FISH AND WILDLIFE STUDY

OF

THE NORTH CASCADE MOUNTAINS

FEBRUARY 1964

U. S. Department of Agriculture Forest Service

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
WASHINGTON 25, D.C.

This resource study report, as well as reports on five other resource studies, has been received by the North Cascade Mountains Study Team and is being reviewed. In addition to Study Team review, copies of all reports have been submitted to the Governor of the State of Washington for his information, review, and comment. In view of the public interest in the management of the North Cascades area and in the individual resource study reports, the Study Team has decided to make this report available for public inspection. The reports are still under review by the North Cascades Study Team. This action in making this report available for public inspection should not be construed either as approval or disapproval by the Study Team of its contents.

Edward C. Crafts, Chairman
North Cascade Mountains Study Team

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ACKNOWLEDGEMENT

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SUMMARY

Report of a Wildlife Study in the North Cascade Mountains

Within the Study Area is a wide variety of vegetation. On the west side, luxuriant forests of Douglas-fir and western hemlock, associated with western red cedar and white fir, are a conspicuous result of the moist climate that prevails from the Pacific Ocean to the crest of the Cascade Mountains.

To the east of the Cascade crest, where precipitation is less, the forest cover is more broken. Tree species, such as Ponderosa pine, which is more open-growing and will admit more sunlight to the forest floor, are more in evidence. Forage plants are plentiful under this timber overstory and on extensive grasslands down to sagebrush ranges at lower elevations. The east slope of the Cascades has a large area that is excellent winter range for big game--much of it on private land, both within and outside the Study Area. See big-game range map in Appendix.

The utilization of fish and game species by fishermen and hunters constitutes an important part of the recreational use of the area. The National Forest wildlife management objective is to manage habitat so that wildlife populations, including nongame species, will be maintained at levels consistent with the requirements for other services of the land and in accordance with their recreational and related public uses and values.

Big Game Resources

Estimates of game animals, game harvest, and hunter use days were made by both the Washington Game Department and the U. S. Forest Service. The following are rounded averages of these estimates:

> In 1962, 75,000 mule deer, 65,000 black-tailed deer, 14,600 elk, 12,000 bear, 8,000 mountain goats, and a few bighorn sheep used federal ranges within the Study Area. In addition, the area had a full complement of small and upland game and nongame species. During 1962, the harvest of game animals in this area was approximately 15,800 deer, 2,400 elk, 1,300 black bear, and 300 mountain goats.

In 1958, the Washington Department of Game, in cooperation with the Forest Service, inaugurated an early high Cascades deer hunting season. The area involved was located entirely within the Study Area. This season permitted hunters to harvest surplus animals in remote areas in September before the onset of unfavorable weather conditions. This special early season provided a unique experience to sportsmen and has been widely approved. Practically all of the State's mountain goat hunting takes place in the Study Area.

Game species are, in general, at high population levels, and the winter habitat is fully stocked or overstocked. In many cases, fish and game species are underharvested in the extensive undeveloped areas because of legal season limitations and lack of road and trail access. Due to underharvest, winter die-offs occur because of habitat limitations or range deterioration. The habitat in some areas can be more fully developed, but the maximum development of big game populations is limited by key winter ranges which are often found on private lands, particularly east of the Cascades.

Opening of the tree canopy through logging increases forage production and improves the habitat for wildlife by creating additional vegetative edge effect. Big game populations increase rapidly to fill the expanded carrying capacity of the habitat. Harvest of annual crops of game species by hunters can be an effective and practical way to control populations and prevent damage and overuse of the range, and, at the same time, provide much recreational enjoyment to outdoor enthusiasts.

Big game increases at the rate of approximately 25 to 35 percent annually, disregarding natural losses. A substantial number of animals are available for harvest annually, in order to avoid losses resulting from overstocked or depleted ranges. The Washington Department of Game estimates that game animals of the Study Area make up approximately 27 percent of the State's big game supply and account for about 298,000 hunting days each year.

Game range produced by logging is transitory. The highest big-game populations follow logging by about ten to twenty years. There is a gradual buildup to a high point and then a gradual decline as the tree canopy again closes. Maintenance of this capacity requires that new openings be created as old ones become reforested. Sustained yield logging helps provide this needed habitat.

Many acres of deteriorated rangeland need to be improved by browse and grass seeding. It is usually necessary to reduce wildlife and livestock uses in order to reestablish desirable forage plants. In the drier parts of the Study Area, better distribution and larger populations of both game animals and birds would result from the installation of wildlife water supply projects.

Small and Upland Game and Waterfowl

Small and upland game species generally are underharvested, particularly in underdeveloped areas. Waterfowl populations are limited by the environment but they can be increased through habitat improvement, such as creation of additional water areas and construction of nesting facilities. Control of land use during the nesting season can be effective in increasing numbers of birds that reach adulthood.

Fur harvest is significant in the North Cascades Area. Of the statewide total, the Study Area produced approximately 91 percent of the marten, 25 percent of the otter, 43 percent of the mink, and 50 percent of the weasel.

Fish

Important resident cold-water fishes are Whitefish and various species of trout, including Rainbow, Cutthroat, Eastern Brook, Dolly Varden, and Brown. At lower elevations, warm-water fishes, such as Bass, Crappie, and Catfish occur. Fish populations are normally largely underharvested in the more inaccessible areas.

Anadromous fishes of both commercial and sport value include King, Silver, Pink, Red, and Chum salmon, and Steelhead and sea-run Cutthroat trout. See anadromous fish map in Appendix. The salmon resources of the Pacific Coast and Alaska comprise one of the important natural assets of the United States and Canada. The streams of the Study Area during the period 1950 to 1960 contributed to this resource approximately 18 percent of the United States' production of salmon.

The current yearly income value of the North Cascades' contribution to commercial fisheries of approximately 27 million pounds is computed to be $12,484,000.

Sport salmon fishery catch on the ocean, Strait of Juan de Fuca, and Puget Sound for the period 1954 through 1958 was 262,000 King salmon, 330,000 Silver salmon and approximately 70,000 Pink salmon. As a result of increasing fishing pressure since 1958, the sport salmon catch for 1962 was estimated to exceed one million fish.

Major streams that produced these fish are: Nooksack, Skagit, Stillaguamish, Skykomish, Snoqualmie, Green, Puyallup, Nisqually, Chehalis, Cowlitz, Methow, Entiat, Wenatchee, and Yakima.

The adjusted 1958-1962 average salt water sport salmon catch of fish originating in the North Cascades Study Area was 497,361 salmon harvested in 904,656 angler days. In addition, steelhead fishing accounted for 303,750 angler days, and smelt and other minor species added another 43,000 man-days. The steelhead is the most important species harvested in fresh water sport fishery. Streams west of the Cascades are not highly productive for resident species because they are being used heavily by populations of migratory fish.

Additional resident fish habitat can be created by the construction of new water impoundments or the expansion of present reservoirs. Fish production can be increased by stabilizing stream channels and streamflows, and further prevention of pollution within drainage systems. Artificial salmon and steelhead spawning channels, natural oxbows and steelhead rearing ponds are also proven management tools that can increase fisheries production.

It is calculated that there are approximately 100 miles of major streams and 500 miles of tributary streams within the Study Area that can be developed for anadromous fish by construction of fish ladders, log jam removal, or stream improvement. Future increased demands for fish can be met only by more intensive use of the habitat in both natural and artificial production efforts.

Economic Values of the Study Area

The economic values of fish and wildlife resources have not been fully determined. Based on information from the Inter-Agency Committee on Water Resources, Sub-Committee on Evaluation Standards, the annual recreation value of these wildlife resources is calculated to be $9,501,000.

Based on a statewide survey of annual expenditures by hunters and fishermen, the calculated pro rata share for the Study Area is $27,120,000 annually. Additionally, the production of fish in the Study Area which enters the commercial catch is computed to have an annual value of $12,484,000. In terms of edible meat produced, the harvest of fish and game animals by sportsmen resulted in an estimated total of 7,400,000 pounds of meat available for consumption.

The intangible aesthetic values of wildlife add much to the total worth of the resource.

Future Demands and Supply

Wildlife is closely allied to recreation in the National Forests. In the Study Area, hunting use has increased from about 180,000 visitor days in 1958 to 420,000 in 1962, and fishing use has increased from about 430,000 to 530,000 visitor days. A continued increase is expected as the population, its income, leisure time, and mobility increases.

One of the outstanding economic factors is the rapid population growth during and since World War II. The population increase in the zone of influence was approximately 24 percent from 1950 to 1960; whereas, in the State of Washington it was 19.9 percent for the same period. The population growth, coupled with an increasing demand and a game supply not yet fully utilized, means that wildlife will be of even more value in the future than it has been in the past.

The wildlife resources and their utilization can be increased to help meet rising public demands by such measures as: more efficient harvest of fish and game crops, increasing access facilities, developing and improving water areas, and intensifying management of the land for wildlife production.

The Washington Department of Game and the Forest Service share in the management of fish and wildlife on National Forests in Washington under the terms of a Memorandum of Understanding approved in 1960.

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INTRODUCTION

Authority

On March 5, 1963, the Secretaries of Agriculture and Interior jointly appointed a study team to explore in an objective manner, all the resource potentials of the Federal lands in the North Cascade Mountains of Washington, and to recommend the form of management and administration that appears to be in the public interest.

Objectives

Within guidelines provided by the study team, the objectives of this sub-study are to assemble data on the wildlife and fish resource, its use and importance to the study area, its problems, future supply, demand and adequacy to meet the demands.

General Description of Study Area

The study area comprises approximately seven million acres in the Cascade Mountains of Washington between Highway No. 5 and the Canadian border. It embraces all of Mt. Rainier National Park, Mt. Baker, and Wenatchee Forests and portions of the Okanogan, Snoqualmie and Gifford Pinchot Forests. It does not include the Tonasket Ranger District of the Okanogan N.F.

In order to fully evaluate the wildlife resource it is necessary to include a zone of influence. This is considered to be the ten counties that have appreciable amounts of land within the study area as shown on the map that follows. The counties are Chelan, King, Kittitas, Lewis, Okanogan, Pierce, Skagit, Snohomish, Whatcom and Yakima. Most big game animals using federal lands live year around within the zone of influence. The fisheries zone of influence includes the Columbia River, Puget Sound, Straits of Juan de Fuca and the Pacific Ocean. See Exhibit No. 1.

These zones of influence have been arbitrarily established; however, hunters and fishermen from the entire state use the area.

EXHIBIT NO. 1.

Zone of Influence Map.
Fish and Wildlife Resources

The Study Area is mountainous. The crest of the Cascade Range divides the area into east and west portions which are somewhat dissimilar because of elevational differences, climates, and vegetation. The area is described in two sections, "Summit and West of Cascades" and "East of Cascades."

Summit and West of Cascades

The terrain rises from near sea level to over 10,000 feet elevation. Major peaks are Mt. Rainier, 14,410 feet; Mt. Baker, 10,778 feet; and Glacier Peak, 10,528 feet. Due to the geographic location and topographical variations, it is an area largely primitive in character which is partially clothed in a moisture laden mantle of dense rain forest. Above the deep woods are innumerable glacier mantled peaks which, for many months of the year, are wind-swept neighbors to the storm and snow-laden clouds. This land is, in a geological sense, youthful and erratic, with all the instability of glacial icefalls and spurting streams whose beds are, overnight, seeking new exits on their hurried rush to the sea. This area has over 50 percent of the 201 square miles of all glacier-covered surface presently existing in the United States.

The topography is very rough with deep canyons. Numerous snow-slide areas scar the side slopes. The swift streams have cut their way to bed rock in the upper slopes and deposited the rocks and gravel in the lower valleys.

The streams run generally from the summit of the Cascades to Puget Sound, Grays Harbor, or the Columbia River. The one exception is the Skagit River, the largest river west of the Cascades, that runs from Canada south to the confluence of Ruby Creek before it turns west. The Cowlitz runs south to join the Columbia; however, it generally runs in a westerly direction. The main ridges have a southern exposure on one side and a northern exposure on the other. The spur ridges have eastern and western exposures.

The principal drainages from north to south are the Nooksack, Skagit, Stillaguamish, Snohomish, Cedar, Green, Puyallup, Nisqually, Chehalis, and Cowlitz Rivers. This area has about 440 lakes and reservoirs below 2,500 feet, with an area of about 30,400 acres. Above 2,500 feet, there are about 890 lakes, with an area of about 10,600 acres. The West Side is typically heavily forested with little undergrowth. Logged areas, however, become densely covered with herbaceous and shrub vegetation. The waters of the glacial rivers and streams are comparatively low in minerals and organic matter and are, therefore, low in productivity. The entire area is extremely valuable as a watershed.

