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WATER RESOURCES ANALYSIS
AND INFORMATION SECTION

Office Report No. 29

NATURAL AREAS IN THE OKANOGAN-METHOW BASINS

By

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(For Use by the Water Resources Management Division)

March, 1975
Department of Ecology
Olympia, Washington

PREFACE

This report was prepared by Jacqueline Davie as a report for her study requirements at Evergreen State College. The purpose of the study was to evaluate the natural areas in the Okanogan-Methow Basins in order for information on natural areas to be included in developing water resources plans for the basins.

The report is solely the work of Jacqueline Davie and has neither been reviewed nor received the approval (or disapproval) of the Department of Ecology. The purpose of publishing the report as an Office Report is to make the information developed by Ms. Davie available to all concerned about water resources management in the Okanogan-Methow Basins.

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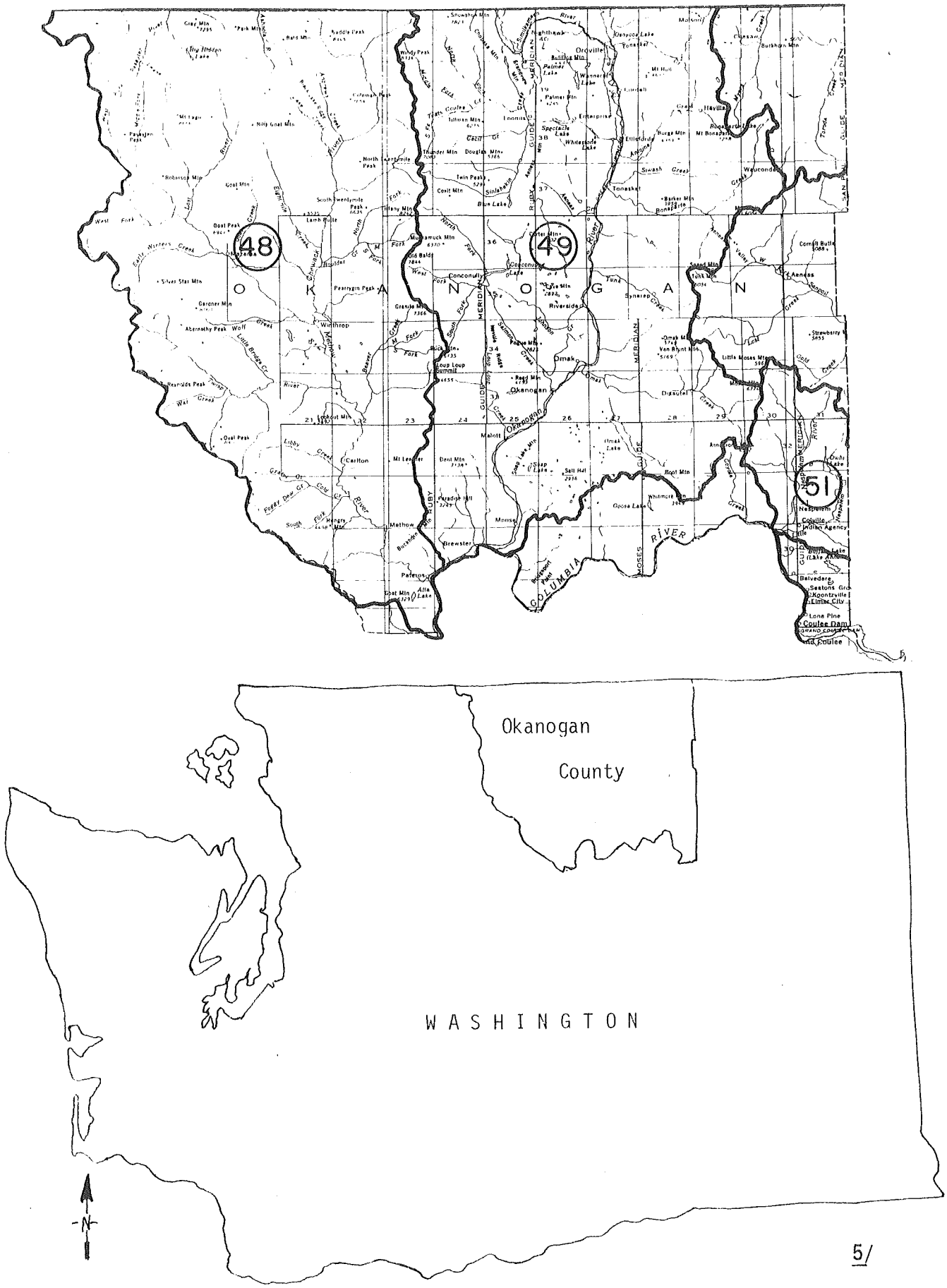

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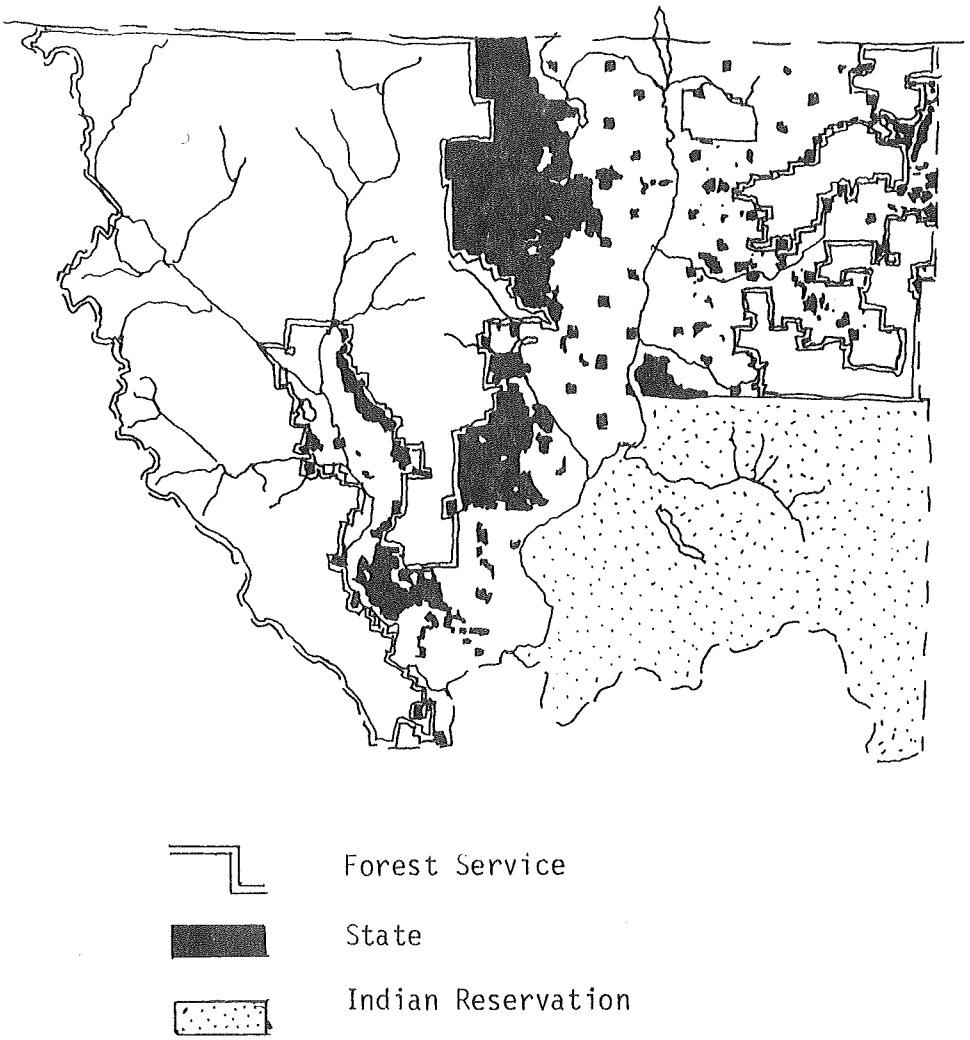
Forest Service
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INTRODUCTION

The purpose of this report is to describe the natural elements in the Okanogan and Methow Basins. The report will be useful in the evaluation of proposed policies, programs, and projects in the Okanogan-Methow Basins.

PHYSIOGRAPHIC DESCRIPTION

The boundaries of Okanogan and Methow River Basins are both within the County of Okanogan. Okanogan is an Indian word meaning "rendezvous." The Indians of British Columbia and Washington often gathered in the area of Osoyoos Lake for their annual potlatch. During these festivals, they also caught their supply of fish and game. 12/ Being the largest county in the State, it encompasses 5,332 square miles. The entire Okanogan Basin, numbered 419 on the title page, totals 8,342 square miles, of which 2,298 are in Washington. The Methow Basin, numbered 48 on the title page, totals 1,772 square miles.

The entire Okanogan-Methow region is geologically known as the Okanogan Highlands Province. Mountains bordering the Methow Basin on the west are the Cascades. The two basins are separated by the crest of the Buckhorn Mountains reaching an elevation of over 8,000 feet. To the east, the Okanogan Basin is bounded by the Sanpoil Range.

Okanogan River from the Canadian border is generally a slow-moving meandering stream. Along the 82.5 river miles, it drops a total of 132 feet for an average drop of 1.6 feet per mile. However, the northern 20 river miles in Canada drops only 0.6 feet per mile.

The Similkameen River, which flows north from Washington to Canada and then southeasterly back into Washington, enters the Okanogan River at the Oroville townsite. The Similkameen contributes 79 percent of the total annual flow down the Okanogan River, which is generally at 2,112,000 acre feet.

The climate of the Okanogan and Methow Basins is dominated by air masses sweeping southward from the interior of British Columbia. Consequently, the temperature is characterized by extreme lows of -20°F. Cold winters are normal and consequently, the average frost free season is only 153 days long. Because of the basins being located on the leeward side of the Cascade Range, little annual precipitation is common. The average annual precipitation is only 10.5 inches, nearly all occurring during the period of October through April.

The economy of the Okanogan Basin is oriented toward agriculture, divided primarily between fruit, generally apples, and beef production. Because the Methow Valley is too cold in the winters to allow fruit trees to mature, the upper valley depends on tourism and recreationists while beef production occurs in the lower valley. A total of 24,600 acres are irrigated. Six irrigation districts in the county serve 18,360 acres. The rest is provided water by 265 individual water diversions. Approximately 17,800 acres of the total irrigated is farmed for production of fruits.

Recreational use of the Okanogan and Methow Basins are presently quite active. Because of its proximity to Seattle and Spokane and its ready accessibility to the vacation areas of British Columbia, the impact of the newly opened North Cascades highway will greatly increase recreational use.

Although Okanogan County may be the largest in the State, less than half that land is privately owned. Figure one shows the proportions. Approximately one-fourth of the county is Colville Indian Reservation. The largest portion is designated as the Okanogan National Forest. Remaining portions are owned by the State, for various purposes, and the Bureau of Land Management. Also, a communications sattelite earth station exists near Monse, a small downstream community. The station stands on a high bluff in the western side of Okanogan County.

