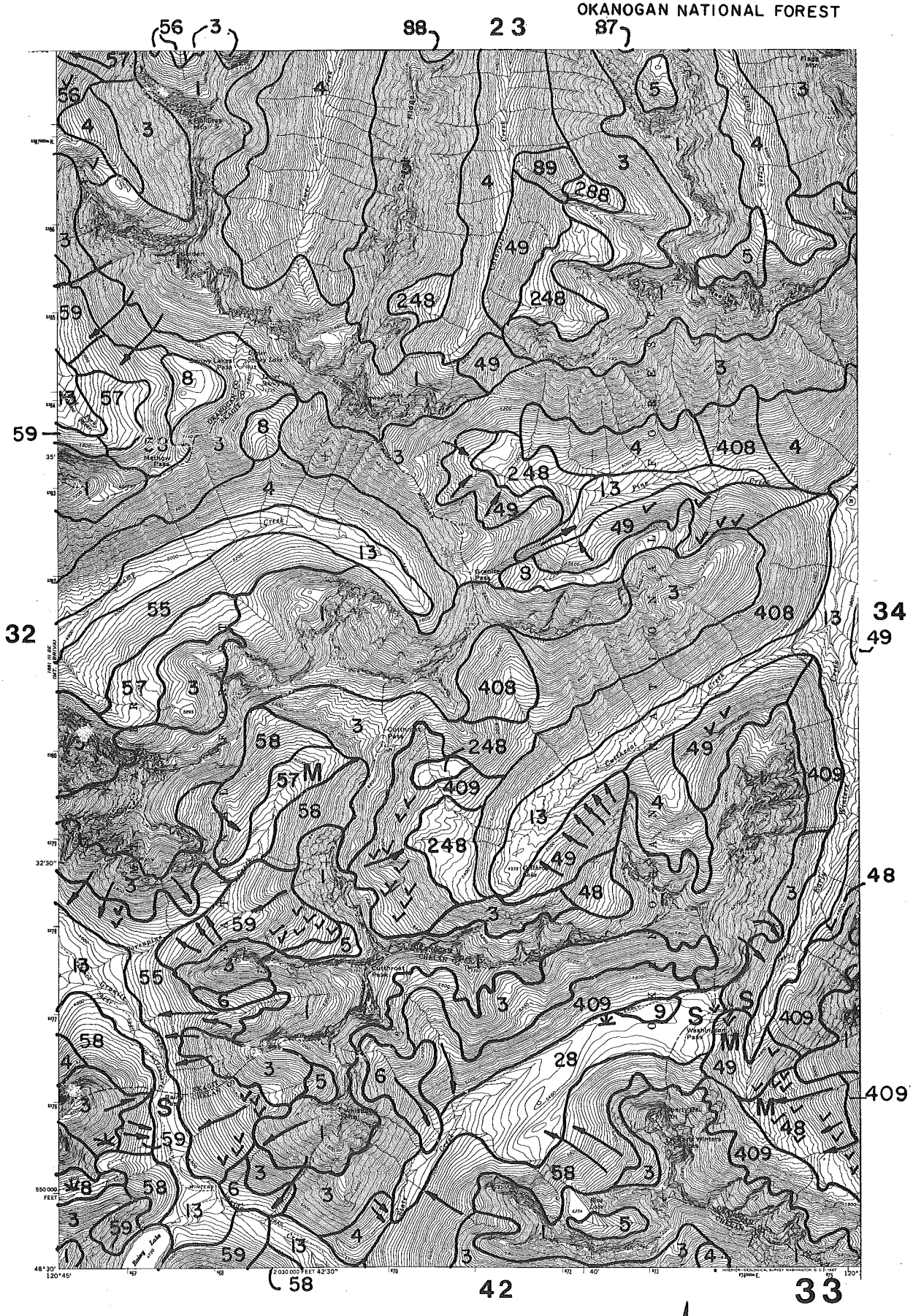
2 OF 2


20
29
30
40
48
R. 24 E.
R. 25 E.
T. 38 N.
T. 37 N.
2 250 000 FEET
630 000 FEET
119°45'
48°45'
LOOMIS 15 MI.
Woodpile Cabin
Woodpile Ridge
Sinlahekin
Twin Peaks
Coxit Mtn
Cougar Mtn
Middle Mtn
Salmon Meadows
Campground
Guard Sta
BOUNDARY
Deer Creek
Trimdon Cr.
Chute Creek
Frank Creek
Sarsapkin Creek
Spread Creek
Coxit Creek
South Fork
Blue Goat Creek
Meadow Creek
North Fork
Salmon Meadows Creek
Middle Fork
Funk Creek
Milk Creek
Canyon
Loomis (Nully) Rd.
SCALE IN MILES
0
1
2

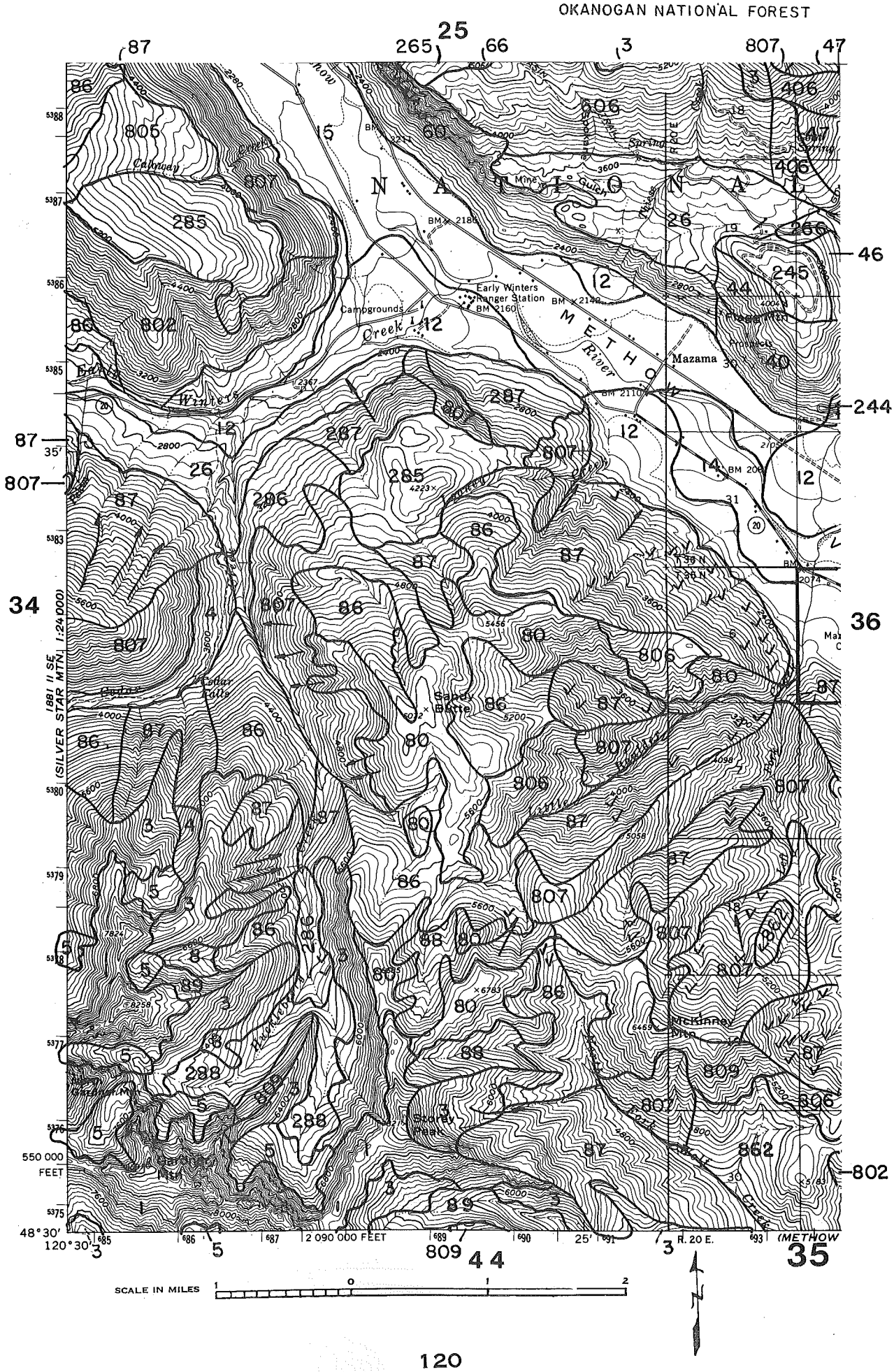
2 OF 2

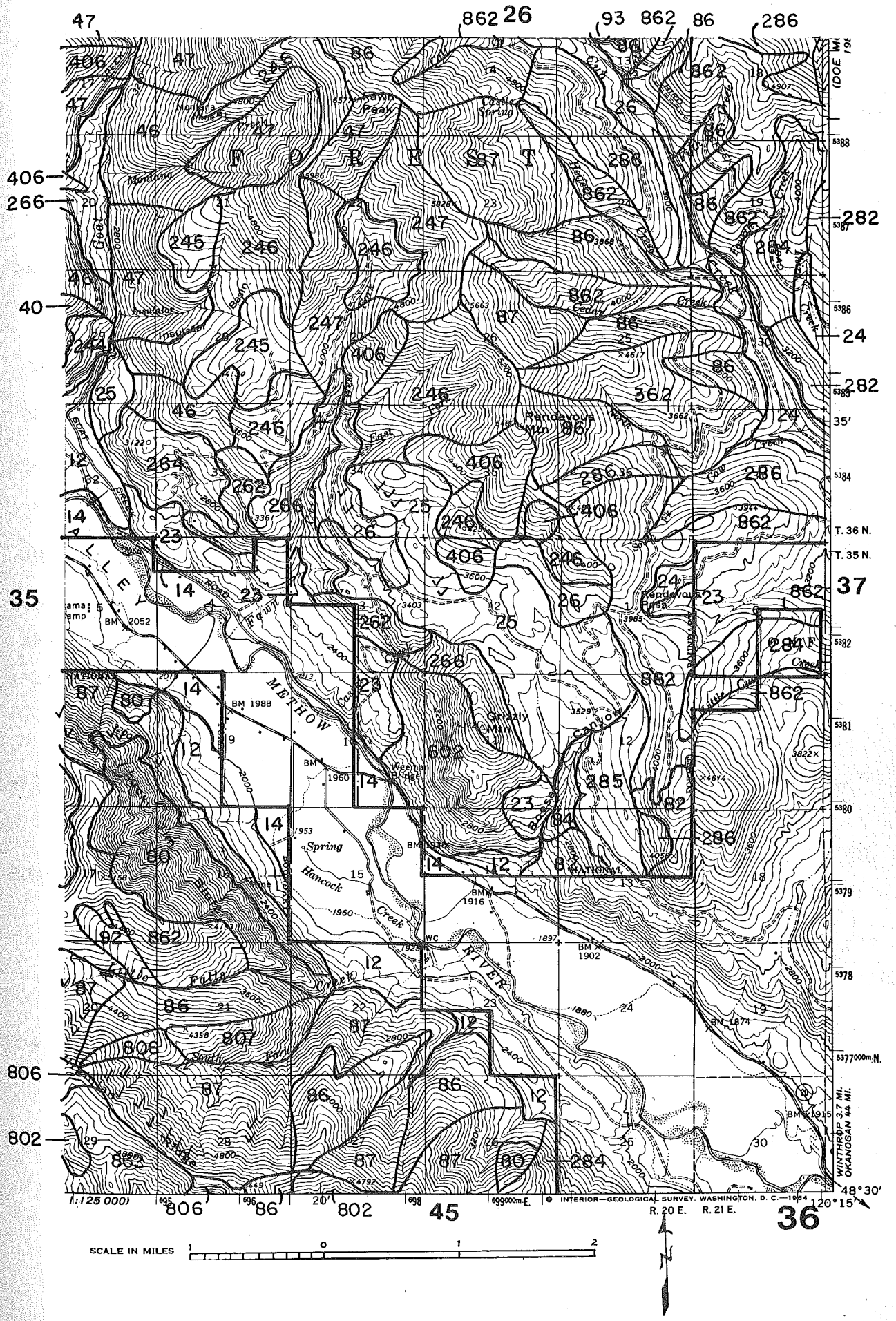

21
13
3
59
13
59
3
32
31
Panther Creek
Fisher Creek
MT BAKER
NATIONAL FOREST
Fisher Creek
Fremont Glacier
Douglas Glacier
OKANOGAN
NATIONAL FOREST
North Fork Meadows
North Fork Bridge Creek
Thunder Glacier
DIABLO LAKE 15 MI.
(FORBIDDEN PEAK)
(GOODE MTN.)
35'
32'30"
48°30'
121°00'
57'30"
55'
120°
550 000 FEET
1 960 000 FEET
SCALE IN MILES
1
0
1
2

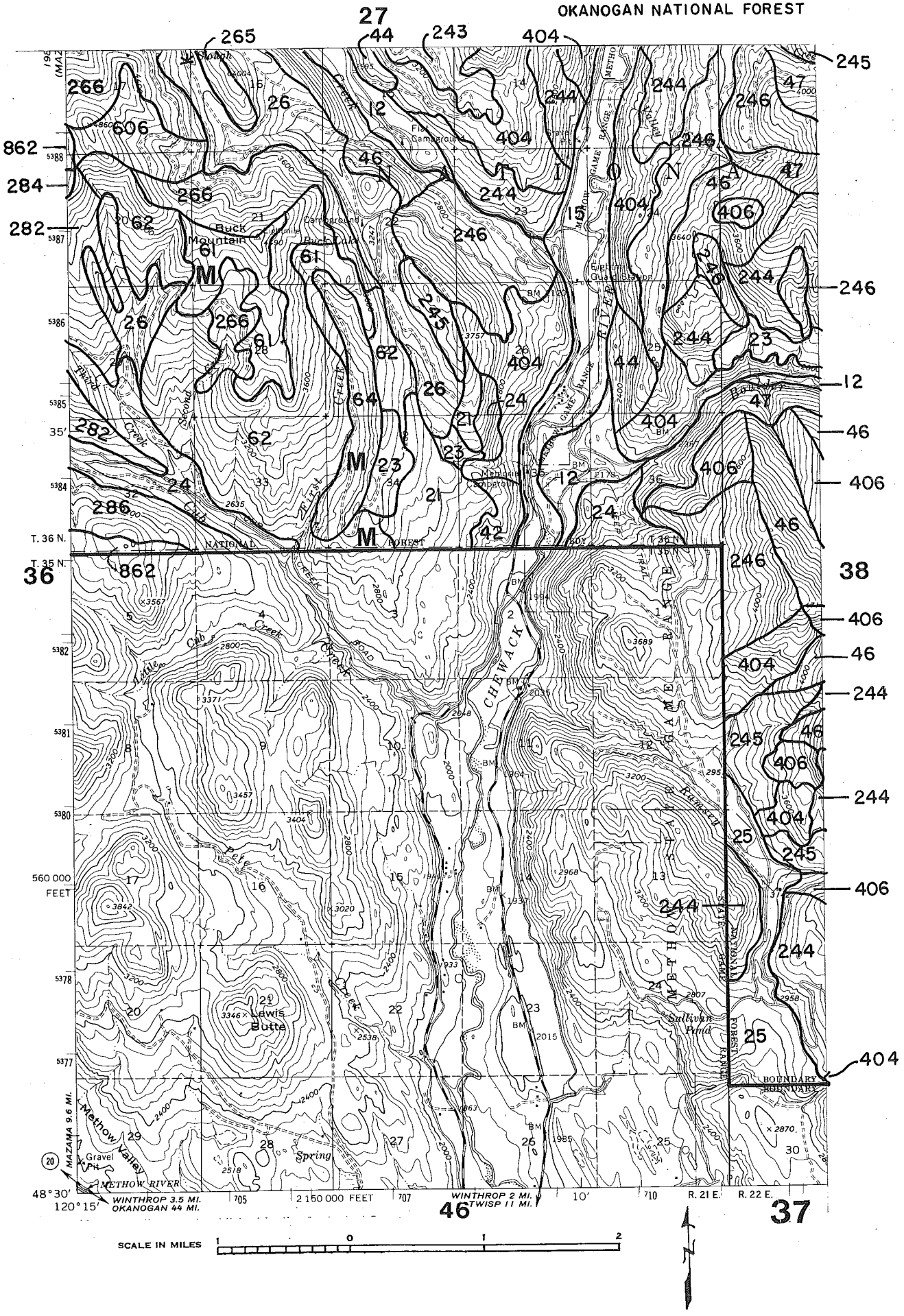

3
13
456 22
33
32
SCALE IN MILES
1 0 1 2
N

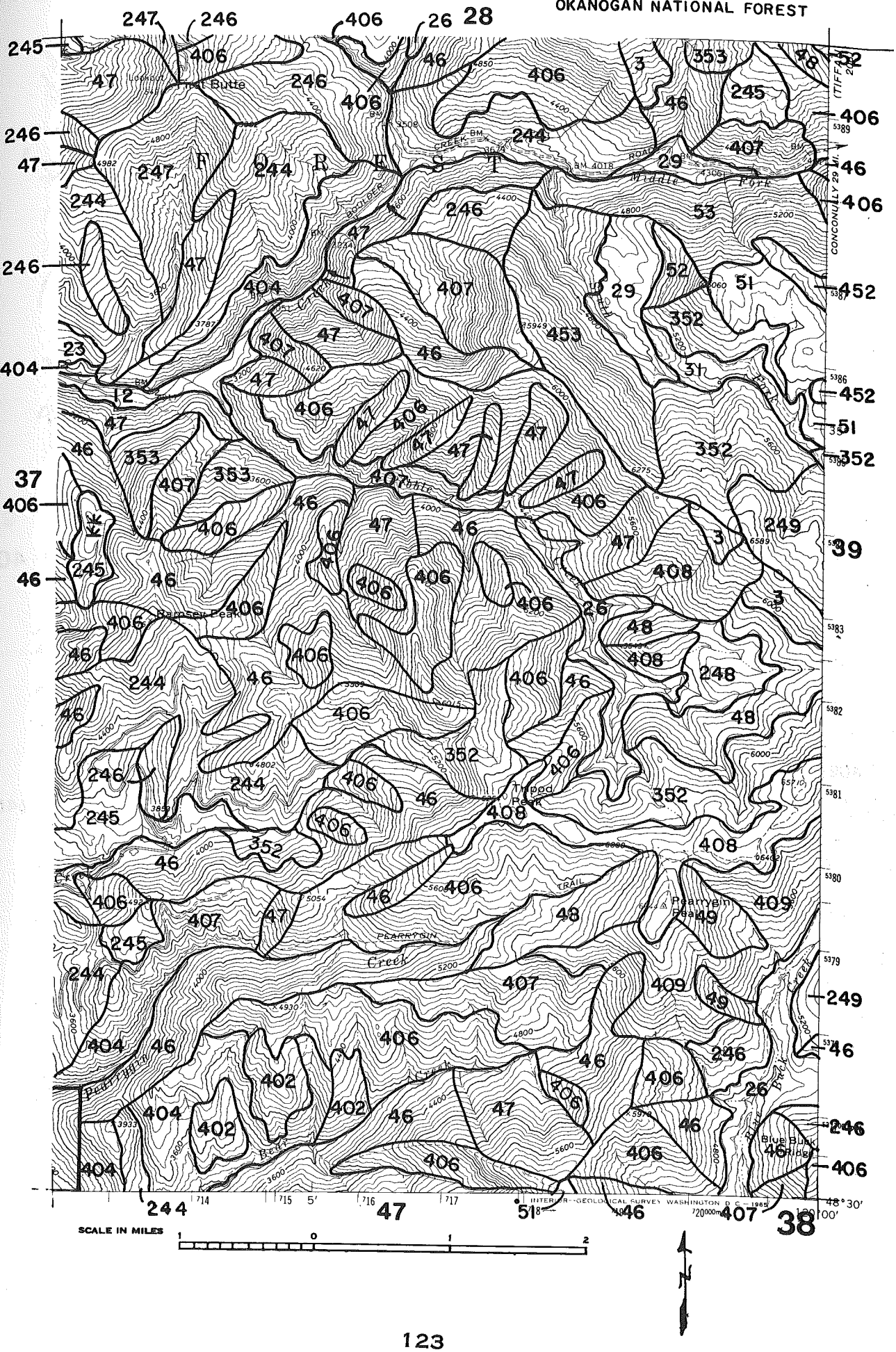

56
3
88
23
87
57
56
4
3
1
4
3
89
288
49
248
248
49
59
8
57
13
59
8
3
4
408
4
248
13
49
49
13
8
55
32
34
49
57
3
408
408
58
248
57M
58
409
49
409
13
4
248
49
48
48
59
5
55
6
3
409
9
S
409
58
4
28
49
409
S
59
M
48
409
58
6
3
3
58
13
59
59
13
4
58
42
33
SCALE IN MILES
1
0
1
2

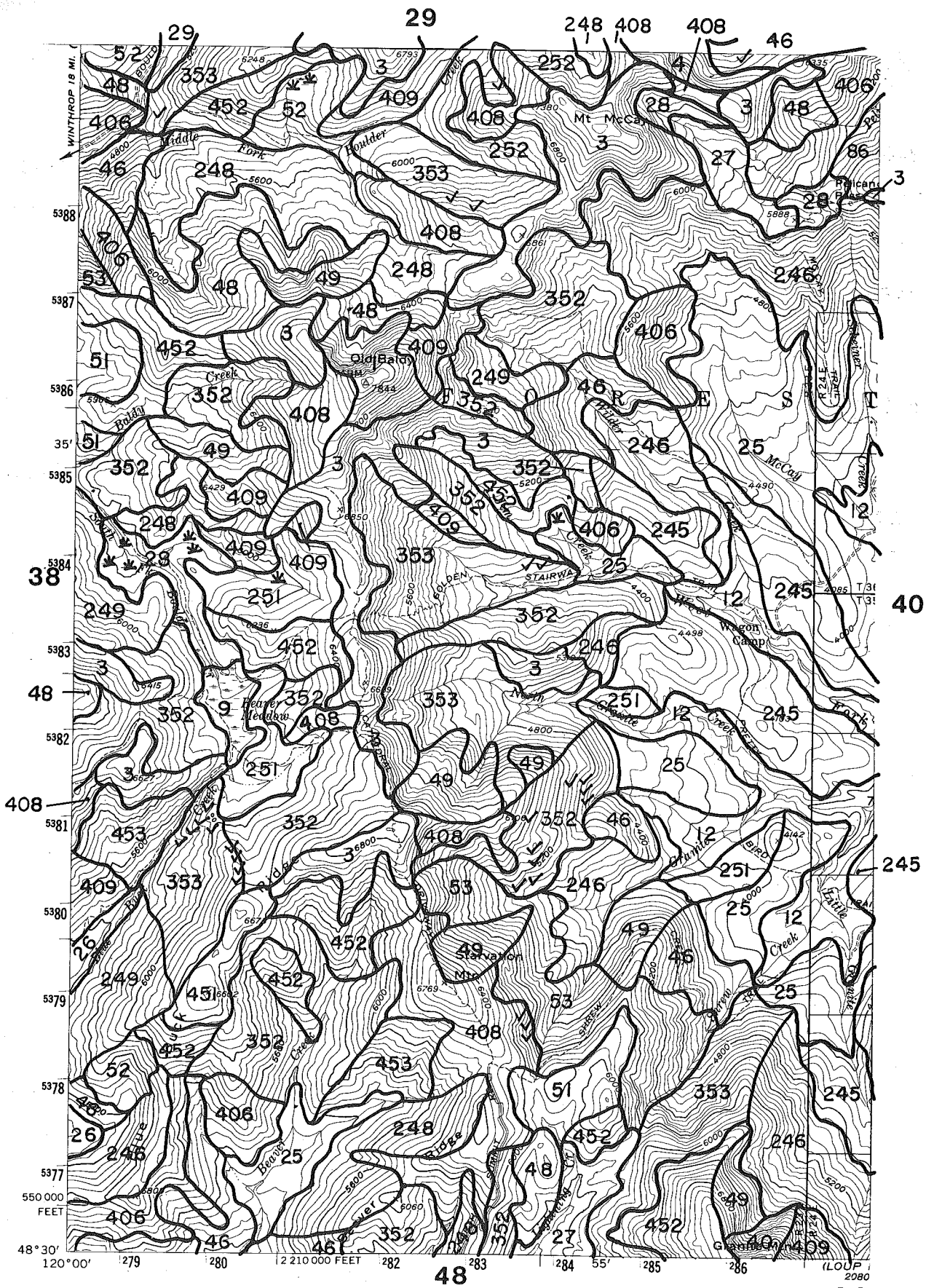
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST

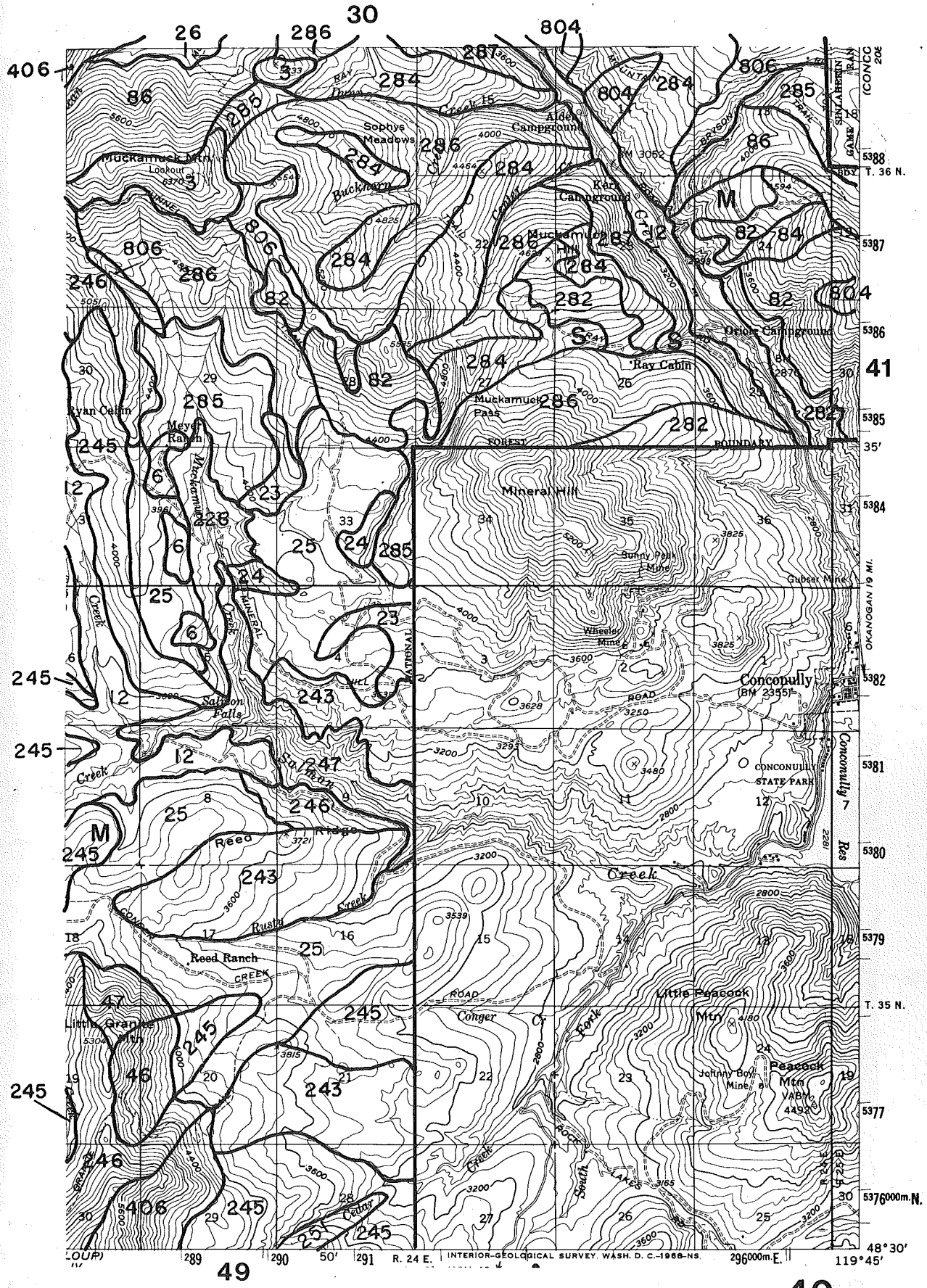

(SILVER STAR MTN.) 1:24 000
48°30'
120°30'
550 000 FEET
2 090 000 FEET
R. 20 E.
SCALE IN MILES
Early Winters Ranger Station
Campgrounds
Mazama
McKinney Mtn.
Cedar Falls
Sandy Butte
Early Peak
Lake
Creek
River
Spring
Mine
Ridge
Trail
Winter
Cabin
Prospect
Pasture
Little
Hidden
Methow
NATIONAL
FOREST
(METHOW

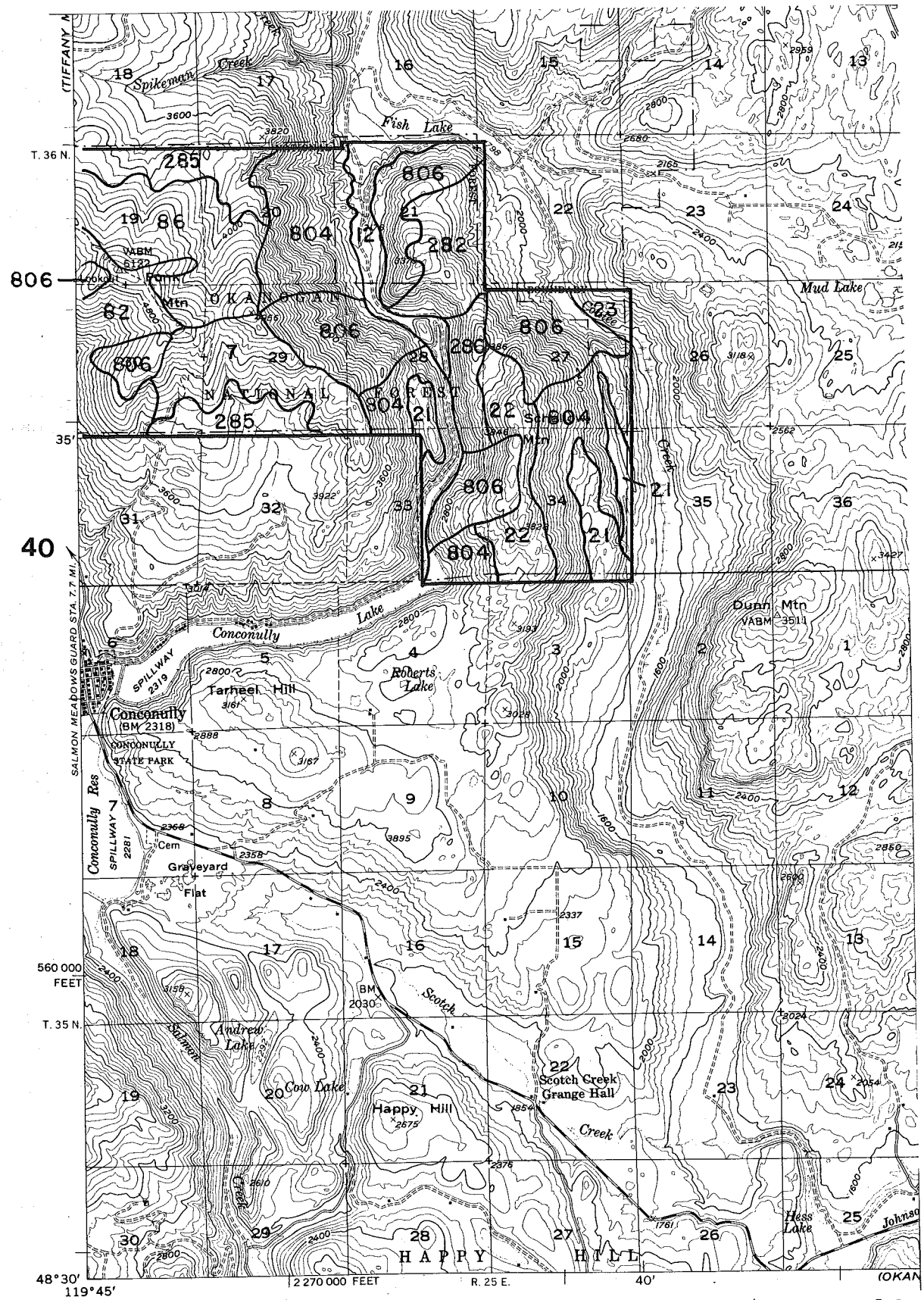

FOREST
Rendezvous Mtn
Rendezvous Mtn
Grizzly Mtn
Spring
Hancock
Creek
METHOW
RIVER
Fawn
Creek
Mordiway
Creek
Indian
Creek
Basin
Creek
Cedar
Creek
Gold
Creek
Fall
Creek
Bear
Creek
Lewis
Peak
Castle
Spring
Weaver
Ranger
Station
Falls
South
Fork
Trail
Ridge
Road
Boundary
Line
Camp
BM 2052
BM 1988
BM 1960
BM 1916
BM 1902
BM 1874
BM 1915
WC
NATIONAL
T. 36 N.
T. 35 N.
R. 20 E.
R. 21 E.
SCALE IN MILES
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1964
WINTHROP 3.7 MI.
OKANOGAN 44 MI.
48°30'
120°15'