East of Cascades

The East Side of the Cascades is typified by trench-like valleys beginning at an elevation of 2,000 feet on the eastern boundary and rising to elevations at the Cascade Crest of over 7,000 feet. The drainage from the east slope is via the Methow, Entiat, Wenatchee, and Yakima Rivers which flow into the Columbia.

Climate

The study area has widely contrasting climatic conditions which greatly influence the vegetative cover. See Exhibit No. 2. The area west of the Cascades receives an abundance of precipitation. Much of it falls in the form of snow at the higher elevations. This plentiful supply of snow results from the moisture borne by the westerly winds blowing in from the Pacific Ocean. As the moisture bearing clouds proceed farther east, they have less moisture and precipitation steadily decreases.

The summer months on the west slope are usually quite dry, but occasionally heavy rains during June and July create a wet, dismal atmosphere. Maximum rainfall record for the area is 172 inches at Verlot Station, Mt. Baker Forest. Rainfall records for northern and southern portions of the Study Area show the increase in rainfall from the base of the range to the summit. Average annual rainfall along the Cascade summit is 90 to 100 inches.

EXHIBIT NO. 2

Climate

Northern Section			Southern Section		
Station	Av. Annual Rainfall (inches)	Approximate Elevation	Station	Av. Annual Rainfall (inches)	Approximate Elevation
Bellingham	32.22	300	Seattle	31.8	400
Mt. Baker Lodge	110.96	4,360	Snoqualmie Pass	96.17	3,010
Winthrop	13.25	1,700	Cle Elum	23.05	1,900
Okanogan	10.07	850	Ellensburg	9.22	1,512

Snowfall *

Snowfall varies from none to one foot along the western boundary of the study area. Snowfall on Mt. Baker often reaches 20 to 30 feet. Average snowfall at Snoqualmie Pass is 15 to 20 feet. On the eastern side, the snowfall diminishes from the Cascade Crest eastward. The average yearly snowfall at Yakima is about 22 inches.

Temperature*

The table below is representative for temperatures for the entire study area. Information is not available for elevations above 5557 feet.

Station	Ele-vation	Jan. Av.	July Av.	Max.	Min.
Seattle	400'	39.5	63.1	98	3
Snoqualmie Pass	3010'	26.2	56.8	101	-15
Paradise Inn	5557'	26.1	51.7	99	-20
Cle Elum	1900'	27.2	63.6	105	-19
Ellensburg	1512'	25.4	68.2	110	-31

*From U.S.D.A. yearbook, Climate and Man

Vegetation

Within the Study Area is a wide variety of vegetation. On the west side luxuriant forests of Douglas fir and western hemlock associated with western red cedar and white fir--at higher elevations other firs and lodgepole pine--are a conspicuous result of the moist climate that prevails from the Pacific Ocean to the crest of the Cascade Mountains.

The lower west slope of the Cascades affords few natural openings in an almost unbroken forest cover. Immediately above the forests in the subalpine zone are extensive natural meadows where winters are long and severe. Summers are balmy and short and frost-free days are few. These areas are ideal summer range for big game animals.

To the east of the Cascade crest where precipitation is less, the forest cover is more broken. Tree species such as Ponderosa pine, which is more open growing and will admit more sunlight to the forest floor, are more in evidence. Forage plants are plentiful under this timber overstory and in extensive grasslands down to sagebrush ranges at lower elevations. The east slope of the Cascades has a large area that is excellent winter range for big game, much of it on private land both within and outside the study area.

Soils[1/]

The Cascade Mountains are new in a geologic sense. Their lofty height was acquired by a gradual uplift accompanied by buckling and upwarping of the strata. As the mountains slowly elevated to great heights the streams in the area adjusted and cut to depths of thousands of feet. The stream valleys broadened by disintegration of rocks and the region was transformed into a lavish network of crests, valleys and ridges.

During the recent glacial period the stream-cut valleys were filled with ice to great depths. These great masses of ice, moving sluggishly downward, gradually enlarged the valleys to broad-floored, U-shaped troughs.

After the mountains gained their present height and were dissected, local volcanic eruptions began. Volcanic cones built up and lava, ash, and cinders were spewed about the landscape. Under the preceding climate and geologic conditions, soils in the Study Area were formed.

[1/] Soils data adapted from Atlas of Pacific Northwest, second edition, published by Oregon State College, Richard M. Highsmith, Jr., Editor.

The soils vary from light andesitic derivities in the higher Cascades to heavy basaltic soils in the lowlands along the eastern boundary. Windblown deposits of volcanic dust have formed numerous pockets of bentonite clay giving rise to many unstable soil sites. On and adjacent to the Cascade crest, light soils derived from old altered sedimentary rocks and andesites form areas which erode easily and require careful management.

For convenience, all soils of the Study Area are broadly grouped as:

Podzolic-Brown Podzolic - 83%
(Mountainous Areas)

Brown Forest-Gray wooded - 17%

The Brown Forest-Gray wooded soils occupy a narrow belt along the eastern edge of the Study Area. They are formed at lower elevations where precipitation is 15 to 30 inches. Typical natural vegetation includes Ponderosa pine, bitterbrush, manzanita and mountain mahogany. These soils are fairly well suited for big game grazing except when they occur on very steep slopes, are shallow or droughy, or have excessive erosion.

The Podzolic-Brown Podzolic soils are formed in mountainous areas where precipitation is 30 to 100 inches. Typical natural vegetation includes Douglas fir, hemlock, western red cedar, larch, spruce, white fir and pine. The soils in open areas are suited for recreation, wildlife, and summer livestock range.

Land Ownership

The Federal Government is the largest owner of land. Total and proportionate ownerships are shown below. The map of the North Cascade Study Area shows lands in Federal and other ownerships. Federal ownership is not consolidated.

Land Ownership Within the Study Area

Ownership	Acres	Percent
Forest Service	6,067,834	86.2
National Park Service	241,571	3.4
Private	639,715	9.2
City	51,625	.7
State	37,270	.5
County	150	.0
TOTAL	7,038,165	100.0

HISTORY

WILDLIFE

Early Abundance and Habitat Conditions

An abundant wildlife population made possible the exploration and settlement of the West. Without the food and clothing provided by wild animals, overland travel across the continent would have been extremely difficult.

When white men arrived, the following animals were probably found in the Study Area:

Big Game

Elk
Mule deer
Black-tailed deer
White-tailed deer
Bighorn sheep
Black bear
Grizzly bear
Mountain goat
Moose

Small Game

Cottontail rabbit
Jack rabbit
Snowshoe hare

Small Mammals

Hoary marmot
Yellow-bellied marmot
Cony
Porcupine

Upland Birds

Band-tailed pigeons
Mourning dove
Ptarmigan
Spruce or Franklin's grouse
Sharp tailed grouse
Sage grouse
Blue grouse
Ruffed grouse

Large Predators

Cougar
Coyote
Wolves

Fur Animals

Marten
Mink
Otter
Weasel
Beaver
Muskrat
Red Fox
Bobcat
Canada lynx
Wolverine
Fisher
Raccoon
Badger
Striped skunk

Wildlife habitat apparently has a long history of overuse. Soon after settlement, the area received excessive grazing pressure from domestic stock. The effects of this early grazing is quite obvious today. Meadows once covered by lush thickets of willow, grasses, and sedges have now assumed a weed or forb-like aspect. On the grasslands, native bunchgrasses were overused and trampled. As these grasses thinned out, they were replaced by less palatable and productive plants and severe erosion occurred. Indians and early white residents annually burned much of the area to increase the available forage, and in the high country, uncontrolled natural fires contributed to the availability of grass and herbaceous vegetation.

On the East Side, cougar, wolves, coyotes, black bear, bobcat, and lynx were the most important predators. Many small mammals and furbearers were common residents of the West Side, especially those adapted to flora associated with very dense timber overstories.

The heavy stands of timber with little understory vegetation were poor sites for ungulates. As wildlife habitat, it was most important to small mammals and birds. Following logging on these forested areas, dense stands of shrubs and herbs became established. It was not until the establishment of those understory communities of palatable plants that the West Side became productive to ungulates.

Early Exploitation - Hunting and Trapping

Although the Indians had always hunted fur-bearing animals, it was with the coming of the white traders in 1808 that furbearers were taken in excess. Beaver, otter, bobcat, marten, cougar, and coyote produced most of the furs of the early traders. Populations of these animals, especially beaver, marten, and otter were greatly reduced before 1900.

In the early days, game was not abundant on the western slopes of the Cascades. The heavy tree growth shaded the ground so that very little game browse was available. The browse was limited to old burns, slides, streamsides, and above timberline. The areas above timberline were out of the snow only three months in summer. The winter range in the low country was very limited and could support only a small number of deer and other animals. The history of early settlers moving into the Northwest reports that they found very few game animals for food.

The Indians and early settlers had little trouble killing a large percentage of the game during the winter when the deer moved down to the few openings and river bars where there was winter feed. The trappers, miners, and settlers killed deer and bear for their meat supply whenever they could find them. This heavy hunting for the few animals that could survive on the meager forage took a high percentage of the total stock.

The area east of the Cascades, because of its drier climate, gentler topography, and more sunlight on the forest floor, provided extensive areas of productive wildlife habitat.

Prior to 1880 deer and big-horn sheep were common. These animals were the favorite foods of the miners and they greatly reduced the populations around the mines. In addition to over-hunting and range competition, there was a very severe winter in 1916 with an extremely heavy snowfall that nearly eliminated the remaining deer population.

During the mid-1920's deer were so scarce in Chelan County that they were considered rare while at other times they have been extremely abundant. The Washington Department of Game Biennial Report in 1921-22 stated that deer were on the wane statewide and that unless drastic steps were taken immediately they were doomed to extinction. The Department estimated that there were only 1,000 deer of both sexes killed in Washington during this biennium.

Protection - Refuges and Closed Seasons

Following the low big-game populations around 1920, the following steps were taken to increase game numbers: (1) Restrictive regulations were passed establishing game seasons, (2) Game reserves were established in Okanogan and Chelan counties to further protect portions of the herds during open season and, (3) Law enforcement was started. Game herds built up to highs in 1938, 1947 and 1955 which completely stocked or over-stocked the winter ranges. With high game populations the game reserves were abolished during the 1940's.

Predator Control

Predator control, to protect livestock and game animals, has been a common practice in all the lower elevations and many of the higher areas since the first settlers entered the region. Stockmen have waged continuous war on predators until the present.

Since the earliest records cougar and black bear have been common in the timbered areas up through the Hudsonian Life Zone. Bears were troublesome for homesteaders because they preyed on hogs, cattle and sheep. See Life Zone map, Exhibit No. 3.

Coyotes and bobcats have probably always been common even though they have long been subject to control by traps and poison, particularly on the lower ranges. The 1080 Program, beginning in the 1940's, has been effective in controlling coyotes. Wolves, because of their livestock depredations, were subject to intensive control. Dalquest[2/] states that wolves were reported from Mt. Rainier as late as 1920. The Mt. Baker Forest reports wolves were present in the 1930's. Grizzly bears were present in limited numbers but have been almost, if not entirely, eliminated. The Mt. Baker states that only an occasional one has been reported since the 1930's.