Excepting the Pasayten Wilderness, the Okanogan National Forest is under the Multiple-Use Management Plan. This means this forest is used for multiple purposes by private industry and the public. All uses are managed and governed by the Forest Service. In the case of Okanogan National Forest, a forest service is not the only body that may govern a national forest. Uses are managed in such a way as not to conflict with the varied public interests. Recreation plays a large part in the management of the Forest. People from the County and throughout the State come to enjoy the country and recreational facilities. Tourists from other parts of the United States and Canada also recreate here. This will be the foundation of the Upper Methow Commerce in years to come.

Beginning the report, Chapter One talks about the geological history and composition of the area. How the Cascade Mountains were formed and the source of some of the soils existing in the valleys are part of this. Chapter Two describes the botanical features. Topics such as soil types, climax communities, and specie composition are discussed. Chapter Three brings in the zoological, or wildlife, picture of the area. A table listing the main mammals, birds, and fish residing will be the format for discussion of some of these animals. Last is a conclusion entailing some basic recommendations for retention of the high quality aesthetics in the Okanogan and Methow Basins.

GEOLOGY

Both the Methow and Okanogan River Basins have an interesting geologic history. In describing the metamorphasis of the Cascade Mountains, and river valleys, we find that it took eons of time to form the rocks we are familiar with today. As the histories of the valleys and mountains are different, geologic composition is quite diverse. This chapter will begin by starting with the description of the Cascade Range, then the Methow Basin, and thirdly, the Okanogan Basin. Last will be a brief description of the valuable mountains and a sample of the western history brought about because of those minerals.

Structures of the North Cascades rise abruptly from the levels of the Columbia Basin. The Okanogan Valley is the only separator between the Cascades from the Rocky Mountains. Deep incisions by streams and glaciers have exposed resistant crystalline rocks of profoundly deep origin. The vast amounts of snowfields, lakes, and glaciers are scattered among the rugged and forested terrain like jewels nestled in settings on a green velvet cloth. Strung throughout are thousands of waterfalls, for which these mountains are named. 4/

Elevation generally rises to the north, averaging 5,000 feet near the Snoqualmie Pass to about 7,000 feet at the Canadian Border. No rivers have cut through this range, although many have cut very deeply. Thus, the Cascade Crest is a pronounced divide between east-flowing drainage and west-flowing drainage. All valleys within the range have been heavily glaciated in the past 20,000 years. Their form consists of relatively flat floors and steep sides rising thousands of feet.

Geologists would term the North Cascades as geosyncline. Geosyncline is a technical term for a particular type of mountain. They started out as a large generally linear trough that over a long period of time in which a thick succession of layered sediments and, in some places, intrusive volcanic rock accumulated. The trough is eventually deformed and is uplifted to form a mountain range.

These mountains consist of series of separate granitic intrusions called the Chilliwack Batholith. A batholith is simply a body of intrusive igneous rock with a surface area greater than 40 square miles. In addition, there are large tracts of crystalline schist (metamorphic rocks containing parallel layers of flakey minerals) and gneiss (coarse grained metamorphic rock, resembling granite, consisting of alternating layers of different minerals). These are very much older than the batholith. To construct the original positions of various blocks is virtually impossible. Folding, faulting, and metamorphism occurred many times before final formation of what we know now as the North Cascades Mountains. The North Cascades are also part of the Cordillera, which is the entire mountainous part of western North America. Thusly, these mountains are part of what geologists term as a Cordilleran Geosyncline.

The Methow River, to the east, drains much of the northern-half of the range in Washington. These waters eventually reach the Pacific Ocean via the Columbia River. Permanent snowfields and glaciers are all that cover parts of the massive amounts of rock exposures at high elevations. Rock outcrops below the timberline are small and due to dense vegetation, are not as noticeable.

Here lies the Methow Graben, a down-dropped block fault that extends north/northwesterly from the Columbia River far into South Central British Columbia. An enormous thickness of Upper Mesozoic strata occurs here. This means that the sediment and rocks in the Methow Valley is from 155-165 million years old (there is a geological time chart on the next page). In the highlands west of the Okanogan River and east of the Methow Graben are some recognizable Mesozoic and Upper Paleozoic (345-365 million years) moraine formations outcrop.

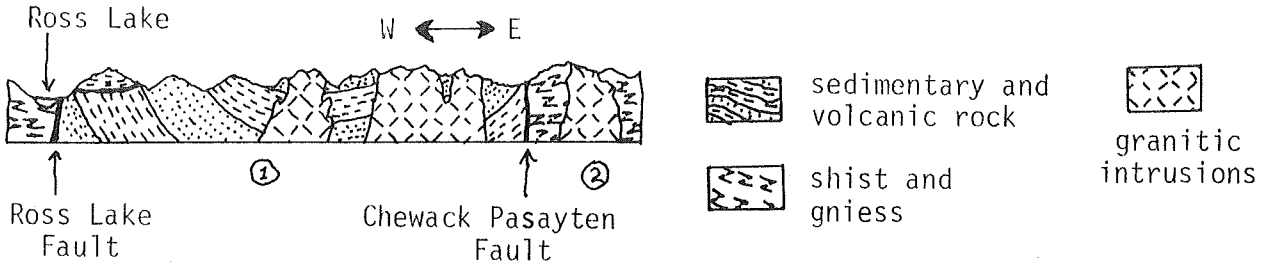

Figure 2. cross section of the North Cascades showing the following major bolcks

One is the Graben, containing folded Upper Mesozoic strata cut by the Cenozoic granitic intrusions; and two is the western section of the Eastern Highland. It is underlain by shist, gneiss, and granite. (ref. 4 Page 87)

The age of the oldest rocks in the Cascades, which are thoroughly metamorphosed gneiss, is unknown. They are certainly older than middle Devonian. The western and eastern foothills near the Okanogan River display only slightly metamorphosed Late Paleozoic strata. Here the moraine sedimentary and volcanic rocks constitute one of the best records of the Cordilleran Geosyncline.

Later, the Pleistocene Ice Age brought much change and geologic history to the surface of the Cascades. The glaciers existing now in the Pasayten Wilderness and other parts of the North Cascade Mountains are only remnants of ancestral glaciers which

Main Division of Geologic Time

ERAS	Periods or Systems	Epochs or Series	Principal Features
CENOZOIC	Quaternary	Recent 12,000	Extinction of giant mammals
		Pleistocene 600,000	Volcanoes along west coast of U.S.; many giant mammals; appearance of modern man
	Tertiary	Pliocene 10,000,000	West N. America uplifted; much modernization of mammals; first possible ape-like hominids appeared in Africa; later, uplift of the Cascades
		Miocene 25,000,000	Extensive lava flows in west U.S.; mammals began to acquire modern characteristics; dogs, modern type horses, man-like ape appeared; late in epoch uplift of Rockies
		Oligocene	35,000,000
		Ecocene	55,000,000
		Paleocene	65,000,000
MESOZOIC		Cretaceous	135,000,000
		Jurassic	180,000,000
		Triassic	230,000,000
PALEOZOIC		Carboniferous	
		Pennsylmanian	310,000,000
		Mississippian	345,000,000
		Devonian	405,000,000
		Silurian	425,000,000
		Ordovician	500,000,000
		Camprian	600,000,000
PRECAMBRIAN			

Table 1

have scoured the jagged peaks and deep valleys for thousands of years. It appears to geologists that the Northern Cascade glaciers grew first, in response to climatic changes. However, evidence, such as erratic boulders of foreign origin, prove that ice from Canada later inundated this area. A series of moraines across the valley floors, east of the Cascade Crest, mark the heads of the former Pleistocene Alpine Glaciers. Ridges of material accumulated at the front and sides of the glaciers, thus building a record of their size and shape.

Geologic composition of the Okanogan Basin is much different from the spectacular mountainous terrains on either side of it. Figure 2 (seen on the next page) shows an illustration of the Basin. The dotted outline area is Quaternary Alluvium and terraced deposits. This consists of unconsolidated gravel, sand, silt, and clay deposited both by modern streams and glacial melt water. Till and other glacial deposits are present also. These areas occur at flood plains or terraced deposits in valleys.

The area to the south, which is striped vertically, is composed of Miocene volcanic rock. This dark gray to black, locally reddish-brown basalt, may be dense or vescular. The dense parts commonly have columnar structure. This sort of triangular exception is merely an extention of the lava flows forming the Columbia Plateau to the south.

Diagonally striped, in the center, is an area of Triassic sedimentary rocks. Composed principally of limestone, dolomite, and marble, it may be about 1,000 feet thick. This type of rock appears to be only in the area between Riverside and Conconully.

The rest of the Okanogan Basin includes undifferentiated igneous and metamorphic rocks. Those intrusive and extrusive rocks of various ages occur in these areas. This valley, occupied by the Okanogan River, has undergone much modification resulting from the advance and retreat of Pleistocene glaciers.

Important Minerals

Okanogan County contains important deposits of gold, silver, and copper. The first prospectors were looking for gold, principally placer deposits. This exposed type usually starts with glacial deposits of sand or gravel containing heavy ore minerals have been eroded from their original bedrock. As concentrated small particles, they can simply be washed out. Early placer mining was active in the 1860's and 1870's.