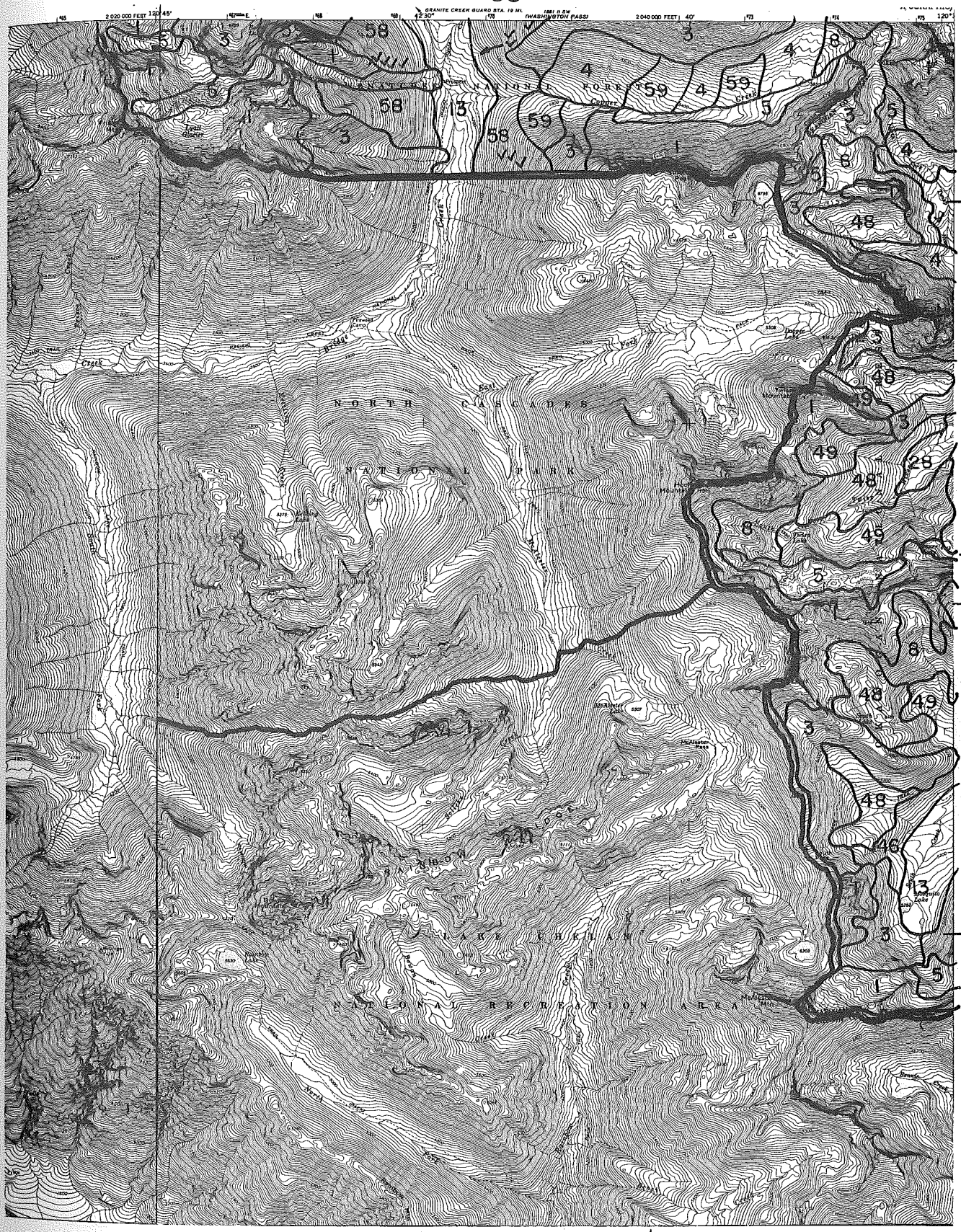

Buck Mountain
Buck Cabin
Buck Cabin Creek
Second Creek
Third Creek
First Creek
Cub Creek
Little Cub Creek
Chewack River
Chewack River Trail
Chewack River Road
Methow River
Methow Valley
Lewis Butte
Sullivan Pond
Spring
Gravel Pit
Campground
Guard Station
Meadow
Corbett
Boundary
Ridge
Creek
Trail
Road
NATIONAL FOREST
BOUNDARY
T. 36 N.
T. 35 N.
R. 21 E.
R. 22 E.
36
37
38
46
560 000 FEET
2 150 000 FEET
MAZAMA 9.6 MI.
WINTHROP 3.5 MI.
OKANOGAN 44 MI.
WINTHROP 2 MI.
TWISP 11 MI.
48°30'
120°15'
SCALE IN MILES

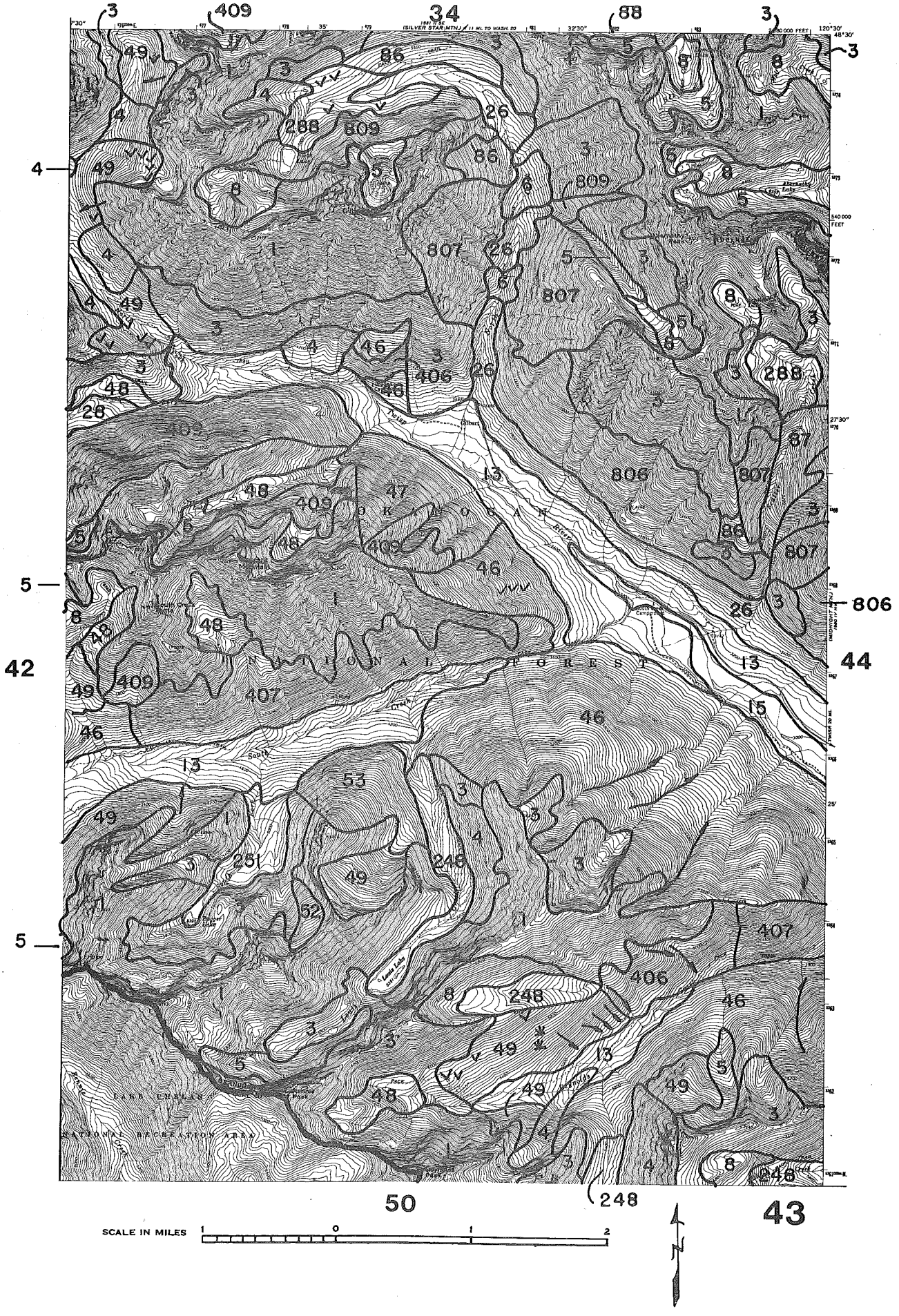

Flat Butte
Ramsey Peak
Tripod Peak
Pearrygin Peak
Blue Buck Ridge
Middle Fork
Creek
Trail
Road
INTERIOR—GEOLOGICAL SURVEY WASHINGTON D C—1965
SCALE IN MILES
1 0 1 2

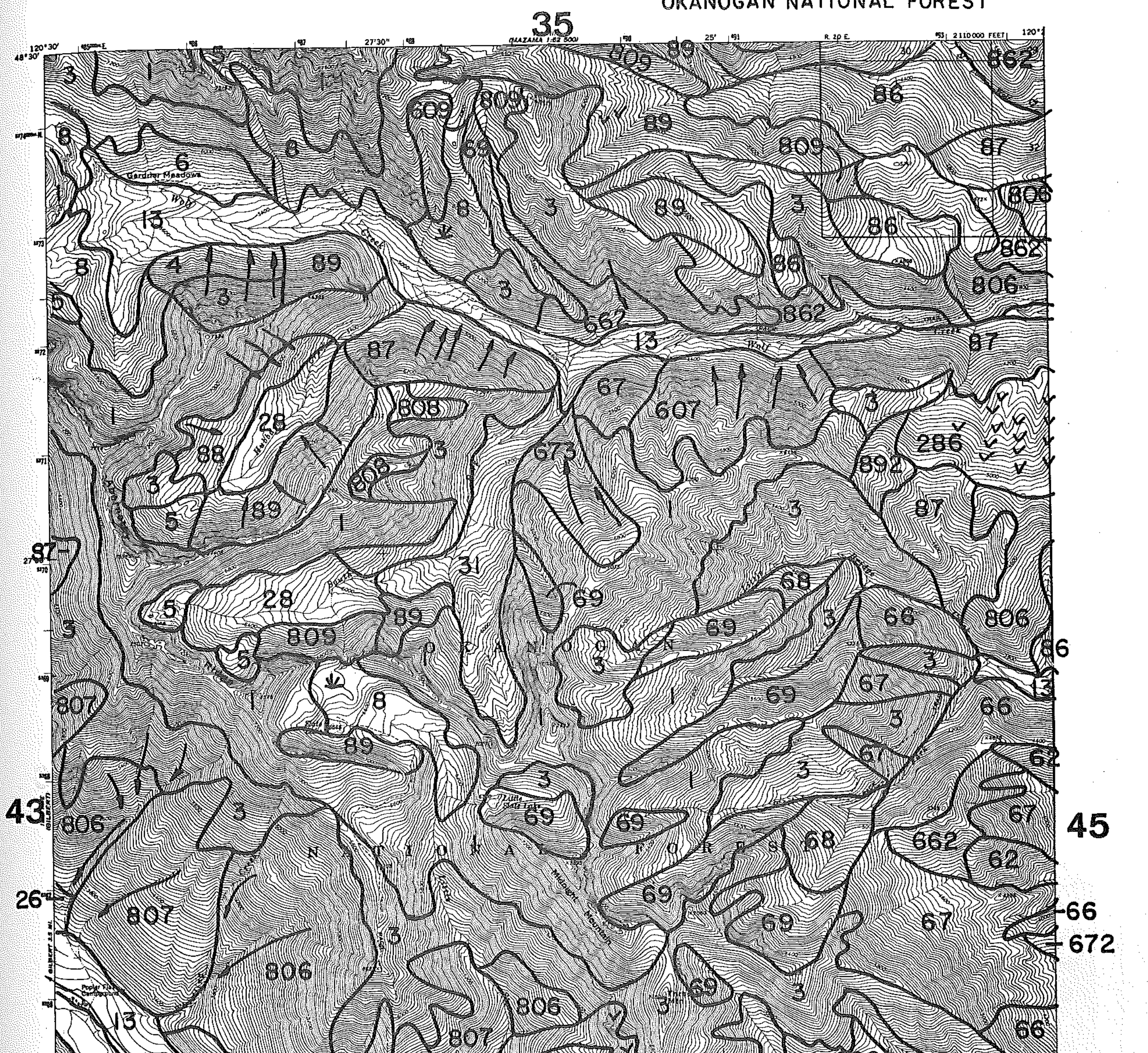

WINTHROP 18 MI.
Middle Fork
Boulder Creek
Mt McCay
Old Baldy
Baldy Creek
Golden Stairway
Beaver Meadow
Wagon Camp
McCay Creek
Pelican Ridge
Starvation Mtn
Bear Ridge
Grandview Mtn
R24E
R25E
T37N
T36N
29
38
48
40
39
550 000 FEET
2 210 000 FEET
48°30'
120°00'
SCALE IN MILES
2 OF 2

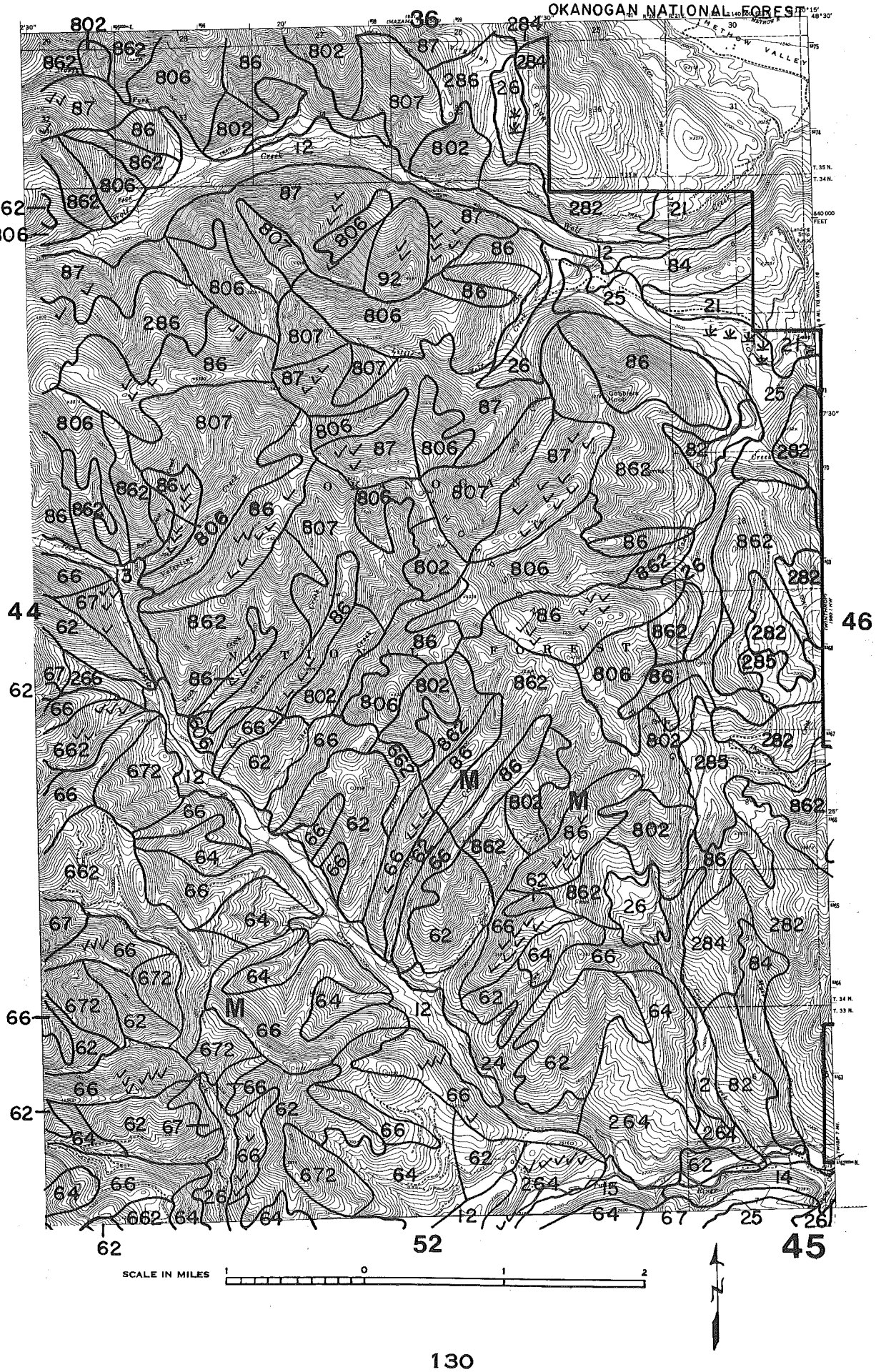

30
26
286
804
406
287
284
806
86
285
Sophye Meadows
Alder Campground
Muckamuck Mtn
Lookout
Kerr Campground
Muckamuck Pass
Ray Cabin
Orion Campground
82
246
Ryan Cabin
Meyer Ranch
Muckamuck Creek
Mineral Hill
Sunny Peak Mine
Gubser Mine
Wheeler Mine
Conconully
(BM 2355)
CONCONULLY STATE PARK
Conconully Res
Salmon Falls
Reed Ridge
Reed Ranch
CREEK
Little Granite Mtn
Little Peacock Mtn
Peacock Mtn
VABM 4492
Johnny Boy Mine
Conger Cr
Rocky Creek
South Fork
LAKES
ROAD
FOREST BOUNDARY
OKANOGAN 19 MI.
T. 36 N.
T. 35 N.
R. 24 E.
INTERIOR-GEOLOGICAL SURVEY, WASH. D. C.-1968-NS.
39
41
49
40
245
243
247
228
223
5388
5387
5386
5385
5384
5383
5382
5381
5380
5379
5377
5376000m.N.
296000m.E.
48°30'
119°45'
SCALE IN MILES
0
1
2
125


(TIFFANY M
Spikeman Creek
Fish Lake
T. 36 N.
806
OKANOGAN
NATIONAL FOREST
Mud Lake
Sor
Mtn
Creek
40
SALMON MEADOWS GUARD STA. 7.7 MI.
Conconully Lake
Roberts Lake
Farheel Hill
Conconully
(BM 2318)
CONCONULLY STATE PARK
SPILLWAY
Conconully Res
Cem
Graveyard
Flat
Dunn Mtn
VABM 3511
560 000 FEET
T. 35 N.
BM 2030
Scotch
Andrew Lake
Salmon
Cow Lake
Happy Hill
Scotch Creek Grange Hall
Creek
Hess Lake
HAPPY HILL
48°30'
119°45'
2 270 000 FEET
R. 25 E.
40'
41
SCALE IN MILES
1 0 1 2

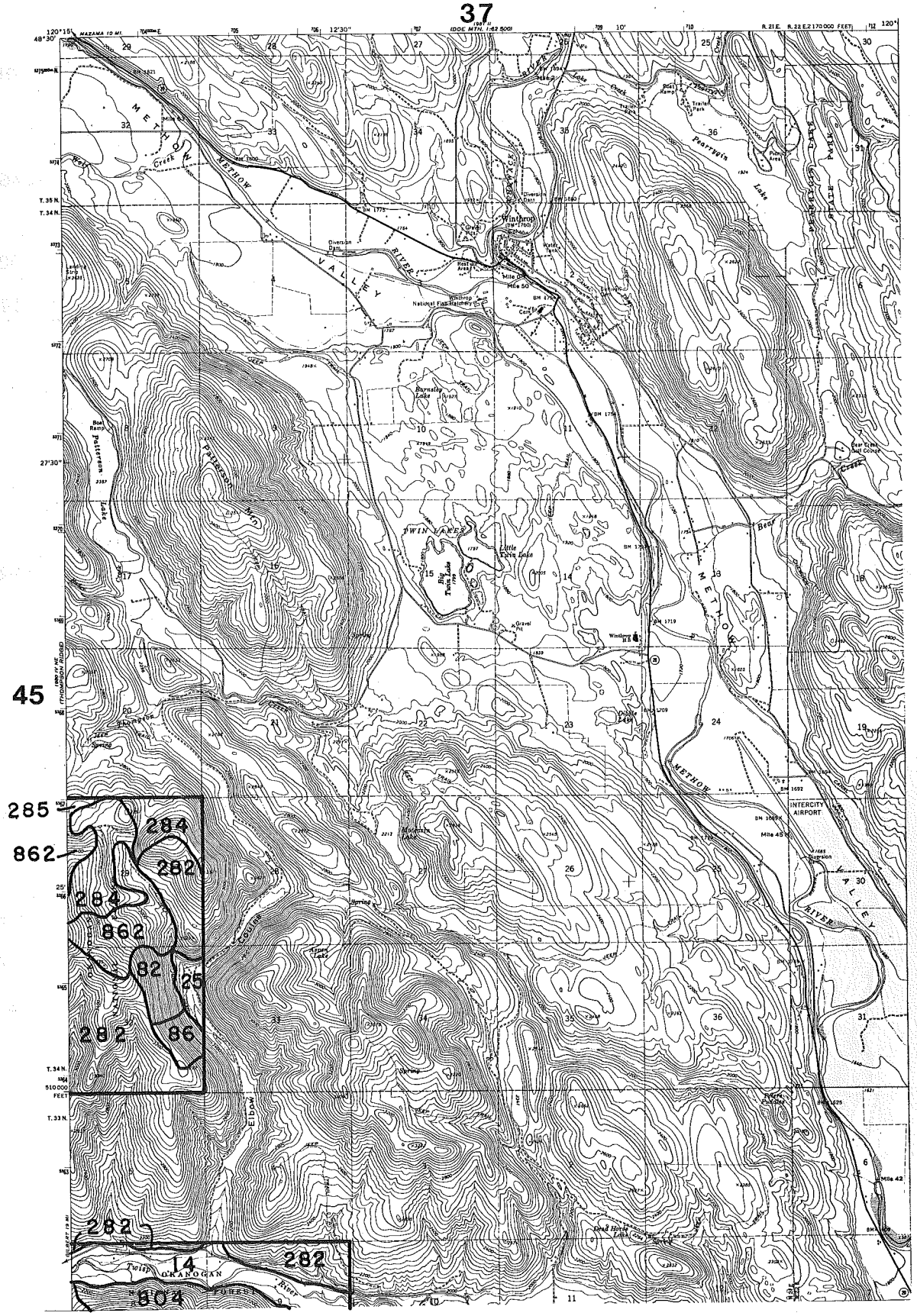

33
43
42
58
3
4
59
5
8
13
1
48
49
28
46
NORTH CASCADES NATIONAL PARK
LAKE CHELAN NATIONAL RECREATION AREA
GRANITE CREEK GUARD STA.
(WASHINGTON PASS)
Lyall Glacier
SCALE IN MILES
1
0
1
2


34
3
409
88
3
49
86
3
26
288
809
4
49
86
809
807
26
807
49
46
406
26
48
28
288
87
806
807
48
409
47
13
OKANOGAN
409
807
5
806
42
NATIONAL FOREST
44
49
409
407
46
13
15
53
49
251
248
49
52
407
406
248
46
49
13
49
49
LAKE CHELAN
NATIONAL RECREATION AREA
50
248
43
SCALE IN MILES
1
0
1
2
N


35
43
45
51
44
SCALE IN MILES
1
0
1
2
Gardner Meadows
OKANOGAN
NATIONAL FOREST
Twisp
M