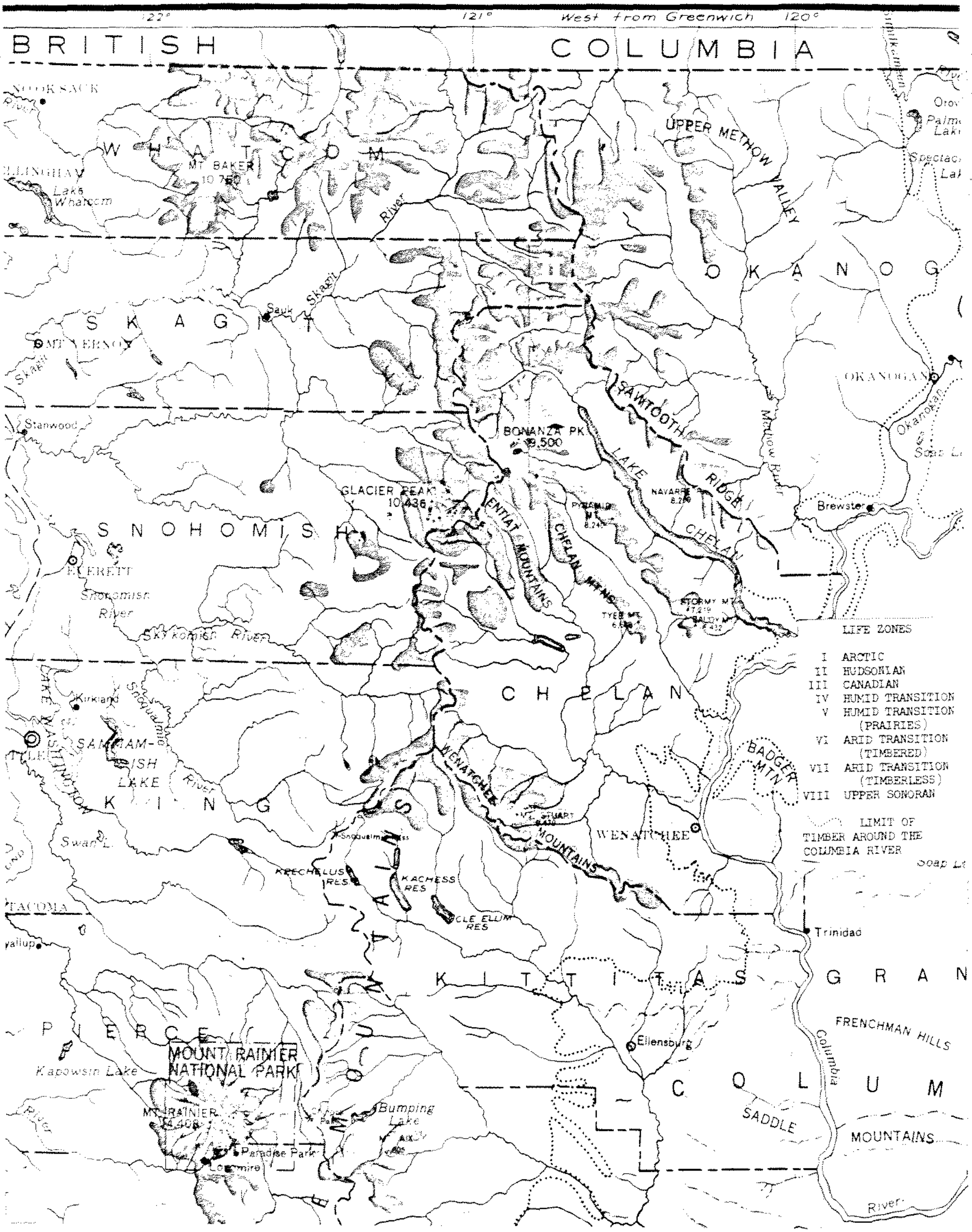
Environmental Changes Affecting Wildlife

Throughout the years the changes in the environment as a result of man's activities have been both detrimental and beneficial to wildlife. In general, east of the Cascades, wildlife has been crowded off the lower, more fertile and productive areas into the less favorable, higher elevation land. This crowding has occurred primarily as a result of the land being occupied by settlements, agriculture, grazing, roads, and other high priority uses. In many cases this has resulted in the movement and concentration of big-game species from primarily private lands in the valley bottoms to less productive lands that are mainly in Government ownership at higher elevations. Some serious range overuse on federal lands has occurred because of game animals being forced in winter into a narrow belt between deep snow above and agricultural land below.

Early records on the West Side indicate that the black-tailed deer, Roosevelt elk and mountain goats were the early ungulate residents of the area. Their numbers were very small, however, for they were primarily associated with the natural openings in the lower regions. The heavy stands of timber with little understory vegetation were poor sites for grazing animals. As wildlife habitat, it was most important to small mammals and birds. Following logging on these forested areas, dense stands of shrubs and herbs became established. It was not until the establishment of those understory communities of of palatable plants that the West Side became increasingly productive.

2/ Mammals of Washington, University of Kansas, 1948 by Walter W. Dalquest, p. 233.

EXHIBIT NO. 3


122°
121°
West from Greenwich
120°
BRITISH
COLUMBIA
WHATCOM
MT BAKER 10 750
Lake Whatcom
River
UPPER METHOW VALLEY
OKANOGAN
SKAGIT
Sauk
Skagit
OKANOGAN
SAWTOOTH RIDGE
Stanwood
BONANZA PK 9,500
LAKE CHELAN
Methow River
Okanogan
GLACIER PEAK 10 436
NAVARRE 8,290
Brewster
SNOHOMISH
ENTIAT MOUNTAINS
CHELAN MTNS
PYRAMID MT 8,245
EVERETT
Snohomish River
Skykomish River
STORMY MT
SADDY M
TYEE MT
LIFE ZONES
I ARCTIC
II HUDSONIAN
III CANADIAN
IV HUMID TRANSITION
V HUMID TRANSITION (PRAIRIES)
VI ARID TRANSITION (TIMBERED)
VII ARID TRANSITION (TIMBERLESS)
VIII UPPER SONORAN
LIMIT OF TIMBER AROUND THE COLUMBIA RIVER
CHELAN
Kirkland
LAKE WASHINGTON
SAMMAMISH LAKE
Snoqualmie River
BADGER MTN
WENATCHEE
KING
WENATCHEE MOUNTAINS
MT STUART
WENATCHEE
Snoqualmie Pass
Swan L.
KEECHELUS RES
KACHESS RES
CLE ELUM RES
TACOMA
Trinidad
Puyallup
KITTITAS
GRANT
FRENCHMAN HILLS
PIERCE
MOUNT RAINIER NATIONAL PARK
Ellensburg
Columbia
Kapowsin Lake
COLUMBIA
MT RAINIER 14,408
Bumping Lake
SADDLE MOUNTAINS
Paradise Park
Longmire
River

Mining

Mining had little effect on big game and other wildlife except that of increased hunting pressure by prospectors and miners. Miners killed game for meat whenever they could. In many places they set fire to the timber and burned hillsides bare to make it easier to prospect. These burns came up with fireweed, berries, willow and many other plants that were good food for deer and bear.

There had been much prospecting and a great number of claims recorded. This has resulted in sporadic clearing and sluicing operations. An example of this would be the Gold Hill area just north of Chinook Pass. From 1858 until the turn of the century, it was mined intensively. The hillsides were burned quite often and a great deal of top soil was washed away.

Logging

Logging, particularly west of the Cascade Divide, favored the increase of big game. The creation of openings in the forest canopy made more productive game habitat through admission of sunlight to the forest floor, and the production of "edge" between vegetative types. With the different ecological conditions created by clear cutting, the openings produced a luxuriant growth of browse, weeds and forbs of high nutritive value. Further, openings were desirable resting as well as feeding areas for wildlife.

Brown states:[3/]

> By the late eighteen hundreds, much of the accessible portion of western Washington had been settled, and uncontrolled hunting around these areas had decimated the game populations. Atkinson (1898), with reference to the Gig Harbor area on Puget Sound, states: "There is not much game in this vicinity, only grouse, rabbits, raccoon, mink, otter and an occasional bear... There has not been a deer seen in this neighborhood for years." However, the residents were beginning to become aware of the value of the timber resources of the region, and the first logging operations were starting. These first attempts were confined to the areas adjacent to water, since this was about the only means of transportation at that time, but they were the beginnings of the great logging industry that was to completely change the game habitat over much of western Washington in the ensuing years.

> Prior to logging, the old-growth timber, with its closed canopy, excluded most vegetation from the forest floor. Only a few shade-tolerant species were to be found, and these were of little value to game. With the clear-cut type of logging commonly practiced in this region, the vegetational pattern was changed abruptly from a climax forest to early successional stages. This was especially true after it became common practice to burn the slash after logging. The vegetation that followed burning consisted of grasses, weeds and many species of shrubs. This resulted in a highly productive game range. Thus, the history of logging in western Washington is essentially the history of our large deer herds.
>
> With the improvement in habitat created by early logging operations, the deer populations started to increase. Although following the same pattern as logging, the peak in deer populations tends to lag some ten to twenty years behind the peak in logging operations. Also aiding the deer populations was the change in attitude of the general public toward game conservation, which occurred shortly after the turn of the century. Laws establishing seasons and bag limits were passed, and provision was made for their enforcement.

Early logging on the West Side consisted of railroad logging in the valley bottoms. Intensive logging was not practiced on most of the West Side of the Study Area, however, until about 1940.

In the early days logging was continuous clear-cutting. This type of logging opened up vast areas of better game food but left no timber near for protection of game. The clear-cut areas were growing good game food in two or three years, but by that time the standing timber was one or more miles away.

Logging by clear-cutting in staggered small patches for the past twenty years has proven to be ideal for game habitat. Food and shelter are close at hand and the residual stock is much greater than twenty years ago.

Agriculture

West of the Cascades agriculture has had only a minor impact on the Study Area. Of the land now in National Forests, only a few homesteads and isolated tracts were ever used for agriculture. Below the National Forest lands agriculture opened up some areas for winter game range.

3/ The Black-Tailed Deer of Western Washington, Washington State Game Department, 1961, by Ellsworth Reade Brown, p. 7-8.

East of the Cascades agriculture, with its associated livestock, has had a marked effect on this part of the Study Area. Land tillage has been confined almost entirely to private land outside. The developments east of the forest boundaries have had a detrimental effect on big-game management. With the loss of the lower areas, a definite lack of winter range has evolved. This situation has become increasingly important since the reintroduction of elk beginning in 1912 or 1913.

The orchards and vegetable gardens, while being confined mainly to the stream bottoms and low benches, have encroached on winter game ranges. Grain farming further affected the deer winter range, as well as almost eliminating the native sage and sharptail grouse from land under cultivation.

Fencing to protect orchards and crops from damage by game has been a heavy expense item for the State Game Department. Since 1944, a total of 267 miles of deer-proof fence, at an average cost of $1,100 per mile, or a total of $293,700 has been spent for fencing.

An unnatural condition is set up by fencing which prevents animals from traveling to and from normal wintering areas. As a consequence, during hard winters animals in some instances must be fed or allowed to starve. Humane considerations dictate that the animals be fed. This allows more animals than normal to be carried through the winter, and in turn they exert heavier grazing pressure on key summer ranges. The situation is further compounded when the key game ranges are also used by domestic livestock.

Livestock Grazing

Before the National Forests were created and prior to the passing of the Administration Act of 1897 (16 U.S.C. 475), the public domain was open grazing land. Sheep and cattle grazed in large numbers on the East Side. Without administration, livestock followed the receding snowline or were driven there to prevent other stockmen from claiming the forage. Ranges were severely damaged from this early-season use and severe overstocking.

Early efforts at administration were severely handicapped by limited funds and a lack of knowledge and trained personnel. Progress was slow and ranges continued to deteriorate.

On the East Side nearly all rangelands have been subjected to overgrazing at one time or another. Probably this was the major environmental change affecting wildlife; the resultant change of vegetation contributed to the final demise of sharptail grouse

in many areas. Domestic sheep competed with deer for browse plants and forbs on game summer and winter ranges. The very poor condition of the Mission Creek deer range is largely due to heavy use by cattle, sheep and deer in the early days.

The past history of overuse by livestock has considerably lessened the forage production. The most productive sites have deteriorated through erosion following overuse, trampling and soil displacement.

On the West Side livestock grazing had very little effect upon the game population in the early days. The few livestock were grazed on the high range lands during the summer months when there was an abundance of food. In some local areas cattle were allowed to roam in the river bottoms where they competed with deer on the winter range.

Hydro-electric Developments

Hydro-electric developments in the Study Area consist of high and low dams and power transmission lines. In general, the dams have had a detrimental effect on game animals by (1) destroying wildlife winter range on the valley floors, and (2) blocking normal migration routes.

The following lakes are examples of destruction of winter range: Ross (11,678 acres), Baker (3,616 acres), Kachess, and Cle Elum. The several hundred miles of power transmission lines, similar to clear-cut logging operations have been beneficial by providing openings in dense cover, making "edge" between vegetative types, opening routes of travel, and producing more abundant game forage. It is necessary to cut second growth or spray every 15 to 20 years to keep growth from interfering with the power lines and keep them productive for game.

Roads and Trails

The first road connecting Seattle with eastern Washington was opened in 1919. Prior to 1930, roads in the Study Area were confined mostly to major cross-state highways. Very limited access was available and as a result game harvest was at a minimum. Beginning about 1930, and particularly following World War II, road access, both railroad and highway, brought about principally through logging, has vastly increased. The roads and the openings created by logging and consequent increased game food production have greatly expanded both game production and harvest.