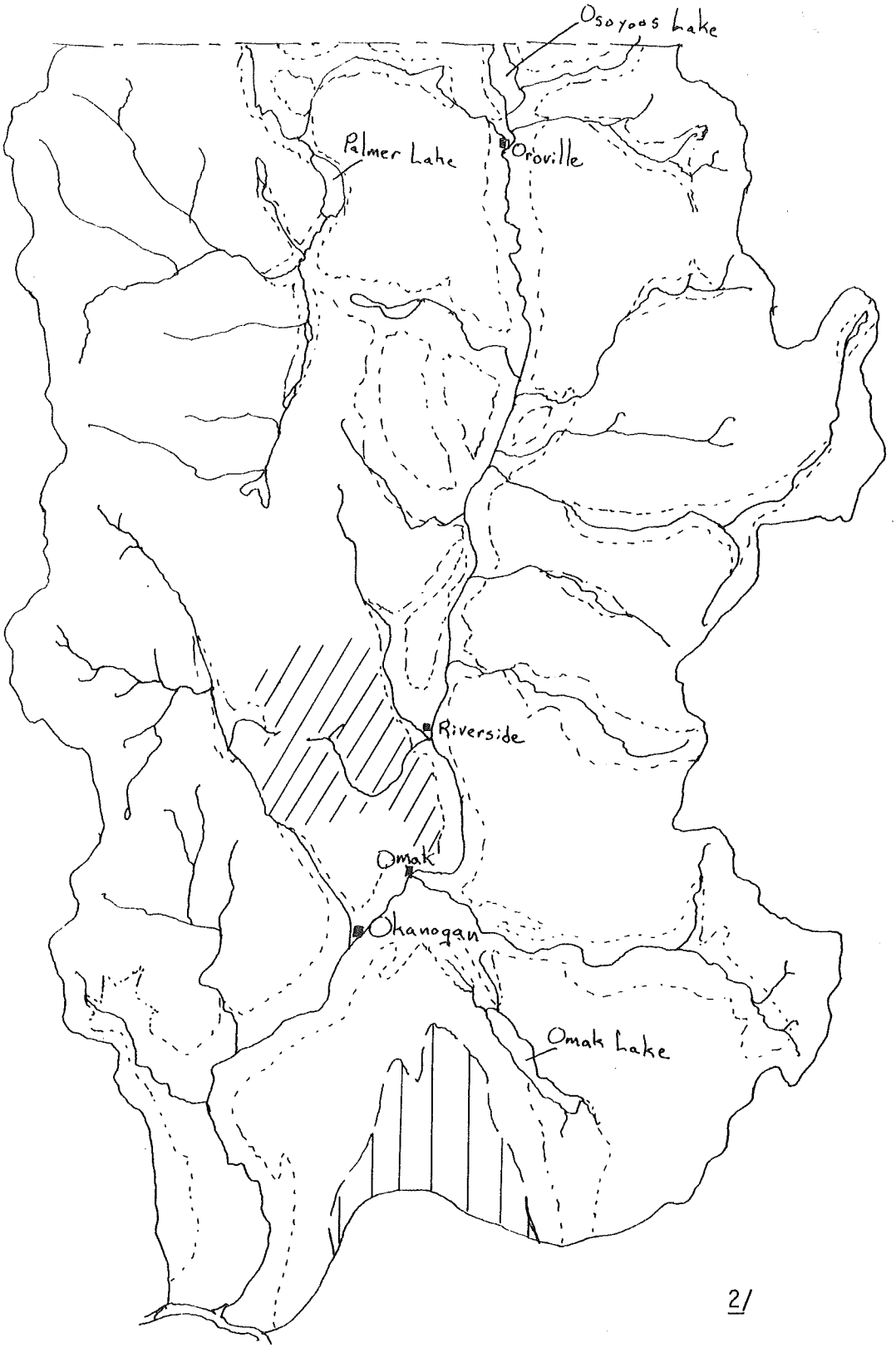

Figure 3. Description of soil types.

Later, lode deposits were found and developed. Lode deposits are veins of the ore found in well-defined fissures in the rock. Since 1957, Washington has ranked fifth to seventh among the gold producing states, and most of it has come directly from Okanogan County. Other metals which occur in Okanogan County are:

Antimony	Lead	Tellurium
Arsenic	Manganese	Thorium
Bismuth	Mercury	Titanium
Cerium	Polubdenum	Tungsten
Chromium	Nickel	Uranium
Cobalt	Platinum	Zinc
Iron	Tantalum	

Only a few are mined. Some are used in small portions in the manufacture of phrmaceuticals. Some are used only in place of other, more durable, metals for making a less expensive alloy or machine part. Components in the ability to extract these minerals depend upon the amount of ore which is in the ground, the demand for a particular mineral, and the economic feasibility in extracting the minerals. Of course, the economic gain would depend greatly upon how much actual demand there was for a mineral. If enough demand is placed on the mineral, a mining company can profit from as little as .35 lbs. of metal or mineral extracted from every 2,000 lbs. (or one ton) removed from the earth.

There are five main mining districts in Okanogan County:

The Methow-Twisp mining district mines gold, silver, copper, tungsten, antimony, and iron, which are metals. Granite, sand, and gravel are the nonmetals mined. This district covers Methow and Pateros town sites and along both sides of the Methow River north to just upstream to the Methow River and Twisp conjunction.

The Oroville-Nighthawk district appears quite extensive in their extraction of gold and copper. Other metals found here are silver, lead, zinc, iron, and tungsten. Nonmetals mined are sand, gravel, clay, basalt, and gypsum.

Conconcully District takes in all of Salmon Creek and its tributaries and part of the Highway 97 area. Metals mined are lead, silver, and manganese. Nonmetals mined are limestone, sand and gravel, basalt, and peat.

Lying in the northeastern most corner of the County, are Meyers Creek, Mary Ann Creek, and Buckhorn Mountain districts. Metals extracted are gold, copper, and iron. Nonmetals extracted are sand and gravel.

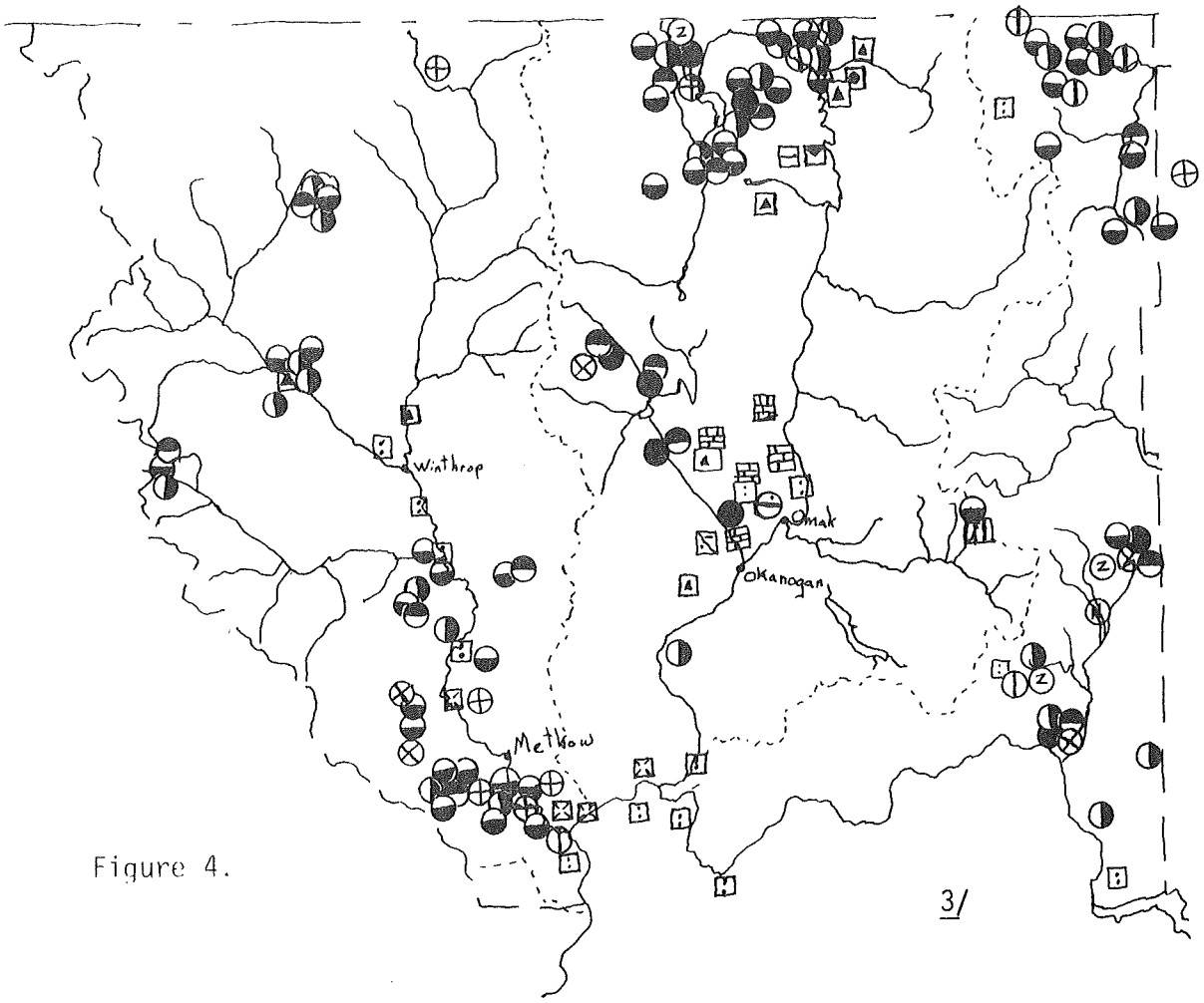

Figure 4.

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⊗	Antimony	▲	Basalt or volcanic rock
◑	Copper	⊠	Clay-pottery, refractory
◒	Gold	□	Granite
◐	Iron	▥	Graphite
●	Lead	⊟	Gypsum
◓	Silver	▦	Limestone
⊕	Tungsten	▨	Peat
ⓩ	Zinc	⁚	Sand and gravel
		▽	Saline salts

The Wauconda District appears to be the smallest in Okanogan County, here is mined gold, silver, copper, and tungsten.

Districts mentioned can be seen in figure 3 on the next page. Other minerals are found scattered about the County.

A TOUCH OF HISTORY

During the year 1859, the International Boundary Commission was engaged in surveying the line between the United States and Canada. Little was known of the Cascade Mountains area up to this time. One of the soldiers, after panning some of the gravel in the Similkameen River, found it bearing gold. This was one of the first discoveries of placer gold in the Okanogan area. A "rush" started, causing Okanogan City to mushroom to nearly 3,000 in population during the first months of its existence.

Just a few months later, news arrived of the gold strikes in the Canadian districts. The miners, always ready to believe faraway fields are greener, deserted the Similkameen for new diggings to the North. Unlike other early mining prospects, records of placer gold discovery prior to 1900 are fragmentary at best. In spite of these nomadic activities, George Adee Bethune, the first State geologist of Washington, accredited the Similkameen River rush as the first to be profitably developed.

Many veins of silver ore were discovered in the Ruby-Conconully District about 1886. At the turn of the century, it was one of the most active camps in the State, with two or three thousand people living in the area. It produced some $200,000 worth of ore before 1907. 7/ The Town of Ruby is now represented only by brush covered foundations of former buildings. The Similkameen River and the Ruby-Conconully District are just two noted examples of the many historical activities in the mineral exploration of the Okanogan and Methow valleys.

VEGETATION

The Okanogan and Methow basins are rather unique in that their habitats range from high-altitude forests to steppe vegetation in the low lands. These diverse communities are also caused by the influence of localized topographic and climatic conditions. The forests are dominated by conifers. These basins, as dry-interior regions, have somewhat different species from that of western Washington. Characterized by a short growing season and minimal summer precipitation, this area has an average annual precipitation of 355 to 760 millimeters. Much of this falls as snow in winter. July, August, and September are very dry.

Figure 5 is an illustration of the general vegetational zones. These zones do not have any definte boundary. It only defines the general areas in which a dominant species will reside. Other different tree species exist within a dominant "zone" along with many types of shrubs, grasses, and herbs.

Eastern Washington is typified by "the western yellow pine," or ponderosa pine. Although the natural climax ponderosa zone are not large, they are seral (member in a successional transition) in other communities.

All the way up the Okanogan Valley to the Canadian Border, and up two-thirds of the Methow Valley, is the natural steppe region. This area now is generally occupied by townsites, irrigated agriculture, and lands for farming and grazing. Adjacent to the steppe region is a v-shaped strip known broadly as the ponderosa pine region. Also along the eastern side of the Okanogan Valley is the north-south region of the ponderosa pine. At higher elevation is the grand fir and the Douglas fir zone which covers about half of Okanogan County. Then, at even higher elevations, is what is called alpine forest. This region includes sub-alpine fir and Shasta red fir climax communities.