SCALE IN MILES
1 0 1 2
N

37



45

47

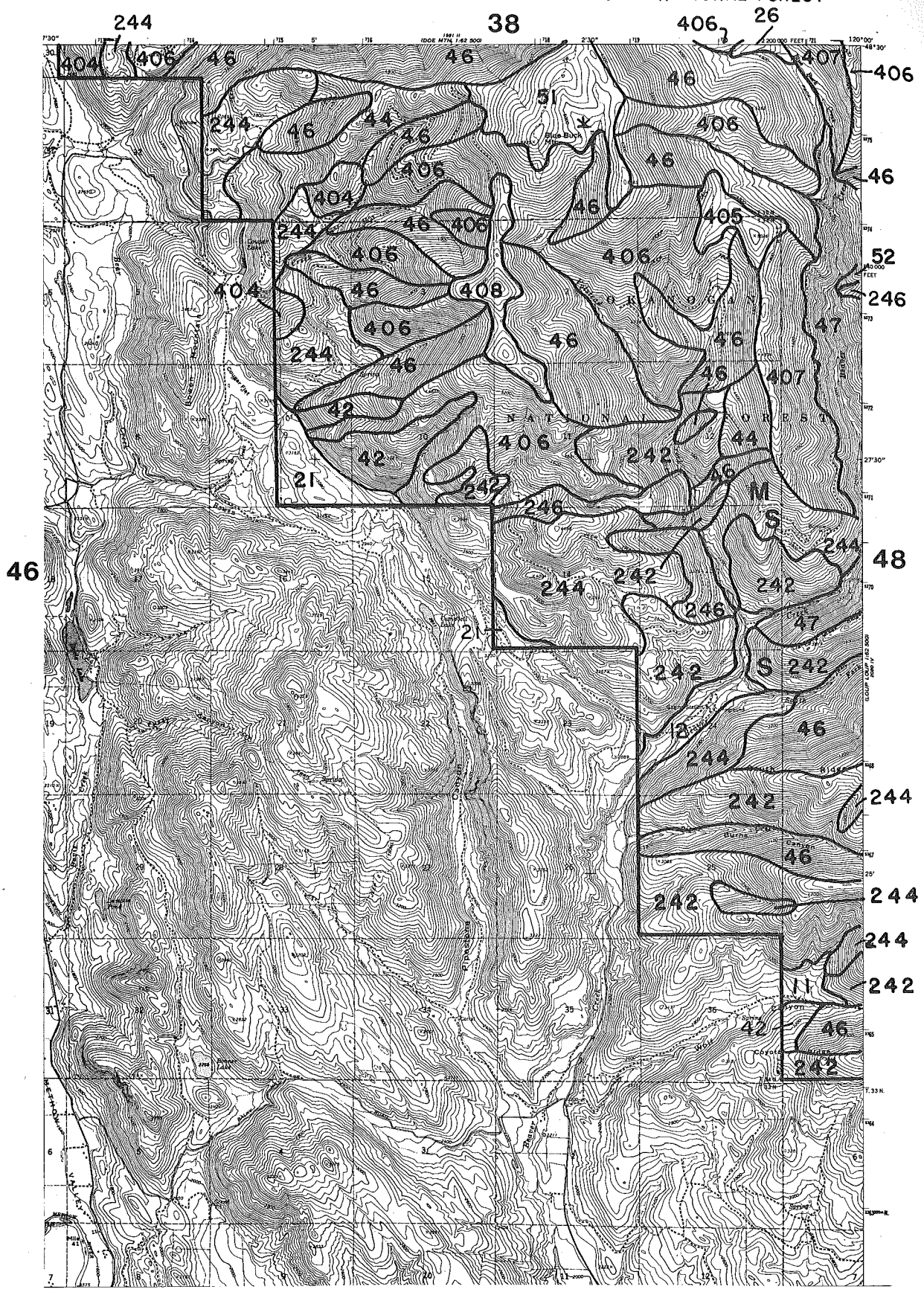
53

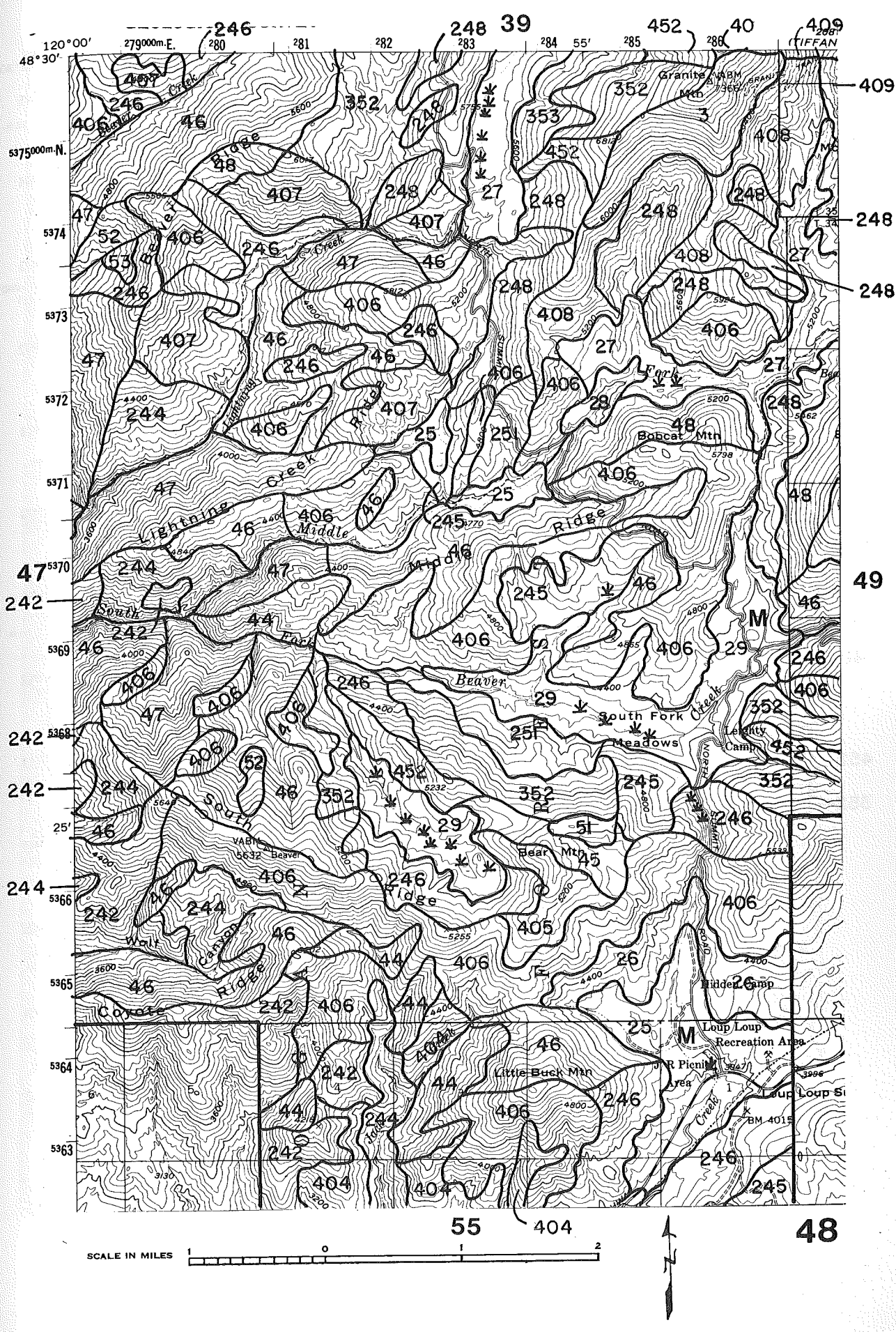
46

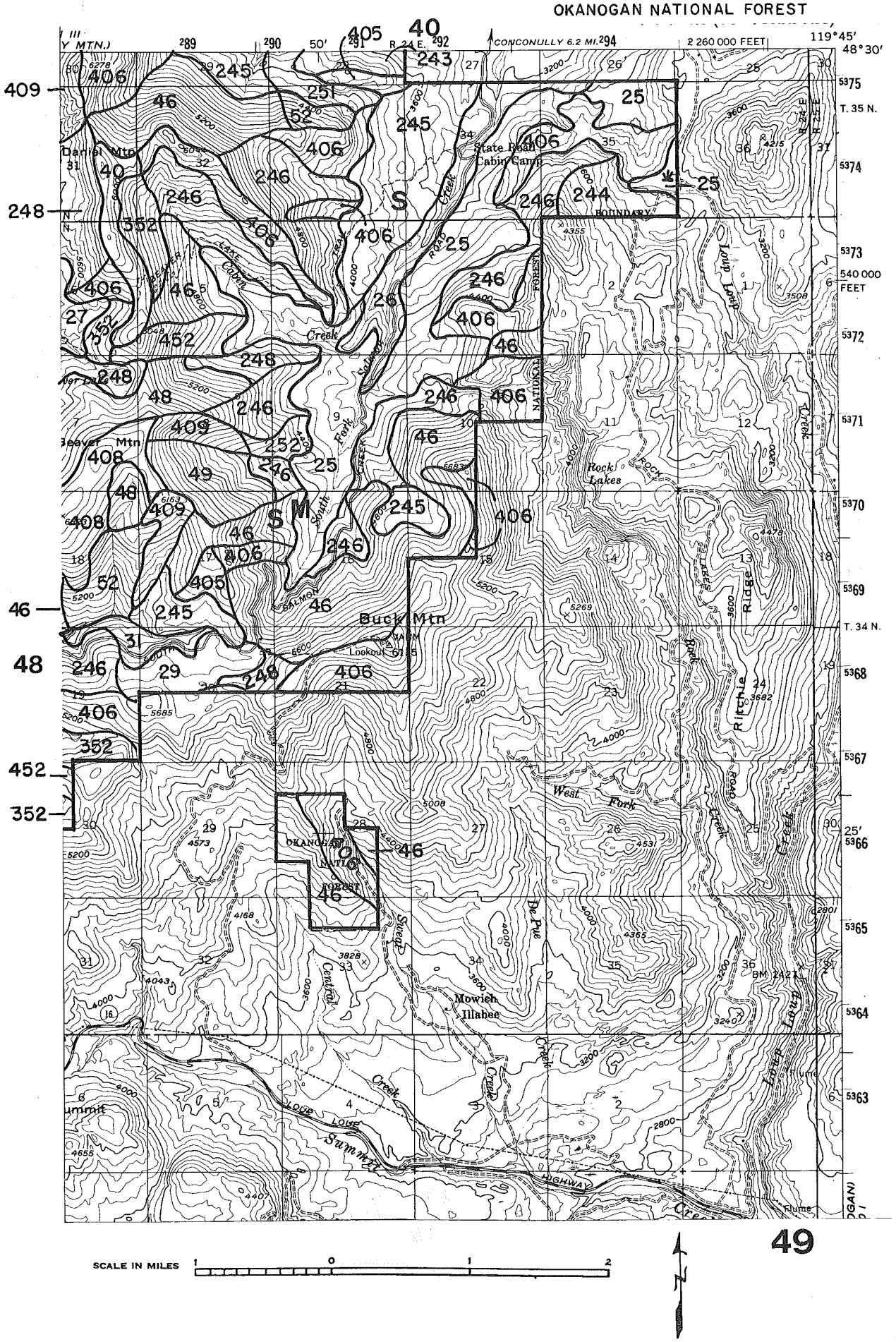
SCALE IN MILES 1 0 1 2

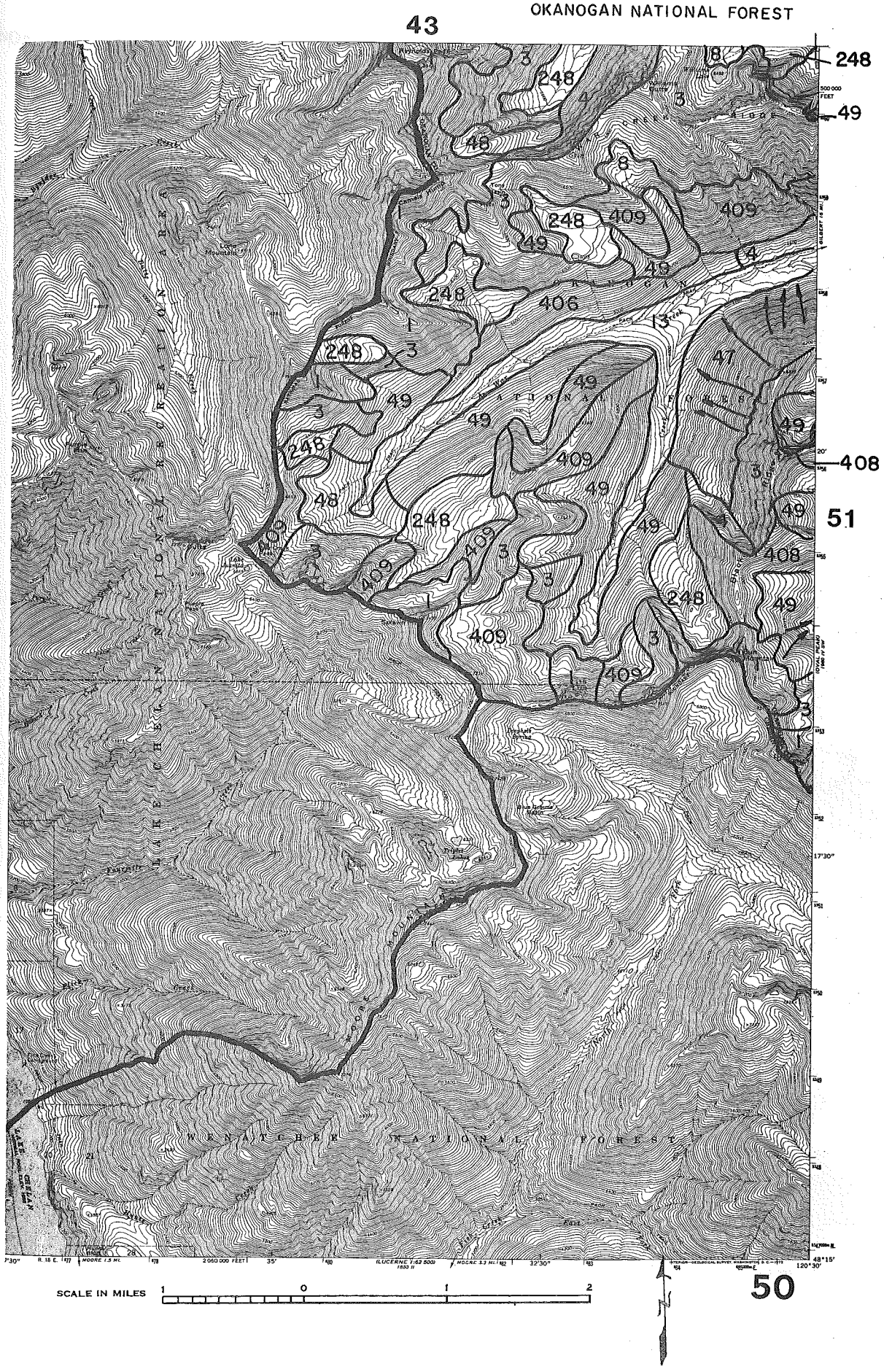
N

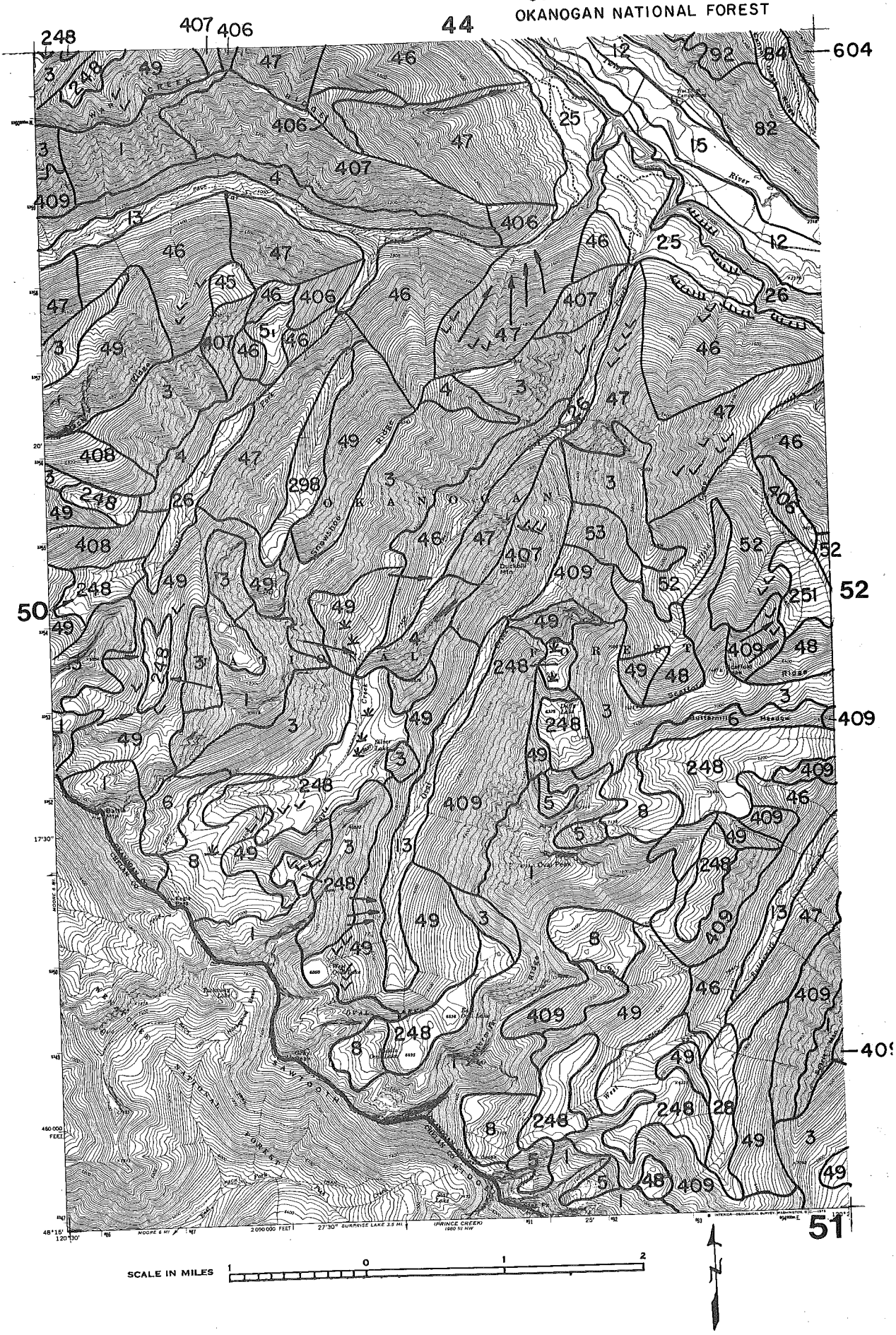
131

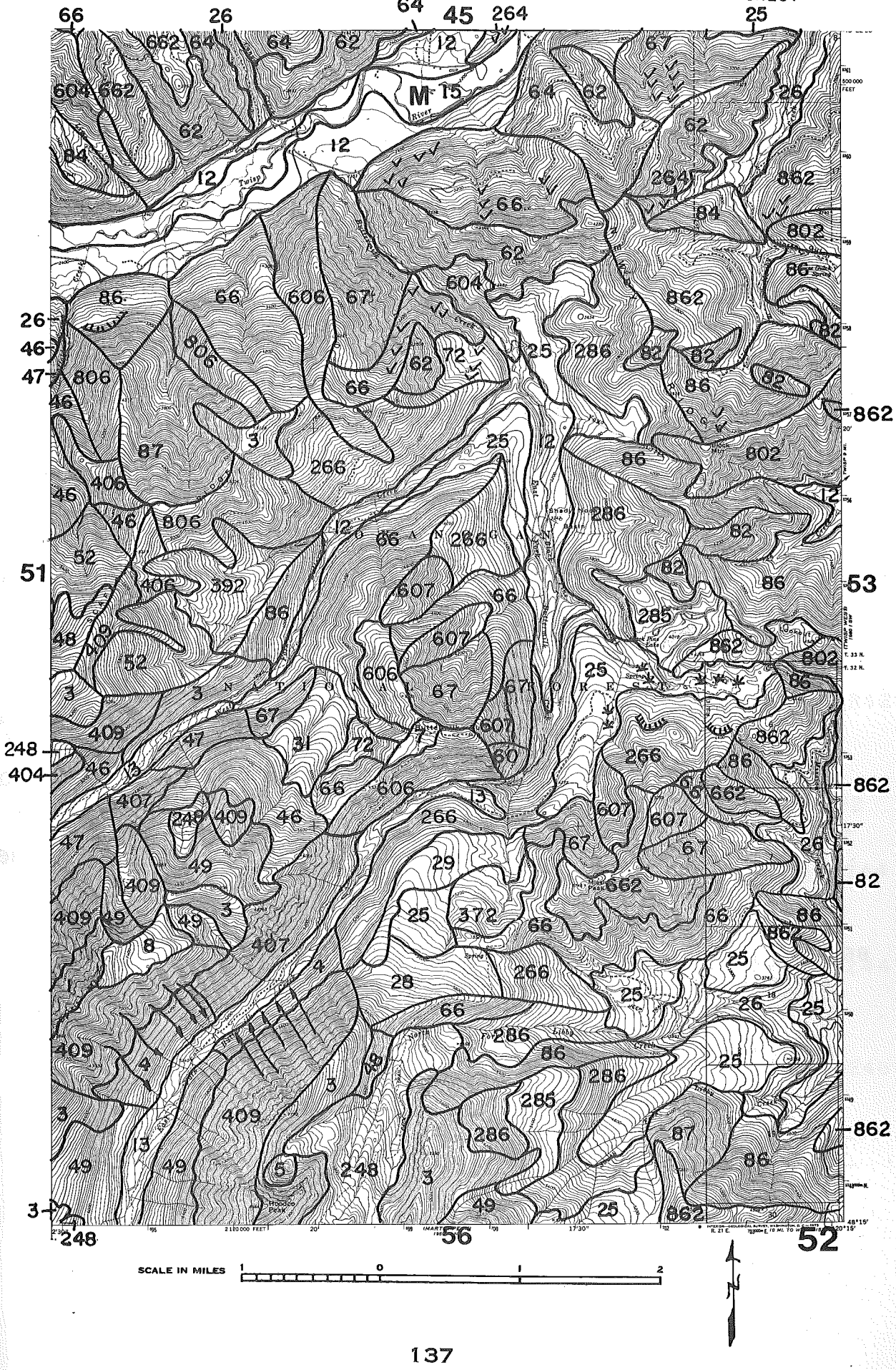

244
38
406
26
46
51
52
246
48
54
47
SCALE IN MILES
1 0 1 2

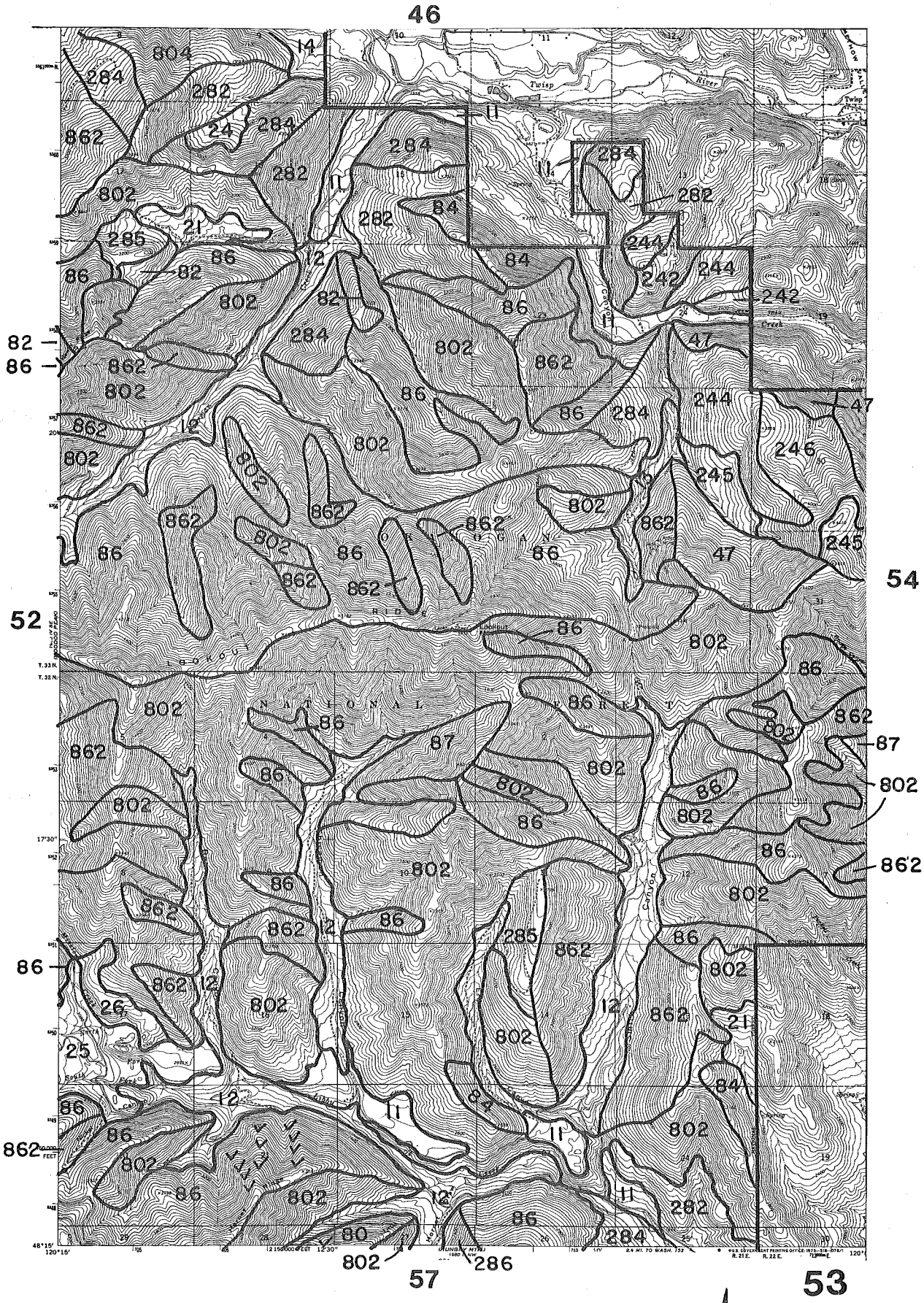

120°00'
279000m.E.
48°30'
5375000m.N.
Granite Mtn
Bobcat Mtn
Lightning Creek
Middle Fork
South Fork
Beaver Creek
Meadows
Bear Mtn
Little Buck Mtn
Coyote Ridge
Wolf Canyon
Loup Loup Recreation Area
Hidden Camp
Leighty Camp
SCALE IN MILES

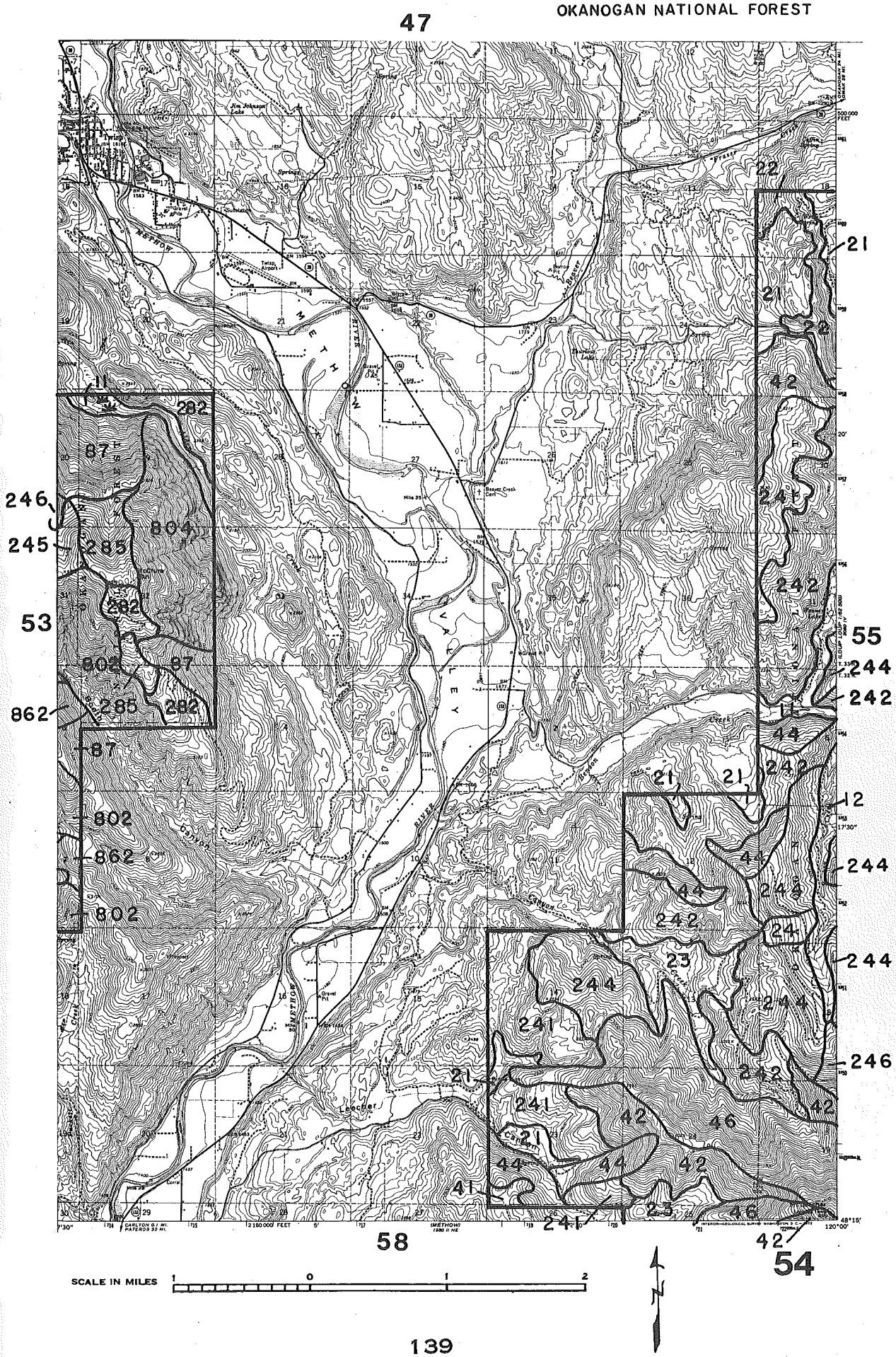

119°45'
48°30'
CONCONULLY 6.2 MI.
2 260 000 FEET
540 000 FEET
T. 35 N.
T. 34 N.
Daniel Mtn
Beaver Mtn
Buck Mtn
Lookout 6115
State Road Cabin Camp
Lake Cabin
Rock Lakes
Ritchie Ridge
West Fork
Mowich Illahee
Summit
Loup Loup
Lower Loup
Flume
HIGHWAY
BOUNDARY
OKANOGAN NATIONAL FOREST
SCALE IN MILES
1 0 1 2
N
49

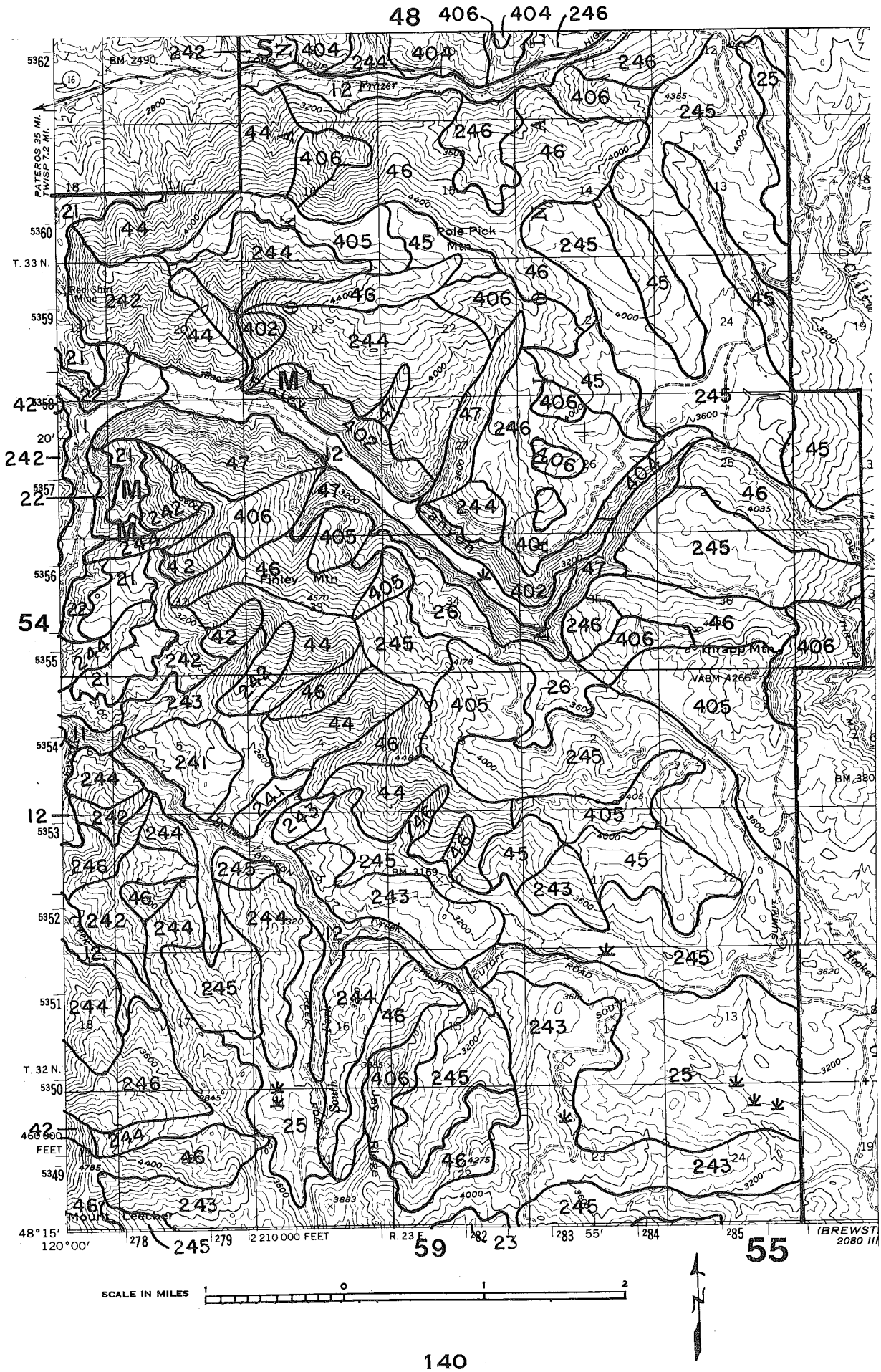

43
248
49
408
51
50
WENATCHEE NATIONAL FOREST
SCALE IN MILES
1 0 1 2

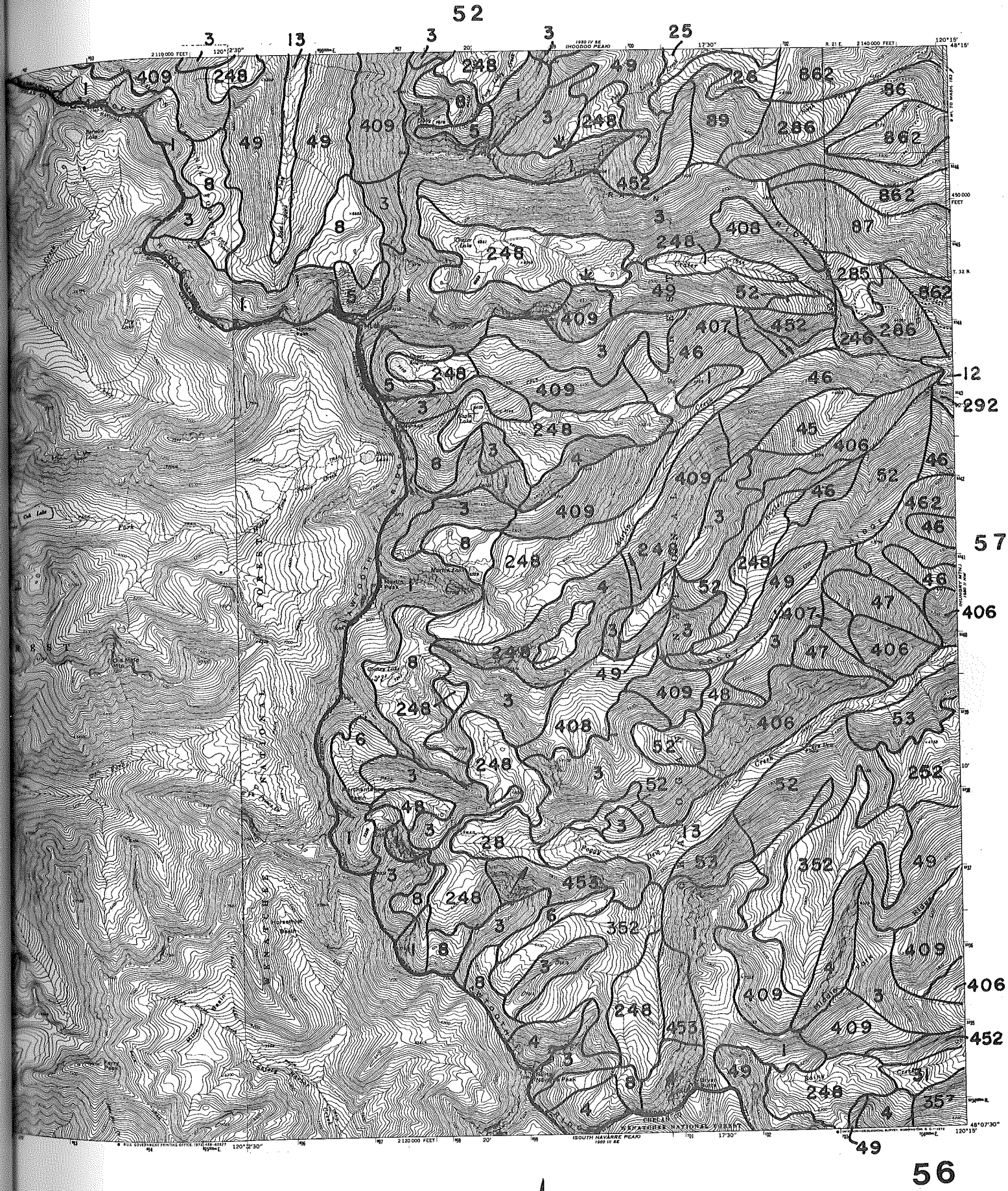

44
50
51
52
248
407
406
409
604
OKANOGAN
SCALE IN MILES
0
1
2
N

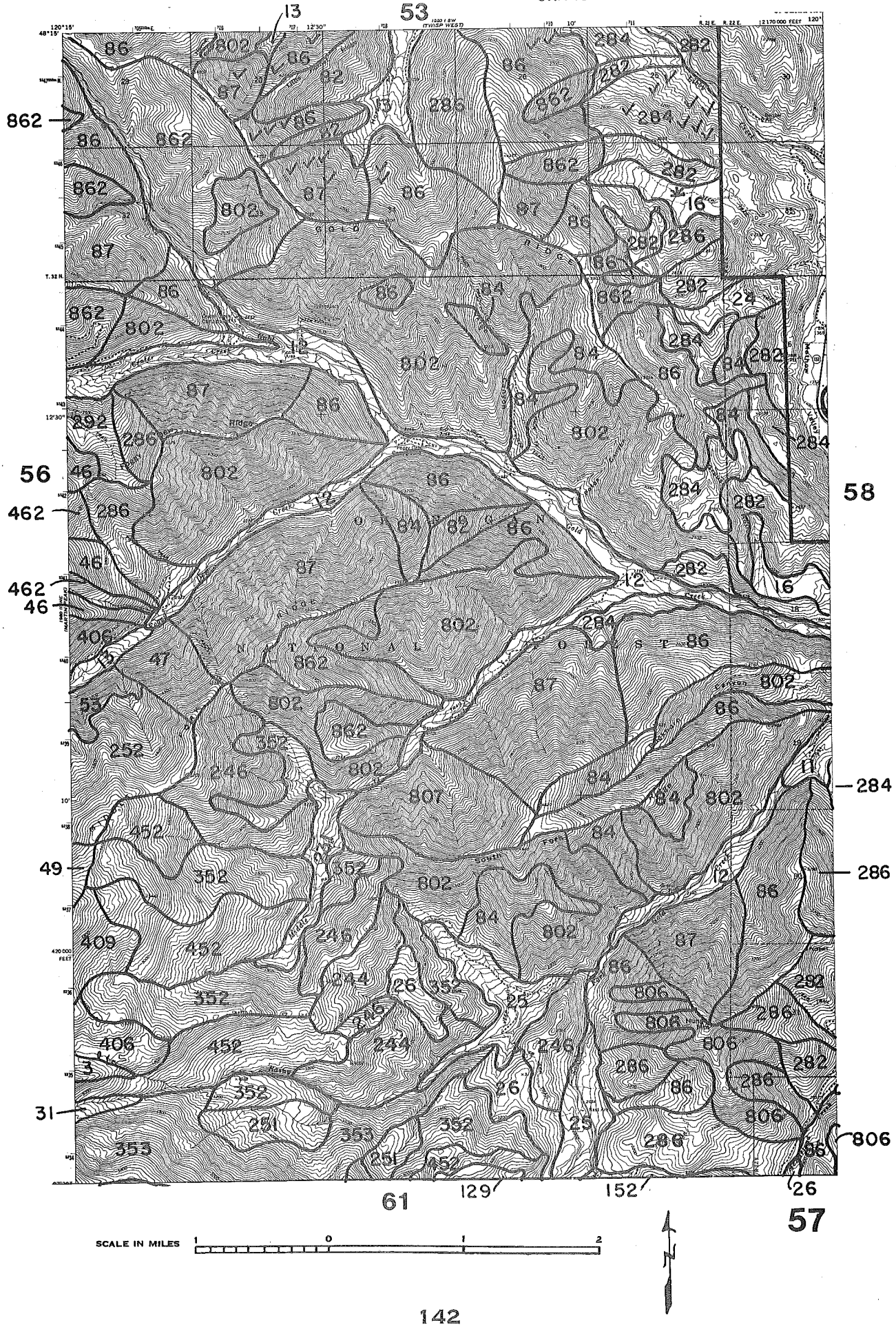

66
26
64
45
264
25
M-15
River
Twisp
Twisp River Rd
Buttermilk Creek
Eagle Creek
Poland Creek
Boundary Peak
Sheep Peak
Spring
Falls
T. 33 N.
T. 32 N.
R. 21 E.
51
53
56
52
248
404
862
82
SCALE IN MILES
1
0
1
2
N