Both roads and trails are beneficial to wildlife management and harvest by providing access to areas otherwise largely inaccessible. They tend to distribute hunters and fishermen over the entire unit and cut down on concentrations in localized areas.

The "edge" produced between vegetative types and the additional food produced have been of definite value. Further, road bank seedings have normally included species of value to wildlife. A potential for much more game production and game harvest exists as the area becomes fully developed with access for all resource production.

Fire Control

The High Cascades in Washington have had a long history of large and destructive fires. Records are not available prior to 1908 when the Forest Service took over the protection of the area, but on-the-ground evidence of fires can be seen almost everywhere. This is in the form of snags, brush fields, barrens, and types of timber stands that characteristically follow burning of the climax stand.

After the Forest Service assumed control, large fires were still a problem for several years. This was because of the difficulty of access and the low level of protection. Records for the entire Study Area are not available, but those covering the old North Cascades Primitive Area of approximately two million acres, of the north 1/3 of the Study Area, show 644 lightning and 124 man-caused fires burned 157,324 acres, or an average of 5,244 acres per year during the period 1908 to 1939.

The advent of the smokejumping program in the early 1940's greatly reduced the size of the burned area. From 1939 to 1959, 652 lightning and 33 man-caused fires burned 16,046 acres, or an average of 802 acres per year in this North Cascades Primitive Area. The size of the burned area is expected to be further reduced with use of new methods of fire attack such as helicopters for quick delivery of firefighters and air tankers to drop fire retardant materials on fires almost anywhere.

The same general level of protection has been in effect over the entire Study Area. This record is excellent from the standpoint of timber and watershed protection. It does, however, reduce the amount of fire-caused wildlife range which has historically been important in providing and maintaining big-game range.

Fire is seriously detrimental to game herds when it burns over areas needed for winter range. Records are lacking, but numerous range fires have occurred which have destroyed winter range for one or more seasons causing drastic reductions in local game herds.

Development of a Game Management Program

The first game management program in the State of Washington was during the period of County control. Regulations were passed

establishing game seasons and game refuges. This action was taken by the Counties due to the low deer and elk populations. The game herds were depleted due to over-hunting and the winter loss during the severe winter of 1916. The State Legislature recognized the low game population and established a buck law.

Legislation was passed in 1932 authorizing a State Game Department. Progressive game management started with the hiring of game technicians in 1936. Game surveys were made of all the ranges in the State and recommendations were made for more liberal harvests. In 1938 limited either-sex seasons were started. Similar seasons have continued to date and are used as a control to reduce populations on over-populated ranges.

The Washington State Game Department is one of the most progressive in big-game management. The State has consistently harvested a higher percentage of its game population than other western states. A good example of this management is that during the last ten-year period, within the Study Area, State Game Department statistics show a harvest of approximately 20% of its elk population.

FISH

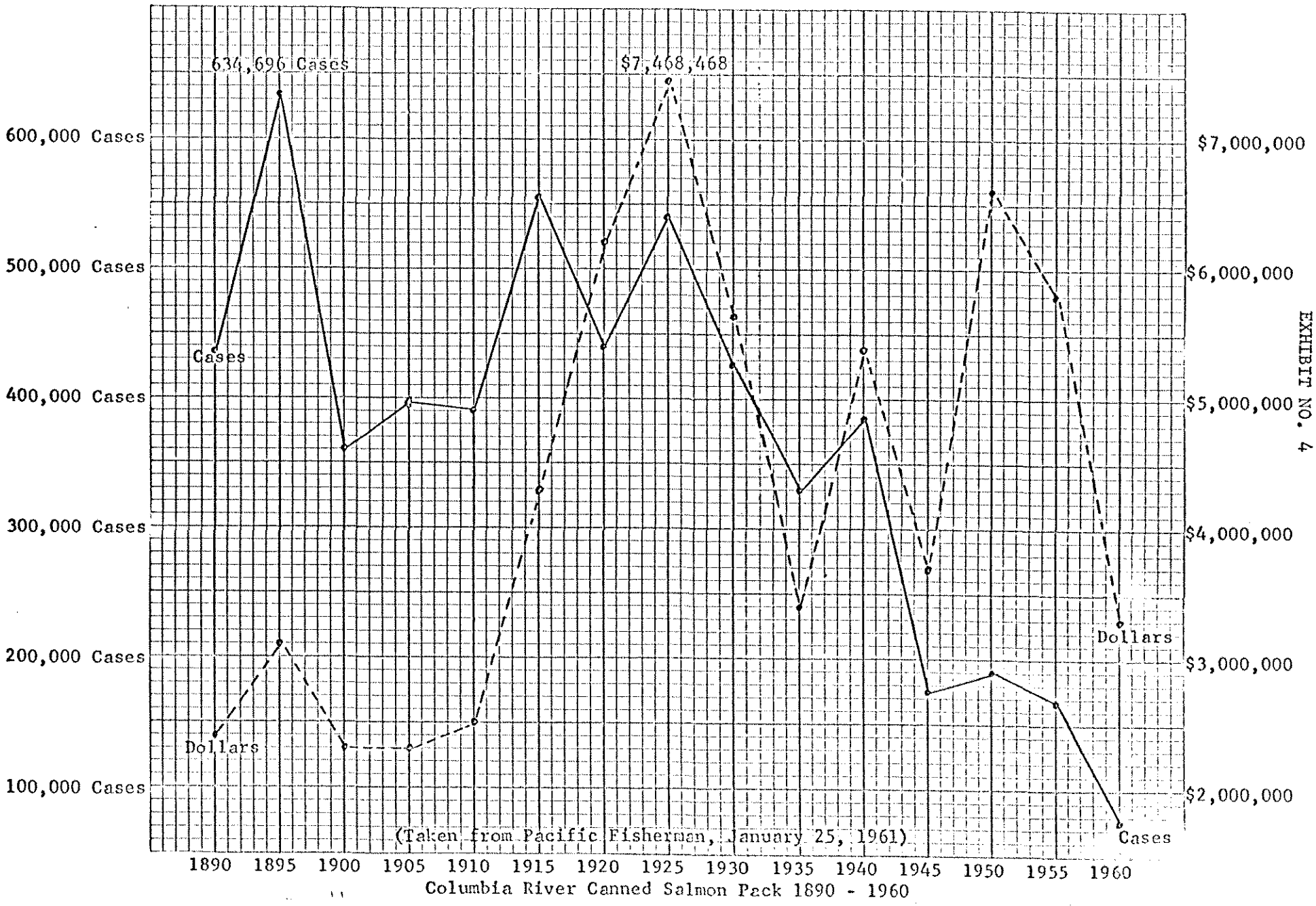
Resources of the North Cascades Area under administration of the Washington State Department of Fisheries include chiefly five species of Pacific salmon. The anadromous fish, and other minor fish populations which are taken in both commercial and recreational fisheries have a special significance in the North Cascades resource study. No commercial harvest of these species occurs within the Study Area boundaries, yet portions of their populations reproduce and have nursery residence within the area, or are dependent upon the maintenance of favorable water qualities in the rivers originating within the area. The extensive migratory habits of salmon extend the influence of this habitat seaward of the states of Washington, Oregon, California, and Alaska and the province of British Columbia.

These fish populations are dependent upon streams of the North Cascades region that flow either into Puget Sound or the Columbia River. The Washington Fisheries Department estimates for the purpose of this report that all anadromous fish should be included if their fresh water residence occurs in rivers with 25% or more of the annual flow originating within the Study Area. The Fisheries Department believes this arbitrary level of inclusion is conservative because the North Cascade streams contribute to the major rivers systems the cooling influence to those river stretches which might otherwise seasonally rise above critical salmon temperatures.

Initial Abundance and Habitat Condition

Salmon Fishing

Early records indicate salmon were abundant in all available habitat at the time of the coming of the white man. Lewis and Clark reported large runs of salmon in the Columbia River and a substantial Indian fishery at Celilo Falls and other favorable fishing sites along the river. The five species of Pacific Salmon (King or Chinook, Red or Sockeye, Pink or Humpback, Coho or Silver, Chum or Dog) and the Steelhead trout are of primary importance in the commercial fishery. See Exhibits Nos. 4, 5, and 6. These exhibits show the level of commercial fisheries production as it existed half a centry or more ago. No corresponding estimate is given covering personal use fish harvest which would also include Indian fisheries. There is a lack of published data to support such a historical estimate.



Columbia River Canned Salmon Pack 1890 - 1960

EXHIBIT NO. 4

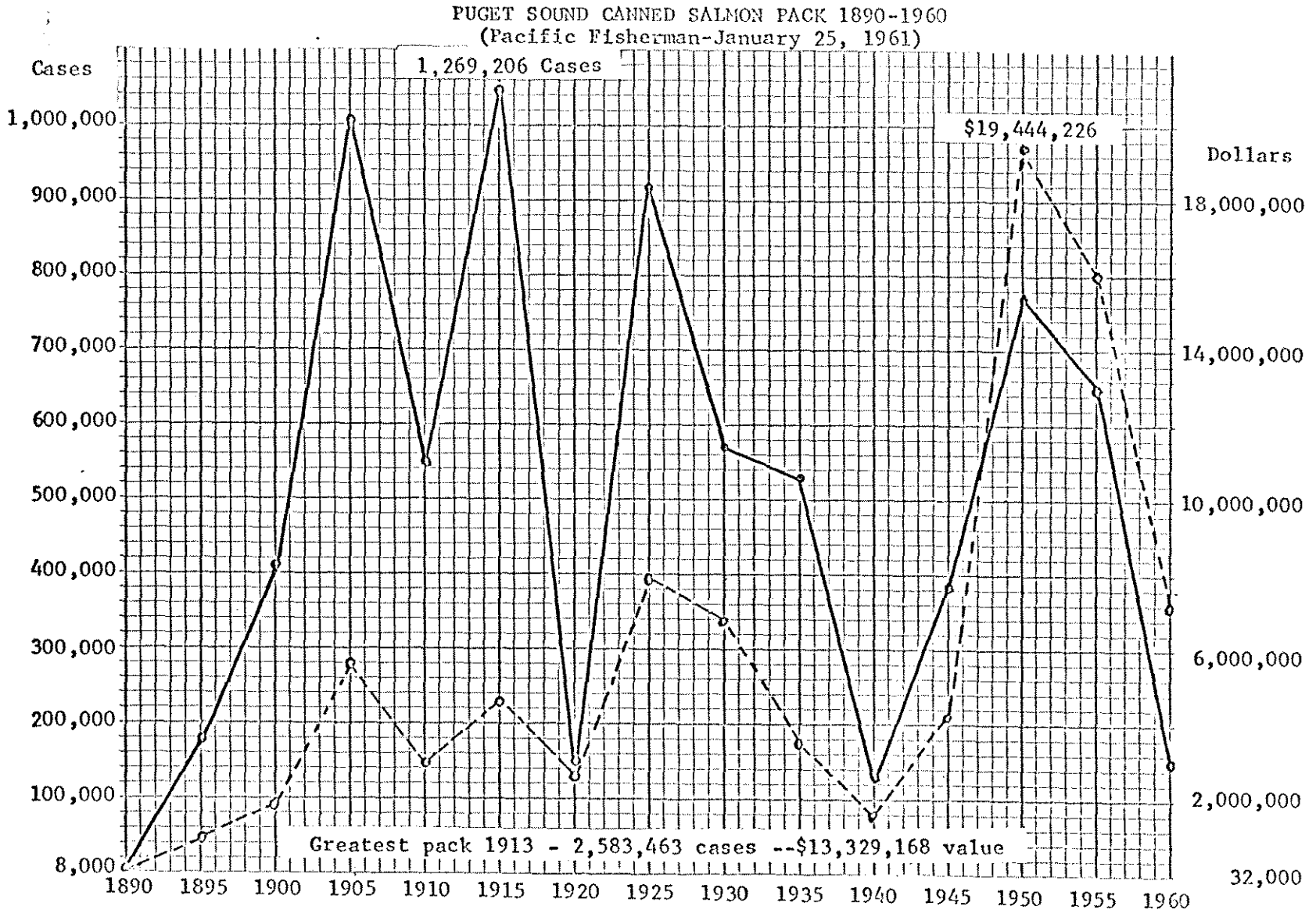

PUGET SOUND CANNED SALMON PACK 1890-1960
(Pacific Fisherman-January 25, 1961)
Cases
1,269,206 Cases
$19,444,226
Dollars
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
8,000
18,000,000
14,000,000
10,000,000
6,000,000
2,000,000
32,000
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
Greatest pack 1913 - 2,583,463 cases --$13,329,168 value

EXHIBIT NO. 5

EXHIBIT 6

Historical Commercial Salmon Landings attributable to North Cascade Habitat(1)

(1915 and 1916)

	1915	1916	Av. No.	Conversion (2)	Pounds
Washington Columbia River Fishery - Total Salmon Landings, (4)					
Chinook	396,711	286,921	349,816	23	7,861,000
Sockeye	59,780	53,756	56,768	5	283,000
Silver	133,622	60,743	97,182	10	971,000
Pink	41,779	2,828	22,303	4	89,000
Chum	56,126	29,203	42,664	9	383,000
Steelhead	150,330	71,198	110,764	10	1,107,000
Puget Sound Selected Salmon Landings (3)					
Chinook	277,628	309,115	293,371	22	6,454,000
Sockeye	24,641	16,281	20,462	5	102,000
Silver	1,245,380	914,817	1,080,098	8	8,640,000
Pink	100,067	1,727	50,897	4.5	229,000
Chum	1,586,078	1,828,855	1,707,466	10	17,074,000
Steelhead	26,175	42,069	34,122	9	307,000

Total Washington Pounds	43,500,000
Total (Columbia River) Oregon Pounds	10,694,000
Total Pounds	54,194,000
Total Adjusted Pounds (5)	40,615,500

Source:

(1) Twenty-sixth and Twenty-seventh Annual Report, Washington Department of Fisheries, Pages 49 and 101.