In describing the different soil types, the 1967 Classification System will be used. The soil pattern in these basins is closely tied to elevation. Xerochrepts and Cryorthods are soils found in the mountainous areas away from major river valleys. They also are the most abundant soils anywhere in the Okanogan and Methow basin. They will be found in the valleys in small amounts. This is probably the result of watershed transport. Another widely distributed soil type is the vitrandept group. These are derived from granitic parent materials. Description of these major soils is as follows:

Steppe Zone (less than 10% woods)

ponderosa pine (Pinus ponderosa Zone)

grand fir (Abies grandis) and Douglas fir (Pseudotsuga menziesii) zone

subalpine forests zone:
subalpine fir (Abies lasiocarpa)
Shasta red fir (Abies magnifica shastensis)

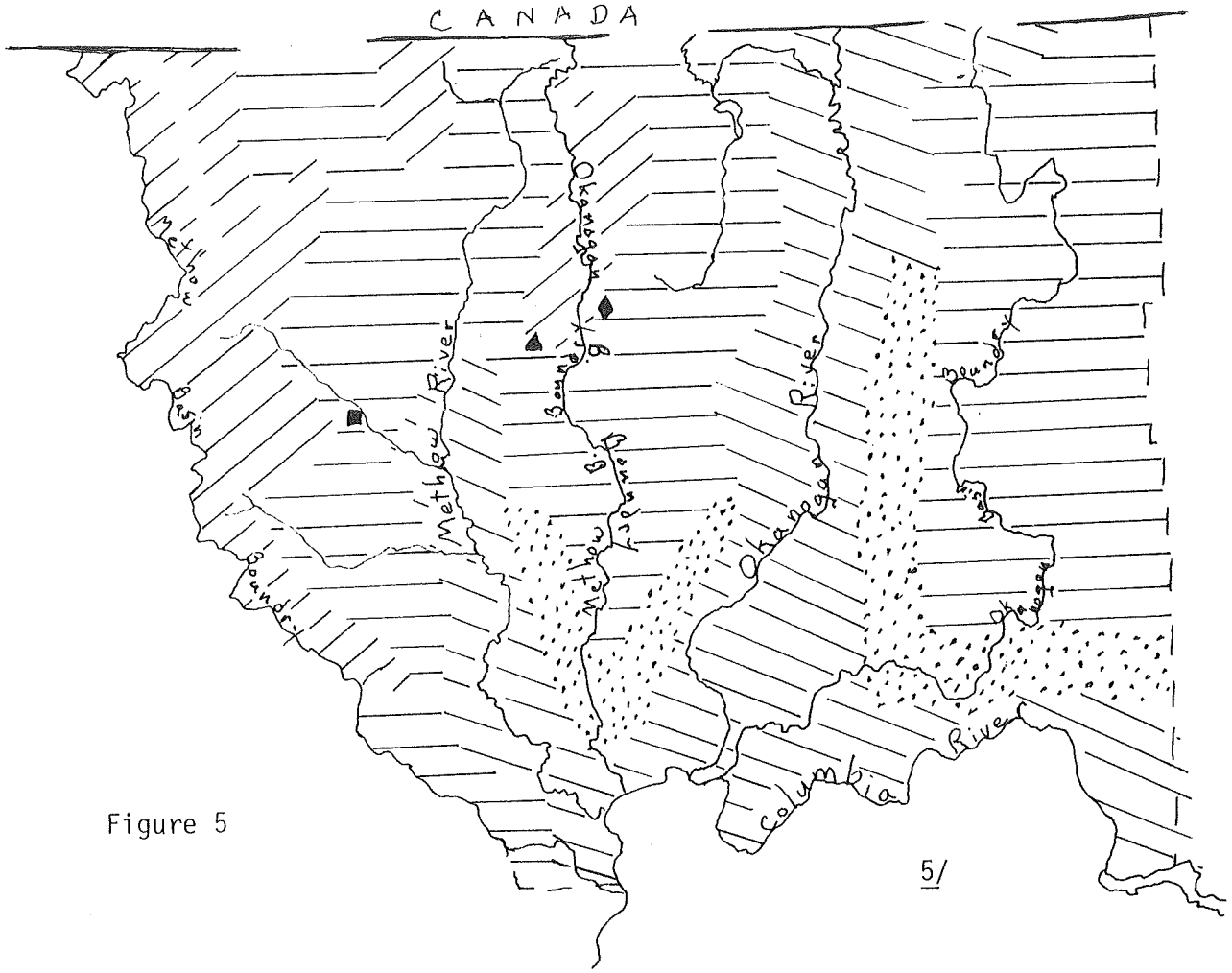

Figure 5

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Xerocarepts: most often cold, acid, stoney, gravelly, sandy, or loam with a total depth of one meter or less to bedrock. Cryorthods: silt loam textured, ligh-colored horizon underlain by a horizon of high iron content. Vitrandepts: high-elevation soils and often considerable amounts of volcanic ash in the surface horizon, consequently silt loam textured soils over generally gravelly loam. At the lower elevations and in the valleys, these soils are found also, mixed with other minor types. The soil transported by way of water runoff is evident.

Ponderosa pine thrive in elevations from approximately 600 to 1,200 meters. At lower elevations, it intermingles with the bunch grass zone, or steppe vegetational zone. The ponderosa pine occupies drier sites than any other forest type (except the western juniper). Its existence is attributed to primarily uniformly sandy soils. Better survival and growth of the ponderosa pine depends on coarse-textured sandy soils rather than on fine-textured, clayey soils.

Other trees associated with this zone are:

Quercus garryana	Oregon white oak
Populus tremuloides	quaking aspen
Larix occidentalis	western larch
Pinus monticola	western white pine
Abies grandis	grand fir
Pseudotsuga menziesii	Douglas fir

Grand fir and Douglas fir are not actual associates in a climax ponderosa pine zone; when found together with ponderosa pine, the Ponderosa is merely a seral member in the Grand fir-Douglas fir climax community because of this situation, the ponderosa pine zone is not as well defined as others. Oregon white oak and quaking aspen are virtually the only two tree associates found in a climax ponderosa pine stand. The quaking aspen is localized only to the poorly drained habitats within the Ponderosa pine zone. The aspen is important in poorly drained soils stable. Wild animals feed on their tender green leaves in the spring also. Here we find the quaking aspen serving a duel purpose, although it is not widely used as lumber production.

Six understory associations have been recognized in Eastern Washington Ponderosa pine zones.

Symphoricarpos albus	common snowberry
Physocarpus malvaceus	mallow ninebark
Festuca idahoensis	Idaho fescue
Agropyronspicatum	bluebunch wheatgrass
Stipa comata	needle and thread
Purshia tridentata	bitterbrush

Most of the natural vegetation types in the steppe zone are these very same species. When looking on the vegetational zones map, one can see the geographical closeness of steppe zones adjacent to Ponderosa pine zones. Deer depend heavily on these shrubs and grasses in winter months. Forced to lower elevations because of cold temperatures and deep snow, deer find these inconspicuous shrubs and grasses a delightful food source.

It is easy for steppe vegetation to grow among the ponderosa pine for two reasons; 1)they both have the ability to grow in well-drained, low moisture soils (termed xeric) and 2)where ponderosa pine is thinly populated, savanna, shrubs, grasses and forbes will thrive in the sun.

Daubenmire and Daubenmire (1968) stated that grassy Pinus ponderosa stands consist of " . . . a mosaic of thin patches of trees, each tending to be distinctive in height and age." This may be the result of one or a combination of factors. A natural fire will burn out the vegetative understory and small ponderosa saplings, while the bark of the mature trees is somewhat resistant of small brush fires. If a ponderosa pine is not old enough to resist fire, it perishes. This will also cause eventual extensive grass cover, especially in dry soils. Some patches of ponderosa pine exist in stagnated patches, where the soil is too shallow for the trees to get very large. Among older, tall, and more mature trees there is a thick carpet of fallen needles on the ground. The seeds of the Pinus ponderosa cannot germinate and take hold in this environment. Under the circumstances, it appears that there is no solution to regeneration once a stand has matured. Rodents serve as a host in this problem. They will gather seeds to put in caches for winter food. Sometimes a cache is not retrieved, and if the ground is in fairly open space, a seedling will grow.

When industries log the ponderosa, they usually cut selectively. By taking the old trees, which have diminishing resistence to pests and disease, they provide additional space for the younger trees to gain full maturity.

The Douglas fir (Pseudotsuga menziesii) - grand fir (Abies grandis) zone, is in actuality, subdivided. The elevation zones of the Douglas fir is typically 600 to 1,300 meters. Abies grandis adapts in elevations between 1,100 to 2,000 meters. This shows that grand fir flourishes beyond the Douglas fir zone into the lower elevations of the subalpine forest zone. Precipitation is higher and temperatures are lower than the lower forested areas.

Douglas fir appears more common as a climax community than the Pinus ponderosa. Temperatures undoubtedly average

cooler; the annual precipitation is higher. As the Pinus ponderosa grows in xeric soils, the Pseudotsuga menziesii grows in more mesic, or moderate moisture content soils. Major tree specie associates in the Pseudotsuga menziesii are:

Pinus ponderosa	ponderosa pine
Pinus contorta	lodgepole pine
Larix occidentalis	western larch

Major understory and open space plant species will consist of;

Festuca rubra	red fescue
Carex spp.	var. sedges
Juncus balticus	Baltic rush
Aster occidentaiis	western aster
Polygonum bistrotoides	American bistort
Trifolium	var. clover
Senecio spp.	var. groundsels

Here clover spp., rushes, sedges and grasses are an important food source for many types of wildlife from rabbits to bighorn sheep. Again, we discover that these understory and meadow-type plants do serve a very noteworthy purpose in their ecological nitch.

The subalpine zone in the Okanogan and Methow Basins consists of two major dominants, Abies magnifica shastensis (Shasta red fir) and Abies lasiocarpa (subalpine fir). Elevation ranges for the Shasta red fir in the Cascade Mountains is from 1,600 to 2,000 meters. Subalpine fir merely has a lower limit of normally 1,500 meters.

For the Shasta red fir, much of the annual precipitation accumulates in winter as snow, while soils tend to be constantly moist with humusy layers. Primary associates are:

Tsuga mertensiana	mountain hemlock
Pinus contorta	lodgepole pine

Great amounts and species of shrubs and herbs constitute a lush understory. Main understory plants are:

Arctostaphylos nevadensis	pine-mat manzanita
Chimaphila umbellata	western prince's pine
Carex pensylvanica	long-stoloned pine
Vaccinum scoparium	grouse huckleberry

Abies lasicarpa, more typical of the alpine environment, grows at the highest levels. The subalpine fir lives in a climate with lower winter and higher summer temperatures than that of the forests just west of the Cascade Crest. Where the grade or slope is not too severe, the subalpine fir's zone is likely to inlcude forest-meadow park lands. These are frequently encountered on or near ridge tops. Here, grasses are the dominant.