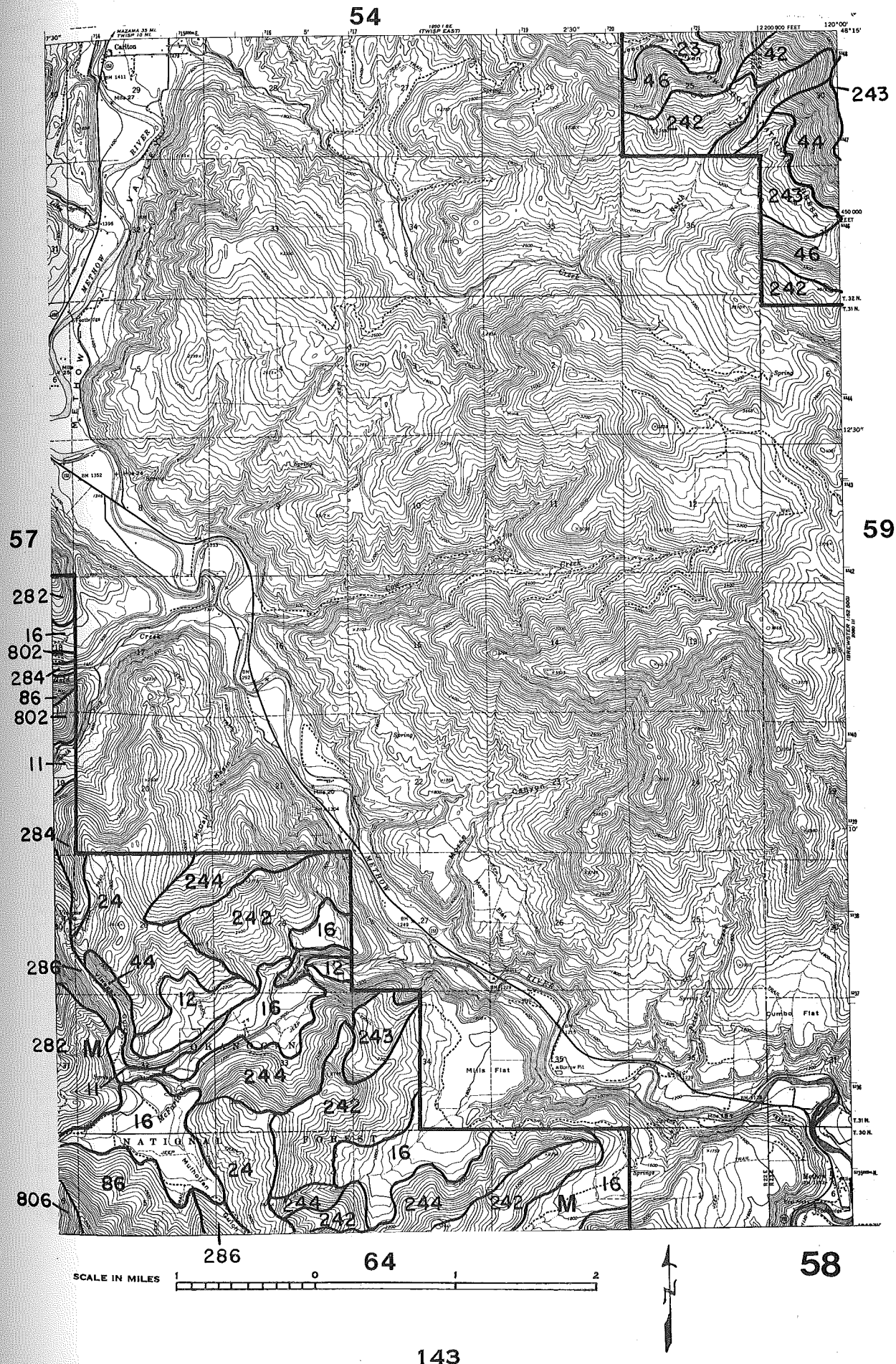

46
52
54
57
53
82
86
862
802
284
282
285
244
242
246
245
47
87
SCALE IN MILES
1 0 1 2

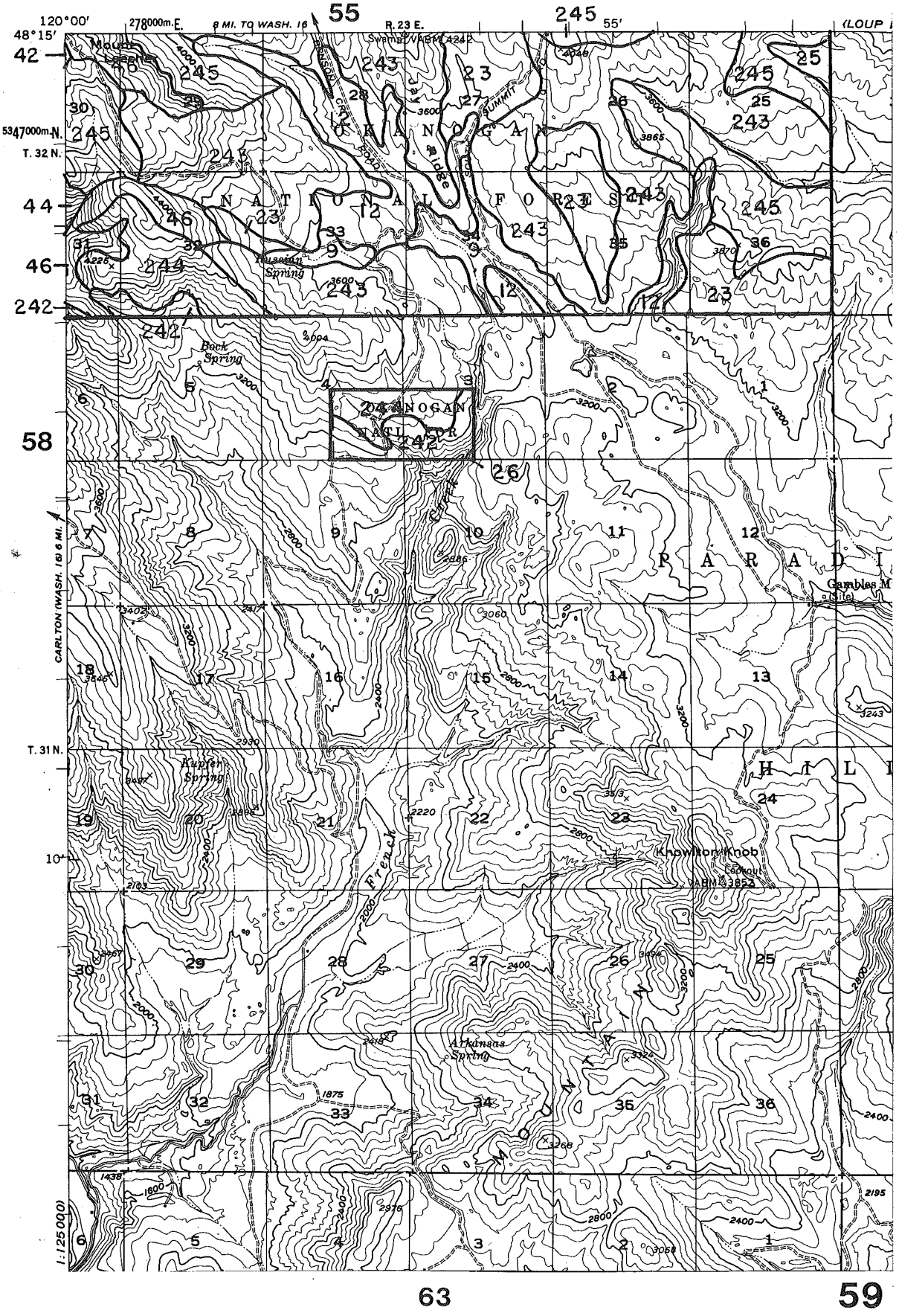

47
53
55
58
54
246
245
862
802
804
285
282
87
242
244
241
21
22
23
24
42
44
46
12
METHOW
METHOW VALLEY
SCALE IN MILES
1 0 1 2


48
406
404
246
BM 2490
Role Pick Mtn
Finley Mtn
Knapp Mtn
VABM 4260
BM 3159
Mount Leecher
T. 33 N.
T. 32 N.
R. 23 E.
2 210 000 FEET
466 000 FEET
48°15'
120°00'
SCALE IN MILES
59
55
54
140

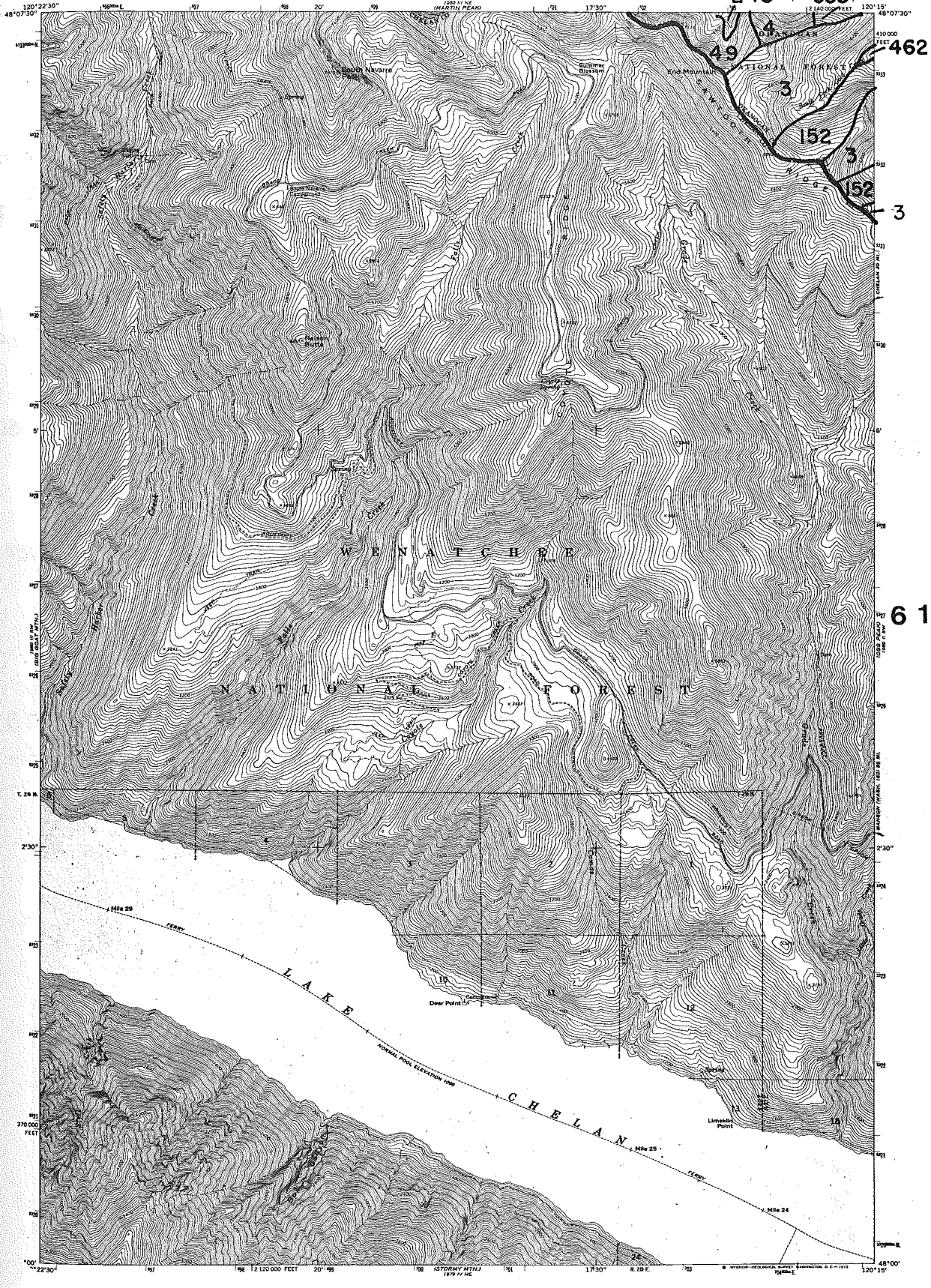

52
3
13
3
3
25
12
292
57
406
406
452
56
SCALE IN MILES
1 0 1 2
N

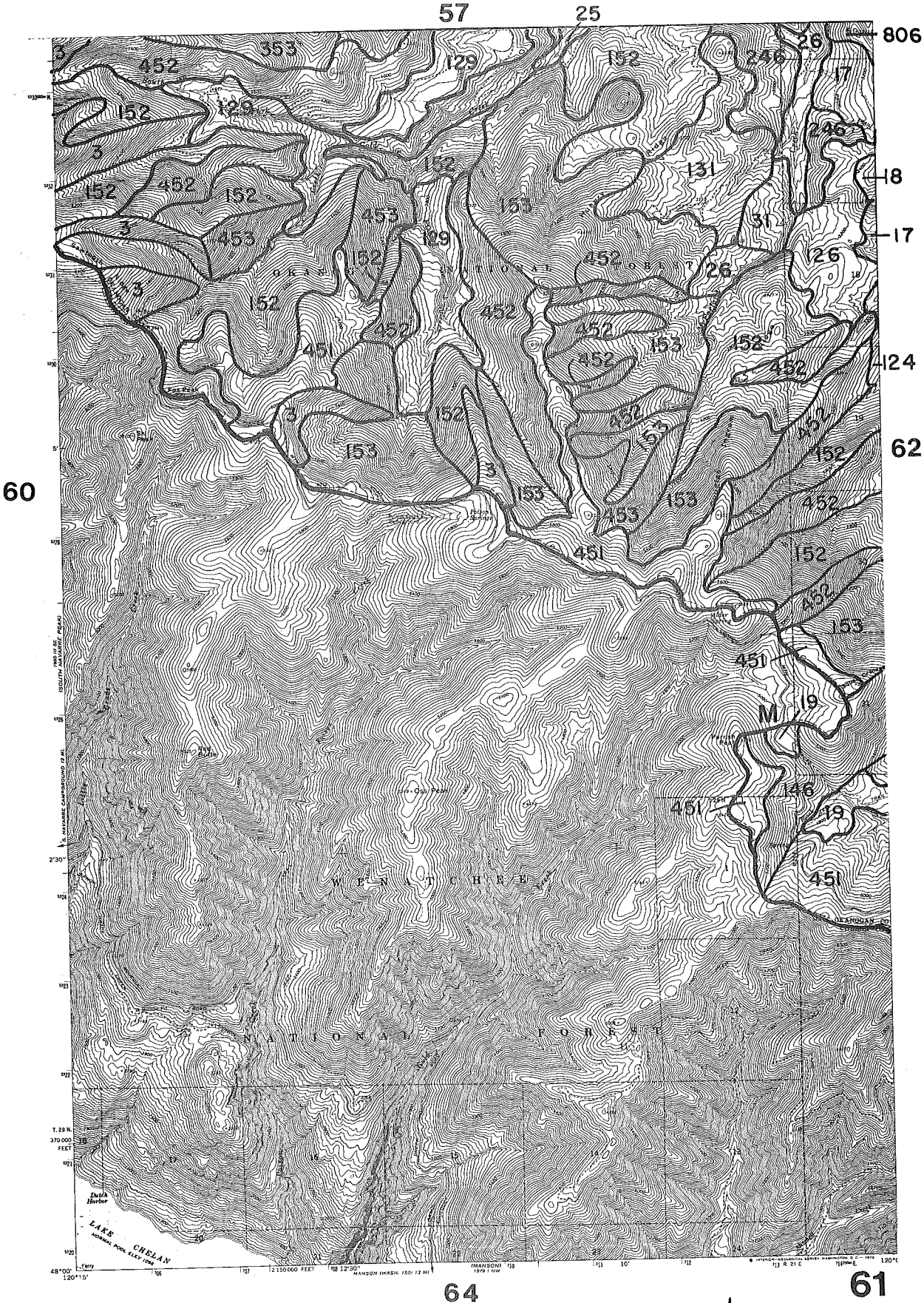

53
13
862
56
462
46
462
46
49
31
61
129
152
57
58
284
286
806
SCALE IN MILES
1 0 1 2
N

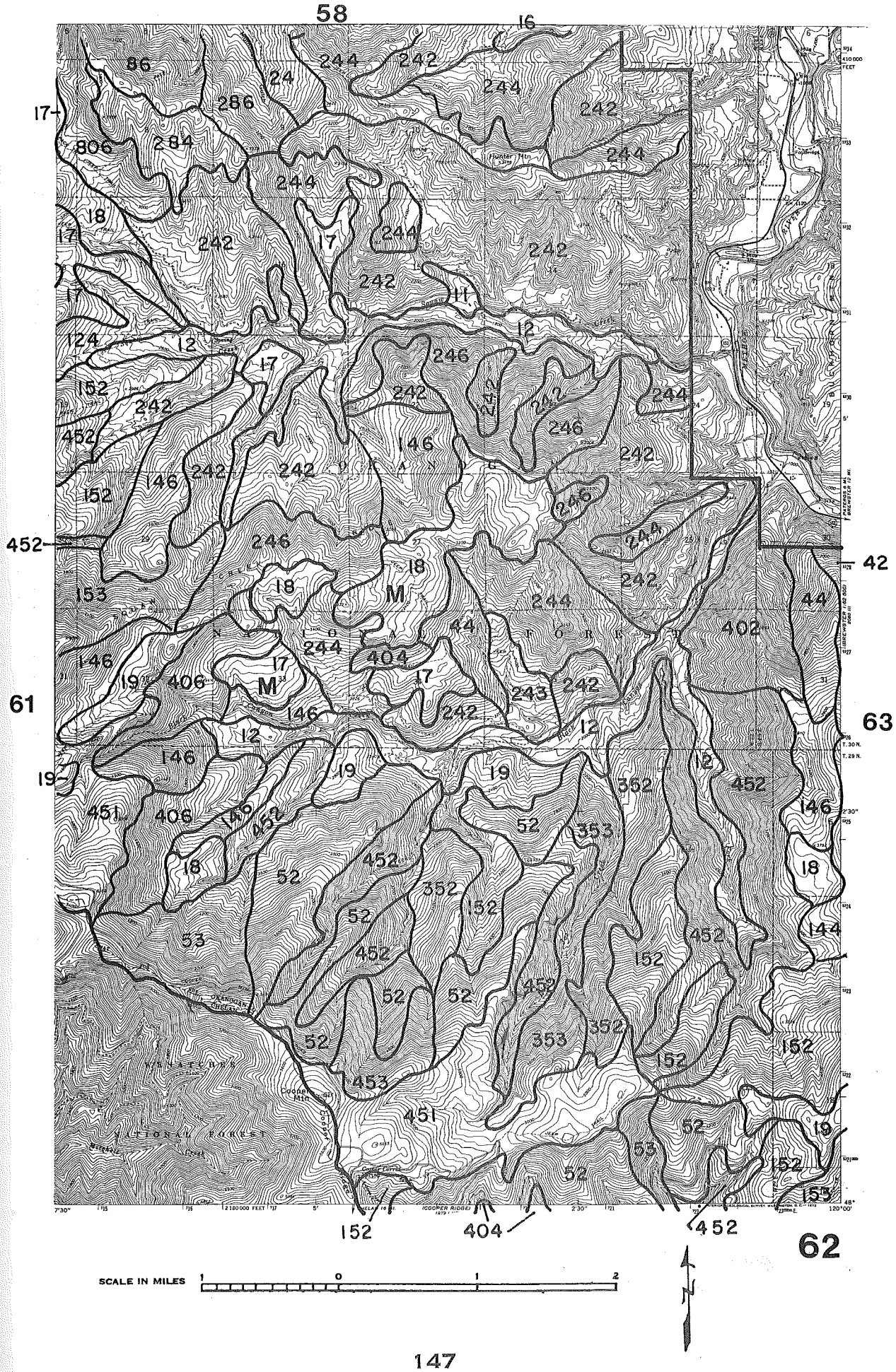

54
57
59
64
58
286
SCALE IN MILES
1 0 1 2
METHOW RIVER
Carlton
Mills Flat
Jumbo Flat
NATIONAL FOREST
23
42
46
242
243
44
46
242
282
16
802
284
86
802
11
284
244
24
242
16
286
44
12
12
16
282
M
243
244
11
242
16
16
24
86
806
244
242
244
242
M
16
286

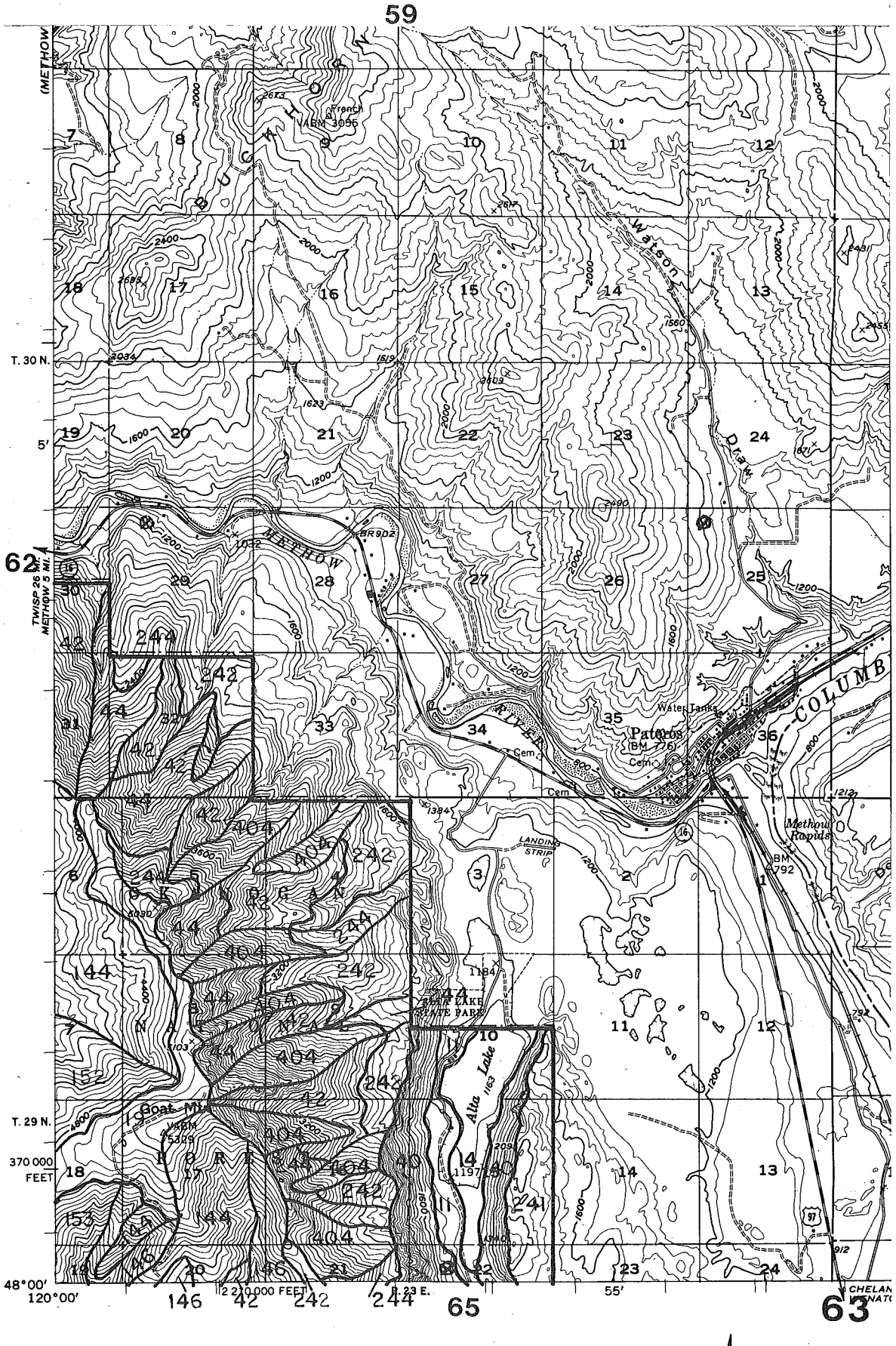

120°00'
48°15'
278000m.E.
8 MI. TO WASH. 16
R. 23 E.
55
245
55'
(LOUP
Swamp
VABM 4242
Mount Chesaw
Bolson Creek
Bolson Creek Road
Ridge
Summit
OKANOGAN
NATIONAL FOREST
Tulsequah Spring
Buck Spring
Gambles M
Site
Creek
PARADISE
HILL
Kuplen Spring
French
Knowlton Knob
Lookout
VABM 3852
Arkansas Spring
MOUNTAIN
5347000m.N.
T. 32 N.
T. 31 N.
CARLTON (WASH. 16) 6 MI.
1:125 000
42
44
46
242
58
63
59
10
SCALE IN MILES
0
1
2

56


248
353
462
49
4
3
152
3
152
3
61
60
WENATCHEE
NATIONAL FOREST
LAKE CHELAN
Mile 29
Mile 25
Mile 24
Deer Point
Limekiln Point
SCALE IN MILES
0
1
2


57
25
806
60
62
64
61
146
SCALE IN MILES
0
1
2

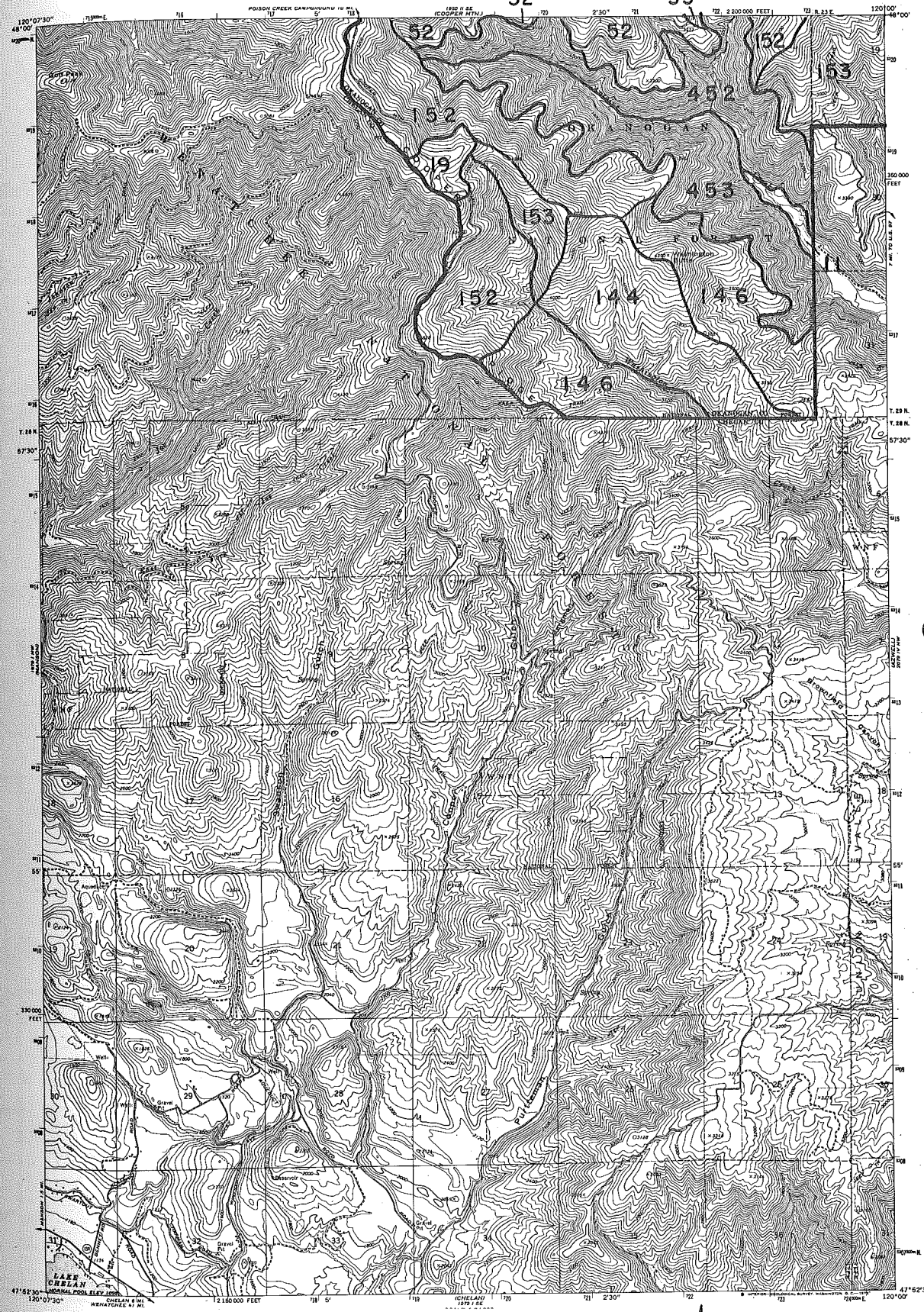

58
16
17
452
42
61
63
19
152
404
452
62
SCALE IN MILES
1 0 1 2
N


59
62
63
65
T. 30 N.
T. 29 N.
TWISP 26 MI.
METHOW 5 MI.
48°00'
120°00'
370 000 FEET
2 270 000 FEET
R. 23 E.
55'
METHOW
Watson
Davis
COLUMB
Patterson
(BM 776)
Water Tanks
Cem
Methow Rapids
BM 792
LANDING STRIP
Alta Lake
STATE PARK
Goat Mt.
YABM 5309
French
YABM 3095
SCALE IN MILES
1 0 1 2