(2) Statistical Files, Washington Department of Fisheries "Fish Weight Converstion Factor Used Prior to 1935."

(3) Puget Sound trap and purse seine catches of pink and sockeye are excluded, because these fish are largely, but not all, of Canadian origin. Other species represented by fish of Canadian origin are included with Puget Sound fish, although their actual origin with respect to the North Cascades region is less known for that date.

(4) Oregon Columbia River Landings assumed to equal those of Washington.

(5) Factor of .75 used to adjust total landings to North Cascades influence, except as in (3).

(Data furnished by Washington Fisheries Department)

H. H. Bancroft makes the following statement:

> There are many salmon taken in the Sound and its affluents, though not so easily caught, or of so uniformly good quality, as those of the Columbia. In 1873 V. T. Tull of Olympia established a salmon fishery at Mukilteo, principally for putting up fish in barrels. The first year 500 bbls. were packed at Mukilteo, after which the fishery was moved temporarily to Seattle to take the late run up the Duwmish River, which is usually large. Fifteen hundred good large salmon have been taken at one haul of the seine in the Puyallup. Olympia Columbian, September 10, 1853. In 1877 Jackson Myres & Co., formerly of Portland, erected a canning establishment at Mukilteo, and made of it a successful enterprise; but it had not, in 1880, been followed by any others. The catch of 1877 was estimated at 10,000 cases, and over 2,000 barrels, valued at $77,300. Snohomish Northern Star, September 22, 1877; Olympia Transcript, December 1, 1877. In 1874 Corbett & Macleay, of Portland, founded a fishery at Tacoma. Sixty barrels were packed in five days, only three men being employed. New Tacoma Tribune, November 14, 1874. In 1876 John Bryggot, a Norwegian, founded another fishery at Salmon Bay, six miles north of Olympia. Morse's Wash. Ter., MS., xviii. 17-18. In the following season D. H. Hume established a fishery near Steilacoom for the purpose of salting salmon. In 1880 H. Levy, of Seattle, went to London with 100 barrels to introduce Puget Sound salted salmon to that market. In 1882 a salmon-packing establishment was opened at Old Tacoma by Williams. Salmon ran in great numbers this year. One boat brought in a thousand fish.[4/]

Commercial fishing in the Puget Sound Area started soon after the establishment of the Columbia River Fishery. Production soon exceeded the Columbia in average pack. The peak pack of 2,583,463 cases for Puget Sound was in 1913 with a value of $13,329,168. The highest cash value of the Puget Sound commercial fishing was the 1951 pack of 931,320 cases with a value of $21,640,184.[5/]

Sport Fishing

The North Cascades is justly famous for its steelhead and resident sport fishing resources. There is also sport fishing for Chinook and Silver Salmon in the Columbia River, Puget Sound, The Straits of Juan de Fuca, and the Pacific Ocean. Early records of abundance is not recorded for the resident species. It appears, however, the accessible habitat was fully stocked before the arrival of white men.

[4/] Bancroft, H. H., History of Washington, Oregon, and Idaho, Vol. XXXI, p. 348.

[5/] Pacific Fishermen, International Yearbook, January 25, 1961, p. 44.

The land-locked lakes and high-mountain lakes that were inaccessible due to obstacles or falls in outlets were barren. The Study Area with over 2,400 miles of fishing streams and 1200 to 1400 lakes with a total area of about 50,000 acres, supports populations of Rainbow, Cutthroat, Easternbrook, Brown, Dolly Varden, Kokanee, Whitefish, Sunfish, Crappies, Bass, Catfish, and a number of other species. These fish furnish recreation for an ever-increasing number of sportsmen.

Early Exploitation

It is estimated that the early Indian fishery on the Columbia River may have yielded as much as 18 million pounds of salmon annually.

Some commercial fishing in the Columbia River was carried on almost from the outset of the white man's occupation. The first fish were commercially exported in 1830. Starting with very limited operations, white men gradually displaced the Indians as the chief consumers. This transition period culminated with the first salmon cannery being established on the Columbia River in 1866. The new and profitable outlet for fish thus made available, caused commercial production to increase very rapidly. In 1883 a peak catch of 43 million pounds (about 700,000 cases) was put up by 39 canneries in the Columbia River.

On Puget Sound cannery operation began in 1877 and by 1900, 19 canneries were operating.

Most of the packing and handling prior to 1903 was by hand. The first processing was that of salting salmon for the mild-cure market in the United States and Europe. Often the canneries were enlargements of salteries that preceded them in point of time.

> With the coming of more adequate water transportation and rail facilities from the Pacific Coast ports to eastern markets in the 1890's, the production of canned salmon began on a large scale. The introduction of the fish trap; the perfection of the process of preserving fish by heat in tin containers; the many improved technical devices, such as the "Iron Chink," mechanical fish cleaner in 1903; automatic filler and soldering machine; and the Jensen can-making machine soon gave the young industry new scope for mass production. The exploitation of enormous virgin fish runs furnished a supply of raw material in many cases beyond the capacity of plants in the early years. After 1903 with mass production equipment, exploitation of the commercial fishery was possible.[6/]

6/ Gregory and Barnes, North Pacific Fisheries

Sport fishing was of no great consequence, historically, in the exploitation of the fishery resource. A search of early records disclosed no reports of over utilization by sports fishermen.

Environmental Influences Affecting Fish

Almost any major idsturbance in a stable watershed is detrimental to fish life. The gradual decline in fish population has occurred because of encroachment of civilization and man's activities both within and outside the Study Area. The following activities, and perhaps others, have all been detrimental to fish life at various times and places: (1) overfishing, (2) farming, (3) grazing, (4) pollution, (5) logging, (6) road construction, (7) mining, (8) water diversions, (9) wild fire, and (10) dam construction. The Fish and Wildlife Service considers the latter to be the major contributing factor.

In addition to mechanical obstructions that prevented fish from reaching their spawning areas, the detrimental effects have been due mainly to siltation, increase of temperature, and pollution.

Mining

Mining activities, although never extensive, have caused some damage to the fishing resource. Mineral developments that have adversely affected fish life are the following: Azurite Mine, headwater of the Skagit River; Holden Mine on Railroad Creek above Lake Chelan; and mines on Peshastin and Swauk Creeks in the Blewett Pass area.

Logging

A certain amount of damage to the watershed is bound to occur from almost all logging. Silting from logging operations has undoubtedly been harmful to the fish populations of many streams.

> The lumbering industry was one of the first and more serious offenders. Neglected log jams and splash dams have been an obstacle to the migration of salmon. Deforestation of the mountains has led to increased spring runoffs, the scouring of streambeds, increased turbidity, and decreased summer flows. Beyond these effects, the lumber and pulp mills have introduced serious pollution in the rivers.7/

7/Laythe, Leo L., The Fishery Development Program in the Lower Columbia River, U. S. Department of the Interior, Fish and Wildlife Service, Portland, Oregon, 1948

The principal detrimental effects of logging have been due to siltation caused by soil disturbance and the increase of stream temperatures through shade removal in many instances. Silt in streambeds is detrimental to small fish, fish eggs, and fish food organisms by clogging the fish's gills and by smothering eggs and food organisms.

Regardless of the adverse effects, however, fish populations in an entire drainage have seldom, if ever, been destroyed by siltation alone.

Retaining stream-side strips for shade and to reduce siltation is a major coordination policy between timber harvest and habitat management.

Road Construction

This has probably been the major environmental factor affecting native trout populations. Many miles of roads and highways have been built along stream bottoms with adverse effects on trout habitat. Peshastin Creek on U. S. Highway 97 is an example of serious damage.

The damaging effects of road construction consist of siltation, blocking of fish migration through poor culvert installation, increase in temperature caused by opening of the streams to the direct rays of the sun, loss of fine gravel for spawning, channel changes, and increased gradient.

Coordination practices between engineering departments and wildlife habitat management in both State and Federal services are designed to alleviate further damage to fisheries resources.

Farming

Cultivation has had a deteriorating effect on stream habitat in the lower valleys, although not much of this activity has extended onto National Forest land. Much of the siltation of the larger streams can be attributed to farming and ranch operations.

Grazing has been injurious to streams. In some areas, willows and other streambank vegetation have been significantly reduced. When the

vegetation is removed, the streambanks are subjected to trampling and water erosion. This, in turn, causes stream siltation; the filling of holes in the stream, the water to spread out and become shallower and warmer, and destruction of fish food organisms.

Hydro-electric Developments

These developments, mostly downstream from the National Forests have greatly reduced the once great runs of salmon and steelhead. (See map of dams and hydro-electric projects in the Appendix.) Without the State and Federal hatchery programs and the Columbia River development plan, it is doubtful if anadromous fish would be present in significant numbers today.

Dams have presented many serious problems to both adult and young anadromous fish. Early construction of even low dams seldom took into consideration the need of fish passages, and such fishways, when installed, were usually unsatisfactory; therefore, many miles of spawning area have become unavailable to the salmon. For example, according to the Fish and Wildlife Service, approximately two-thirds of the original spawning area in the Columbia Basin have been lost because of the more than 300 dams of all sizes that have been constructed.

The Bumping Lake Reservoir on the Snoqualmie Forest acts as a total block for anadromous fish. It is very important, however, in providing safe water levels in the streams below for these fish populations. It also creates an excellent resident fishery within the reservoir.

The Bumping project is presently under study for a proposed enlargement from the present 33,000 acre feet to 400,000 acre feet. Such a project will have a great impact on both the resident and anadromous fishery, by creating a larger environment and providing safer water levels in downstream rivers.

It is estimated that 500 miles of National Forest streams and 1,840 acres of lakes have been blocked to anadromous fish by hydro-electric projects. Hydro-electric projects, on the other hand, have created 20,000 acres of new fishing waters.

Pollution

Within the Study Area, pollution has been a minor problem. Mining operations, residential sites and commercial developments have all had pollution problems, but they have usually been quickly detected.

Outside the Study Area, pollution from lumber and pulp mills, other industrial and domestic wastes, and chemicals from orchards and agricultural operations have all caused serious fish losses. Many of the sources of water pollution have yet to be controlled.

Fire

Wildfire, although quite often beneficial to big game, is almost always detrimental to fish life. Fires produce accelerated erosion, excess siltation and log jams in streams, with consequent stream blockage. They also open up extensive areas to the direct rays of the sun causing excessively high stream temperatures. These detrimental effects last for a number of years until the watershed again becomes stabilized. Many of the spring floods which occur are the result of runoff from old burns where vegetation has been destroyed at higher elevations. Efforts to stabilize these sites have generally been successful; however, some remain a problem. The National Forests estimate that watershed rehabilitation and stream improvement have bettered habitat conditions in 65 miles of fishing streams.

The fire record discussed above points out the great improvement in the protection of the area, particularly since 1939. As a consequence, fires will likely be less damaging to fishery values in the future than they have been in the past.

Development of Fish Management Program

Commercial Fisheries

Milo Moore, former Director, Washington Fisheries Department, in discussing fisheries management stated:

> Historical reference to considerations given to the management of North American salmon fisheries on the Pacific Coast reveals that for over seventy years those associated with this resource have concerned themselves with the possibility that the ever-expanding industry involved in the harvest of salmon might easily deplete the stocks, in spite of continued restrictions placed upon the fishery to allow for escapement of the various runs of salmon to their natural spawning grounds. In addition, from the outset of development of this industry State and Federal governments have maintained programs of artificial incubation and rearing of young migrant salmon to strengthen the runs depleted in the fishery and through man-made obstructions affecting the migration of salmon in the natural waterways.