Subalpine Fir is sometimes the sole climax species in a forest area. Only occasionally Picea engelsannii (Engelmann spruce) or Tsuga mertensiana (mountain hemlock) will appear as a conspicuous local dominant. Engelmann spruce is found in habitats which are characterized by drainage and an accumulation of cold air. The mountain hemlock is not as tolerant of the climate in which subalpine fir thrives. In places, one can see where the topography and local climate has allowed the mountain hemlock to challenge the dominance of the subalpine fir. The leafy hemlock will provide food during spring months for sheep, mountain goats, and deer.

Four understory associations were recognized;

Vaccinium scoparium	grouse huckleberry
Menzies aferruginea	rusty leaf
Zerophyllum tenax	common beargrass
Pachistma myrsinites	Oregon beargrass

Th grouse huckleberry is widespread throughout the zone and common in dry locales. The rustyleaf occupies only the wettest and coolest sides, like north slopes and ravines. The common beargrass prefers upper south slopes and ridge-tops. The Oregon boxwood grows only in the lower elevations of this zone.

There seems to be a large amount of Pinus contorta, or lodgepole pine in the area of these specific basins. It is well known for its rapid invasion of severely disturbed sites. Adaptability to thrive on wet, poorly drained sites, as well as coarse-textured droughty soils, makes the lodge-pole pine successful where others may not succeed. The

lodgepole pine does favor pumice and volcanic ash soil. Shrubs of the steppe region are its major associates.

The Douglas Fir community has a somehwat different composition of understory dominants. Those are mainly grasses and shrubs such as;

Symphoricarpos albus	common snowberry
Spiraea betulifolia lucida	shiny leaf spirea
Rosa woodsii	wood rose
Rosa nutkana	nootka rose
Calamagrostis rubescens	pine grass
Carax concinnoides	northwestern sage
Carax geyeri	elk sage
Arnica latifolia	broadleaf arnica

These communities may exist in open patches of forest where shrub and forbe steppe vegetation can be found. The most common are Artemisia rigida/Poa sandbergii (stiff sagebrush/ Sandberg bluegrass) and festuca idahoensis - Eriogonum heracleoides (Idaho fescue-Weyeth buckwheat). They can be found in elevations as high as 800 to 900 meters.

Abies grandid or grand fir, in actuality, is associated with ponderosa pine at lower elevations and Douglas Fir at higher elevations.

Nonforest communities are common in this zone also. Some are successional to forests as post fire vegetation, and others are climax shrub or grassland communities. Mountain meadows are conspicuous and also common in areas of relatively gentle topography along and near heads of stream courses. Deschampsia caespitosa, or tufted hairgrass, is a typical perennial grass found growing in these meadows.

The vegetation map on Figure 5 has three marked areas that have not been identified as of yet; the diamond, the triangle, and the square. The diamond represents Tiffany Mountain; it lies in the Okanogan National Forest. As described by the Corps of Engineers inventory (1973) this 430-acre mountain contains 400 year old timber stands representing pioneer and climax of the Larix lyallii (subalpine larch) specie. The triangle, also brought to attention by the Corps of Engineers (1973) represents Boulder Creek. Boulder Creek is a 870-acre park of 300 to 350 year old Pinus ponderosa stands. It has been recommended for preservation as a natural area. The square represents the Wolf Creek Federal Research Natural Area, and the following discussion pages describe this 150 acre tract.

Discussion

As we noticed through the vegetational description, every climax community has within it open parklands. These may be areas where the soil is not deep enough to support trees. Open space, such as these parklands, allow grasses and small shrubs to flourish. These serve as natural pasturelands forthe wildlife. Bighorn sheep, mountain goat, mule deer, and white-tailed deer utilize these areas. High elevation areas are probably utilized year round, while lower elevation parklands are important winter range. At present, bug game are losing competition with domestic cattle for important wildlife wintering areas.

The Okanogan National Forest covers a lot compared to private ownership in Okanogan County. The Forest Service, located in Okanogan Townsite, is presently finishing up an extensive study and land use plan. They have considered 23 different areas to be set aside as Wilderness Study Areas. The procedure for division of these tracts was with the identification of water drainage boundaries.

This appeared to be the most reasonable approach, as the public is familiar with drainage basins. Of the total 523,200 acres (approximately) within the County itself, only 600 acres of other ownership and only 25,700 acres will be affected by plans made concerning the next five years. There are three areas of immediate concern, which total 67,800 acres. These areas were selected on the basis of "most sensitive" which include invasions such as timber extractions, road construction, campground development, etc.

WOLF CREEK FEDERAL RESEARCH NATURAL AREA

Wolf Creek Federal Research Natural Area is in Section 1 of Township 34N and Range 20E, which is 24 miles west of Winthrop townsite. This is one of the smaller Federal research areas which is 61 hectares (150 acres). Generally, the required minimum size is 141 hectares (300 acres). Exceptions are made for smaller areas if they are adjacent to lands generally unmodified in condition, and managed as such. In the case of Wolf Creek, it is lined on the west and south by national forest, and on the north by State forest. It is to an advantage this exception was made, because this area is important big game wintering range. Wolf Creek itself borders the southern edge. To the east is privately owned land. The U. S. Forest Service administers the area from the Winthrop Ranger District.

The only access to Wolf Creek Federal Research Natural Area is by trail which starts about four kilometers (2.5 miles) east, at the end of a blacktop road. The trail bisects the southern third of the area. Being steep, rolling foothills of the Cascades, the elevation ranges from 792 to 975 meters (2,600 to 2,300 feet). General slope direction is southerly. The average annual precipitation, which is 368 milimeters (14.5 inches), occurs mostly during the cool, cloudy winters as snow. Two to three months of drought are common during the summer. All this appears as a somewhat harsh environment for the existing vegetation.

Soils in the Wolf Creek Natural Area are termed as generally colluvial Entisols or Regosols. This means that, commonly, sand to pea-size granititic gravel has collected here from upper regions, and dominates. This is well-drained, poorly developed soils, testing slightly acid to moderately alkaline. Soils where small areas of forest do occur have little, but some, organic matter. Top soil is light in color and of platy structure. Deeper soils contain more clay which has blocky structure.

Because of these soil conditions, botanic life is sparse. Gentle slopes are characterized by the Pinus ponderosa/Purshia tridentata/Festuca idahoensis (Ponderosa pine/ bitterbrush/Idaho fescue) community. Purshia/Festuca or Purshia/Agropyron are the dominant communities living on steep slopes and level benches. Others are Bolsamorhiza sigittata (arrow-leaf balsamroot) Poa sandbergrii (Sandberg bluegrass) and very scattered Ponderosa pine. These savanna conditions suggest limited forest productivity.

Wolf Creek Natural Area also has a history of some disturbance. There is evidence of fires prior to 1910, which was the beginning of fire control programs. Scars on Ponderosa pine indicate periodical ground fires. Dominant old growth firs simply do not

exist. This further suggests that all portions of the track have been burned at some time.

Since 1900 there has been some domestic livestock grazing on this area. Changes in vegetative composition have occurred in the late 1930's and early 1940's because of heavy overgrazing. Presently, livestock pass through the area annually on their way to higher elevation ranges.

Seven to ten years ago, logging has taken place on eastern portions of the Wolf Creek Natural Area. Recently, land adjacent to this area and state-owned property above have been logged. No further timber harvest will be allowed. The Forest Service predicts that logging on adjacent land should have no impact on bitterbrush, wheatgrass communities.

Figure 6, on the next page, is a map of Wolf Creek Federal Research Natural Area.

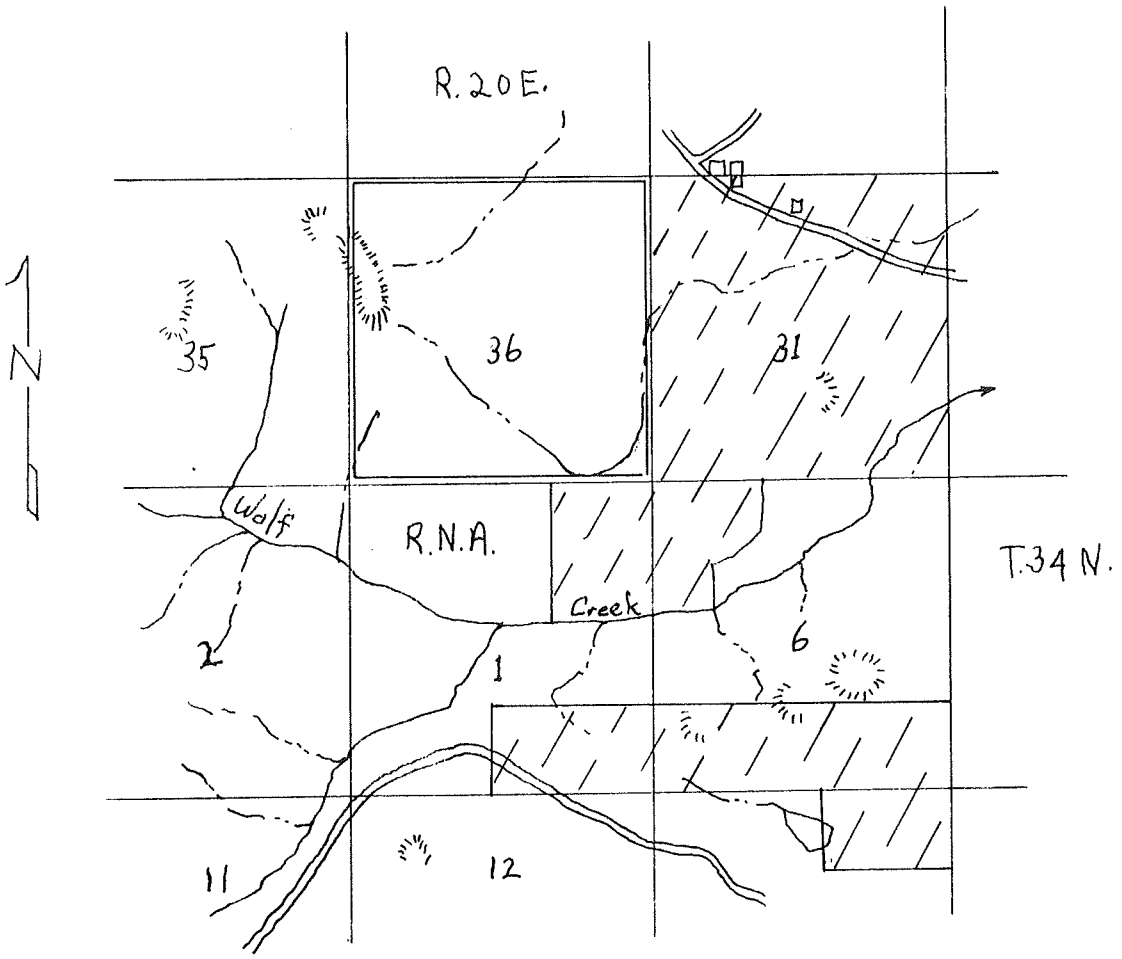
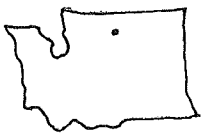


Figure 6



R.N.A. Research Natural Area

State owned land

Privately owned land

(the rest is U.S. property)

ZOOLOGICAL

This chapter lists the main mammals, birds, and fish, native and exotic, living in the Okanogan and Methow Basins. The big game, water fowl, and anadromous fish which are discussed, are those with ready accessability of information. Included are, a map illustrating general range of certain animals and concluding thoughts and recommendations.