62

52

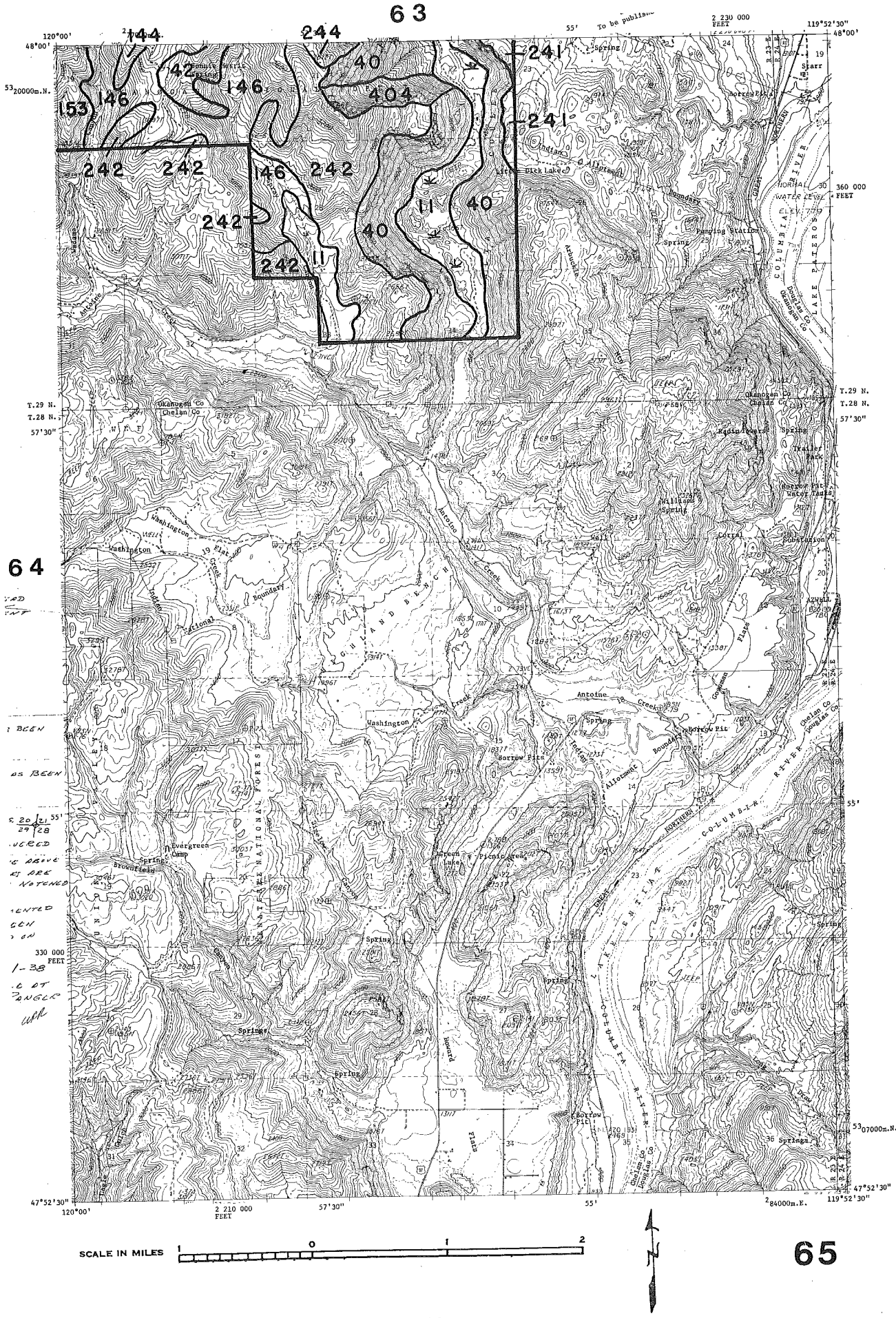
53

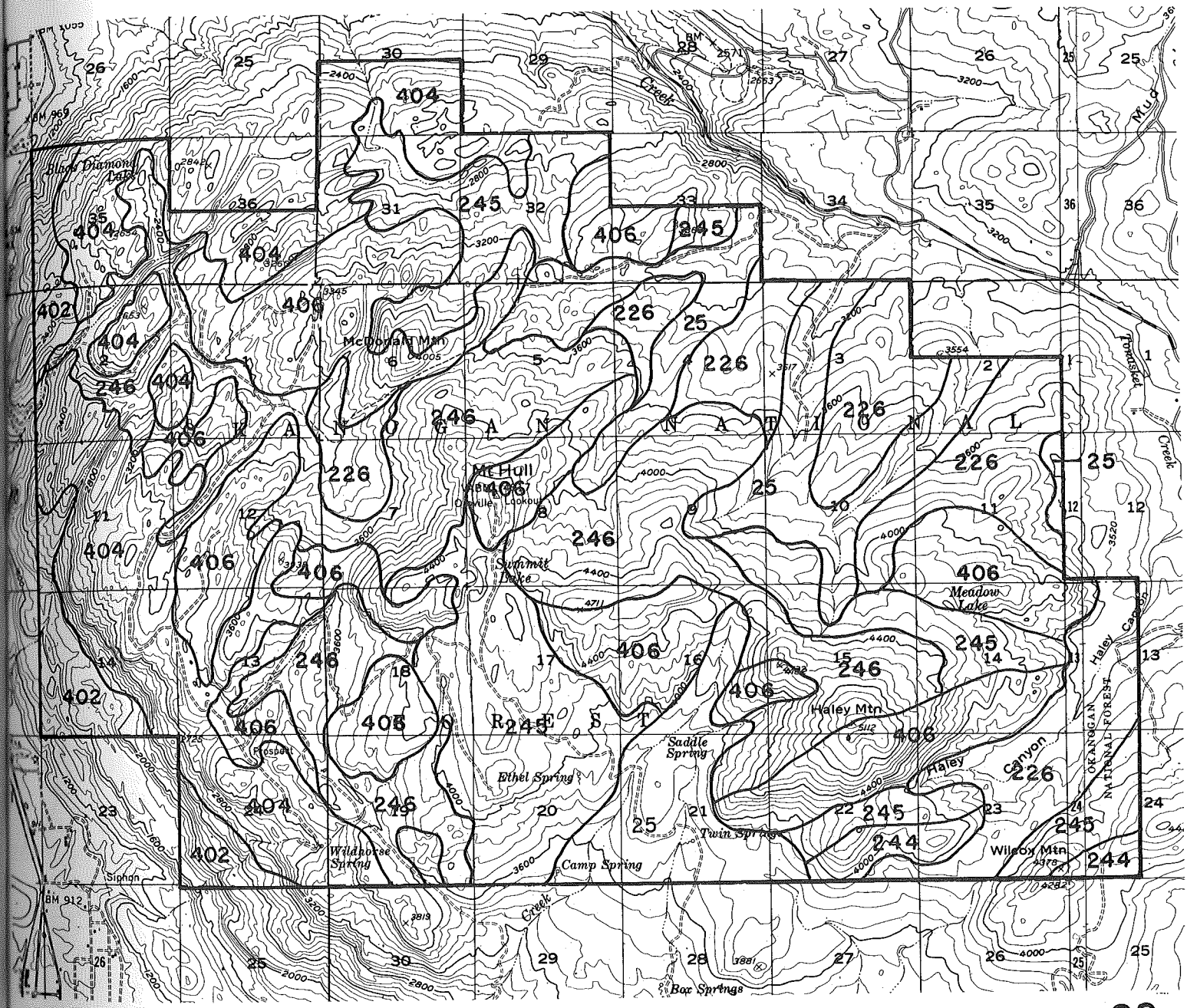


65

64

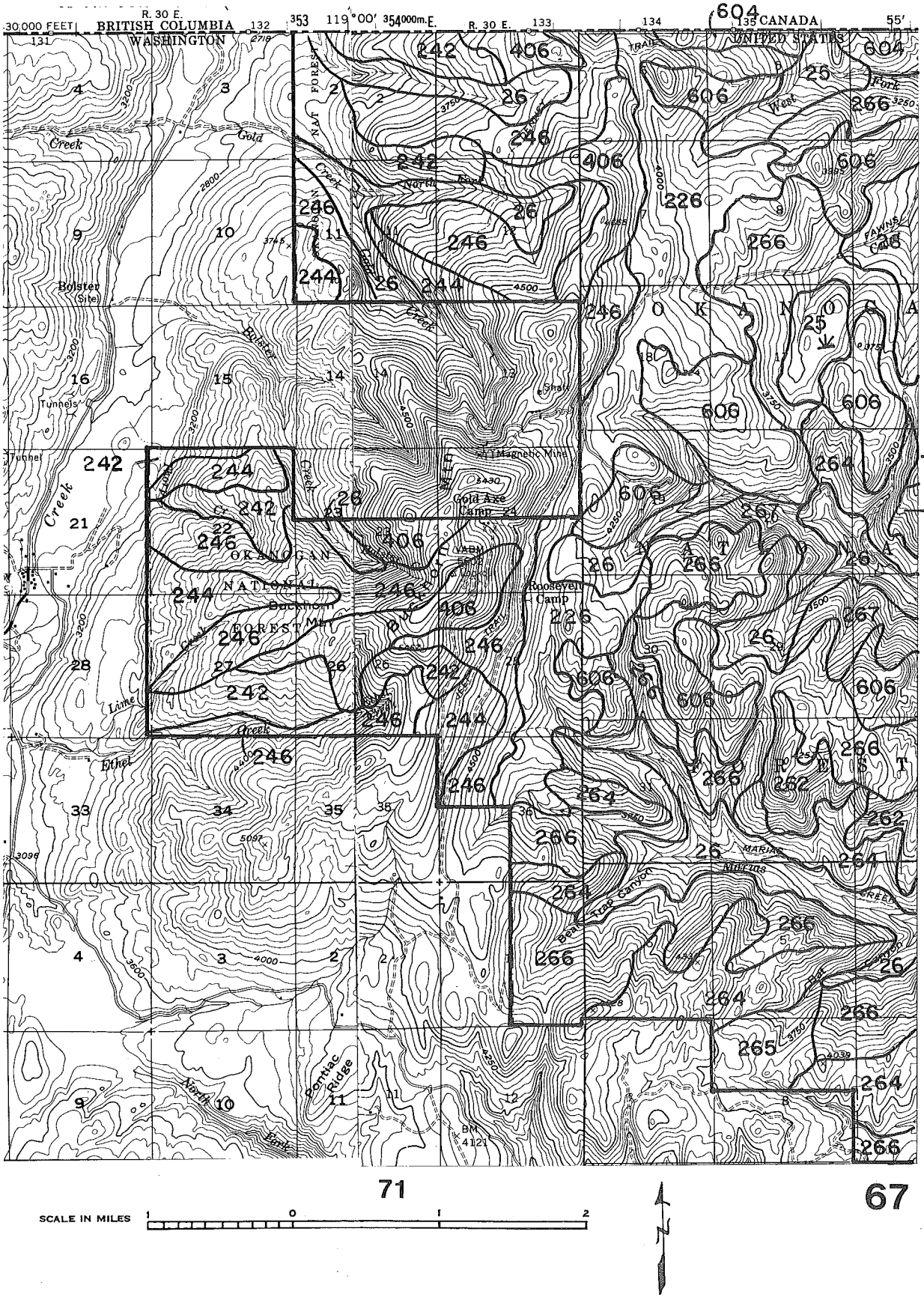
149

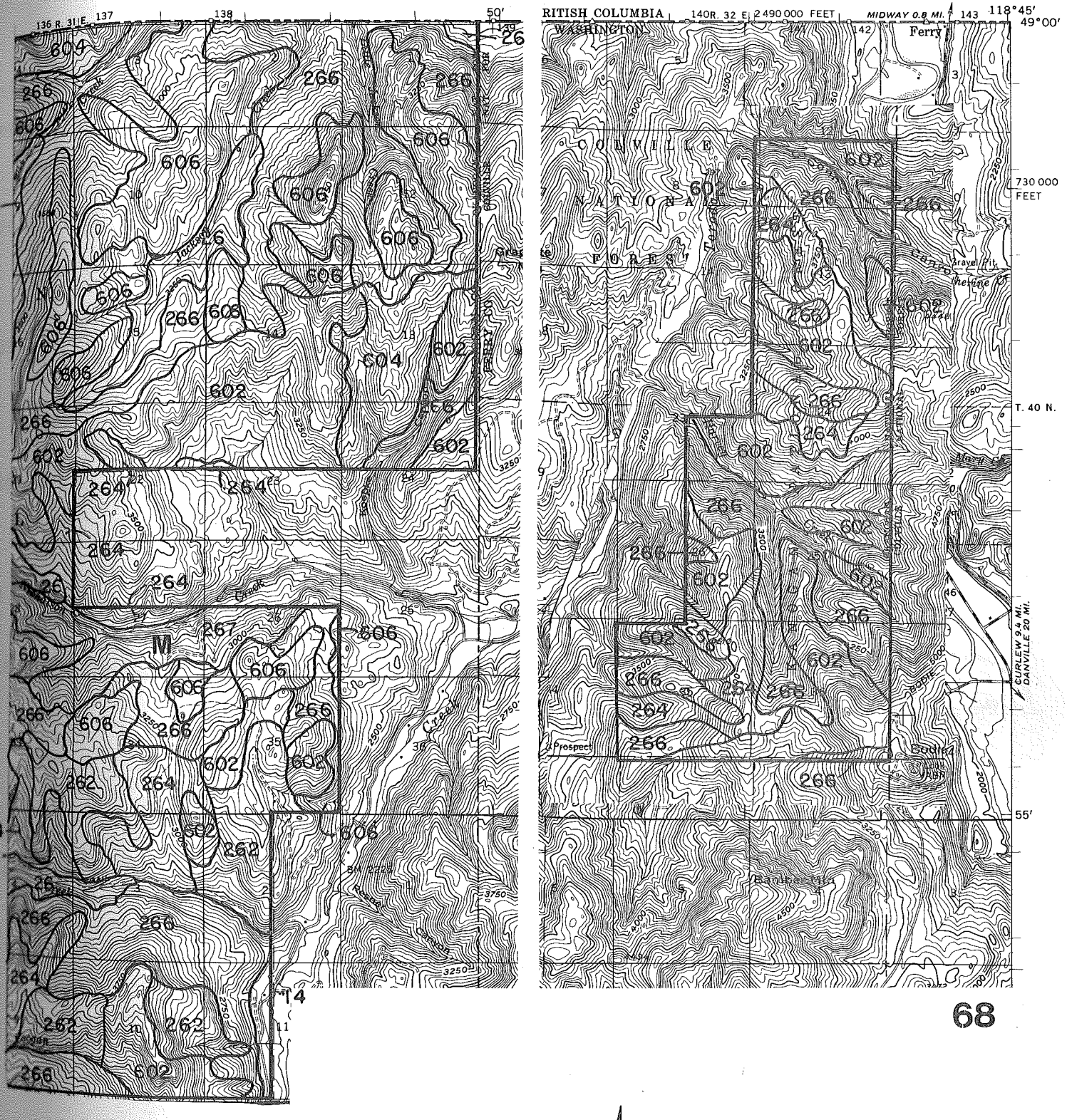

63
64
65
144
244
241
40
42
146
404
153
242
11
Little Dick Lake
Indian Creek
Antoine Creek
Washington
Boundary
Okanogan Co
Chelan Co
Douglas Co
Spring
Pumping Station
Borrow Pit
Trailer Park
Corral
Evergreen Camp
Green Lake
Picnic Area
Campground
Fence
Trail
Road
Creek
Flats
T.29 N.
T.28 N.
120°00'
119°52'30"
48°00'
47°52'30"
57'30"
55'
2 230 000 FEET
2 210 000 FEET
330 000 FEET
360 000 FEET
53 20000m.N.
53 07000m.N.
284000m.E.
SCALE IN MILES
0
1
2



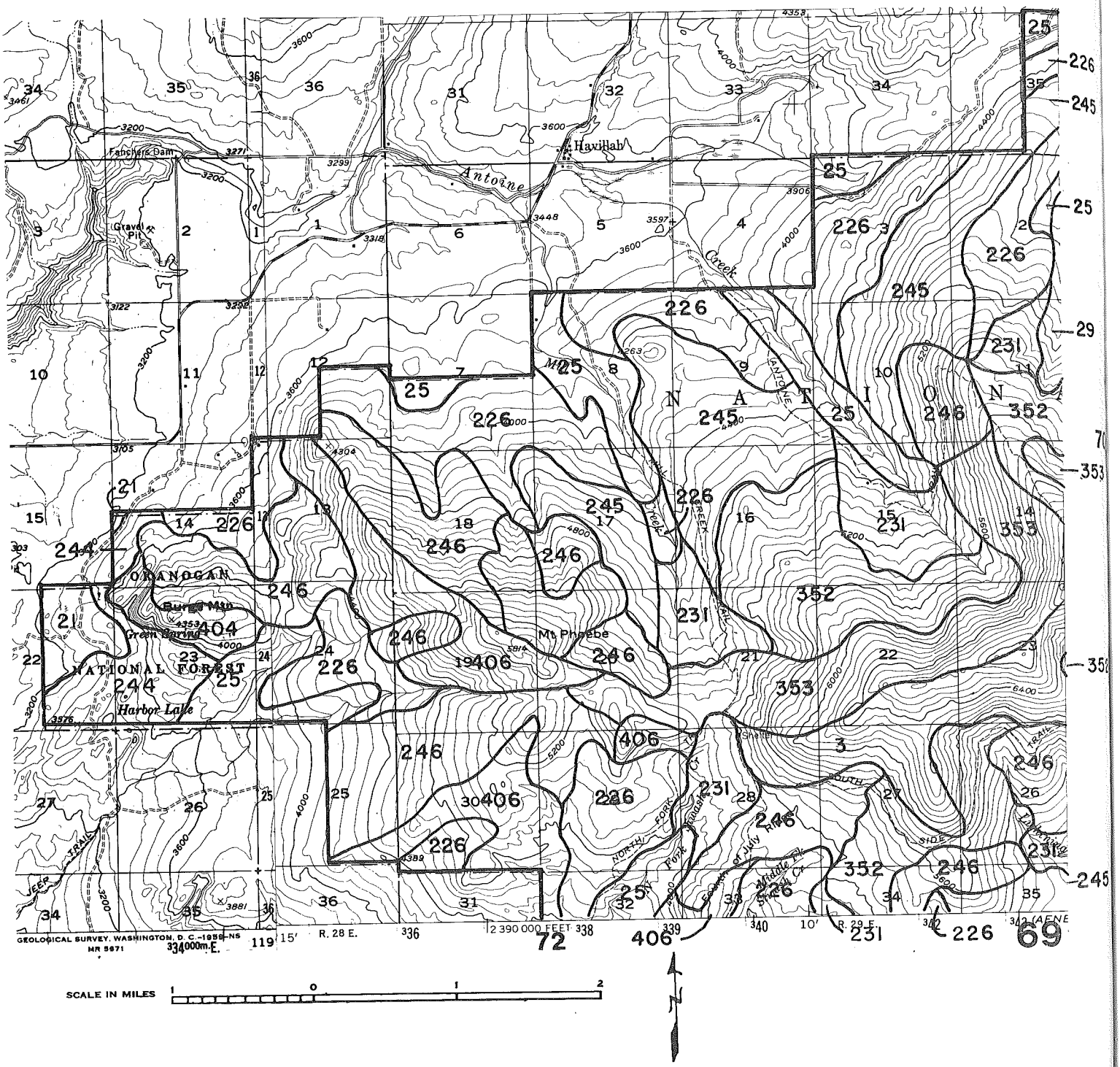
66

SCALE IN MILES 1 0 1 2

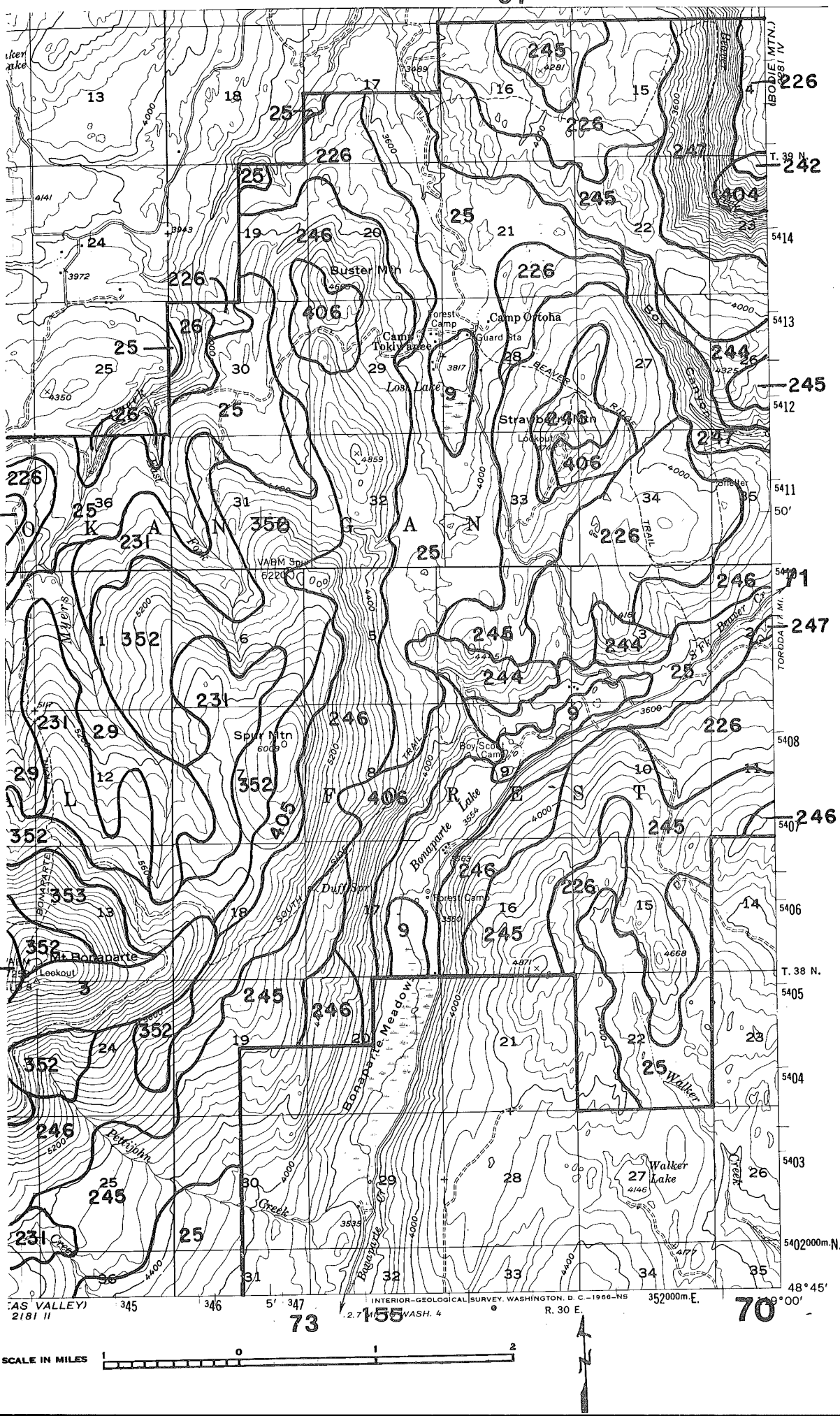

R. 30 E.
30,000 FEET
BRITISH COLUMBIA
WASHINGTON
119°00'
354000m.E.
R. 30 E.
CANADA
UNITED STATES
Gold Creek
Bolster (Site)
Bolster Creek
Tunnels
Tunnel
Lime Creek
Ethel
North Fork Ponthac Ridge
Cold Axe Camp 24
Roosevelt Camp
Trap Canyon
Marias Creek
OKANOGAN NATIONAL FOREST
242
244
246
226
406
606
266
264
262
265
602
68
67
71
SCALE IN MILES
1 0 1 2
N

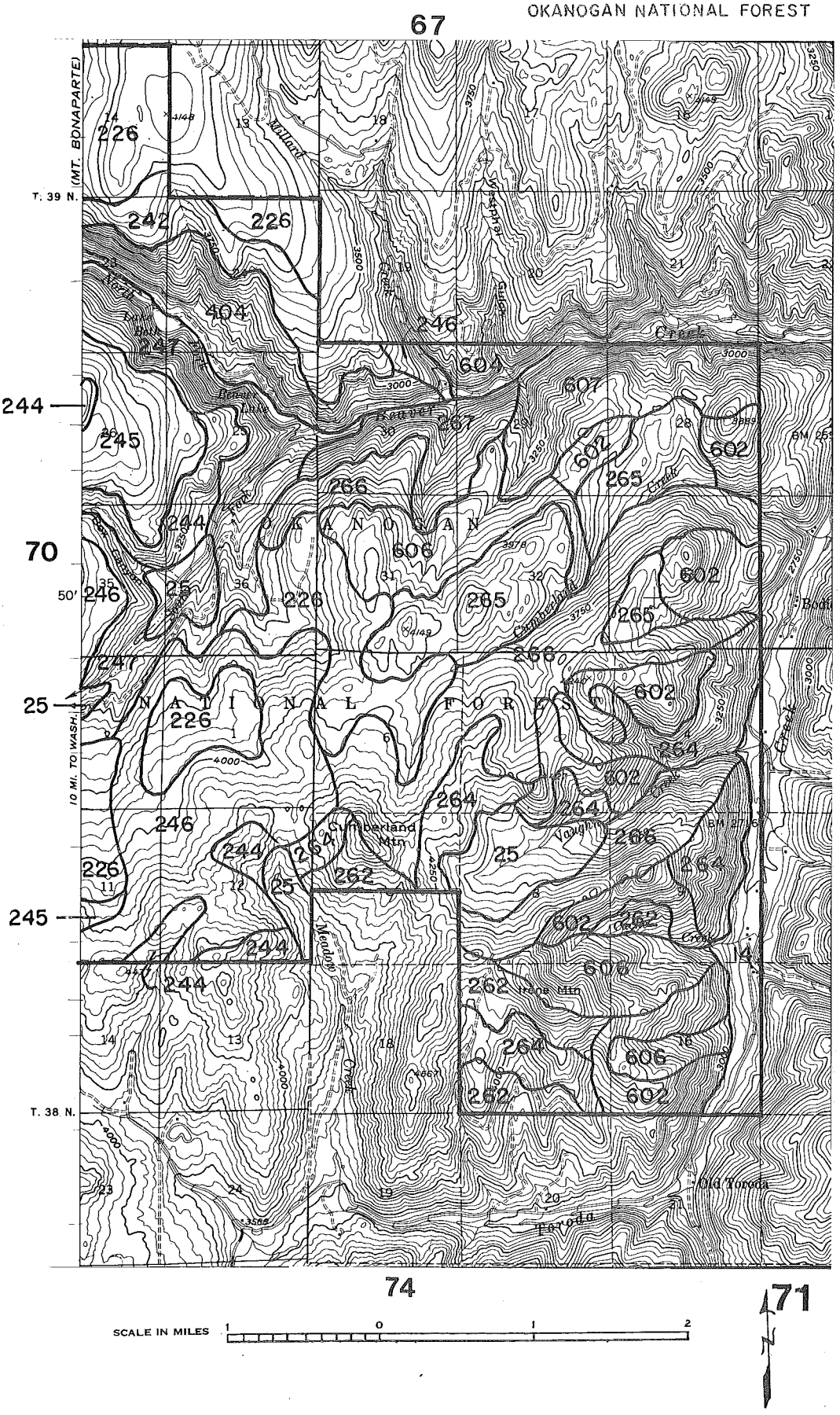

136 R. 31 E.
137
138
139
50'
49°00'
118°45'
BRITISH COLUMBIA
WASHINGTON
140R. 32 E.
2 490 000 FEET
MIDWAY 0.8 MI.
142
143
Ferry
730 000 FEET
T. 40 N.
COLVILLE
NATIONAL
FOREST
Gravel Pit
Prospect
Boulder
Banker Hill
CURLEW 9.4 MI.
DANVILLE 20 MI.
55'
SCALE IN MILES
1
0
1
2
N

68

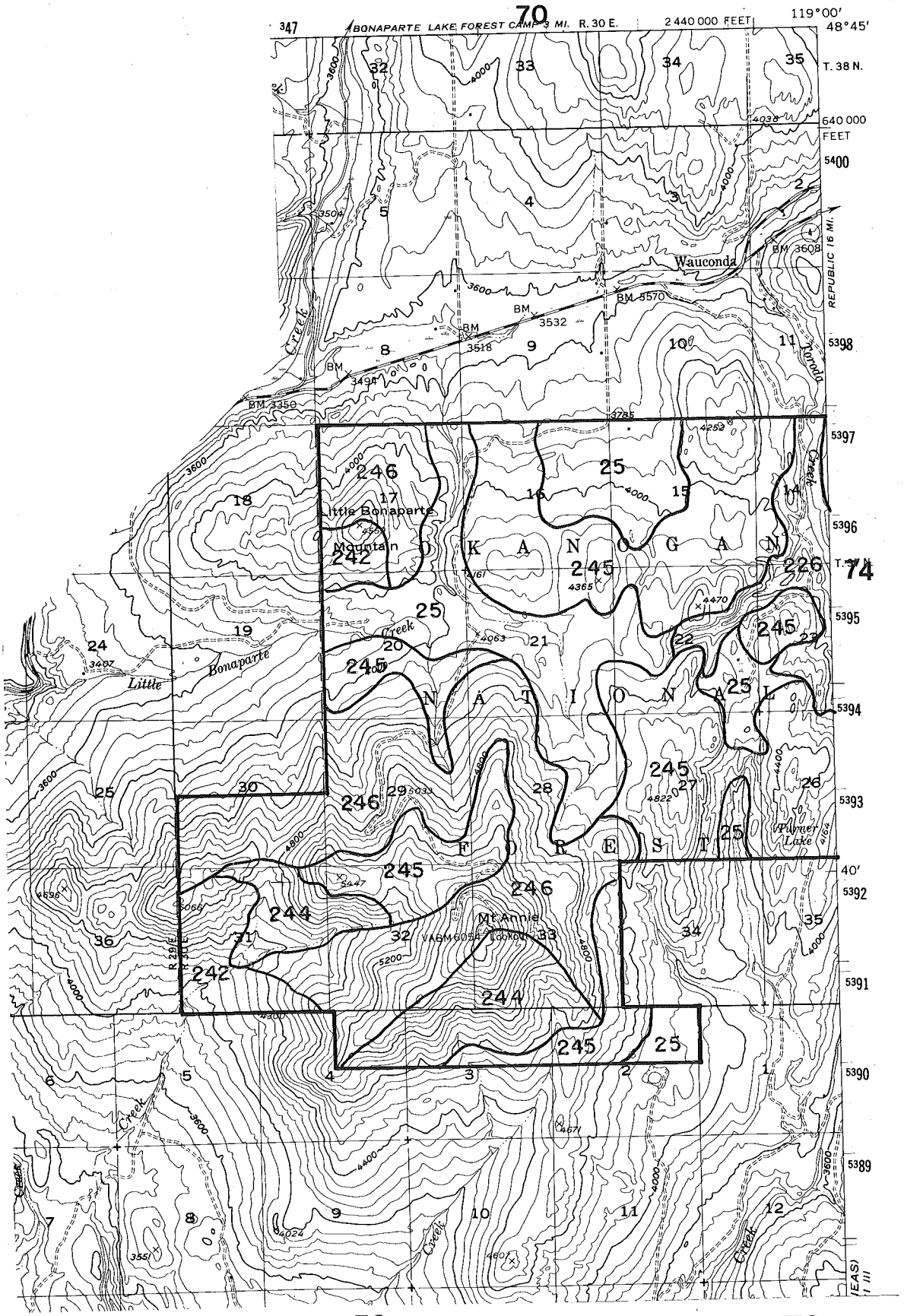

Fancher's Dam
Gravel Pit
Havillah
Antoine
Antoine Creek
Mt. Phoebe
Green Spring
Harbor Lake
OKANOGAN
NATIONAL FOREST
Middle Fk
South
North Fork
Fourth of July
Trail
2 390 000 FEET
119° 15'
R. 28 E.
R. 29 E.
10'
SCALE IN MILES
GEOLOGICAL SURVEY, WASHINGTON, D. C.-1956-NS
MR 5671