With the wide fluctuations from one year to the next, a surprising number of salmon have over the years appeared in the fishery in spite of serious hazards obstructing the natural migration due to the rapid industrial growth of the area.

Each year the Pacific Coast states, Canada and Alaska have had to reassess these hazards to further restrict and regulate fishing operations to provide regulations necessary to stabilize the resource.

Dams in Streams Require Fishways

Both Federal and State laws require fish passage facilities at all impoundment projects to secure the migration of salmon and other fish. To compensate for losses, hatcheries artificial rearing ponds and spawning channels serve to strengthen runs.

Environmental and Predator Control

Presently programs of predator and environmental control are under way to promote the growth and migration of salmon by increasing their survival in fresh water and coastal areas. Such efforts, carried out with the aid of artificial propagation to make the fullest use of available spawn, and regulations imposed upon the fishery, provide a program of fisheries management heretofore unequalled for the security of a resource dependent upon both territorial and international waters for survival.

A Resource Fully Exploited

Statistical analysis of North American stocks of salmon leaves no doubt that the resources without the application of definite controls would soon cease to exist. Entire seasons have in the past had to be closed to harvest of the runs, due to poor survival and previous overfishing of the stocks.[8/]

The Fishery Development Program in the Lower Columbia River

The gradual decline of the Columbia River salmon fishery has been brought about through deforestation, pollution, overfishing, unscreened water diversions, and construction of dams within the watershed. The latter is believed to be the major contributing factor.

8/Moore, Milo; McLeod, Ken; Reed, Don; State of Washington Fisheries, p. 212-213, Vol. III, First Edition, February 1960.

Present water-development programs of the U. S. Bureau of Reclamation and the Corps of Engineers have accelerated the organization of a conservation plan for the maintenance of the salmon and steelhead fishery before the proposed dams bring about further diminution of the runs. This plan, endorsed and supported by federal planning agencies, consists of the maximum development and management of the fish runs in tributaries of the lower Columbia River basin. To effectuate this program, it was estimated that approximately 20 million dollars would be required; one million of which was appropriated for expenditure in fiscal year 1949. By June 30, 1963, about 20.5 million dollars had been spent on construction. Essentially, the program is based on the cooperative efforts of the States of Oregon and Washington and the U.S. Fish and Wildlife Service in (1) removal of obstructions to permit passage of fish, (2) abatement of pollution, (3) screening of water diversions and construction of fishways, (4) transplantation of upriver runs, (5) extension of artificial propagation, and (6) establishment of fish refuges in which conflicting developments would not be permitted. There is sufficient reason to believe that with the effectuation of this program, the populations of salmon and trout in the Columbia River and its tributaries can be maintained.

This program has been partially successful in maintaining salmon runs. During the development of the lower river, dams continue to be constructed on the Snake, Cowlitz, and other rivers reducing the spawning area for salmon. The new dams below Chief Joseph in the Columbia River have included fish ladders which make the Okanogan, Methow, Entiat, Wenatchee, and Yakima still available for spawning.

Clarence F. Pautzke makes the following statement on early abundance of salmon: "The Columbia, Snake, Cowlitz, White, Green, Skagit, Stilliguamish, Nooksack and their tributaries played host to migration of salmon so fantastic in numbers that they are almost inconceivable in present day thinking. These runs were truly of the magnitude which caused the old-timers to say, "the salmon were numerous enough to walk upon without getting your feet wet."[9/]

The salmon resources of the Pacific Coast and Alaska comprise one of the important natural assets of the United States and Canada. The streams of the Study Area during the period 1950 to 1960 contributed to this resource approximately 18 per cent of the United States' production of salmon.

9/ Moore, Milo; McLeod, Ken; Reed, Don; State of Washington Fisheries, p. 92, Vol. III, First Edition, February 1960.

COMMERCIAL SALMON PACK 1950 - 1960 [10]

Area	Cases in Thousands	Per Cent
Alaska	2,831.2	77.9
Puget Sound	646.3	17.8
Columbia	156.1	4.3
TOTAL	3,633.6	100.0

Sport Fisheries

In addition to the commercial and Indian fisheries, there are extensive sport fisheries for king, silver, and pink salmon. The most important salmon sport fishing areas and the catch are shown in Exhibits Nos. 7 and 8.

EXHIBIT NO. 7

Per Cent of Sport Fish Catch by Areas

Areas	Approximate Per Cent of Catch [11]
Puget Sound	60
Washington Coast - (Westport and LaPush)	17
Straits of Juan de Fuca	15
Columbia River	8
TOTAL	100

EXHIBIT NO. 8

Sport Fish Catch Average 1954 - 1958 [12]

*Information not available
**1949, 1951, 1953, 1955, 1957 Data

Area	Thousands			
	Silvers	Kings	Pinks	Total
Alaska*				
Puget Sound	185.2	150.2	60.7**	396,100
Straits of Juan de Fuca	48.4	40.3	11.4	100,100
Washington Coast	64.3	51.2	-	115,500
Columbia River	31.9	20.6	-	52,500
AVERAGE TOTAL	329.8	262.3	72.1	664,200

10/ Pacific Fishermen International Yearbook, January 25, 1961
11/ & 12/ Fisheries, Vol. III State of Washington Department of Fisheries

The steelhead trout is a sport fish in all of Washington except the Lower Columbia River where it is both a sport and commercial species.

Sport fishing management developed more slowly in the State of Washington than salmon management. Under county control, sports fishing management consisted only of setting seasons and limited hatchery production.

The State Game Department was authorized in 1932. Technical personnel were employed and management began about 1935. The first major program was to rehabilitate steelhead trout. This program was successful with the harvest increasing from 22,757 fish in 1947-1948 to 252,600 in 1962.[13/] Streams west of the Cascades are not highly productive for resident species for they are being heavily used by migratory fish. Streams open to fishing one month later than lowland lakes to allow anadromous fingerlings to migrate prior to opening of fishing season on streams.

Clarence F. Pautzke, Commissioner of the U. S. Fish and Wildlife Service and a nationally known authority on lakes and fish, has made the following statement: "The high mountain lakes are Washington's greatest unused recreational asset." Starting in 1935 the State started a program of packing fish into its lakes. Since World War II the lakes have been restocked by airplanes.

The third fisheries program of the state was the lowland lake rehabilitation. This consisted of chemical treatment of the lakes to remove the stunted spiny-rayed population. The lakes were then planted to trout which were preferred by the sportsmen.

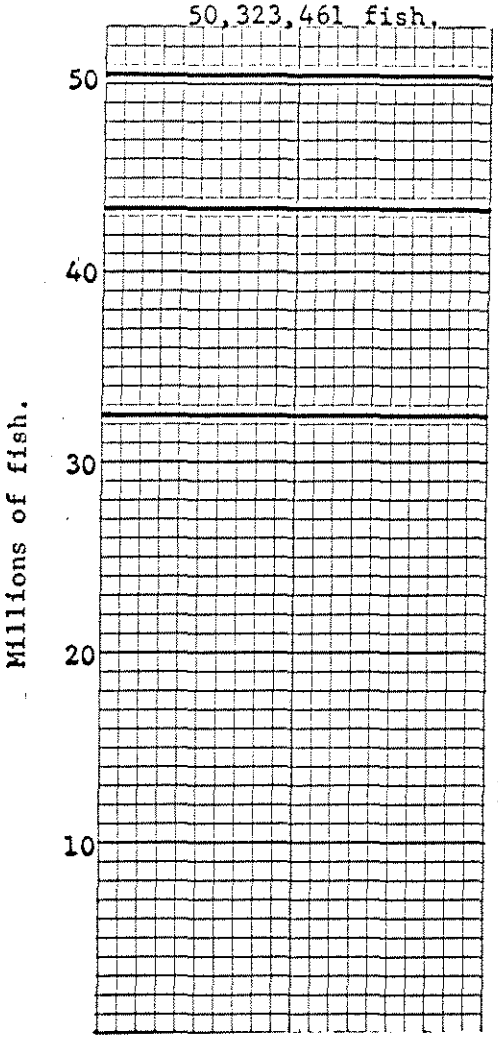
Lowland lakes are more productive than streams because of their high nutritive content. Hatchery fish planted in the lakes grew more rapidly than in streams and a much larger percentage returned to the fishermen's creel. It was found that some of the trout migrated from the lakes. To eliminate this loss, screens are now placed on the outlets of lakes if there are no anadromous population passing through the lakes.

The State operates 25 hatcheries which produce fish for release into lakes and streams. See Exhibit No. 9. The State also has an excellent access program to get the fishermen to the lakes and streams.

13/ The Progress and Promise of Modern Game Management, Washington State Game Department, 1962.

EXHIBIT NO. 9

TOTAL FISH PLANTINGS
50,323,461 fish.



Washington Department of Game
6,465,486 fish.
13%

Bureau of Sports Fisheries and Wildlife
11,278,596 fish.
22%

Washington Department of Fisheries
32,579,379 fish.
65%

Fish plantings in 1962 by:
Washington Department of Game.
Washington Department of Fisheries.
Bureau of Sports Fisheries and Wildlife, U. S. Fish and Wildlife Service.
(Taken from agency statistics).

ANIMAL AND FISH POPULATIONS AND DISTRIBUTION

BIG GAME

Independent estimates of game animals, game harvest and hunter use days were made by both the Washington Game Department and the U. S. Forest Service. There was very close agreement in the figures in each instance. The following figures are rounded averages of the estimates from the two organizations.

In 1962 it was estimated that 75,000 mule deer, 65,000 black-tailed deer, 14,600 elk, 12,000 bear, 8,000 mountain goats and a few big-horn sheep used federal ranges within the Study Area. See Exhibits Nos. 10, 11 and 12. This use occurred for the most part during the summer months. The majority of these animals, except the mountain goats, migrate in the winter to lower game ranges, many of which are outside the National Forest boundaries. (See map of winter game range in appendix)

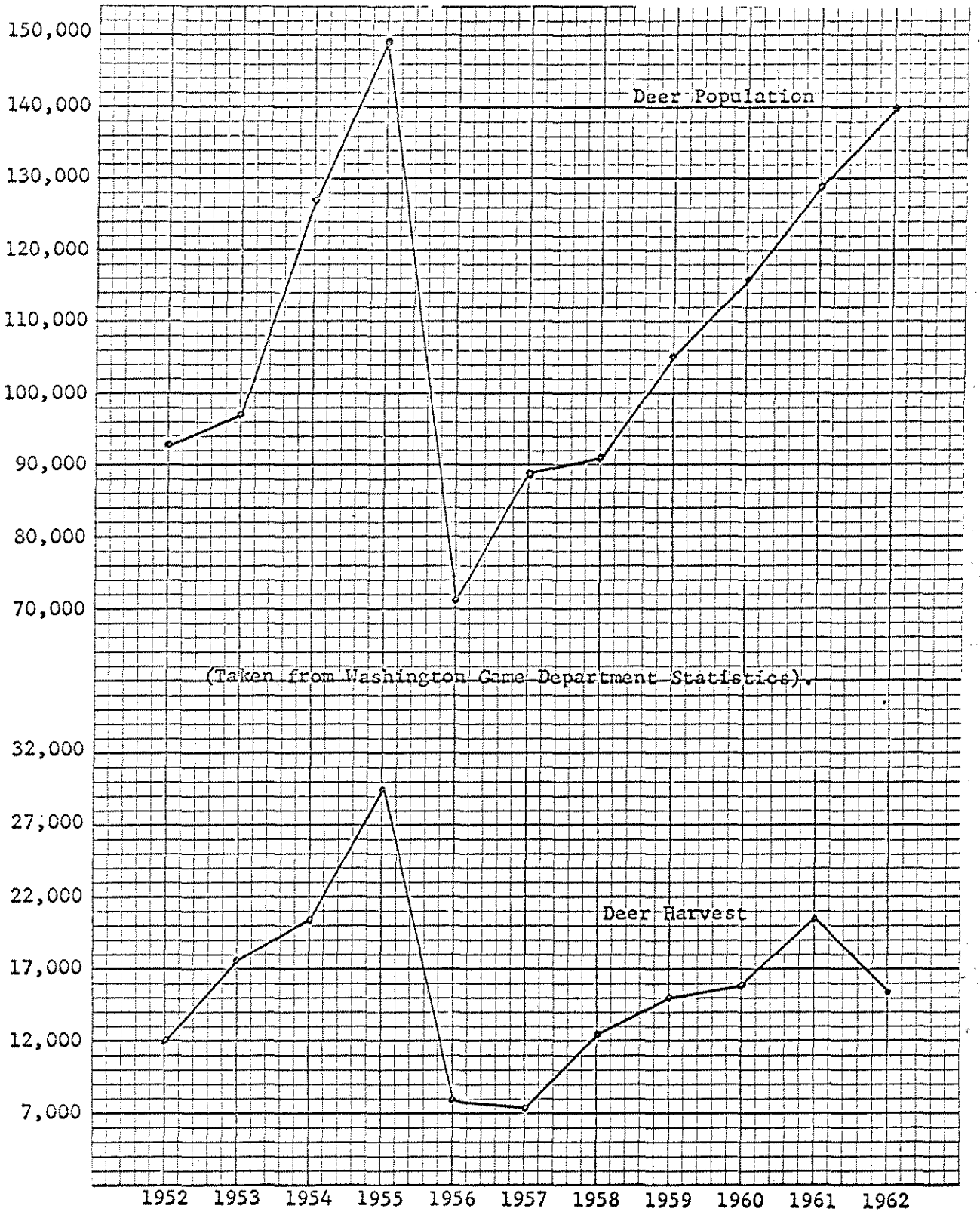
During 1962 the harvest of game animals in the Study Area was approximately as follows: 15,800 deer, 2,400 elk, 1,300 black bear and 300 mountain goats. See Exhibits Nos. 10, 11 and 12, and Washington Game Department, Hunting Season Map 1962 in Appendix.