Mammals:

badger	%	
beaver	%	
bighorn sheep	+	*
blackbear	+	*
black tail jackrabbit-	=	*
bobcat	%	
cotton tail jackrabbit	=	*
coyote	%	
fisher	%	°
link red fox	%	°
martin	%	°
mink	%	
mountain goat	+	*
mule deer	+	*
muskrat	%	
puma	+	*
raccoon	%	
river otter	%	°
skunk	%	
varying hare	=	*
weasle	%	
white tail deer	+	# *
white tail jackrabbit-	=	*
wolverine	%	°

Fish:

bass		
carp		
catfish	&	
chinook salmon	*	
crappie		
Lahontan cutthroat	#	
resident trout		
sockeye salmon	*	
squawfish	&	
steelhead trout		
sucker	&	
sunfish		
whitefish		

Birds:

bald eagle	&	
black-crown night heron	&	
blue grouse	=	
bobolink	&	
burrowing owl	&	
California quail	=	*
Canada goose	¶	*
canvasback	¶	°
chukar	=	*
coot	¶	
golden eagle	&	
golden eye	¶	
harlequin duck	¶	°
Hungarian partridge	=	*
lesser scaup	¶	
long billed curlew	&	
mallard	¶	*
merganzer	¶	
mourning dove	=	
osprey	&	
peregrine falcon	&	#
pintail	¶	°
redhead	¶	°
ring neck duck	¶	
ringnecked pheasant	=	*
ruddy	¶	*
ruffed grouse	=	*
sage grouse	=	
sharptail grouse	=	°
shouvler	¶	° *
teal	¶	*
turkey	=	
valley quail	=	*
whistling swan	¶	° *
widgeon	¶	*
Wilson snipe	=	
wood duck	¶	*

legend:

% fur bearers
+ big game
= upland game
& nongame
¶ waterfowl

° less common species
* species which will be discussed
# endangered species as designated by U.S. Department of Interior

Deer

The most abundant big game species is the mule deer (Odocoileus hemionus). Although the Columbian white-tailed deer exists in this area also, it is an endangered fauna, according to the United States Department of Interior; Fish and Wildlife Service.13/ In the early days, no other animal was more sought after than the deer. Both Indians and early settlers used deer for food and clothing. The fat, or tallow, was also used for making candles and water proofing for wearing apparel.

The average buck will weigh between 100 and 200 pounds. Does weigh somewhat under 175 and lighter. Weight variation of deer in general depends on locality. Mating or rutting seasons begin in autumn. The males(the only sex with antlers) compete for does. The males will lose weight during this season, while the female is confronted with physical hardships during winter months because of pregnancy.

Deer are thought to be essentially forest inhabitants, although old-growth timber, is not well preferred as the only habitat. They seem to obtain their greatest abundance in a diversity of habitat types. 14/ Now facing inadequate winter range, their population density varies with elevation, slope, exposure, available browse, and harrassment. South-facing slopes are most favorable, where the sun hits. There is less snow and somewhat warmer temperatures than slopes faced in the other direction. Deer must be able to descend low enough, usually below 3,000 feet, to find available browse; also for escape from freezing at higher elevations. When descending, looking for food, deer often are faced with harrassment from domestic dogs and famine because cattle have eaten the grasses and shrubs the previous summer.

Still another aspect where deer and human life conflict, is when deer eat the buds off fruit trees in farmer's orchards. This is usually the result of man utilizing deer winter range for profit. He failed to realize that the land was previously utilized by wildlife, and that wildlife habits persist. After this is reached, the Game Department (i.e., sportsmen) must pay for crop damages, fencing to exclude the deer, manpower to maintain the fences, and hay to feed the deer because of habitat loss.

Bighorn Sheep

Bighorn sheep (Ovis Canadensis) are large wild sheep, much larger than our domestic variety. Its muscular body is well adapted to rugged country. The feet, with cloven hoofs, are able to travel over the most broken country with apparent ease. Mature males weigh from 200 to 300 pounds and mature females weigh from 125 to 175 pounds. Both males and females have horns, although the males are more massive.

Bighorn sheep inhabit undisturbed areas. The largest congregations are on Mount Hall and Aerenas Mountain. Bighorn sheep are not compatible with domestic livestock, because they can carry diseases in which bighorn sheep are susceptible. They also do not show an ability to thrive where deer are overly abundant.

One investigator (14) found that bighorn sheep have more successful reproduction when the sex ratio is 1:1. He discovered that when there were more males than females, less females would conceive. The hypothesis presented was that the long breeding period, with many males breeding the females, may cause sterility in females. If this has any validity, it would appear wise to hold the male hunting season longer, or shorten the female hunting season. Bighorn sheep have a grass, sage, forb diet. Like domestic sheep, they have the ability to get along with a minimum of water. "In winter, moisture is taken largely in the form of snow. While in the summer, it is obtained from dew and from the succulence of food."14/ Also, like domestic stock, they need minerals. Natural licks are few. Conspicuous minerals found in these natural licks are sodium chloride (salt), lime, and phosphorus salts.

Rocky Mountain Goat

The Rocky Mountain goat (Oreamnos Americanus) is the only hoofed animal in North America which can live above the timber line. High elevations are where they find the preferable, virtually undisturbed, rock land and forests. They occur mainly around Palmer Lake, Loon Lake, and west of the Methow River. Their rugged habitat requires much stamina. Level surface is almost nonexistant and clouds, gales, snow, and danger are always present.

Diet consists of grass, brush, moss, and lichens that grow between rocky outcrops. When descending from the high-altitude blizzards, winter food consists of moss, lichens, berries, pine twigs and needles, roses, and erigeron. During spring and summer they will eat aspen and birch. The mountain goat also is faced with domestic livestock competition. When livestock are herded into these high altitude parklands, during the summer, winter becomes more difficult for the wild goats.

Mountain goats are about the same size as domestic sheep. Exceptionally large males may get over 200 pounds in weight. Both sexes again have horns as the big horn sheep do; usually pure white in color and sometimes a few dark hairs.

Puma

The cougar, or mountain lion, is historically known as a puma (Felis concolor). The puma once existed in all parts of the United States from border to border and coast to coast. Adult pumas vary from 80 to 200 pounds. They have the stamina to wander as much as 20 miles in one night in search of food.15/

Pumas are known at times, to take what is left after a kill and bury the remainder of the carcass under leaves or litter. This would appear that the puma is storing it for later, if it could not make another easy kill. Also, in winter the carcasses may remain fresh for many weeks. Other pumas will act to the contrary, however. "In one incidence, a puma attacked a herd of ewes and killed 192 in one night." 15/

Venison is the pumas favorite meat. But, when there is a scarce amount of deer, they will attack young domestic stock such as; colts, lambs, kids, and even full-grown horses and cattle. At times, they will eat a moose, elk, bighorn sheep, beaver, field mouse, porcupine, coyote, skunk, turkey, fish, or snail.

One ecological significance the puma does have is that they keep the deer population in control. Only the strong and healthy survive. In this way, a good stock is available for bearing healthy young. If there are too many deer, they starve during winter months, because of food scarcity. Deer are less apt to intrude on orchard trees if there is enough in the wild to satisfy all of them. On the other hand, the puma population grows too large, bounty or hunting procedures can be designated on them.

Black Bear

The mature black bear (Euarctos americanus americanus) will weigh somewhere between 200 and 300 pounds, occasionally up to 400 pounds. The bear's coat is one of its most important assets. It looks faded and shaggy in summertime, but when the fur grows thick in the fall, it becomes glossy from late fall to early spring. The coat is depended upon to keep the bear warm through the winter months during hibernation.

Bears mate during the last week of June and the first week of July. Females breed only every other year. They bear their young during the winter months and usually have between one and three cubs. The mother is aware of her young and takes care of them with little trouble. Because they are so small when born (less than four pounds) they may even participate in a hibernating sleep.

Winter months are a time of low or no consumption of food. Therefore, the bears consume enough food during nine months of the year to enable them to live through the remaining three. Bears are omnivorous. They will eat both meat and vegetables, such as; dead meat, fresh meat, fish, insects, roots, fruits, berries, nuts, and tree seeds. Bears have been known to eat farmers corn, also. Black bears are not usually harmful to man. Records from early settlements state occasions where a bear has taken a small pig or lamb. During these times, though, the bears were not familiar with the sting of a rifle bullet or the fangs of dogs.

Bears generally reside in areas where undisturbed by man. They like to be near water, but hunt for food in diverse habitats from old growth forest to open parkland.

Rabbits

There are thirty species and subspecies of the genus Sylvilagus listed. 14/ All of which are known locally as cotton tail rabbits. The cotton tail described in the next few paragraphs is rather loosely referring to all the species and subspecies in the Okanogan and Methow basins. This information is generally true for all the species and subspecies of rabbits. Differences may occur in specific habitat types and resulting in slight diet differences also.

Rabbits reside in generally brushy and tall grassy habitats. They seem to thrive on agricultural lands such as croplands and grassland. During winter months rabbits have been known at times, when population density is low, to congregate in areas where there is favorable coverage. High population density decreases the tendency to congregate. Woodchuck dens are favorable and they will use them for shelter from storms and cold weather. When spring arrives, the population disperses. Their daily cruising radius is somewhere from one acre as far as two miles.

A well fed adult rabbit will weigh from 2 1/2 to 3 1/2 pounds. They make their nests on the ground lined with grass and hair for bearing their young. It takes baby rabbits 25 to 32 days to be born from time of conception. Born blind, they never leave the nest until about two weeks later. About two or three days after that the nest is sometimes completely abandoned. The female rabbit will have 2 to 3 litters per season, each litter will be about five or more babies.

The rate of population growth may appear misleading, but the rabbit also faces high mortality. Destruction by natural elements, predatory birds, predatory mammals, hunting and disease are all factors which control the rabbit population. Owls, eagles, and falcons are such predatory birds in the Okanogan and Methow basins. Weasels, foxes, mink, skunks, badgers, bobcats, and martins are mammals which prey upon rabbits.

Rabbits eat varied and diverse types of plants such as succulent herbs, fruits, seeds, and the bark, buds, and foliage of woody plants. Orchard growers of the Okanogan Basin must protect their young seedlings from the rabbits' consumption. Destroying the entire rabbit population would be virtually impossible, and rather converse because rabbits are also good game meat. Predatory animals are an advantage

to the farmer in keeping rabbit populations down. The farmer can also take measures of his own by surrounding the seedlings with branches pruned off the large fruit trees. In this way the rabbits will be too preoccupied in the pruned branches to notice the young trees. Also the farmer can line the orchard forest line with prunings for deer during winter when food is scarce.