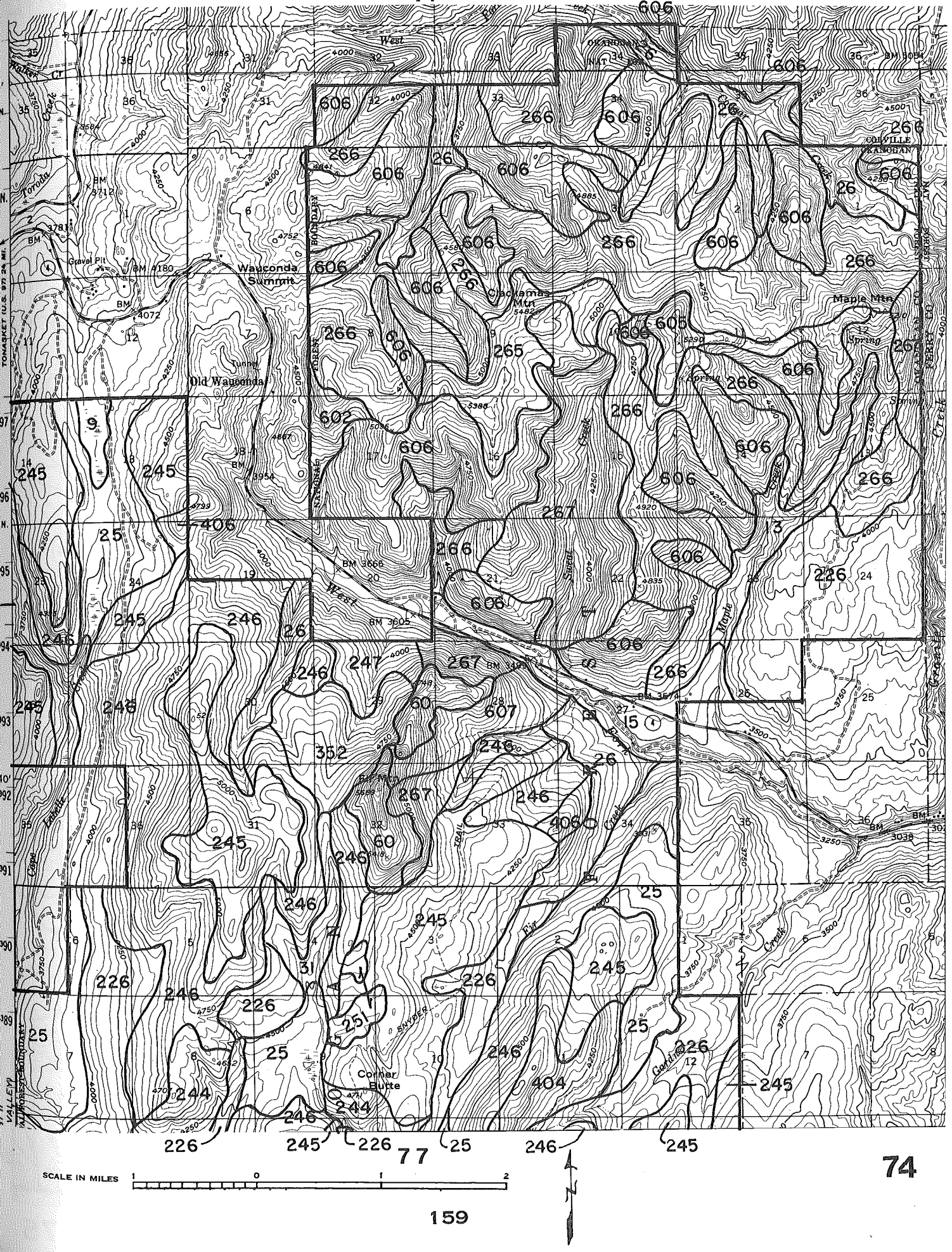
SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST

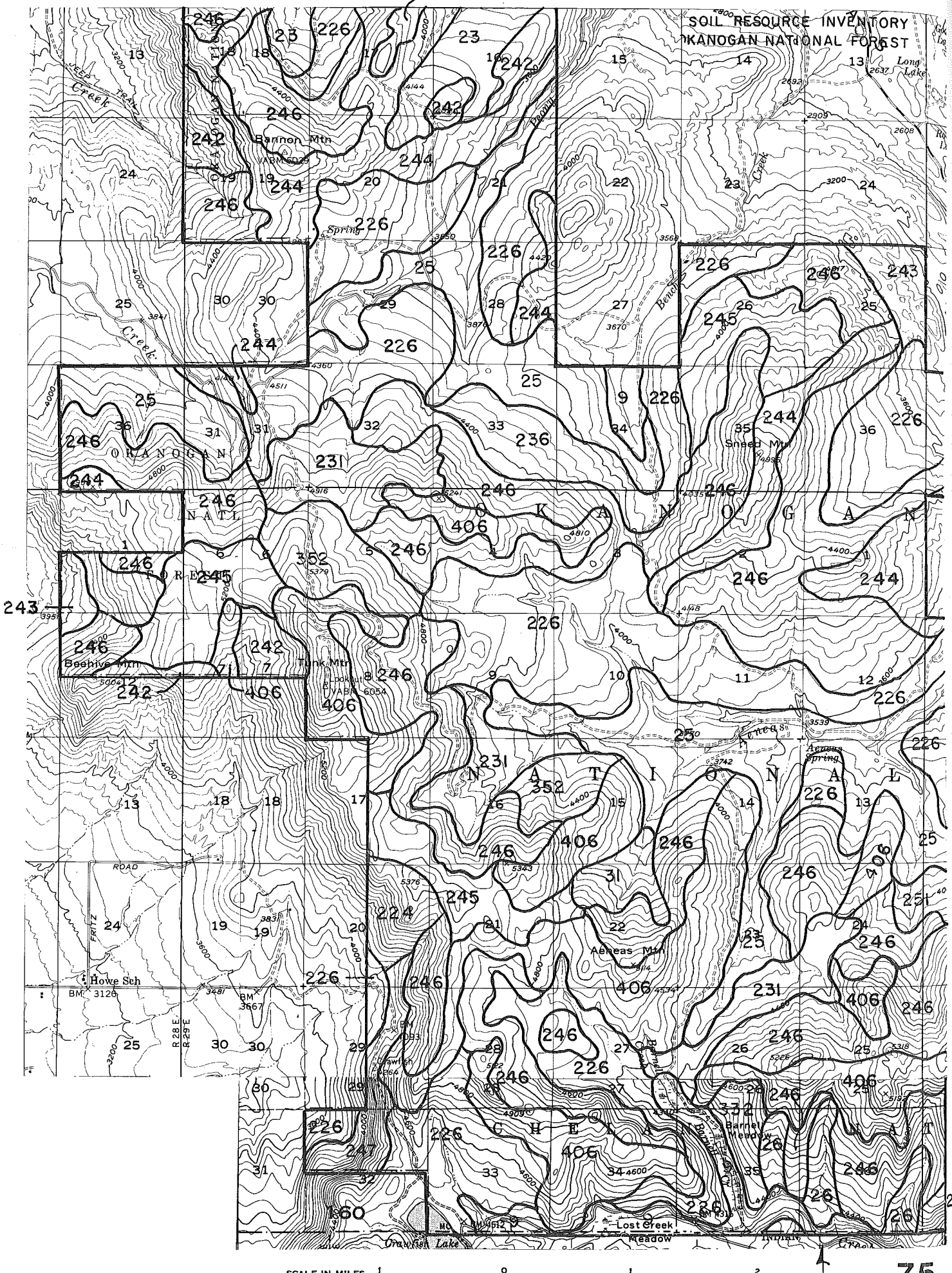


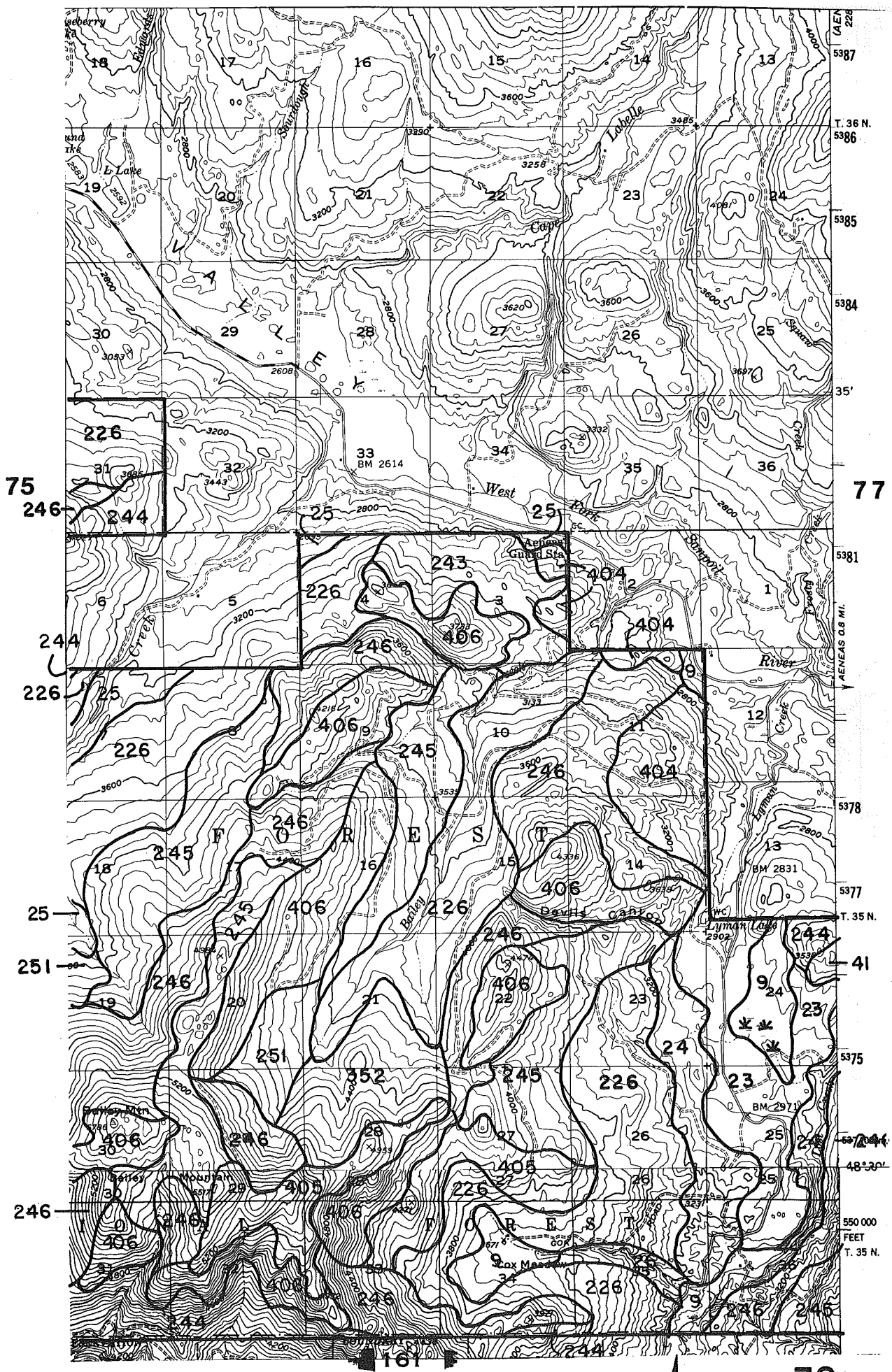

67
(MT. BONAPARTE)
T. 39 N.
244
70
50'
25
10 MI. TO WASH.
245
T. 38 N.
74
71
OKANOGAN
NATIONAL FOREST
Cumberland Mtn
Meadow Creek
Trone Mtn
Old Tonoda
Tonoda
Chamberlain
Vaughn
Creek
SCALE IN MILES
1 0 1 2
N

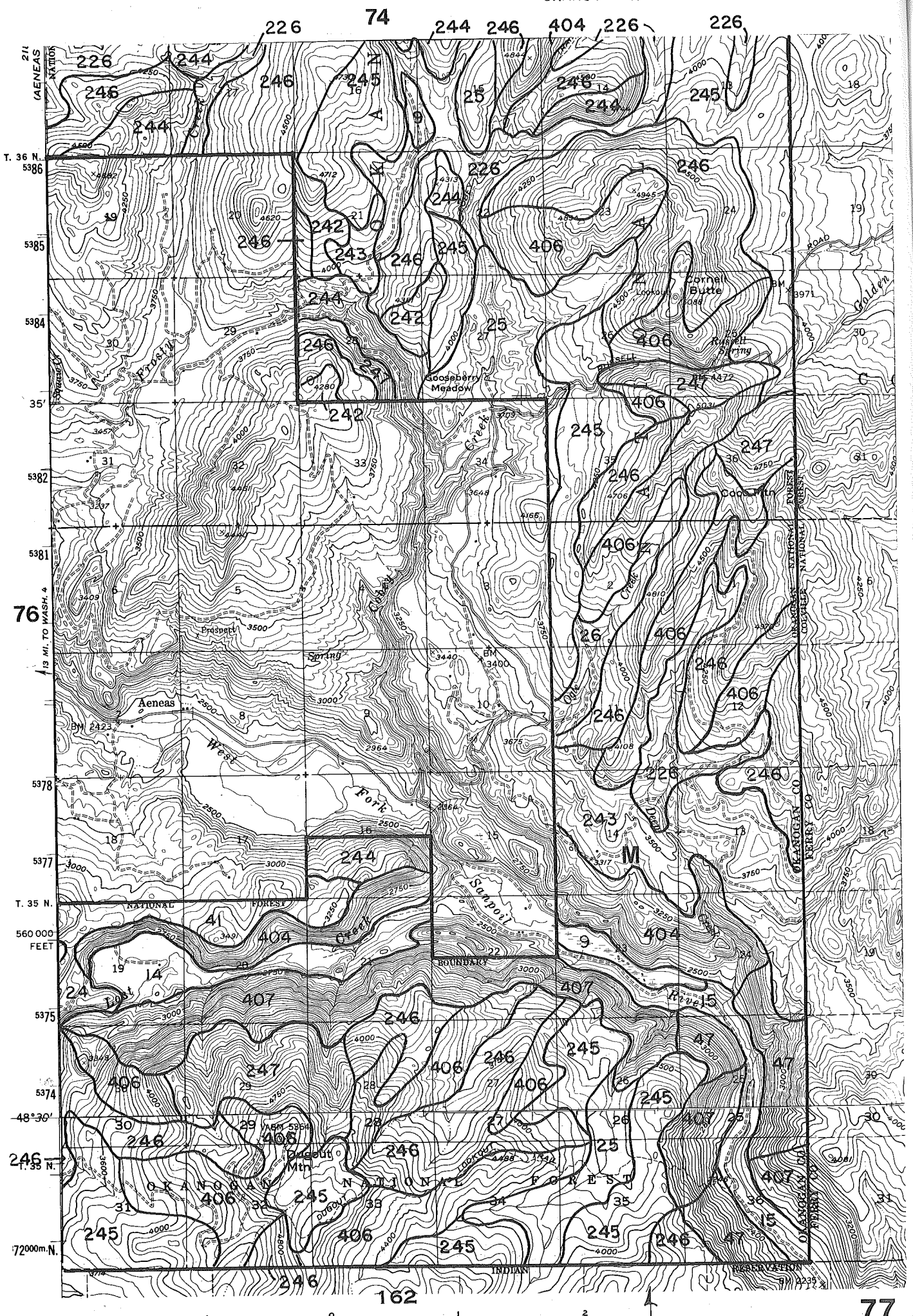
SCALE IN MILES 1 0 1 2


70
74
72
73
76
73
BONAPARTE LAKE FOREST CAMP 3 MI. R. 30 E.
2 440 000 FEET
119°00'
48°45'
T. 38 N.
640 000 FEET
T. 37 N.
Wauconda
BM 3608
BM 3570
BM 3532
BM 3518
BM 3494
BM 3350
REPUBLIC 16 MI.
OROVILLE 35 MI.
TONASKET (U.S. 97) 24 MI.
Little Bonaparte Mountain
Bonaparte Creek
Little Bonaparte Creek
Tunnel Creek
Palmer Lake
Mt Annie
O K A N O G A N
N A T I O N A L
F O R E S T
SCALE IN MILES
1 0 1 2


Wauconda Summit
Old Wauconda
Gravel Pit
Wauconda Mtn
Jackamas Mtn
Maple Mtn
Corner Butte
Spring
Creek
West
Fir
Maple
Gardner
Trail
Torrona
Loop
Lariat
Valley
Ridge
BM 3712
BM 4180
BM 4072
BM 3954
BM 3666
BM 3605
BM 3674
BM 3038
T. 38 N.
T. 37 N.
R. 27 E.
R. 28 E.
SCALE IN MILES
1 0 1 2


SOIL RESOURCE INVENTORY
OKANOGAN NATIONAL FOREST
Bannon Mtn
Beehive Mtn
Tunk Mtn
Lookout
Sneed Mtn
Aeneas Mtn
Aeneas Spring
Howe Sch
Crawfish Lake
Lost Creek Meadow
Barnett Meadow
Long Lake
Jeep Trail
Spring
Creek
Road
OKANOGAN NATL
FOR. RES.
CHELAN
SCALE IN MILES
1 0 1 2


75
77
76
T. 36 N.
T. 35 N.
T. 35 N.
AENEAS 0.8 MI.
Aeneas Guard Sta
West Fork
Aeneas Creek
Lubelle
Cape
Lyman Lake
Lyman Creek
Davis Canyon
Bailey Mtn
Bailey Mountain
Fox Meadow
BM 2614
BM 2831
BM 2971
F O R E S T
550 000 FEET
SCALE IN MILES
161


74
76
77
162
T. 36 N.
T. 35 N.
560 000 FEET
72000m.N.
48°30'
Aeneas
Prospect Spring
Gooseberry Meadow
Cornell Butte
Russell Spring
Coon Mtn
Dupont Mtn
Lookout
Trail
Creek
Fork
Ridge
Road
BM 2423
BM 3400
BM 4472
BM 3971
BM 5239
OKANOGAN NATIONAL FOREST
COLVILLE NATIONAL FOREST
INDIAN RESERVATION
OKANOGAN CO
FERRY CO
BOUNDARY
13 MI. TO WASH. 4
SCALE IN MILES

SECTION 4

INTERPRETATIONS

This section contains the third important part of this report. Each page covers one or two interpretations. In the upper box, a general definition of the interpretation is given. It is followed by a listing of the ratings and their definitions. The lower box contains a mapping unit list with the interpretative rating opposite each mapping unit number. Complexes are not rated. Instead, interpretations for complexes will have to be derived from the rating of each component.

Five types of interpretations are considered:

EROSION AND SOME HYDROLOGIC INTERPRETATIONS
TIMBER MANAGEMENT INTERPRETATIONS
ENGINEERING INTERPRETATIONS
RECREATION INTERPRETATIONS
LIVESTOCK MANAGEMENT INTERPRETATIONS

1. EROSION AND SOME HYDROLOGIC INTERPRETATIONS

   Included under this heading are several basic erosion and water management interpretations. Interpretations for erosion include the two major kinds of erosion - surface and mass movement. Surface erosion pertains only to surface soil loss by runoff and overland flow. Mass movement refers to all types of soil and bedrock movement which occurs below the soil surface such as landslips, slumps, slides, rockfall and landflow.

2. TIMBER MANAGEMENT INTERPRETATIONS

   Interpretations for Timber Management are of two types. One type includes some interpretations that directly affect timber management, such as "potential for regeneration." The other type indicates the effect on soils and other resources from timber harvest activities.

3. ENGINEERING INTERPRETATIONS

   Interpretations for engineering include those for roads, foundations and other uses.

4. RECREATION INTERPRETATIONS

   Interpretations for recreation pertain to suitability for recreation development. Interpretations are based on soil and bedrock properties, drainage characteristics and landform and vegetation features. Factors such as aesthetics and accessibility are not considered when making these ratings.

5. LIVESTOCK MANAGEMENT INTERPRETATIONS

   Interpretation for livestock management has been developed for two principal effects hoofed animals have on soils - compaction and soil displacement. Several soil and landform characteristics are used to develop the interpretations.

INTERPRETATION

SURFACE EROSION POTENTIAL

This rating is based on expected losses of surface soil when all vegetative cover, including litter, is removed. Evaluations of climate, slope gradient and length, soil characteristics, hydrologic characteristics of the soil and bedrock materials of each mapping unit are considered in making ratings.

Very slight - Practically no loss of surface soil materials is expected.

Slight - Little loss of soil materials is expected. Some minor sheet and rill erosion may occur.

Moderate - Some loss of surface soil materials can be expected. Rill erosion may be occurring. Sheet erosion can be determined by some soil pedestals and observable accumulation of soil materials along the up-slope edge of rocks and debris. At this level of erosion, there is a possible fertility loss.

Severe - Considerable loss of surface soil materials can be expected. Rill erosion, numerous small gullies or evidence that considerable loss from sheet erosion may occur. Sheet erosion is indicated by frequent occurrence of soil pedestals and considerable accumulation of soil materials along the up-slope edge of rocks and debris. This is accompanied by a probable fertility loss.

Very severe - Large loss of surface soil material can be expected in the form of many large gullies and/or numerous small gullies or large loss from sheet erosion. Sheet erosion loss is exhibited by numerous examples of soil pedestals and extensive accumulation of soil materials along the up-slope edge of rocks and debris. This is accompanied by a fertility loss.

MAPPING UNIT	INTERPRETATION
1	Not Applicable
2	Not Applicable
3	Not Applicable
4	Not Applicable
5	Not Applicable
6	Very Severe
7	Slight to Moderate
8	Moderate to Severe
9	Very Slight
11	Slight to Moderate
12	Slight to Moderate
13	Slight to Moderate
14	Very Slight
15	Very Slight
16	Very Slight
17	Slight to Moderate
18	Slight to Moderate
19	Slight to Moderate
21	Slight
22	Moderate to Severe
23	Slight
24	Moderate to Severe
25	Slight
26	Moderate to Severe
27	Slight
28	Moderate to Severe
29	Slight
31	Moderate to Severe
40	Not Applicable
41	Slight to Moderate
42	Severe to Very Severe
43	Slight to Moderate
44	Severe to Very Severe
45	Slight to Moderate
46	Severe to Very Severe
47	Very Severe

MAPPING UNIT	INTERPRETATION
48	Slight to Moderate
49	Severe to Very Severe
51	Slight to Moderate
52	Severe to Very Severe
53	Very Severe
55	Severe to Very Severe
56	Very Severe
57	Slight to Moderate
58	Severe to Very Severe
59	Very Severe
60	Not Applicable
61	Slight to Moderate
62	Severe to Very Severe
64	Severe to Very Severe
65	Slight to Moderate
66	Severe to Very Severe
67	Very Severe
68	Slight to Moderate
69	Severe to Very Severe
72	Severe to Very Severe
73	Very Severe
80	Not Applicable
82	Severe to Very Severe
84	Severe to Very Severe
85	Slight to Moderate
86	Severe to Very Severe
87	Very Severe
88	Slight to Moderate
89	Severe to Very Severe
92	Severe to Very Severe
93	Very Severe
95	Severe to Very Severe
96	Very Severe
97	Slight to Moderate
98	Severe to Very Severe
99	Very Severe

INTERPRETATION

NATURAL STABILITY

This rating is based on the relative stability of the mapping units as they occur in the natural state. This includes any movement or loss other than surface erosion by slumps, slides, and all kinds of deep-seated failures. This rating applies throughout Region 6.

I. Very stable - No evidence of failure.

II. Stable - Occasional failures are observed.

III. Moderately stable - Several failures are observed.

IV. Unstable - Many failures are observed.

V. Very unstable - Entire area shows evidence of recent and past failures.

MAPPING UNIT	INTERPRETATION
1	Not Applicable
2	Very Unstable
3	Not Applicable
4	Not Applicable
5	Not Applicable
6	Moderately Stable
7	Very Stable
8	Stable
9	Very Stable
11	Very Stable
12	Very Stable
13	Very Stable
14	Very Stable
15	Very Stable
16	Very Stable
17	Very Stable
18	Very Stable
19	Very Stable
21	Very Stable
22	Stable
23	Very Stable
24	Stable
25	Very Stable
26	Stable
27	Very Stable
28	Stable
29	Very Stable
31	Stable
40	Not Applicable
41	Very Stable
42	Stable
43	Very Stable
44	Stable
45	Very Stable
46	Stable
47	Moderately Stable

MAPPING UNIT	INTERPRETATION
48	Very Stable
49	Stable
51	Very Stable
52	Stable
53	Moderately Stable
55	Stable
56	Moderately Stable
57	Very Stable
58	Stable
59	Moderately Stable
60	Not Applicable
61	Stable
62	Stable
64	Stable
65	Very Stable
66	Stable
67	Moderately Stable
68	Very Stable
69	Stable
72	Stable
73	Moderately Stable
80	Not Applicable
82	Stable
84	Stable
85	Very Stable
86	Stable
87	Moderately Stable
88	Very Stable
89	Stable
92	Stable
93	Moderately Stable
95	Stable
96	Moderately Stable
97	Very Stable
98	Stable
99	Moderately Stable

INTERPRETATION

SOIL AND WATERSHED IMPACTS
FROM TRACTOR TIMBER HARVESTING

This interpretation indicates the susceptibility of soil and watershed resources to incur damage from tractor timber harvest methods. The evaluation of expected impact includes soil and watershed resource damages from timber removal, main access roads, spur roads, landings and other activities that may be associated with the harvest method being evaluated. The evaluations are based on a full operating season. Damage is caused to soils by creating soil disturbance which may destroy soil structure, cause compaction and increase erosion. This may affect other resources through loss of production, lower water quality and yield, and loss of fisheries. Factors involved in making these ratings are wetness of soil, soil texture and structure, percentage of coarse fragments, slope, drainage and climate.

Low - This rating indicates that the impacts to soil and watershed resources are minor. Little or no soil damage is expected.

Moderate - This rating indicates that the impacts to soil and watershed resources are moderate. Soils and watershed resources are expected to incur moderate damage.

High - This rating indicates that the impacts to soil and watershed resources are major. Excessive damage to soil and watershed resources is likely to occur.

MAPPING UNIT	INTERPRETATION	TYPE OF DAMAGE
1	Not Applicable	
2	Not Applicable	
3	Not Applicable	
4	Not Applicable	
5	Not Applicable	
6	Not Applicable	
7	Not Applicable	
8	Not Applicable	
9	Not Applicable	
11	Not Applicable	
12	Low	Duff Destruction
13	Low	Duff Destruction
14	Not Applicable	
15	Low	Duff Destruction
16	Low	Duff Destruction
17	Low	Duff Destruction
18	Low	Duff Destruction
19	Low	Duff Destruction
21	Not Applicable	
22	Not Applicable	
23	Low to Moderate	Soil Displacement
24	High	Increased Erosion
25	Low to Moderate	Soil Displacement
26	High	Increased Erosion
27	Low to Moderate	Soil Displacement
28	High	Increased Erosion
29	Low to Moderate	Soil Displacement
31	High	Increased Erosion
40	Not Applicable	
41	Not Applicable	
42	Not Applicable	
43	Low to Moderate	Soil Displacement
44	High	Increased Erosion
45	Low to Moderate	Soil Displacement
46	High	Increased Erosion
47	High	Increased Erosion

MAPPING UNIT	INTERPRETATION	TYPE OF DAMAGE
48	Low to Moderate	Soil Displacement
49	High	Increased Erosion
51	Low to Moderate	Soil Displacement
52	High	Increased Erosion
53	High	Increased Erosion
55	High	Increased Erosion
56	High	Increased Erosion
57	Low to Moderate	Soil Displacement
58	High	Increased Erosion
59	High	Increased Erosion
60	Not Applicable	
61	Not Applicable	
62	Not Applicable	
64	High	Increased Erosion
65	Low to Moderate	Soil Displacement
66	High	Increased Erosion
67	High	Increased Erosion
68	Low to Moderate	Soil Displacement
69	High	Increased Erosion
72	High	Increased Erosion
73	High	Increased Erosion
80	Not Applicable	
82	Not Applicable	
84	High	Increased Erosion
85	Low to Moderate	Soil Displacement
86	High	Increased Erosion
87	High	Increased Erosion
88	Low to Moderate	Soil Displacement
89	High	Increased Erosion
92	High	Increased Erosion
93	High	Increased Erosion
95	High	Increased Erosion
96	High	Increased Erosion
97	Low to Moderate	Soil Displacement
98	High	Increased Erosion
99	High	Increased Erosion

INTERPRETATION

SOIL AND WATERSHED IMPACTS FROM CABLE TIMBER HARVEST METHODS
PARTIAL AND FULL SUSPENSION

This interpretation indicates the susceptibility of soil and watershed resources to incur damage from uphill cable timber harvest methods. The evaluation of expected impact includes soil and watershed resource damages from timber removal, main access roads, spur roads, landings and other activities that may be associated with the harvest method being evaluated. The evaluations are based on a full operating season. Damage is caused to soils by creating soil disturbance which may destroy soil structure, cause compaction and increase erosion. This may affect other resources through loss of production, lower water quality and yield, and loss of fisheries. Factors involved in making these ratings are wetness of soil, soil texture and structure, percentage of coarse fragments, slope, drainage and climate.

Low - This rating indicates that the impacts to soil and watershed resources are minor. Little or no soil damage is expected.

Moderate - This rating indicates that the impacts to soil and watershed resources are moderate. Soils and watershed resources are expected to incur moderate damage.

High - This rating indicates that the impacts to soil and watershed resources are major. Excessive damage to soil and watershed resources is likely to occur.

MAPPING UNIT	PARTIAL	FULL
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
11	N/A	N/A
12	Low	Low
13	Low	Low
14	N/A	N/A
15	Low	Low
16	Low	Low
17	Low	Low
18	Low	Low
19	Low	Low
21	N/A	N/A
22	N/A	N/A
23	Low	Low
24	Moderate	Low
25	Low	Low
26	Moderate	Low
27	Low	Low
28	Moderate	Low
29	Low	Low
31	Moderate	Low
40	N/A	N/A
41	N/A	N/A
42	N/A	N/A
43	Low	Low
44	Moderate	Low to Mod.
45	Low	Low
46	Moderate	Low to Mod.
47	Mod. to High	Moderate

N/A = Not Applicable

MAPPING UNIT	PARTIAL	FULL
48	Low	Low
49	Mod. to High	Moderate
51	Low	Low
52	Moderate	Low to Mod.
53	Mod. to High	Moderate
55	Moderate	Low to Mod.
56	Mod. to High	Moderate
57	Low	Low
58	Moderate	Low to Mod.
59	Mod. to High	Moderate
60	N/A	N/A
61	N/A	N/A
62	N/A	N/A
64	Moderate	Low to Mod.
65	Low	Low
66	Moderate	Low to Mod.
67	Mod. to High	Moderate
68	Low	Low
69	Mod. to High	Moderate
72	Moderate	Low to Mod.
73	Mod. to High	Moderate
80	N/A	N/A
82	N/A	N/A
84	Moderate	Low to Mod.
85	Low	Low
86	Moderate	Low to Mod.
87	Mod. to High	Moderate
88	Low	Low
89	Mod. to High	Moderate
92	Moderate	Low to Mod.
93	Mod. to High	Moderate
95	Moderate	Low to Mod.
96	Mod. to High	Moderate
97	Low	Low
98	Moderate	Low to Mod.
99	Mod. to High	Moderate

INTERPRETATION

SOIL AND WATERSHED IMPACTS FROM CABLE TIMBER HARVEST METHODS
PARTIAL AND FULL SUSPENSION

This interpretation indicates the susceptibility of soil and watershed resources to incur damage from uphill cable timber harvest methods. The evaluation of expected impact includes soil and watershed resource damages from timber removal, main access roads, spur roads, landings and other activities that may be associated with the harvest method being evaluated. The evaluations are based on a full operating season. Damage is caused to soils by creating soil disturbance which may destroy soil structure, cause compaction and increase erosion. This may affect other resources through loss of production, lower water quality and yield, and loss of fisheries. Factors involved in making these ratings are wetness of soil, soil texture and structure, percentage of coarse fragments, slope, drainage and climate.

Low - This rating indicates that the impacts to soil and watershed resources are minor. Little or no soil damage is expected.

Moderate - This rating indicates that the impacts to soil and watershed resources are moderate. Soils and watershed resources are expected to incur moderate damage.

High - This rating indicates that the impacts to soil and watershed resources are major. Excessive damage to soil and watershed resources is likely to occur.