Under the administration of the Washington State Department of Game, game species are generally at a high level and the winter habitat is fully stocked, or overstocked. In many cases fish and game species are underharvested in the extensive undeveloped areas, because of legal season limitations and lack of road and trail access. Due to underharvest, animals die annually because of habitat limitations and or range deterioration. The habitat in some areas can be more fully developed but the maximum development of big game populations is limited by key winter ranges which are often found on private lands, particularly east of the Cascades.

All of the Study Area where soil has formed produces some forage which is subject to use by game animals in summer. During the winter their range is much restricted as the animals move to lower elevations because of snow depth and severe climatic conditions. The State Department of Game estimates that for every 20 square miles of summer range there is only one square mile of key winter range that is useable during critical periods.

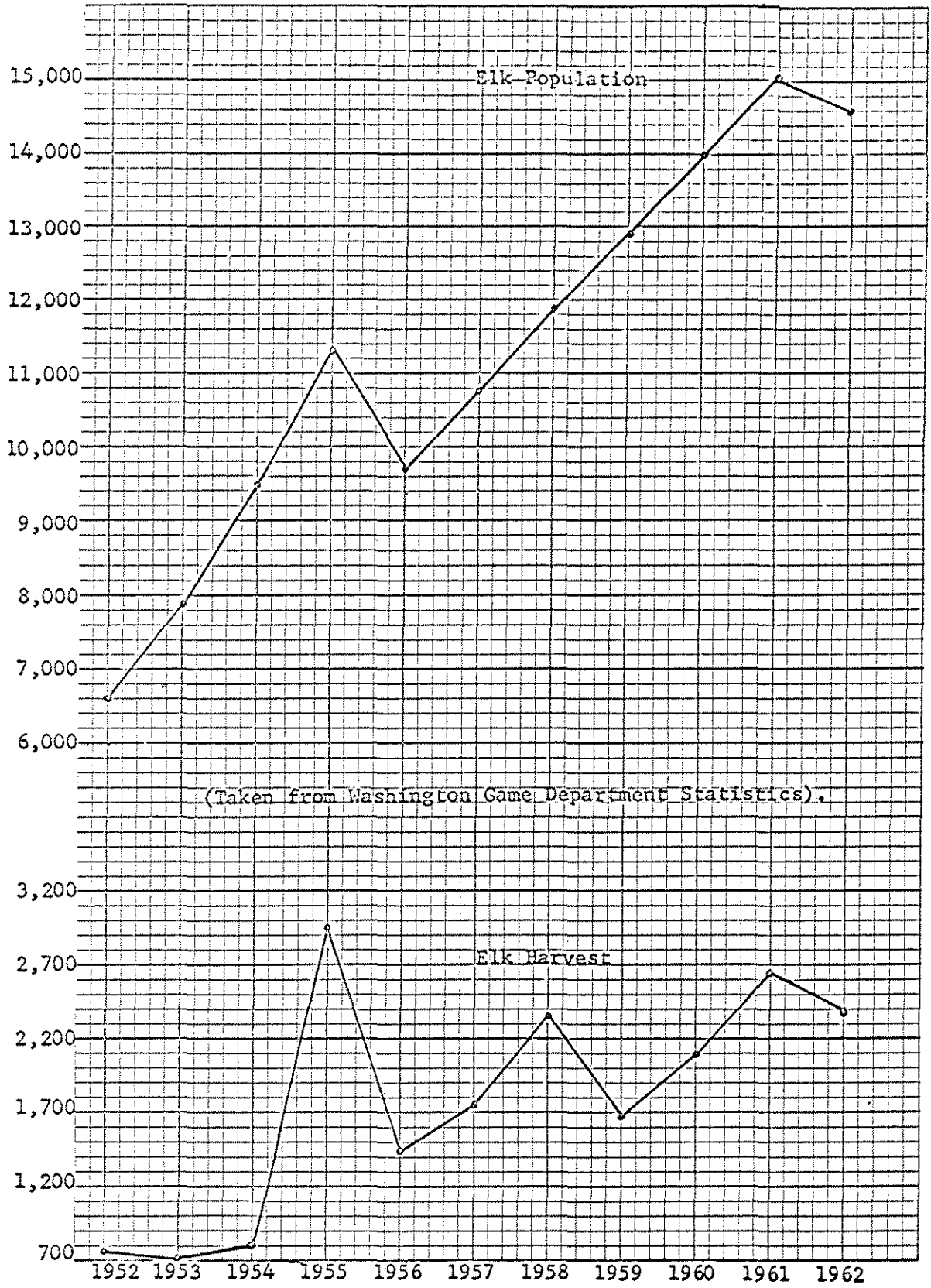
Key game areas are those portions of the range where game animals concentrate at certain seasons and forage use is usually more intense than on adjacent ranges. They are areas where big game find food and cover during severe weather, but they may also occur on other seasonal-use areas such as places to escape insects, open mountain meadows or favorite ridge tops used intensively for food in summer.

EXHIBIT NO. 10.



North Cascades Study Area
Deer Population and Deer Harvest
1952 - 1962, Inclusive

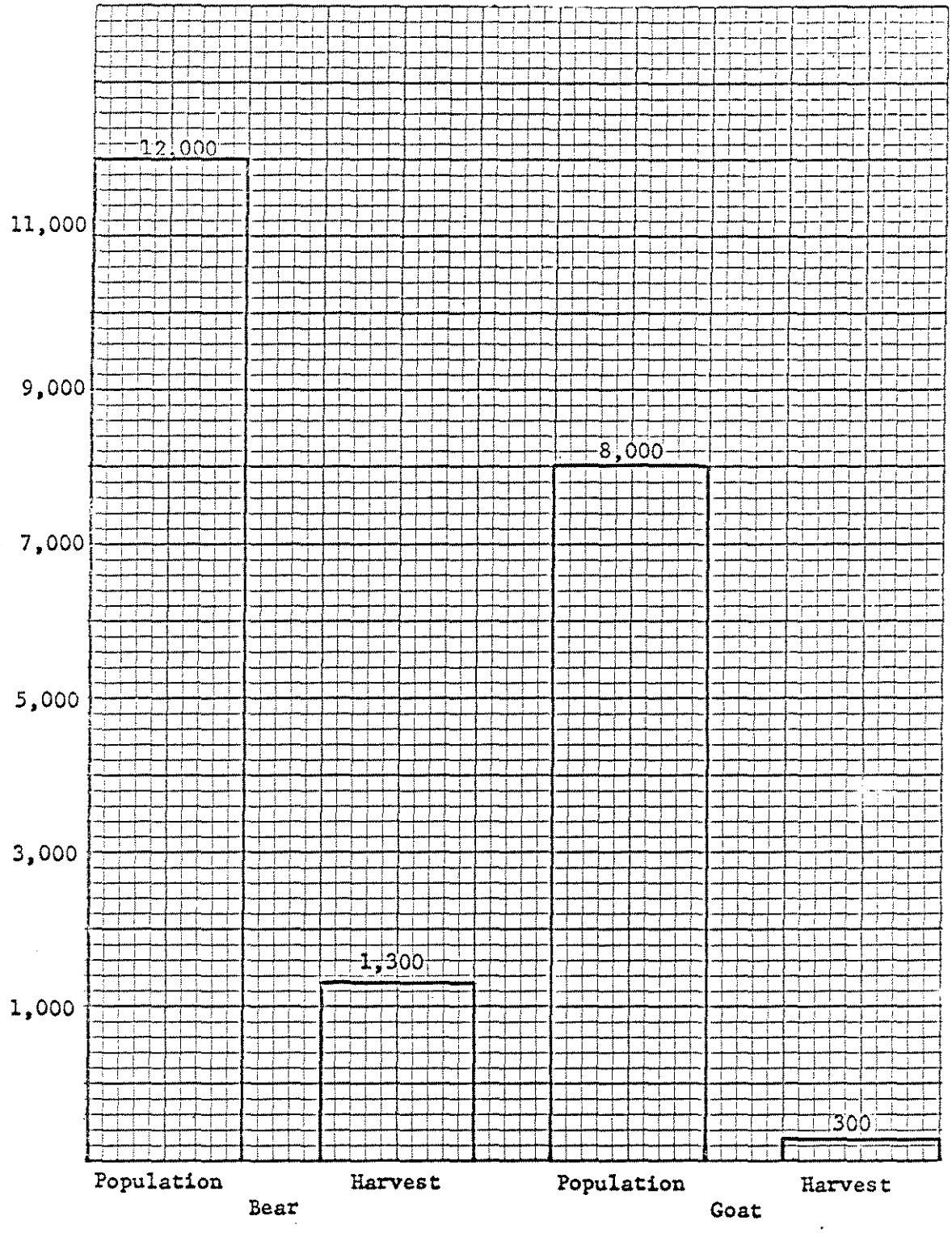
EXHIBIT NO. 11.



North Cascades Study Area
Elk Population and Elk Harvest
1952 - 1962, Inclusive.

EXHIBIT NO. 12

Bear and Goat Population
and Harvest, 1962.



(From Washington Department of Game Statistics)

Winter and summer big game ranges used during normal years on lands within the Study Area are shown in Exhibit No. 13.

SMALL GAME

Small game species consist primarily of rabbits, and snowshoe hares. These species tend to be cyclic in their abundance and their numbers fluctuate significantly according to the pressures of climatic and biological factors. Their reproductive potential is high so populations rebuild promptly after a severe winter or an epidemic.

Cottontail rabbits are common in the lower valleys on the east side. Jack rabbits are rare in the National Forests, but are common in the dry sage areas east of the forest boundaries. Snowshoe hares are abundant at times throughout the Canadian Life Zone; less common in the semi-arid Transition and Hudsonian Life Zones. They do much damage to tree plantations and are considered nuisance animals rather than game in most areas.

Small game hunting is insignificant today but it has a large potential for future development.

WATERFOWL

The Study Area is of minor value for waterfowl because it contains limited waterfowl habitat. There are a few mallards, wood duck, golden-eye, harlequin, grebe, and mergansers nesting on the area. The lakes and reservoirs are used during migration by the birds listed above as well as by scaup, pintail, shoveler, green-wing teal, bufflehead, Barrows and American golden eye, coot, and perhaps others. A few thousand ducks winter on the lower end of Lake Chelan. Canada geese are rare on waters of the National Forests.