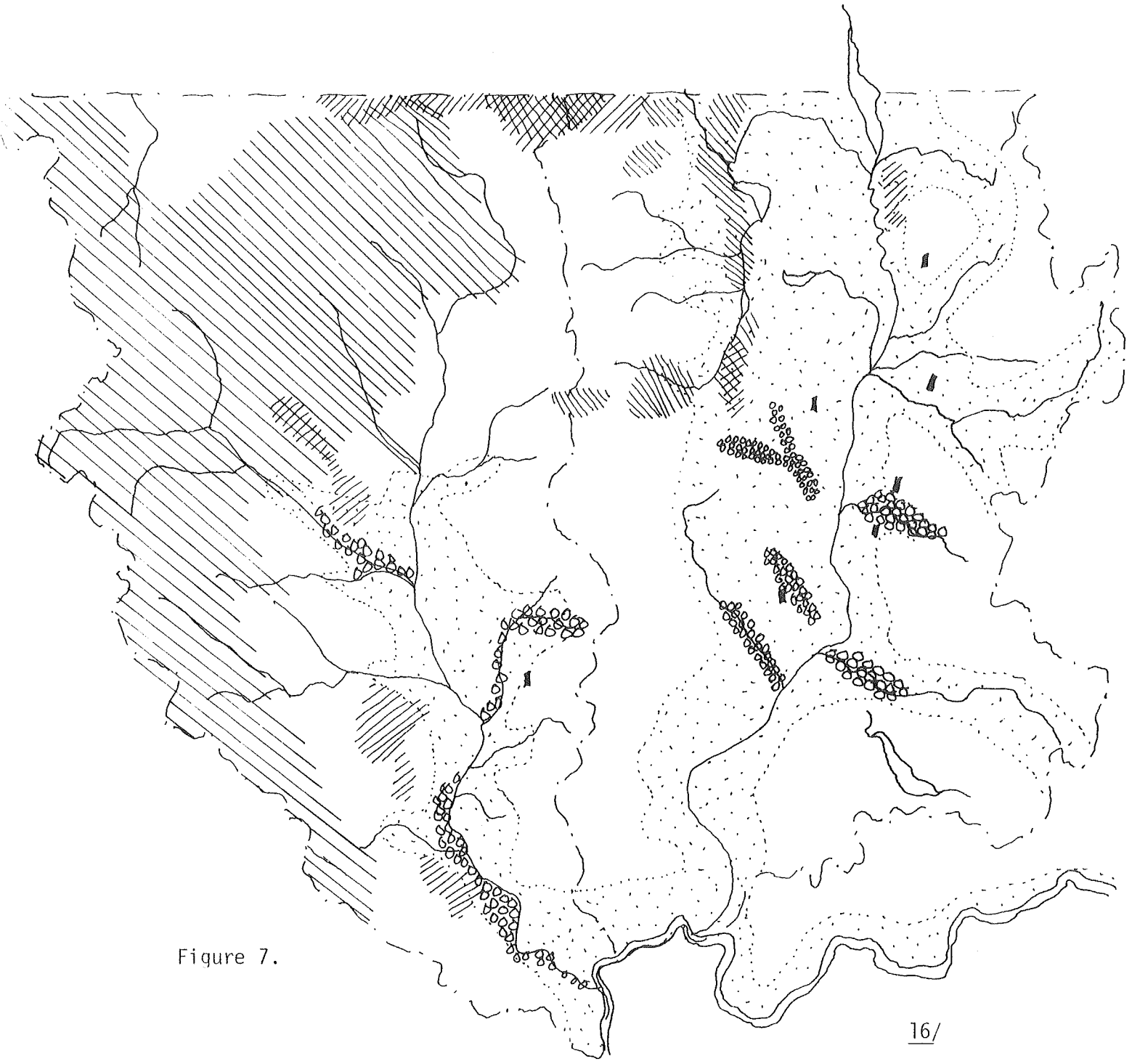


Figure 7.

16/

Deer winter and blue grouse nesting and brooding (pheasant and quail and chukar range lies within these same boundries also, only narrower)

Bighorn sheep wintering

Mountain goat range

Sharptail grouse dancing, or mating, grounds

Sharptail grouse wintering areas

General game priorities

Wild fires are beneficial to game, in the long run, because it creates openings in a forest which stimulates forage growth. Periodic fires also maintain existing meadows. Mountain goats, bighorn sheep, deer, and many other wildlife species are heavily dependent upon these mountain meadows for food. Intensive fire control has reduced this natural process. Some clear-cutting of trees for wood products can create a similar opening for added forage growth. As long as cutting is managed in a manner as not to cause erosion or eliminate an entire forest, it would prove beneficial. Clear cutting does not take the place of periodic burns, however. Burning in natural open areas also stimulates some species of seeds to grow, while the ashes serve as fertilizer.

Following, Table 3 shows some wildlife problems and results.

	Problems	Results
A.	Increasing road construction	Increasing road kills
B.	Off road vehicle traffic	Soil compaction and disturbance, loss of vegetation, erosion and C.
C.	Direct and indirect noise harassment stress or breeding and reproduction seasons.	Energy expended, sometimes resulting in death during cold winter months and low production rates during vulnerable breeding seasons.

Waterfowl

Along the Okanogan and Similkameen Rivers, there are many slow moving meandering portions which provide actual goose and duck nesting areas. Ducks also utilize the numerous glacially formed ponds and lakes in this area. Some of the larger undisturbed lakes provide habitat for goose broods. Areas of goose use are characterized by the presence of adjacent pasture lands. As geese are natural grazers, available grasses and tender shoots attract them.

Ducks classified as river and puddle ducks are the mallard, teal, pintail, widgeon, shoveler, and wood duck. The teal likes fresh, shallow waters and they eat vegetation at edges and in the water land interface. The mallard is a grain eater and likes fresh water but will tolerate brackish waters. The pintail also eats seeds and grains and it lives and thrives in both fresh and salt water habitats along shores. They prefer fresh water. The widgeon duck prefer leafy plants for food and shallow fresh, brackish, or salt water. The shoveler feeds in shallow, fresh, or saltwater, and marshes. It screens the mud with its bill for organisms to feed upon. Dead or alive, the floating matter is consumed also.

Most ducks nest on the ground near bodies of water. Either hard-stemmed bullrush types or little grazed pastures of tall grasses are usual nesting sites. The wood duck prefers nesting above the water such as in trees. Man made boxes on poles can be made and the wood duck will use them. The poles must be in water to prevent squirrels from using them. The wood duck is an eater of insects and seeds.

Diving ducks, such as the redhead, merganser, coot, goldeneye, ruddy, ringnecked duck, lesser scaup, harlequin, and canvasback live at one season or another in the Okanogan-Methow Basins. Diving ducks are different than river or puddle ducks in some respects. They feed more on marine forms, especially during winter. In contrast to the initial vertical flight of the river or pond duck, they must paddle along the water surface before getting into flight. Also, the diving ducks' markings are not as striking as the river or pond ducks'. Diving ducks are not as adaptable to changes in their habitat, and have suffered more than puddle ducks through the years. Because the water fowl are migratory animals, importance of breeding, resting, and wintering areas is stressed.

Fish

Fishing, as well as hunting, is quite good in the Okanogan-Methow Basins area. Aeneas Lake, Alta Lake, Chopaka Lake, Conuly Lake, Fish Lake, Nespelem River, Osoyoos Lake, Palmer Lake, Patterson Lake, Pearrygin Lake, Similkameen River, Wannackt Lake, and Whitestone Lake are all important fish producing sites. Lake Alta, Chopaka, Concunully, Fish, Palmer, Patterson, Pearrygin, and Wassackt are all utilized as fishing recreational sites. (The most significant of these can be sited on the detailed map of the two Basins on the title page.) Chopaka Lake is, at present, the least altered from its natural state. Incidentally, both Chopaka Lake and Chopaka Mountain are extremely scenic.17/

Buffalo Lake, Omak, and Owhi Lake are alkaline lakes. Unique alkaline-tolerant fauna live in these lakes. Omak Lake is being stocked with the threatened species, the Lahontan cutthroat trout. This is possible through a cooperative effort by the Colville Indians and the Bureau of Sport Fish and Wildlife.

There are some excellent runs of anadromous fish in the Okanogan Methow Basins, also. Steelhead trout and chinook and sockeye salmon all utilize the Okanogan River, for it is still entirely free-flowing south of the Canadian Border. A short outline below shows differences between the two salmon species.

Chinook	Sockeye
1. Five hundred to 2,500 escape from spawning.	1. Twelve thousand to 130,000 escape from spawning.
2. Enter Okanogan River in September.	2. Enter Okanogan in July and and August.
3. Waits for temperature drop to 66¼F.	3. Not as sensitive to high water temperatures.
4. Spawn from Mallot to Oroville.	4. Spawn north of Osoyoos Lake.
5. Young leave the following spring.	5. Young leave the following spring. 10/

Problems faced by all anadromous fish in the Okanogan River are water temperature at Enloe Dam on the Similkameen River. High summer water temperatures are a result of natural causes plus water diversions. Enloe Dam obstructs migration into and upstream of the Similkameen River, where there is high potential for anadromous fish to survive.

DISCUSSION

The Game Department's statutory obligation is to preserve, protect, and perpetuate those animals which are hunted game. This assures recreational use of public-owned lands and acquisition of State hunting and fishing licenses. The Department's "industry" is dependent, to a large extent, upon land use practices on private land. Before development, these areas,being the most fertile lowlands, were utilized by wildlife during the winter season.

Most northwestern states have certain amounts of low elevation lands in the public ownership for wildlife use during the critical winter months. Washington does not have much public-owned low elevation lands for these purposes, but this state has developed the Wildlife Recreation Area (WRA) Program. It is designed to acquire key wildlife habitat for their management and recreational use. In the Okanogan-Methow Basins, the 13,799 acre Sinlahekin WRA, and the 11,699 acre Methow WRA were established to provide for new deer herds in winter. Various grain crops and browse planting have provided food for elk, deer, upland game and other wildlife. Artificial feeding is limited, because elk winter in widely dispersed small groups, which makes feeding difficult. Deer, however, congregate in large herds during winter and can be fed baled hay. Limiting also, is the expense necessary to feed the wildlife, which was once self-sustaining.

CONCLUSION

Plans are made for people, this report only points out to the people of other life types, besides people, which exist in the Okanogan and Methow areas. People, in a round about way, are dependent upon other life types. Plants and animals of prehistoric form existed long before the human being. For the human to achieve a life style in the highly technalized form we know today, he had to utilize the resources (plants, animals, and minerals) around him. Likewise, plants and animals are also dependent upon humans. Many types of plants and animals live outside their natural habitat. They are dependent upon man for survival. Crop cultivation and raising of cattle are examples. Life forms in their natural habitat are dependent upon man's decision which may materialize in the form of development and preservation. That decision may be total destruction of a site for profit on projects of short-term benefits. It can be to set aside natural areas for reasons such as; natural resources, recreational activity or just plain aesthetic value. We, the humans have the power to destroy, control, enhance and preserve our environments.