MAPPING UNIT	PARTIAL	FULL
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
11	N/A	N/A
12	Low	Low
13	Low	Low
14	N/A	N/A
15	Low	Low
16	Low	Low
17	Low	Low
18	Low	Low
19	Low	Low
21	N/A	N/A
22	N/A	N/A
23	Low	Low
24	Moderate	Low
25	Low	Low
26	Moderate	Low
27	Low	Low
28	Moderate	Low
29	Low	Low
31	Moderate	Low
40	N/A	N/A
41	N/A	N/A
42	N/A	N/A
43	Low	Low
44	Moderate	Low to Mod.
45	Low	Low
46	Moderate	Low to Mod.
47	Mod. to High	Moderate

N/A = Not Applicable

MAPPING UNIT	PARTIAL	FULL
48	Low	Low
49	Mod. to High	Moderate
51	Low	Low
52	Moderate	Low to Mod.
53	Mod. to High	Moderate
55	Moderate	Low to Mod.
56	Mod. to High	Moderate
57	Low	Low
58	Moderate	Low to Mod.
59	Mod. to High	Moderate
60	N/A	N/A
61	N/A	N/A
62	N/A	N/A
64	Moderate	Low to Mod.
65	Low	Low
66	Moderate	Low to Mod.
67	Mod. to High	Moderate
68	Low	Low
69	Mod. to High	Moderate
72	Moderate	Low to Mod.
73	Mod. to High	Moderate
80	N/A	N/A
82	N/A	N/A
84	Moderate	Low to Mod.
85	Low	Low
86	Moderate	Low to Mod.
87	Mod. to High	Moderate
88	Low	Low
89	Mod. to High	Moderate
92	Moderate	Low to Mod.
93	Mod. to High	Moderate
95	Moderate	Low to Mod.
96	Mod. to High	Moderate
97	Low	Low
98	Moderate	Low to Mod.
99	Mod. to High	Moderate

INTERPRETATION

POTENTIAL SEDIMENT YIELD

This interpretation indicates the potential for water sedimentation and pollution from silt and clay particles carried in suspension following timber harvest, road construction, or other activities. Factors considered in making ratings are soil texture and structure, drainage patterns, landforms and climate.

Low - Sedimentation levels of silt and clay particles are not expected to be significant following management activities. Soils are generally moderately coarse-textured.

Moderate - Sedimentation levels of silt and clay particles may be significantly increased following management activities with moderate loss of water quality and damage to fisheries. Soils are generally medium-textured.

High - Sedimentation levels of silt and clay particles are expected to be high following management activities. Streams become turbid and there is considerable loss of water quality and damage to fisheries. Soils are generally fine to moderately fine-textured.

EXPECTED SEDIMENT-SIZE, SURFACE SOIL - Indicates size of soil particles from surface soil layer.
EXPECTED SEDIMENT-SIZE, SUBSOIL - Indicates size of soil particles from subsoil layer.

MAPPING UNIT	INTERP.	SURFACE	SUBSOIL
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	Moderate	Silt	Silt
7	Moderate	Silt	Silt
8	Moderate	Silt	Silt
9	High	Silt	Silt
11	Low	Silt	Silt
12	Low	Silt,Sand	Sand
13	Low	Silt,Sand	Sand
14	Low	Sand	Sand
15	Low	Sand	Sand
16	Low	Silt,Sand	Sand
17	Low	Pumice	Pumice
18	Low	Pumice	Pumice
19	Low	Pumice	Pumice
21	Low	Silt,Sand	Sand
22	Moderate	Silt,Sand	Sand
23	Low	Silt,Sand	Sand
24	Moderate	Silt,Sand	Silt,Sand
25	Low	Silt,Sand	Sand
26	Moderate	Silt,Sand	Sand
27	Low	Silt,Sand	Sand
28	Moderate	Silt,Sand	Sand
29	Low	Silt,Sand	Sand
31	Moderate	Silt,Sand	Sand
40	N/A	N/A	N/A
41	Low	Silt,Sand	N/A
42	Low	Sand,Grav.	Sand,Gravel
43	Low	Sand	Sand,Gravel
44	Low	Sand,Grav.	N/A
45	Low	Sand,Grav.	Sand,Gravel
46	Low	Sand	Sand
47	Low	Sand,Grav.	Sand,Gravel

MAPPING UNIT	INTERP.	SURFACE	SUBSOIL
48	Low	Silt,Sand	Sand,Gravel
49	Low	Silt,Sand	Sand,Gravel
51	Low	Sand,Grav.	Sand,Gravel
52	Low	Sand,Grav.	Sand,Gravel
53	Low	Sand	Sand,Gravel
55	Low	Sand,Grav.	Sand,Gravel
56	Low	Sand,Grav.	Sand, Gravel
57	Low	Sand	Sand,Gravel
58	Low	Sand,Grav.	Sand,Gravel
59	Low	Sand,Grav.	Sand,Gravel
60	N/A	N/A	N/A
61	Moderate	Sand	N/A
62	Moderate	Silt,Sand	N/A
64	Mod.to High	Silt,Sand	Silt,Clay
65	Low to Mod.	Silt,Sand	Silt,Clay
66	High	Silt	Silt,Clay
67	High	Silt	Silt,Clay
68	Low to Mod.	Silt	Silt,Clay
69	High	Silt	Silt,Clay
72	Moderate	Silt,Sand	Silt
73	High	Silt	Silt,Clay
80	N/A	N/A	N/A
82	Low to Mod.	Silt,Sand	N/A
84	Mod.to High	Silt,Clay	Clay
85	Moderate	Silt,Clay	Silt,Clay
86	High	Silt,Sand	Silt,Clay
87	High	Silt,Sand	Silt,Sand
88	Low to Mod.	Silt,Sand	Silt,Clay
89	Moderate	Silt,Sand	N/A
92	Moderate	Sand	Sand,Gravel
93	Moderate	Sand	Sand,Gravel
95	Moderate	Sand	Sand,Gravel
96	Moderate	Sand	Sand,Gravel
97	Low to Mod.	Silt,Sand	Silt,Sand
98	Moderate	Silt,Sand	Sand
99	Moderate	Silt,Sand	Sand,Grav.

INTERPRETATION

POTENTIAL FOR DOUGLAS-FIR REGENERATION

Variables such as seasonal weather patterns, microclimate, timber harvest and post-sale management practices, handling of tree seedlings, and distance to seed source (natural regeneration) often overshadow the mapping unit's potential for regeneration. Achievement of satisfactory stocking levels is best accomplished in areas with the following characteristics:

1. Northerly facing slopes
2. Elevations between 3,000 to 5,000 feet
3. Average annual precipitation at least 20 inches
4. Slopes of 20 to 60 percent
5. Soils with fine sandy loam or finer surface soils
6. Soils at least 40 inches deep

Mapping units most suited to regenerateDouglas-fir are 13, 25, 26, 45, 46, 47, 65, 66, 67, 85, 86, 87.

INTERPRETATION

SUSCEPTIBILITY TO PINEGRASS REVEGETATION

Pinegrass is present as a ground cover grass throughout most of the ponderosa pine and Douglas-fir zones. Revegetation of pinegrass to a site following timber harvest is related more to differences in harvest and post-sale management practices than to differences in mapping unit characteristics. Opening of timber stand, minor scarification and fire stimulate pinegrass revegetation.

INTERPRETATION

SUITABILITY OF BEDROCK FOR ROAD ROCK AND ESTIMATE OF ROAD ROCK THICKNESS

Most of the bedrock encountered in the survey area is suitable for use as base course and weathering surface material. It is usually unweathered and hard. No significant differentiation in suitability of bedrock for use as road rock is recognized.

A very thin, four-to-six inch, layer of rock material is suitable for heavy-vehicle all-weather use roads. The only exception to this occurs during the spring breakup or snow melt period. During this period, roads are closed to use by all traffic.

INTERPRETATION

SUITABILITY FOR USE AS TOPSOIL SOURCE

This rating evaluates each soil as to its suitability for use as topsoil. It does not specify any particular use of topsoil. Ratings are based on soil characteristics.

Suited - Soil texture ranges from sandy loam to clay loam and gravel content is less than 30 percent.

Unsuited - This rating indicates the soils do not satisfy the requirements specified under "Suited." However, soils rated "Unsuited" may still satisfy a particular requirement.

SUITABILITY OF SOIL AS SAND AND/OR GRAVEL SOURCE

This interpretation indicates the suitability of each soil as a possible source of sand and/or gravel. It does not indicate the kind or quality of sand or gravel, or refer to any specific use of the sand and/or gravel.

Suited - This rating indicates that sand and/or gravel is present and the following conditions are satisfied: There is a layer present which is composed of 80 percent, by volume, of sand and/or gravel. This layer is at least 4 feet thick and has no more than a 5-foot overburden.

Unsuited - This rating indicates that sand and/or gravel is generally not present in amounts which satisfy the requirements under "suited." However, soils rated "unsuited" may still satisfy a particular requirement.

SUITABILITY OF SOIL AS A POSSIBLE CLAY SOURCE

This rating indicates the suitability of each soil as a possible source of clay. It does not indicate the kind or quality of clay or refer to any specific use of the clay.

Suited - This rating indicates that the soil is a possible source of clay. Soils with this rating have the following: texture ranges from clay loam to clay. Gravel content is less than 30 percent.

Unsuited - Soils with this rating generally are not possible sources for clay.

MAPPING UNIT	TOPSOIL	SAND & GRAVEL	CLAY
1	Unsuited	Unsuited	Unsuited
2	Unsuited	Unsuited	Unsuited
3	Unsuited	Unsuited	Unsuited
4	Unsuited	Unsuited	Unsuited
5	Unsuited	Unsuited	Unsuited
6	Suited	Unsuited	Unsuited
7	Suited	Unsuited	Unsuited
8	Suited	Unsuited	Unsuited
9	Suited	Unsuited	Unsuited
11	Suited	Suited	Unsuited
12	Suited	Suited	Unsuited
13	Suited	Suited	Unsuited
14	Suited	Suited	Unsuited
15	Suited	Suited	Unsuited
16	Suited	Suited	Unsuited
17	Unsuited	Suited	Unsuited
18	Unsuited	Suited	Unsuited
19	Unsuited	Suited	Unsuited
21	Unsuited	Suited	Unsuited
22	Unsuited	Suited	Unsuited
23	Unsuited	Suited	Unsuited
24	Unsuited	Suited	Unsuited
25	Unsuited	Suited	Unsuited
26	Unsuited	Suited	Unsuited
27	Unsuited	Suited	Unsuited
28	Unsuited	Suited	Unsuited
29	Unsuited	Suited	Unsuited
31	Unsuited	Suited	Unsuited
40	Not App.	Not Appl.	Not Appl.
41	Unsuited	Suited	Unsuited
42	Unsuited	Suited	Unsuited
43	Unsuited	Suited	Unsuited
44	Unsuited	Suited	Unsuited
45	Unsuited	Suited	Unsuited
46	Unsuited	Suited	Unsuited
47	Unsuited	Suited	Unsuited

MAPPING UNIT	TOPSOIL	SAND&GRAVEL	CLAY
48	Unsuited	Suited	Unsuited
49	Unsuited	Suited	Unsuited
51	Unsuited	Suited	Unsuited
52	Unsuited	Suited	Unsuited
53	Unsuited	Suited	Unsuited
55	Unsuited	Suited	Unsuited
56	Unsuited	Suited	Unsuited
57	Unsuited	Suited	Unsuited
58	Unsuited	Suited	Unsuited
59	Unsuited	Suited	Unsuited
60	Not Appl.	Not Appl.	Not Appl
61	Unsuited	Suited	Unsuited
62	Unsuited	Suited	Unsuited
64	Unsuited	Suited	Unsuited
65	Suited	Suited	Unsuited
66	Unsuited	Suited	Unsuited
67	Unsuited	Suited	Unsuited
68	Unsuited	Suited	Unsuited
69	Unsuited	Suited	Unsuited
72	Unsuited	Suited	Unsuited
73	Unsuited	Suited	Unsuited
80	Not Appl.	Not Appl.	Not Appl
82	Unsuited	Unsuited	Unsuited
84	Unsuited	Unsuited	Unsuited
85	Suited	Unsuited	Unsuited
86	Unsuited	Unsuited	Unsuited
87	Unsuited	Suited	Unsuited
88	Unsuited	Suited	Unsuited
89	Unsuited	Suited	Unsuited
92	Unsuited	Suited	Unsuited
93	Unsuited	Suited	Unsuited
95	Unsuited	Suited	Unsuited
96	Unsuited	Suited	Unsuited
97	Unsuited	Suited	Unsuited
98	Unsuited	Suited	Unsuited
99	Unsuited	Suited	Unsuited

INTERPRETATION

SUSCEPTIBILITY TO CUTBANK SLOUGHING AND RAVELING

This rating evaluates each unit for its susceptibility to sloughing or raveling after excavation. Ratings are based on cutbanks at least 10 feet high. Factors include soil and bedrock characteristics, backslope ratio, frost action, climate and potential for revegetation.

Low - Sloughing and/or raveling is a minor problem requiring occasional road maintenance.

Moderate - Sloughing and/or raveling causes some damage. Annual road maintenance is usually adequate.

High - Sloughing and raveling occur at a rate that often plugs culverts and fills inside ditches. Frequent road maintenance with heavy equipment such as front-end loader is required.

MAPPING UNIT	INTERPRETATION
1	N/A
2	N/A
3	N/A
4	N/A
5	N/A
6	Moderate
7	Moderate
8	Moderate
9	High
11	Low
12	Low
13	Low
14	Low
15	Low
16	Low
17	High
18	High
19	High
21	Moderate
22	High
23	Moderate
24	High
25	Moderate
26	High
27	Moderate
28	High
29	Moderate
31	High
40	N/A
41	Low
42	Low
43	Low
44	Low
45	Low
46	Low
47	Low to Moderate

MAPPING UNIT	INTERPRETATION
48	Low
49	Low
51	Low
52	Low
53	Low to Moderate
55	Low
56	Low to Moderate
57	Low
58	Low
59	Low to Moderate
60	N/A
61	Low
62	Low
64	Low
65	Low
66	Low
67	Low to Moderate
68	Low
69	Low
72	Low
73	Low to Moderate
80	N/A
82	Low
84	Low
85	Low
86	Low
87	Low to Moderate
88	Low
89	Low
92	Low
93	Low to Moderate
95	Low
96	Low to Moderate
97	Low
98	Low
99	Low to Moderate

INTERPRETATION

SUITABILITY OF CUTBANKS TO SEEDING

This interpretation indicates the probable success of cutbank seeding. Factors considered in making ratings are soil characteristics, elevation, slope, climate, snowpack, and frost hazard. Ratings are based on current methods and practices of seeding, grass species, fertilizer application and time of seeding.

Poor - Probability of success is low. Seeding generally is not successful and requires three or more reseedings and special treatments.

Fair - Success is likely on about 50 percent of area treated. Requires one or two followup treatments. Seeding is usually spotty; some areas become easily established, while others fail completely.

Good - Probability of high success. Seeding usually becomes well established within two years. Little followup seeding necessary.

LIMITATIONS TO CUTBANK SEEDING

This indicates the major limitations to success of cutbank seeding.

MAPPING UNIT	INTERPRETATION	LIMITATION
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	Fair	High Elevation
7	Good	
8	Fair	High Elevation
9	Good	
11	Fair	Droughty
12	Good	
13	Good	
14	Good	
15	Good	
16	Good	
17	Poor	Pumice
18	Poor	Pumice
19	Poor	Pumice
21	Poor	Low Fert.,Droughty
22	Poor	Low Fert.,Droughty
23	Poor	Low Fert.,Droughty
24	Poor	Low Fert.,Droughty
25	Fair	Low Fertility
26	Poor	Low Fert.,Raveling
27	Fair	Low Fert.,Cold
28	Poor	Low Fert.,Raveling
29	Fair	Low Fertility
31	Poor	Low Fertility
40	N/A	N/A
41	Poor	Low Fert.,Droughty
42	Poor	Low Fert.,Droughty
43	Poor	Low Fert.,Droughty
44	Poor	Low Fert.,Droughty
45	Fair	Low Fertility
46	Fair	Low Fertility
47	Poor	Low Fert.,Raveling

MAPPING UNIT	INTERPRETATION	LIMITATION
48	Fair	Low Fert.,Cold
49	Poor	Low Fert.,Raveling
51	Fair	Low Fertility
52	Poor	Low Fert.,Raveling
53	Poor	Low Fert.,Raveling
55	Fair	Low Fertility
56	Poor	Low Fert.,Raveling
57	Fair	Low Fert.,Cold
58	Poor	Low Fert.,Cold
59	Poor	Low Fert.,Cold
60	N/A	N/A
61	Fair	Rock Outcrops
62	Fair	Rock Outcrops
64	Good	
65	Good	
66	Good	
67	Fair	Raveling
68	Good	
69	Fair	Raveling,Cold
72	Good	
73	Fair	Raveling
80	N/A	N/A
82	Fair	Rock Outcrops
84	Good	
85	Good	
86	Good	
87	Fair	Raveling
88	Good	
89	Fair	Rock Outcrops
92	Good	
93	Fair	Raveling
95	Good	
96	Fair	Raveling
97	Good	
98	Good	
99	Fair	Raveling,Cold

INTERPRETATION

POTENTIAL FOR FILL AND ROAD WASTE EROSION, FAILURE AND SEEDING

These interpretations rate the erosion and failure susceptibility and the seeding potential of fills and sidecast waste. Erosion is defined as the downslope movement of soil particles causing numerous rills or small gullies in the fill or sidecast material. This movement takes place over one or several seasons. Failure is defined as a rapid loss of a mass of fill or sidecast material causing significant damage to road bed. In both cases, soil materials are deposited at and below the base of the fill and result in potentially affecting timber productivity and water quality. The third interpretation indicates the probable success of fillslope seeding. Ratings in each interpretation are based on current road construction practices and procedures and on type of soil materials, natural drainage of the site, landform, slope of the fill, and field observation.

Erosion and Failure

Low - Erosion or failure on road waste and fills is sufficiently low to result in only minor damage to resource values.

Moderate - Erosion or failure on road waste and fills occurs with sufficient magnitude to cause moderate damage to resource values.

High - Erosion or failure on road waste and fills occurs at a magnitude sufficient to cause major damage to resource values.

Seeding

Poor - Probability of success is low. Seeding generally is not successful and requires three or more reseedings and special treatments.

Fair - Success is likely on about 50 percent of area treated. Requires one or two followup treatments. Seeding is usually spotty; some areas become easily established, while others fail completely.

Good - Probability of high success. Seeding usually becomes well-established within two years. Little followup seeding is necessary.

MAPPING UNIT	EROSION	FAILURE	SEEDING
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	Moderate	Moderate	Fair
7	Low	Low	Good
8	Moderate	Moderate	Fair
9	Low	Low	Good
11	Low	Low	Fair
12	Low	Low	Good
13	Low	Low	Good
14	Low	Low	Good
15	Low	Low	Good
16	Low	Low	Good
17	High	Low	Poor
18	High	Low	Poor
19	High	Low	Poor
21	Moderate	Low	Poor
22	High	Moderate	Poor
23	Moderate	Low	Poor
24	High	Moderate	Poor
25	Moderate	Low	Fair
26	High	Moderate	Poor
27	Moderate	Low	Fair
28	High	Moderate	Poor
29	Moderate	Low	Fair
31	High	Moderate	Poor
40	N/A	N/A	N/A
41	Moderate	Low	Poor
42	High	Moderate	Poor
43	Moderate	Low	Poor
44	High	Moderate	Poor
45	Moderate	Low	Fair
46	High	Moderate	Fair
47	High	High	Poor

MAPPING UNIT	EROSION	FAILURE	SEEDING
48	Moderate	Low	Fair
49	High	Moderate	Poor
51	Moderate	Low	Fair
52	High	Moderate	Poor
53	High	High	Poor
55	High	Moderate	Fair
56	High	High	Poor
57	Moderate	Low	Fair
58	High	Moderate	Poor
59	High	High	Poor
60	N/A	N/A	N/A
61	Moderate	Moderate	N/A
62	Moderate	Moderate	Fair
64	Moderate	Moderate	Fair
65	Low	Low	Good
66	Moderate	Moderate	Good
67	High	High	Fair
68	Low	Moderate	Good
69	Moderate	Moderate	Fair
72	Moderate	Moderate	Fair
73	High	High	Fair
80	N/A	N/A	N/A
82	Moderate	Moderate	Fair
84	Moderate	Moderate	Good
85	Low	Low	Good
86	Moderate	Moderate	Good
87	High	High	Fair
88	Low	Moderate	Good
89	Moderate	Moderate	Fair
92	Moderate	Moderate	Fair
93	High	High	Fair
95	Moderate	Moderate	Good
96	High	High	Fair
97	Low	Low	Good
98	Moderate	Moderate	Fair
99	High	High	Fair

INTERPRETATION

SOIL SUITABILITY FOR RECREATION AREA DEVELOPMENT

This rating is based on soil and bedrock characteristics and topographic features of each unit as related to recreation development. Factors important to this interpretation are soil depth, texture, structure, permeability, drainage, topography, and susceptibility to flooding.

Unsuited - This rating indicates that soils and/or topography are of a nature which would prohibit recreation development without extensive modification.

Low - These soil units have major limitations to recreation development but limited development is feasible.

Moderate - This rating indicates that the soil unit is generally suitable for recreation development but has minor limitations.

High - These soils are particularly well suited for recreation development. Generally, they have no limitations.

SOIL LIMITATIONS FOR RECREATION DEVELOPMENT

Indicates the major limitation to recreation development.

MAPPING UNIT	INTERPRETATION	LIMITATION
1	Unsuited	Rock Land
2	Unsuited	Unstable Soils
3	Unsuited	Rock Land
4	Unsuited	Dissected Slopes
5	Unsuited	Bouldery Surface
6	Low to Moderate	Shallow Soils
7	Low to Moderate	High Water Table
8	Low to Moderate	Shallow Soils
9	Low	Wet Areas
11	Moderate to High	Some Flooding
12	Moderate to High	Some Flooding
13	Moderate to High	Some Flooding
14	Moderate to High	Some Flooding
15	Moderate to High	Some Flooding
16	High	None
17	Moderate	Pumice Soils
18	Moderate	Pumice Soils
19	Moderate	Pumice Soils
21	Moderate	Dustiness
22	Unsuited	Steep Slopes
23	Moderate	Dustiness
24	Unsuited	Steep Slopes
25	High	None
26	Unsuited	Steep Slopes
27	High	None
28	Unsuited	Steep Slopes
29	High	None
31	Unsuited	Steep Slopes
40	Unsuited	Rock Land
41	Low	Dustiness
42	Unsuited	Steep Slopes
43	Low to Moderate	Dustiness
44	Unsuited	Steep Slopes
45	High	None
46	Unsuited	Steep Slopes
47	Unsuited	Dissected Slopes

MAPPING UNIT	INTERPRETATION	LIMITATION
48	High	None
49	Unsuited	Steep Slopes
51	Low to Moderate	Dustiness
52	Unsuited	Steep Slopes
53	Unsuited	Dissected Slopes
55	Unsuited	Steep Slopes
56	Unsuited	Dissected Slopes
57	High	None
58	Unsuited	Steep Slopes
59	Unsuited	Dissected Slopes
60	Unsuited	Rock Land
61	Low	Dustiness
62	Unsuited	Steep Slopes
64	Unsuited	Steep Slopes
65	High	None
66	Unsuited	Steep Slopes
67	Unsuited	Dissected Slopes
68	High	None
69	Unsuited	Steep Slopes
72	Unsuited	Steep Slopes
73	Unsuited	Dissected Slopes
80	Unsuited	Rock Land
82	Unsuited	Steep Slopes
84	Unsuited	Steep Slopes
85	High	None
86	Unsuited	Steep Slopes
87	Unsuited	Dissected Slopes
88	High	None
89	Unsuited	Steep Slopes
92	Unsuited	Steep Slopes
93	Unsuited	Dissected Slopes
95	Unsuited	Steep Slopes
96	Unsuited	Dissected Slopes
97	High	None
98	Unsuited	Steep Slopes
99	Unsuited	Dissected Slopes

INTERPRETATION

SOIL AND SITE DAMAGE SUSCEPTIBILITY

This interpretation applies to recreation areas after development. Each soil that is suitable or can be made suitable for campground development, is rated for its susceptibility to damage of soil and/or site by normal recreation use. Site includes vegetation as well as soil conditions. Factors used in determination ratings include surface erosion potential, soil compactibility, and vegetative growth potential.

Low - These soils resist compaction and have a low surface erosion potential. The native vegetation is hardy and will generally come back annually after heavy use. These soils and the vegetation they support will withstand and hold up well under continued use.

Moderate - These soils are not readily compacted and surface erosion potential is moderate to low. The vegetative types are somewhat hardy. In general, these soils and the site can sustain frequent use but require some rehabilitation.

High - These may be either soils that are fragile and support vegetation that is not hardy or soils that are easily compacted. A period of nonuse and major rehabilitation will be required.

MAPPING UNIT	INTERPRETATION
1	Not Applicable
2	Not Applicable
3	Not Applicable
4	Not Applicable
5	Not Applicable
6	High - Fragile Vegetation
7	Moderate - Compaction
8	High - Fragile Vegetation
9	High - Compaction
11	Low
12	Low
13	Moderate - Fragile Vegetation
14	Low
15	Low
16	Low
17	Moderate - Erosion
18	Moderate - Erosion
19	Moderate - Erosion
21	Moderate - Erosion
22	Not Applicable
23	Moderate - Erosion
24	Not Applicable
25	Low
26	Not Applicable
27	Moderate - Fragile Vegetation
28	Not Applicable
29	Low to Moderate - Erosion
31	Not Applicable
40	Not Applicable
41	Moderate - Erosion
42	Not Applicable
43	Moderate - Erosion
44	Not Applicable
45	Low
46	Not Applicable
47	Not Applicable

MAPPING UNIT	INTERPRETATION
48	High - Fragile Vegetation
49	Not Applicable
51	Low to Moderate - Erosion
52	Not Applicable
53	Not Applicable
55	Not Applicable
56	Not Applicable
57	High - Fragile Soils
58	Not Applicable
59	Not Applicable
60	Not Applicable
61	Moderate - Erosion
62	Not Applicable
64	Not Applicable
65	Low
66	Not Applicable
67	Not Applicable
68	High - Fragile Vegetation
69	Not Applicable
72	Not Applicable
73	Not Applicable
80	Not Applicable
82	Not Applicable
84	Not Applicable
85	Low to Moderate - Compaction
86	Not Applicable
87	Not Applicable
88	High - Fragile Vegetation
89	Not Applicable
92	Not Applicable
93	Not Applicable
95	Not Applicable
96	Not Applicable
97	High - Fragile Vegetation
98	Not Applicable
99	Not Applicable

INTERPRETATION

SUSCEPTIBILITY TO MUDDINESS

This interpretation pertains only to the soils suitable, or those that can be made suitable, for recreation development. This interpretation rates each soil as to its susceptibility to becoming muddy. The rating is limited to the surface soil under normal conditions. Factors include soil characteristics, climate and drainage.

Low - Muddiness is not likely to be a problem. Factors indicate soils are not susceptible to muddiness.

Moderate - Soils become muddy at times for short periods, occasionally causing problems. Road rock is usually necessary.

High - Soils are very likely to become muddy and remain muddy for long periods. Road rock is necessary. Camp closure may be necessary during wet periods.

SUSCEPTIBILITY TO DUSTINESS

This interpretation pertains only to the soils suitable for recreation development, and applies primarily to unsurfaced roads within recreation areas.

Low - Factors indicate dust will not be a problem.

Moderate - Under normal conditions dust will not be a problem, but under heavy use and droughty conditions, dust very likely will be a problem.

High - Factors indicate dust will be a problem. Dust abatement measures are necessary under normal conditions and use.

MAPPING UNIT	MUDDINESS	DUSTINESS
1	Not Applicable	Not Applicable
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	Moderate	Moderate
7	High	Low
8	Moderate	Moderate
9	High	Low
11	Low	High
12	Low	High
13	Low	High
14	Low	High
15	Low	High
16	Low	High
17	Low	High
18	Low	High
19	Low	High
21	Low	High
22	N/A	N/A
23	Low	High
24	N/A	N/A
25	Low	Moderate
26	N/A	N/A
27	Low	Moderate
28	N/A	N/A
29	Low	Moderate
31	N/A	N/A
40	N/A	N/A
41	Low	High
42	N/A	N/A
43	Low	High
44	N/A	N/A
45	Low	Moderate
46	N/A	N/A
47	N/A	N/A

N/A = Not Applicable

MAPPING UNIT	MUDDINESS	DUSTINESS
48	Low	Moderate
49	N/A	N/A
51	Low	Moderate to High
52	N/A	N/A
53	N/A	N/A
55	N/A	N/A
56	N/A	N/A
57	Low	Moderate
58	N/A	N/A
59	N/A	N/A
60	N/A	N/A
61	Low	High
62	N/A	N/A
64	N/A	N/A
65	Low	Moderate
66	N/A	N/A
67	N/A	N/A
68	Low	Moderate
69	N/A	N/A
72	N/A	N/A
73	N/A	N/A
80	N/A	N/A
82	N/A	N/A
84	N/A	N/A
85	Moderate	Moderate
86	N/A	N/A
87	N/A	N/A
88	Moderate	Moderate
89	N/A	N/A
92	N/A	N/A
93	N/A	N/A
95	N/A	N/A
96	N/A	N/A
97	Moderate	Moderate
98	N/A	N/A
99	N/A	N/A

INTERPRETATION

SUITABILITY FOR SEWAGE FILTER FIELD

This interpretation evaluates the soil as to its suitability as a sewage filter field. Ratings are based on soil depth, texture, permeability, drainage and slope. Only those soils suitable for recreation development are rated. Onsite investigation is recommended before design or installation of filter system.

Poor - These soils have properties which make them poorly suited as sewage filter fields. Sewage filter disposal in these soils would be ineffective and create major problems.

Moderate - These soils have properties which limit their use as sewage filter fields. They require a large filter area for adequate drainage which limits the capacity of the campground.

Well - These soils are well suited to sewage filter use and offer only minor limitations, if any.

SOIL LIMITATION TO SEWAGE FILTER FIELD USE

This indicates the major limitations to sewage filter field use.

MAPPING UNIT	INTERPRETATION	LIMITATION
1	Not Applicable	Rock Land
2	Not Applicable	Unstable Soils
3	Not Applicable	Rock Land
4	Not Applicable	Dissected Slopes
5	Not Applicable	Bouldery Surface
6	Poor	Shallow Soils
7	Poor	High Water Table
8	Poor	Shallow Soils
9	Poor	Wet Areas
11	Moderate to Well	Rapid Percolation
12	Moderate to Well	Rapid Percolation
13	Moderate to Well	Rapid Percolation
14	Moderate to Well	Close to Stream
15	Moderate to Well	Close to Stream
16	Well	None
17	Well	None
18	Well	None
19	Well	None
21	Well	None
22	Not Applicable	Steep Slopes
23	Well	None
24	Not Applicable	Steep Slopes
25	Well	None
26	Not Applicable	Steep Slopes
27	Well	None
28	Not Applicable	Steep Slopes
29	Well	None
31	Not Applicable	Steep Slopes
40	Not Applicable	Rock Land
41	Well	None
42	Not Applicable	Steep Slopes
43	Well	None
44	Not Applicable	Steep Slopes
45	Well	None
46	Not Applicable	Steep Slopes
47	Not Applicable	Steep Slopes

MAPPING UNIT	INTERPRETATION	LIMITATION
48	Well	None
49	Not Applicable	Steep Slopes
51	Well	None
52	Not Applicable	Steep Slopes
53	Not Applicable	Steep Slopes
55	Not Applicable	Steep Slopes
56	Not Applicable	Steep Slopes
57	Well	None
58	Not Applicable	Steep Slopes
59	Not Applicable	Steep Slopes
60	Not Applicable	Rock Land
61	Well	None
62	Not Applicable	Steep Slopes
64	Not Applicable	Steep Slopes
65	Well	None
66	Not Applicable	Steep Slopes
67	Not Applicable	Steep Slopes
68	Well	None
69	Not Applicable	Steep Slopes
72	Not Applicable	Steep Slopes
73	Not Applicable	Steep Slopes
80	Not Applicable	Rock Land
82	Not Applicable	Steep Slopes
84	Not Applicable	Steep Slopes
85	Well	None
86	Not Applicable	Steep Slopes
87	Not Applicable	Steep Slopes
88	Well	None
89	Not Applicable	Steep Slopes
92	Not Applicable	Steep Slopes
93	Not Applicable	Steep Slopes
95	Not Applicable	Steep Slopes
96	Not Applicable	Steep Slopes
97	Well	None
98	Not Applicable	Steep Slopes
99	Not Applicable	Steep Slopes

INTERPRETATION

TRAIL SUITABILITY

This interpretation indicates the suitability of each soil for trails. Factors include soil and bedrock characteristics, drainage, climate and slope.

Poor - These soils have properties which severely limit their use for trails. Extensive treatment measures are required.

Moderate - These soils have some limitations for trail development. Certain treatment measures may be required.

Well - These soils have no limitations for trail development.

LIMITATIONS FOR TRAILS

This indicates the limitations to trails.

MAPPING UNIT	INTERPRETATION	LIMITATION
1	Poor	Steep, Rocky Slopes
2	Poor	Unstable Soils
3	Moderate to Poor	Shallow-Fragile
4	Poor	Dissected Slopes
5	Poor	Talus
6	Moderate to Poor	Shallow-Fragile
7	Poor	Muddiness
8	Moderate	Fragile Soils
9	Poor	Wet Areas
11	Well	None
12	Well	None
13	Well	None
14	Well	None
15	Well	None
16	Well	None
17	Well to Moderate	Pumice Ravel
18	Well to Moderate	Pumice Ravel
19	Well to Moderage	Pumice Ravel
21	Well	None
22	Well to Moderate	Loose Soils
23	Well	None
24	Well to Moderate	Loose Soils
25	Well	None
26	Well to Moderate	Loose Soils
27	Well	None
28	Well to Moderate	Loose Soils
29	Well	None
31	Well to Moderate	Loose Soils
40	Poor	Rock Outcrops
41	Well	None
42	Well to Moderate	Steep Loose Soils
43	Well	None
44	Well to Moderate	Steep Loose Soils
45	Well	None
46	Well to Moderate	Steep Loose Soils
47	Moderate to Poor	Dissected Slopes

MAPPING UNIT	INTERPRETATION	LIMITATION
48	Well	None
49	Well to Moderate	Steep Loose Soils
51	Well	None
52	Well to Moderate	Steep Loose Soils
53	Moderate to Poor	Dissected Slopes
55	Well to Moderate	Steep Loose Soils
56	Moderate to Poor	Dissected Slopes
57	Well	None
58	Well to Moderate	Steep Loose Soils
59	Moderate to Poor	Dissected Slopes
60	Poor	Rock Outcrops
61	Well	None
62	Well to Moderate	Steep Slopes
64	Well to Moderate	Steep Slopes
65	Well	None
66	Well to Moderate	Steep Slopes
67	Moderate to Poor	Dissected Slopes
68	Well	None
69	Well to Moderate	Steep Slopes
72	Well to Moderate	Steep Slopes
73	Moderate to Poor	Dissected Slopes
80	Poor	Rock Outcrops
82	Well to Moderate	Steep Slopes
84	Well to Moderate	Steep Slopes
85	Well	None
86	Well to Moderate	Steep Slopes
87	Moderate to Poor	Dissected Slopes
88	Well	None
89	Moderate to Well	Steep Slopes
92	Moderate to Well	Steep Slopes
93	Moderate to Poor	Dissected Slopes
95	Well to Moderate	Steep Slopes
96	Moderate to Poor	Dissected Slopes
97	Well	None
98	Well to Moderate	Steep Slopes
99	Moderate to Poor	Dissected Slopes

INTERPRETATION

SUSCEPTIBILITY TO COMPACTION

This interpretation indicates the soil's inherent ability to resist compaction by hoofed animals. Factors important to this interpretation are: soil texture, structure, bulk density, pore size and distribution, and rate of infiltration.

Low - Factors indicate that the soil will resist compaction.

Moderate - Factors indicate that the soil has tendencies to become compacted under livestock and wildlife use. Time of grazing on these soil units is important.

High - Factors indicate that soil compaction will be severe unless livestock use is withheld until the soils have adequately dried.

SUSCEPTIBILITY TO SOIL DISPLACEMENT

This interpretation indicates the general susceptibility of the soil unit to be displaced by livestock grazing. Soil displacement is the downslope movement of soil. Animal trampling causes loosening of soil particles which are moved downslope by gravity, wind and water. Displacement ratings are based on such factors as texture, slope and field observations.

Low - Factors indicate that displacement is insignificant. Slopes usually are less than 35 percent.

Moderate - Factors indicate that moderate soil displacement will occur.

High - Factors indicate that displacement is severe and slopes usually exceed 50 percent.

MAPPING UNIT	COMPACTION	DISPLACEMENT
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A
6	Moderate	Low to Moderate
7	High	Low
8	Moderate	Low
9	High	Low
11	Low	Low
12	Low	Low
13	Low	Low
14	Low	Low
15	Low	Low
16	Low	Low
17	Low	Moderate
18	Low	Moderate
19	Low	Moderate
21	Low	Low
22	Low	Moderate to High
23	Low	Low
24	Low	Moderate to High
25	Low	Low
26	Low	Moderate to High
27	Low	Low
28	Low	Moderate to High
29	Low	Low
31	Low	Moderate to High
40	N/A	N/A
41	Low	Low
42	Low	Moderate to High
43	Low	Low
44	Low	Moderate to High
45	Low	Low
46	Low	Moderate to High
47	Low	High

N/A = Not Applicable

MAPPING UNIT	COMPACTION	DISPLACEMENT
48	Low	Low
49	Low	Moderate to High
51	Low	Low
52	Low	Moderate to High
53	Low	High
55	Low	Moderate to High
56	Low	High
57	Low	Low
58	Low	Moderate to High
59	Low	High
60	N/A	N/A
61	Low	Low
62	Low	Moderate to High
64	Low	Moderate to High
65	Low	Low
66	Low	Moderate to High
67	Low	High
68	Low	Low
69	Low	Moderate to High
72	Low	Moderate to High
73	Low	High
80	N/A	N/A
82	Low	Moderate to High
84	Low to Mod.	Moderate to High
85	Low to Mod.	Low
86	Low	Moderate to High
87	Low	High
88	Low	Low
89	Low	Moderate to High
92	Low	Moderate to High
93	Low	High
95	Low	Moderate to High
96	Low	High
97	Low	Low
98	Low	Moderate to High
99	Low	High

SECTION 5

APPENDIX

This section contains three parts:

REPORT OF ENGINEERING TEST RESULTS
GLOSSARY
BIBLIOGRAPHY

The glossary and bibliography are self-explanatory. However, some explanation is required for the Engineering Test Results information.

MAPPING UNIT: states the mapping unit number and gives whether the sample was taken from the surface or subsoil layer or is a composite sample from both.

LOCATION: gives specific legal description where sample was taken.

DEPTH: gives the soil layer, measured in inches from the surface downward, where the soil sample was obtained.

UNIFIED: a term referring to Unified Soil Classification System. This system is used by Corps of Engineers and U. S. Bureau of Reclamation to classify suitability of soil materials for embankments, foundations, roads and airfields.

AASHO: stands for American Association of State Highway Officials. It is another soil material classification system. It is widely known and used primarily for highway construction.

LIQUID LIMIT: is the moisture content at which a soil passes from a plastic to a liquid state. Sandy soils have low liquid limits of the order of 20. N.P. means nonplastic.

PLASTICITY INDEX: is defined as the numerical difference between the liquid limit and the plastic limit. The plastic limit is the moisture content at which a soil changes from a semisolid to a plastic state. A small plasticity index, such as 5, indicates that a small change in moisture content will change the soil from a semi-solid to a liquid condition. Such a soil is very sensitive to moisture unless the silt and clay content combined (amount passing No. 200 sieve) is less than 20 percent.

pH (DYE METHOD): indicates the acidity or or alkalinity of a soil based on a dye-color chart comparison method. Neutral pH, neither acid nor alkaline is pH = 7.0. A normal soil is slightly acid to neutral, in the pH range from 6.5 to 7.2.

HYDROMETER ANALYSIS: A standard laboratory method of determining the distribution of the fraction of the soil passing the No. 200 sieve.

MAXIMUM DENSITY - p.c.f.: Compaction tests are used to determine the density to which a soil can be compacted with various moisture contents. The greatest density obtained is termed the "maximum density" and the corresponding moisture content is termed "optimum moisture." Maximum density is measured in pounds per cubic foot.

OPTIMUM MOISTURE - %: see above.

SAND EQUIVALENT: This is a rapid field test that has been developed to detect the presence of undesirable claylike materials in soils and aggregate material. Concrete sands and crushed stone have SE values of about 80; very expansive clays have SE values of 0 to 5.

MECHANICAL ANALYSIS: This refers to the amounts of each particle size group in a soil. The amounts of the gravel and sand fractions are determined by sieving; silt, clay and colloid contents are determined by sedimentation tests.

REMARKS: Indicates if soil samples were obtained at the modal site location.

Engineering tests were performed at the Okanogan National Forest Soil Testing Laboratory.

ENGINEERING TEST RESULTS

Mapping Unit: 13 Surface Layer
Location: SE,SE, Sec. 25, T.36N.,R.16E.
Depth: 0"-8" Unified: SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): pH 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 91.73
Optimum Moisture - %: 19.75
Sand Equivalent: 40

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	100%
3/4"	100%
1/2"	97.1%
3/8"	93.7%
#4	86.4%
#10	75.1%
#40	50.0%
#100	35.2%
#200	27.6%
Pan	0

Mapping Unit: 19 Surface Layer
Location: NW,NW, Sec.17, T.29N., R.23E.
Depth: 0"-12" Unified: ML AASHO: A-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 69.47
Optimum Moisture - %: 25.21
Sand Equivalent: 76

Mechanical Analysis	
Sieve Size	% Passing
1"	100.0
3/4"	100.0
1/2"	100.0
3/8"	99.97
#4	99.6
#10	95.3
#40	73.7
#100	63.0
#200	53.9
Pan	0

Mapping Unit: 19 Subsoil Layer
Location: NW,NW, Sec.17, T.29N., R.23E.
Depth: 23"-37" Unified: SM-SW AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 67.52
Optimum Moisture - %: 36.11
Sand Equivalent: 88

Mechanical Analysis	
Sieve Size	% Passing
1"	100.0
3/4"	98.9
1/2"	98.5
3/8"	98.4
#4	98.1
#10	94.2
#40	27.8
#100	11.1
#200	9.1
Pan	0

Mapping Unit: 28 Subsoil Layer
Location: NW,NE, Sec.19, T.35N., R.18E.
Depth: 15"-42" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.:
Optimum Moisture - %:
Sand Equivalent: 43

Mechanical Analysis	
Sieve Size	% Passing
1"	97.3
3/4"	96.4
1/2"	94.3
3/8"	90.6
#4	72.6
#10	52.7
#40	30.5
#100	20.2
#200	15.9
Pan	

Mapping Unit: 42 Surface Layer
Location: NE,NE, Sec.24, T.34N., R.22E.
Depth: 0"-9" Unified: SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 117.63
Optimum Moisture - %: 10.92
Sand Equivalent: 23

Mechanical Analysis	
Sieve Size	% Passing
1"	98.7
3/4"	95.6
1/2"	90.4
3/8"	87.2
#4	77.7
#10	67.7
#40	50.6
#100	41.6
#200	33.5
	0

Mapping Unit: 44 Surface Layer
Location: NE,NE, Sec.13, T.34N., R.22E.
Depth: 0"-15" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 112.90
Optimum Moisture - %: 12.21
Sand Equivalent: 42

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	93.1
3/4"	90.4
1/2"	84.6
3/8"	80.4
#4	69.4
#10	55.3
#40	34.9
#100	25.1
#200	19.9
Pan	0

Mapping Unit: 44 Surface Layer
Location: NW,SW, Sec.9, T.33N., R.23E.
Depth: 0"-8" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.8
Hydrometer Analysis:
Maximum Density - p.c.f.: 118.31
Optimum Moisture - %:
Sand Equivalent: 55

Mechanical Analysis	
Sieve Size	% Passing
1"	93.6
3/4"	87.3
1/2"	83.5
3/8"	82.2
#4	76.4
#10	65.8
#40	36.5
#100	20.1
#200	15.1
Pan	0

Mapping Unit: 45 Surface and Subsoil Layers
Location: SE,SE, Sec.33, T.35N., R.24E.
Depth: 0"-23" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 118.05
Optimum Moisture - %: 14.65
Sand Equivalent: 43

Mechanical Analysis	
Sieve Size	% Passing
1"	98.1
3/4"	97.0
1/2"	96.2
3/8"	95.3
#4	87.6
#10	71.9
#40	41.1
#100	29.0
#200	23.0
Pan	0

Mapping Unit: 46 Surface and Subsoil Layers
Location: NW,NW, Sec.16, T.34N., R.24E.
Depth: 0"-19" Unified: SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.8
Hydrometer Analysis:
Maximum Density - p.c.f.: 99.50
Optimum Moisture - %: 16.72
Sand Equivalent: 35

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	79.6
3/4"	77.9
1/2"	76.1
3/8"	74.9
#4	72.0
#10	66.9
#40	48.1
#100	33.8
#200	26.4
Pan	0

Mapping Unit: 49 Subsoil Layer
Location: NE,NE, Sec.19, T.35N., R.18E.
Depth: 12"-40" Unified: SMd AASHO: A-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 5.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 75.19
Optimum Moisture - %: 26.64
Sand Equivalent: 32

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	91.7
3/4"	90.7
1/2"	87.4
3/8"	85.5
#4	80.8
#10	75.4
#100	65.0
#200	44.6
Pan	37.0

Mapping Unit: 52 Surface Layer
Location: NE,NW, Sec. 10, T.36N., R.16E.
Depth: 0"-24" Unified: SW-SMd AASHO: A-1-a
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 7.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 120.0
Optimum Moisture - %: 10.0
Sand Equivalent: 67

Mechanical Analysis	
Sieve Size	% Passing
1"	91.6
3/4"	88.6
1/2"	83.6
3/8"	78.3
#4	64.1
#10	46.8
#40	20.9
#100	9.7
#200	6.1
Pan	0

Mapping Unit: 56 Surface and Subsoil Layers
Location: NE,SW, Sec.12, T.37N., R.15E.
Depth: 1"-28" Unified: GW-GM AASHO: A-1-a
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 112.16
Optimum Moisture - %: 14.16
Sand Equivalent: 47

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	87.2
3/4"	77.3
1/2"	61.6
3/8"	52.9
#4	37.5
#10	28.1
#40	18.6
#100	12.4
#200	9.4
Pan	0

Mapping Unit: 59 Surface and Subsoil Layers
Location: NE,NE, Sec.28, T.35N., R.17E.
Depth: 4"-30" Unified: SMd AASHO: A-1-a
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 113.61
Optimum Moisture - %: 11.03
Sand Equivalent: 60

Mechanical Analysis	
Sieve Size	% Passing
1"	92.2
3/4"	86.4
1/2"	79.6
3/8"	75.4
#4	63.3
#10	50.6
#40	28.6
#100	17.9
#200	13.7
Pan	0

Mapping Unit: 65 Surface Layer
Location: NE,NW, Sec. 5, T.36N., R.19E.
Depth: 0"-10" Unified: SW-SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 113.76
Optimum Moisture - %: 11.01
Sand Equivalent: 76

Mechanical Analysis	
Sieve Size	% Passing
1"	93.6
3/4"	91.6
1/2"	89.7
3/8"	88.7
#4	85.1
#10	78.6
#40	46.4
#100	14.9
#200	7.9
Pan	0

Mapping Unit: 65 Subsoil Layer
Location: NE,NW, Sec. 5, T.36N., R.19E.
Depth: 10"-35" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 113.67
Optimum Moisture - %: 12.86
Sand Equivalent: 30

Mechanical Analysis	
Sieve Size	% Passing
1"	97.2
3/4"	94.7
1/2"	89.5
3/8"	85.8
#4	73.9
#10	59.3
#40	36.1
#100	24.2
#200	18.9
Pan	

Mapping Unit: 65 Subsoil Layers
Location: NE,NE, Sec.3, T.36N., R.19E.
Depth: 8"-40" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 120.75
Optimum Moisture - %: 12.14
Sand Equivalent: 24

Mechanical Analysis	
Sieve Size	% Passing
1"	97.7
3/4"	94.4
1/2"	85.3
3/8"	77.3
#4	58.9
#10	45.3
#40	29.7
#100	20.9
#200	17.2
Pan	

Mapping Unit: 66 Subsoil Layer
Location: SE,SE, Sec.11, T.36N., R.19E.
Depth: 5"-24" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 106.67
Optimum Moisture - %: 15.42
Sand Equivalent: 39

Mechanical Analysis	
Sieve Size	% Passing
1"	98.2
3/4"	91.5
1/2"	82.0
3/8"	73.2
#4	56.2
#10	43.2
#40	29.9
#100	22.4
#200	17.9
Pan	0

Mapping Unit: 82 Surface Layer
Location: NW,NW, Sec. 13, T.35N., R.20E.
Depth: 0"-11" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 122.48
Optimum Moisture - %: 10.38
Sand Equivalent: 21

Mechanical Analysis	
Sieve Size	% Passing
1"	96.2
3/4"	94.1
1/2"	91.3
3/8"	88.0
#4	78.0
#10	66.5
#40	43.3
#100	27.6
#200	21.7
Pan	

Mapping Unit: 84 Surface and Subsoil Layers
Location: NE,NW, Sec. 26, T.36N., R.24E.
Depth: 1"-15" Unified: SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.8
Hydrometer Analysis:
Maximum Density - p.c.f.: 117.63
Optimum Moisture - %: 10.92
Sand Equivalent: 19

Mechanical Analysis	
Sieve Size	% Passing
1"	94.3
3/4"	92.3
1/2"	87.3
3/8"	82.4
#4	73.2
#10	66.0
#40	49.9
#100	34.0
#200	26.7
Pan	0

Mapping Unit: 85 Surface and Subsoil Layers
Location: NE,SW, Sec. 35, T.37N., R.19E.
Depth: 4"-43" Unified: SMd AASHO: A-2-4
Liquid Limit: 18.2 Plasticity Index: 0.2
pH (Dye Method): 6.7
Hydrometer Analysis:
Maximum Density - p.c.f.: 119.81
Optimum Moisture - %: 11.81
Sand Equivalent: 17

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	100.0
3/4"	99.2
1/2"	96.1
3/8"	93.9
#4	85.8
#10	73.4
#40	52.6
#100	38.2
#200	32.0
Pan	0

Mapping Unit: 85 Surface Layer
Location: NW,SW, Sec.12, T.35N., R.20E.
Depth: 1"-12" Unified: ML AASHO: A-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 87.20
Optimum Moisture - %: 23.51
Sand Equivalent: 11

Mechanical Analysis	
Sieve Size	% Passing
1"	100.0
3/4"	100.0
1/2"	100.0
3/8"	99.9
#4	99.7
#10	98.9
#40	88.5
#100	70.5
#200	60.4
Pan	

Mapping Unit: 85 Subsoil Layer
Location: NW,SW, Sec.12, T.35N., R.20E.
Depth: 12"-38" Unified: SMd AASHO: A-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 119.44
Optimum Moisture - %: 11.93
Sand Equivalent: 16

Mechanical Analysis	
Sieve Size	% Passing
1"	99.4
3/4"	98.4
1/2"	97.8
3/8"	96.9
#4	94.7
#10	90.7
#40	73.2
#100	53.7
#200	43.0
Pan	

Mapping Unit: 87 Subsoil Layer
Location: NE,SW, Sec. 36, T.37N., R.18E.
Depth: 16"-36" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 121.17
Optimum Moisture - %: 11.0
Sand Equivalent: 20

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	85.2
3/4"	81.4
1/2"	75.8
3/8"	71.8
#4	60.2
#10	50.6
#40	34.5
#100	22.7
#200	17.7
Pan	

Mapping Unit: 87 Surface and Subsoil Layers
Location: SE,NE, Sec. 26, T.36N., R.24E.
Depth: 0"-21" Unified: SMd AASHO: A-2-4
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 108.56
Optimum Moisture - %: 16.33
Sand Equivalent: 12

Mechanical Analysis	
Sieve Size	% Passing
1"	91.7
3/4"	87.6
1/2"	86.0
3/8"	84.5
#4	81.0
#10	77.4
#40	66.4
#100	48.9
#200	35.4
Pan	0

Mapping Unit: 88 Surface Layer
Location: NW,NW, Sec.28, T.37N., R.18E.
Depth: 0"-18" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 108.95
Optimum Moisture - %: 16.31
Sand Equivalent: 14

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	99.6
3/4"	97.7
1/2"	95.9
3/8"	93.0
#4	86.5
#10	75.9
#40	49.3
#100	33.8
#200	28.1
Pan	0

Mapping Unit: 88 Subsoil Layer
Location: NW,NW, Sec. 28, T.37N., R.18E.
Depth: 18"-60" Unified: SMd AASHO: A-1-b
Liquid Limit: 23.6 Plasticity Index: 7.2
pH (Dye Method): 6.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 119.51
Optimum Moisture - %: 12.90
Sand Equivalent: 12

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	89.6
3/4"	86.2
1/2"	81.9
3/8"	79.0
#4	73.7
#10	65.2
#40	46.3
#100	35.2
#200	13.6
Pan	0

Mapping Unit: 88 Surface and Subsoil Layers
Location: NE,SE, Sec.13, T.37N., R.17E.
Depth: 0"-26" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 6.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 93.06
Optimum Moisture - %: 18.40
Sand Equivalent: 36

Mechanical Analysis	
Sieve Size	% Passing
1"	81.0
3/4"	75.7
1/2"	65.1
3/8"	59.9
#4	50.2
#10	42.1
#40	31.4
#100	22.1
#200	16.4
Pan	0

ng Unit: 89 Surface and Subsoil Layers
ion: NW,NW, Sec.18, T.37N., R.18E.
= 0"-12" Unified: SMd AASHO: A-1-b
d Limit: N.P. Plasticity Index: N.P.
ve Method): 5.5
ne ter Analysis:
um Density - p.c.f.: 78.82
um Moisture - %: 24.88
quivalent: 35

= Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	91.5
3/4"	86.6
1/2"	80.6
3/8"	74.5
#4	65.5
#10	53.2
#40	44.0
#100	29.7
#200	20.6
Pan	0

g Unit: 96 Surface and Subsoil Layers
n: NW,SE, Sec.9, T.37N., R.17E.
0"-30" Unified: GMd AASHO: A-1-a
Limit: N.P. Plasticity Index: N.P.
Method): 5.5
ter Analysis:
Density - p.c.f.: 114.90
Moisture - %: 10.79
ivalent: 50

Mechanical Analysis	
Sieve Size	% Passing
1"	87.3
3/4"	81.6
1/2"	71.3
3/8"	65.8
#4	52.0
#10	41.6
#40	29.5
#100	20.1
#200	15.0
Pan	0

Unit: 96 Surface and Subsoil Layers
n: SE,SE, Sec.20, T.37N., R.16E.
0"-12" Unified: GW-GM AASHO: A-1-a
Limit: N.P. Plasticity Index: N.P.
Method): 7.0
ter Analysis:
Density - p.c.f.: 99.45
Moisture - %: 19.23
ivalent: 40

Mechanical Analysis	
Sieve Size	% Passing
1"	65.1
3/4"	49.9
1/2"	41.1
3/8"	34.6
#4	24.7
#10	19.1
#40	14.9
#100	12.4
#200	10.2
Pan	0

GLOSSARY

ALLUVIUM

Fine material, such as sand, silt, or clay that has been deposited on land by streams.

ANDESITE

A dark gray to black, dense, fine-grained extrusive igneous rock. Very similar to basalt.

ARGILLITE

An extremely hard, fine-grained, gray to black sedimentary rock composed primarily of clay minerals. It is distinguished from shale and slate by its lack of cleavage planes parallel to stratification. It typically breaks up into small pencil-like fragments.

ARKOSIC SANDSTONE

Sandstone that is low in quartz and high in clay-bearing minerals.

ASH (VOLCANIC ASH)

Sand-size volcanic ejecta as used in this report.

BASALT

A dark gray to black, dense, fine-grained extrusive igneous rock. Very similar to andesite.

BEDROCK

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

BLOCK GLIDE

A deep-seated, slow-moving failure marked by lateral separation with but little vertical displacement. Generally occurs in plastic materials.

CLAY

A soil separate less than .002 millimeters in diameter. As a soil textural class, less than 45 percent sand, and less than 40 percent silt.

COLLUVIUM

Soil material or rock fragments moved downslope by gravitational force in the form of soil creep, slides, and local wash.

COMPACTION

The packing together of soil particles by forces exerted at the soil surface resulting in increased soil density.

COMPLEX (MAPPING UNIT COMPLEX)

An association in which two soil units or a soil unit and a miscellaneous landtype are so intricately mixed that it is not practical to show them separately at the scale of mapping used.

CONGLOMERATE

A highly-resistant sedimentary rock, consisting of firmly-cemented sand and gravel.

CRITICAL SOIL

The term "critical soil" is frequently used by laymen, but it is a meaningless term unless it is related to a specific function. Many soils may be critical for one reason or another but different soils may not be critical for the same reasons. For example, a deep, wet, plastic and unstable soil will be critical in relation to road location and stability. This soil is not critical in relation to regeneration and droughtiness problems. Another soil may be very shallow over hard bedrock. This soil is not critical from the standpoint of road stability, but may be critical as to regeneration problems resulting from droughtiness and low fertility. It may also be critical in relation to surface erosion. From these two examples, it becomes obvious that the term "critical soil" must be defined by the user in relation to its intended purpose.

DEBRIS SLIDE

A rapidly moving slide composed of soil, bedrock or both.

EROSION

The wearing away of the land surface by running water, wind, ice or gravitational creep. Accelerated erosion may result from the activities of man or animals.

EXTRUSIVE IGNEOUS ROCK

This applies to those igneous rocks derived from volcanic lavas that cooled on the surface of the earth. This lava cools rapidly and forms fine-textured rocks such as basalt and andesite.

GEOMORPHOLOGY

The study of landforms as they relate to geologic composition and history.

GLACIAL DRIFT

The debris deposited by glaciers or by streams directly associated with them.

GLACIOFLUVIAL DEPOSITS

Soil materials that have been transported and deposited by glaciers and subsequently reworked by water.

GLACIOLACUSTRINE DEPOSITS

Soil materials transported by glaciers and deposited by glacial meltwater in glacial lakes, ranging from fine sand and small gravel near the lakeshores, to fine silts and clay in the lake bottom.

Mapping Unit: 89 Surface and Subsoil Layers
Location: NW,NW, Sec.18, T.37N., R.18E.
Depth: 0"-12" Unified: SMd AASHO: A-1-b
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 5.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 78.82
Optimum Moisture - %: 24.88
Sand Equivalent: 35

Remarks: Modal Site Location

Mechanical Analysis	
Sieve Size	% Passing
1"	91.5
3/4"	86.6
1/2"	80.6
3/8"	74.5
#4	65.5
#10	53.2
#40	44.0
#100	29.7
#200	20.6
Pan	0

Mapping Unit: 96 Surface and Subsoil Layers
Location: NW,SE, Sec.9, T.37N., R.17E.
Depth: 0"-30" Unified: GMd AASHO: A-1-a
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 5.5
Hydrometer Analysis:
Maximum Density - p.c.f.: 114.90
Optimum Moisture - %: 10.79
Sand Equivalent: 50

Mechanical Analysis	
Sieve Size	% Passing
1"	87.3
3/4"	81.6
1/2"	71.3
3/8"	65.8
#4	52.0
#10	41.6
#40	29.5
#100	20.1
#200	15.0
Pan	0

Mapping Unit: 96 Surface and Subsoil Layers
Location: SE,SE, Sec.20, T.37N., R.16E.
Depth: 0"-12" Unified: GW-GM AASHO: A-1-a
Liquid Limit: N.P. Plasticity Index: N.P.
pH (Dye Method): 7.0
Hydrometer Analysis:
Maximum Density - p.c.f.: 99.45
Optimum Moisture - %: 19.23
Sand Equivalent: 40

Mechanical Analysis	
Sieve Size	% Passing
1"	65.1
3/4"	49.9
1/2"	41.1
3/8"	34.6
#4	24.7
#10	19.1
#40	14.9
#100	12.4
#200	10.2
Pan	0

GLACIAL SOILS

Soils derived from materials transported or influenced by glaciers.

GLACIAL TILL

Glacial materials deposited directly by ice with little or no transportation by water. It is generally an unconsolidated, unstratified compact mixture of clay, silt, sand, gravel and boulders.

GLACIATED VALLEY

U-shaped valley formerly occupied by a glacier.

GRAYWACKE

A loose and general term for sandstone containing significant quantities of clay materials.

HUMMOCKY

Hilly, uneven landscape resulting from deep-seated soil movement, usually of a rotational nature.

INCLUSION

Soil type found within a mapping unit that is not extensive enough to be mapped separately or as part of a complex.

INTRUSIVE IGNEOUS ROCK

This applies to those rocks derived from magmas that have been injected into older rocks at depth without reaching the surface. These magmas are slow-cooling and form coarse-textured rocks, such as granite.

LANDFORM

Structural configuration of the topography as a result of past and present geological activity.

MAPPING UNIT

Any delineated area shown on a soil map that is identified by a number. A mapping unit may be a soil unit, a miscellaneous landtype, or a complex.

MASSIVE

Soil structure or bedrock condition in which there is no observable aggregation or no definite orderly arrangement of natural lines of weakness.

MASS MOVEMENT

All movement of soil and bedrock materials occurring below the soil surface such as landslips, landflows, rock slides, slumps, etc.

MASS WASTING

Wearing away of the landscape through the process of mass movement. Geologic erosion.

MISCELLANEOUS LANDTYPE

A mapping unit for areas of land that have little or no natural soil, or have properties that are too variable and unpredictable for classification.

MUDSTONE

Soft, fine-grained, gray to black sedimentary rock composed primarily of clay minerals. It lacks cleavage planes parallel to stratification and typically breaks into small block-like fragments.

OUTWASH

Glacial material swept out, sorted and deposited by water that originated from the melting of glacial ice.

PLASTIC SOIL

A soil capable of being molded or deformed continuously and permanently, by relatively moderate pressure, into various shapes.

PUMICE

An excessively cellular, light-colored, volcanic ejecta.

PYROCLASTIC

A general term applied to rocks formed from volcanic material that has been explosively or aerially ejected from a volcanic vent.

RESIDUUM

Soil material formed by rock weathering in place.

RUNOFF

That part of the precipitation which appears in surface streams of either perennial or intermittent form.

SAND

A soil separate between .05 and 2.0 mm. in diameter.

SANDSTONE

A hard rock composed primarily of cemented sand-size grains.

SEDIMENTARY ROCK

Rock formed by deposition of soil and rock particles by water, ice or wind that later solidifies through cementation, ionic exchange or compression.

SHALE

Fine-grained rock, softer than slate, consisting of clay minerals and silt, which characteristically splits readily along closely-spaced planes, parallel to stratification.

SHEET EROSION

Uniform removal of surface soil by water flowing overland or by wind.

SILT

A soil separate consisting of particles between 0.002 and 0.05 millimeters in diameter.

SILTSTONE

A sedimentary rock consisting primarily of silt-size particles.

SLATE

Rock formed by the metamorphism of shale. Slate is very fine-grained and exceptionally well-foliated. Because of its excellent foliation, it splits into thin sheets parallel to stratification.

SLUMP

A deep-seated, slow-moving, rotational failure occurring in plastic materials, resulting in vertical and lateral displacement.

SOIL

Any and all loose, incoherent, unconsolidated weathered material on the earth's surface resting on consolidated, weathered or unweathered bedrock, no matter how formed, or origin, or method of weathering or deposition. Generally includes any material that may be moved or broken by hand tools or heavy equipment without the need of blasting except soft, unweathered bedrock. In soil horizon designation, soil materials included A, B, and C horizons.

SOIL CREEP

Slow mass movement of soil material downslope primarily under the influence of gravity, but facilitated by saturation with water and/or by alternating freezing and thawing.

SOIL MAPPING UNIT

Taxonomic description of a portion of the landscape sufficiently uniform in soil, bedrock and landform so that it can be clearly defined and easily recognized wherever it occurs.

SPOT SYMBOLS

Symbols used on soil maps to represent a landscape factor too small to delineate.

SURFACE SLIPS

Rapid movement downslope of the surface few feet of soil on steep slopes.

TOESLOPE

Portions of a slope that is transitioned between the valley floor and the upper slope.

TOPOGRAPHY

The relief features or surface configuration of an area.

U-SHAPED VALLEY

Descriptive phrase of the cross-profile of a valley which has been carved out by glacial movement.

V-SHAPED VALLEY

A descriptive phrase of the cross-profile of a valley which has been cut by stream action.

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