Agriculture, in the form of apple orchards and cattle raising, is the largest activity in the Okanogan and Methow Basins, and should have full recognition in the Basin's plans. People living in these basins also have some responsibility in the decision of the federal lands' uses. The citizen's decision will not only affect their own economy, futures, and environment, but also, in part, the nations' environment, welfare and aesthestics. A considerable amount of wildlife, national forest, and potential recreation sites exist in Okanogan County, in which thousands outside the county come to enjoy. Following are some specific terms which must be considered for the future welfare of the Okanogan and Methow Basins.

Undeveloped lands

The Forest Service points out that there are areas within the Okanogan National Forest which are undeveloped and roadless. These areas being 5,000 acres in size or over, or adjacent to the existing Pasayten Wilderness, are qualified for possible inclusion in a wilderness study. The Forest Service, directed by the Chief, has conducted an undeveloped inventory and study. This procedure is prior to a wilderness study, and includes the involvement of the local public. The Forest Service specifically states that they are not recommending the areas inventoried to be included in the Wilderness Preservation System, but merely as a possible alternative. Unaffected by an undeveloped inventory and study, these areas mentioned continue to be managed under the Forest Multiple Use Management Plan.

Local people in Okanogan County feel that more wilderness designation would have a severe effect on local economy (wages, services, taxes, and 25 percent return money). They are not necessarily against Wilderness. They are more for Multiple Use Management for such reasons as; (a) better fire protection, (b) utilization of forest products, and (c) greater potential for general recreation development to meet increasing needs. Minority viewpoint on possible wilderness designation was that (a) there is not enough wilderness nationally, (b) if not set aside now, they will be destroyed by commercial interest, and (c) the North Cascades Highway causes more population impact and, thusly, more recreation areas will be needed.

The National Forest Multiple Use Act was passed in 1960. "Multiple Use" simply means the management of all surfaced resources of the national forest so that they are utilized in the combination that will meet the needs of the majority of the American people. This also means the harmonious and coordinated management of the various resources as not to impar on the productivity of the lands.

There are projects like the Forest Multiple Use Management Plan, Environmental Coordination Procedures Act, and the United States Department of Agricultures' Forest Service to protect and make better use of the forest and undeveloped land. Evidently, then, undeveloped lands are of value. There also exists what is called the State of Washington Water Resources Planning Act of 1971. This Act provides space for a minimum flow to be established on all perennial streams of the State and to provide for preservation of wildlife, fish, and scenic and aesthetic values.

Other land plans

The secret behind the future success or doom of the Okanogan and Methow Basins lies in the use and management of water and water-related resources. Specific terms must be met concerning flood damage, security of agricultural, municipal, and industrial water supply, and adequate flow to sustain fish. In addition, there will be other overriding problems, needs, and conditions, that will have a direct bearing on water and water related resources. Planning programs for the Okanogan and Methow Basin must contain a true evaluation of local goals and objectives, plus State, National and International interests.

The Okanogan Basin must, firstly, assure sufficient water supply for existing orchard and grain irrigation. Food production is an important factor regarding the strength of this nation. In addition, the economy of the Okanogan Basin is heavily tied to irrigation. There are also industrial goals, such as the production of timber products and the tapping of potential mining sites. Timber cutting must comply with plans which prevent erosion and flash floods. If forests are to exist as a resource, water needed for ore

purification and processing must realize a sharing of water use with irrigated lands. If the water is not available, agriculture should have priority.

Recreation sites are highly in demand and becoming more so. This also will require the use of water. Excellent hunting, fishing, skiing, and nonconsumptive sports such as canoeing all exist in these two basins. This requires development of skiing resorts and presevation of wild and scenic areas and game habitat including game winter range.

Okanogan County is the largest game producing area in the State and one of the largest in the Nation. The entire Okanogan and Methow Valleys were once big game winter ranges and upland game habitats. Now considerably privately owned and developed, we have reached a dilemma. The responsibility is multi-fold. Research should be done by the Department of Game to establish a game management plan which would integrate with private orchard and beef production. The State should be able to supply benefits to land owners complying with the management plan. This is basic democratic public relations.

Those areas on National Forest lands and State owned lands nearest the valley floors should have little human activity. The most destructive activities concerning game winter range, are heavy domestic cattle grazing during summer months and heavy recreational use during winter months such as skiing and snow mobiling. If these steps are taken, not only will deer herds be preserved, but also other wildlife, including the rare and endangered species, will find security.

Proposals have been made to improve existing urban levies, build another storage dam on the Similkameen River (mainly the Night Hawk Site), deepen portions of the Okanogan River for flood control, shorten the Okanogan River at its confluence with the Similkameen, remove gravel deposits at the mouths of tributary streams, control debris on tributaries, replace small and restrictive bridges, and flood plain zoning. Then, these will not always solve the entire flooding problem. Some appear detrimental to salmon runs, resident fish, and upland wildlife. Either temporarily during construction or entirely destructive, fish and wildlife will suffer. Temporary destruction may be avoided or at least minimal if requirements for fish and wildlife habitat and habitat studies are implemented.

Any development for preservation of floods is going to cost money, whether or not it be natural or human caused. The state or Corps might look into spending the money toward removal and reconstruction of buildings from immediate floodplain areas. The greatest advantage this solution provides, which no other solution can, is the assurance that there will be no side effects in other places, mainly down-

stream. An added advantage would be the comeback of winter range area for big game. The money spent by the Department of Game for feeding game could go for the construction of fences to protect orchards.

Both the Okanogan and Methow Rivers are free flowing streams, which should remain so for sustinance of anadromous fish. Preservation of their habitat will improve the fishing sport.

Much of the area from Palmer Lake north to the Canadian border and is wintering range for the mountain goat and big horn sheep. The western section, now in the hands of private land owners, is called to attention. The decision-making for the future state of this area is a serious matter.

There are also quite beautiful scenic areas which deserve attention and thought concerning preservation. Chopaka Lake is still quite a primitive lake. There exists an excellent quality of resident trout fishing. Located just southwest of the Similkameen River, Chopaka Mountain is also of aesthetic and recreational value. Owned by the State Department of Natural Resources, this area is probably the most spectacular state-owned terrain. It has been suggested the mountain be set aside as a natural preserve.12/ At present, cattle are inflicting serious damage to the area.

Another factor a plan for Okanogan Basin must take into consideration is the Colville Indian Reservation. About 33 percent, or one third, of the Okanogan River Basin is located within the Colville Indian Reservation, as the lower half of the river borders the reservation. The use of the Colville water will significantly influence other water usages throughout the rest of the Basin.

All of these proposals must be completely studied as to the present and future impacts, costs versus reasonability, and possible side effects. Cost is looked into most thoroughly. Sometimes when a change is wanted, compiled benefits are presented to make the initial cost appear more reasonable. This is good, if all other aspects are studied also. Long term effects must be studied. Is this proposed project a lasting benefit? If this project is not a lasting benefit, is it reversible to its natural state, which we are sacrificing? Something that we or posterity may need in the future, that may never return by natural needs? If we are to make the right decisions, meeting as participants in a plan for our environment, we must ask ourselves this question, and make possibly more.

> "Every effort needs to be made to integrate the water and related land resources plan ning activities for the total Basins in order to provide the most reasonable use of the basin's natural resources."9/

REFERENCES

5. Dyrness, C.T. and J.F. Franklin. 1973. Natural Vegetation of Oregon and Washington. General Technical Report PNW-8. U.S. Department of Agriculture, Forest Service. Portland. U.S. Government Printing Office.

6. Easterbrook, Don J. and David A. Rahm. Landforms of Washington, The Geologic Environment. 1970. Union Printing Co. Bellingham, Washington. pp. 5-42.

12. Engineer Agency for Resource Inventories. 1973. U.S. Army Corps of Engineers. Environmental Reconnaissance Inventory. Washington, D.C.

19. Finch, Dick. U.S. Forest Service, Okanogan County. Personal Communication. Okanogan, Wa.

1. Franklin, Jerry F., Frederick C. Hall, C.T. Dyrness, and Chris Maser. 1972. Federal Research Natural Areas in Oregon and Washington. A Guidebook for Scientists and Educators. Pacific Northwest Forest and Range Experiment Station. Forest Service U.S. Department of Agriculture. Portland, Oregon. pp. WW - 1 - WW - 7.

16. Game, Department of. C. Young. 1974. Okanogan - Methow River Basin Wildlife Situation Paper, Steps One and Two. Olympia, Wa.

7. Glover, Sheldon L. Biennial Report No. 5 Division of Mines and Geology. 1954. State Printing Plant. Olympia, Washington.

13. Interior, U.S. Department of Fish and Wildlife Service. May 1974. U.S. List of Endangered Fauna. Washington, D.C.

17. King, James D. Okanogan County Planner. Dec. 1974. Personal communication. Okanogan, Wa.

21. Knott, Norm. Department of Ecology, Jan. 1974. Personal communication. Olympia, Washington.

4. McKee, Bates. 1972. Cascadia. The Geologic Evolution of the Pacific Northwest. McGraw - Hill Book Company, San Francisco. ch. 7, pp. 82-104.

3. Pacific Northwest River Basins Commission. 1970. Land and Mineral Resources. Columbia-North Pacific Region. Comprehensive Framework Study of Water and Related Lands. Appendix IV, vol. 1. Vancouver, Washington. pp. 97-119.

9. Pacific Northwest River Basins Commission. Sept. 11, 1973. Situation Paper for the Okanogan River Basin. Compiled from data furnished by the various federal and state agencies. Department of Ecology, Olympia, Washington.

18. Rother, Erle. Dec. 1974. U.S. Forest Service. Personal communication. Okanogan, Wa.

20. Thayer, Dick. Dec. 1974. Department of Ecology. Personal communication. Okanogan, Wa.

15. Trippensee, Ruben Edwin. 1948. Wildlife Management; Fur Bearers, Waterfowl, and Fish. Vol. II. McGraw-Hill Book Company, New York.

14. Trippensee, Ruben Edwin. 1948. Wildlife Management; Upland Game and General Principles. Vol I. McGraw-Hill Book Company, New York.

8. U.S. Army Engineer District, Chief Joseph Dam; Additional Unit, Operation and Maintenance. Draft supplement to Environmental Statement. 1974. Seattle, Washington. pp. 229-236.

10. U.S. Army Corps of Engineers. Sept. 1974. Public Brochure. Alternatives and Their Pros and Cons. Okanogan River Basins Study. Seattle, Wa.

22. U.S. Department of Interior; Fish and Wildlife Service. May 1974. United States List of Endangered Fauna. Washington, D.C.

11. U.S. Department of Agriculture. May 30, 1972. Forest Service Environmental Analysis Report, Undeveloped area inventory and selection of areas for study for possible inclusion in wilderness. Okanogan, Wa.

2. Walters, Kenneth L. 1974. Water in the Okanogan River Basin, Washington. Water - Supply Bulletin 34. Department of Ecology. Olympia, Wa.