FURBEARERS

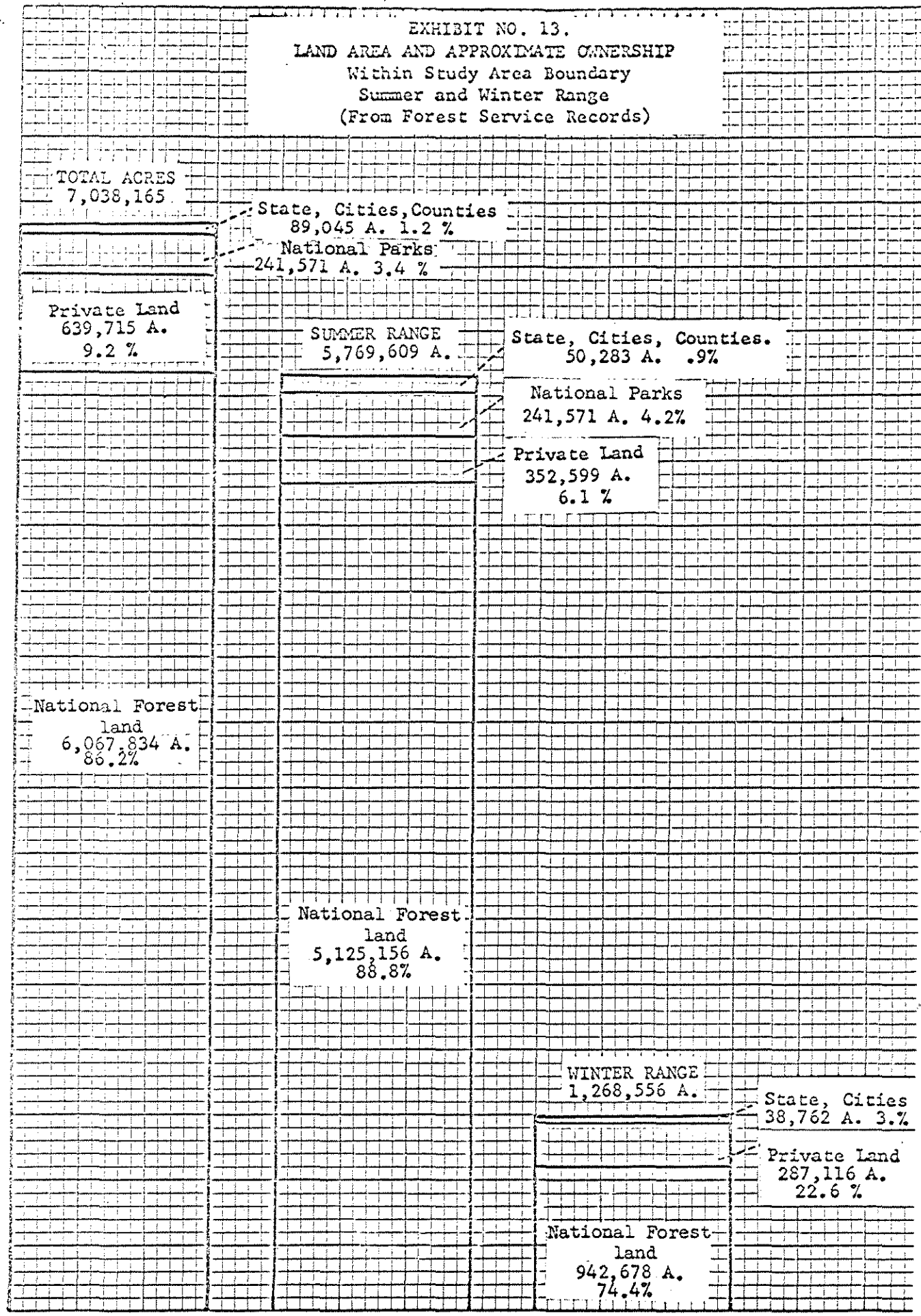
Fur prices have declined rapidly during the past 15 years. This decrease in wild fur values is due in part to changing fashions, competition from foreign imports, competition from domestic fur farms, and excise taxes that are imposed on finished furs.

Within the Study Area the value of the fur catch has dropped from approximately $140,000 in 1947 to slightly over $25,000 in 1962. The number of trappers in the 10 counties of the zone of influence decreased from 1,219 to 298 during the same period. See Exhibit No. 14.

Although the fur resource is not fully utilized at present a potential source of income exists.

EXHIBIT NO. 13.

LAND AREA AND APPROXIMATE OWNERSHIP
Within Study Area Boundary
Summer and Winter Range
(From Forest Service Records)



Beaver

The beaver is a common resident on almost all suitable habitat in and below the Canadian Life-Zone.

Mink

The mink is commonly found along streams, lakes and ponds in the transition zone although not often seen because it is shy and principally nocturnal.

Marten

The marten is a common resident of the heavier overstoried timber areas, often at the higher altitudes. They are both nocturnal and diurnal but, except where very numerous, are seldom seen.

Weasels

Both the long-tailed and the short-tailed weasels are common.

Raccoon

The raccoon is a common resident in lower elevations and around agricultural areas.

Otter

The otter is an uncommon resident in the lower streams and lakes.

Fisher

The fisher was probably always rare but there are still a few in the Study Area.

Muskrat

The muskrat is an uncommon resident. It is confined to areas near water and is likely to be found in areas that are lower in elevation.

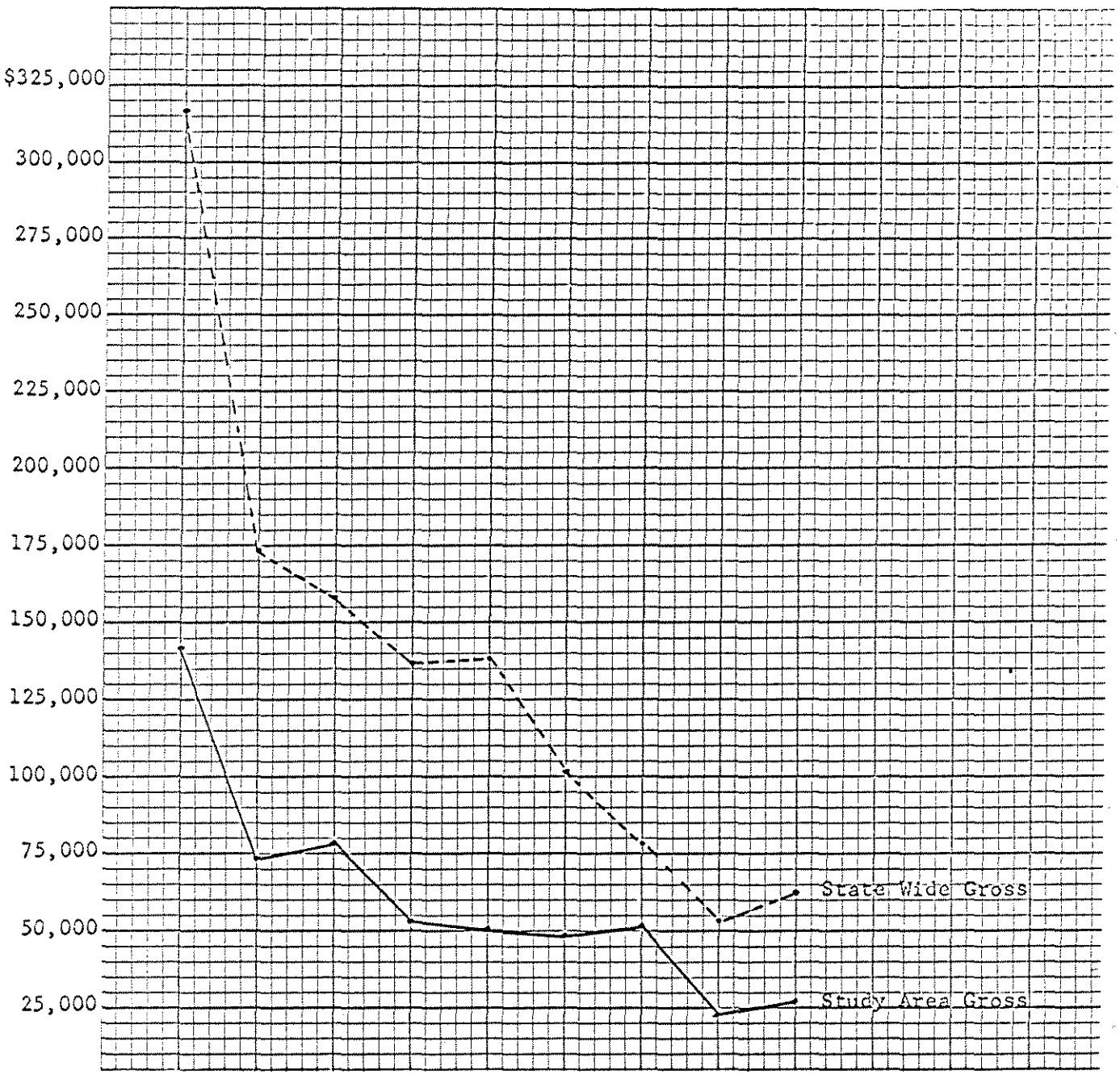
Fox

The Cascade fox is an uncommon resident. With the reduced use of 1080 poison, its numbers are expected to increase.

Lynx

The lynx is rare in the Canadian and Hudsonian Zones.

EXHIBIT NO. 14



GROSS VALUE OF PELTS
Mink, Otter, Marten, Weasel
1947 - 1962, Inclusive

PREDATORS

The following predatory animals are found in the Study Area: (1) coyote, (2) bobcat, and (3) cougar. These animals and their abundance are discussed below.

Coyotes

The coyote is a common resident, but use of 1080 poison has cut its numbers sharply in recent years. No bounty has been paid on coyotes for a number of years.

Bobcat

The bobcat is a common resident of the area; however, it is not often seen because of its shy and nocturnal habits. Bobcat bounties varied from 594 in 1946 to 330 in 1951 and to 640 in 1960.

Cougar

The cougar is a rarely seen resident, chiefly associated with the high mountain habitat. Its numbers have dropped over the past several years according to the State Game Department.

All predator bounties were discontinued in 1961. The number of cougar bountied in the Study Area has varied remarkably over the years. In 1935 bounties were paid on nine cougars; in 1946 on 180; and on 15 in 1960. Apparently the cougar kill rises on hard winters when deer are forced into concentration areas and cougars are more accessible to the hunters.

The wolf and the grizzly bear, if not extinct in the study area are virtually so. No authoritative reports of the occurrence of either animal have been received in the past 20 years. The wolverine has been reported at various times but its status today is doubtful.

Predators exert a definite controlling influence on animals when populations are very small; however, during periods of high game populations, as now exist in the Study Area, predators have insignificant effect.

BIRDS

Upland game birds are found throughout the study area. The various species of grouse furnish the majority of the upland bird hunting. During the 1962 season, according to State Game Department statistics, upland birds provided 100,000 man days of hunting with .7 grouse per man day. Upland birds have a great potential for increase in the hunting resource when better access becomes available.

Sheep grazing was detrimental to grouse nesting and the rearing of young birds. Grouse are on the increase as sheep grazing has been curtailed.

The birds and the places they are normally found are given below:

Blue Grouse

Common throughout timbered areas.

Ruffed Grouse

Common, largely restricted to hardwoods along lower elevation streams.

Spruce or Franklin's Grouse

Generally restricted to lodgepole pine and alpine fir types.

White-tailed Ptarmigan

Alpine summits above timberline.

Band-tailed Pigeon

The band-tailed pigeons are migratory and appear irregularly in varying numbers along the low woodland areas, principally among broadleaf trees west of the Cascades. Populations have remained quite constant with an annual thirty-day hunting season.

Mourning Dove

Common in the Sonoran and Transition Zones on the East Side.

Chukar Partridge

Huntable populations of chukar partridge are found in some of the semiarid habitat along the eastern border.

Valley Quail

A limited number of valley quail are found along the stream sides in the lower valleys on the eastern border. They are also found in the Humid Transition Zone west of the Cascades. Quail hunting is usually incidental to grouse or chukar partridge hunting.

Chinese Pheasants

Found in limited numbers on the east side.

Hungarian Partridge

Found in very limited numbers in the lower fringes of the Study Area.

Important birds other than upland game species are as follows:

Eagles

The Golden and Bald eagles are uncommon residents. The Golden eagle is a year long resident in the mountains but is seldom found very far west of the Cascade Crest. The Bald eagle is most common on the coast; but it is found in small numbers on both sides of the Cascades, and there have been a few reported nestings.

Hawks

Hawks which have been reported include the marsh hawk, sharp-skinned hawk, Cooper's hawk, goshawk, western red-tailed hawk, Swainson's hawk, American rough-legged, ferruginous roughleg and the hawk's close relative, the American osprey.

Owls

Owls which have been recorded include the great-gray owl, the horned owl, the long-eared owl, the screech owl, and the pygmy owl.

Song Birds

An abundance of song birds reside within or are common migrants to the study area. Their cheerful songs and bright colors contribute greatly to the aesthetic value of the area.

FISH

Resident

Rainbow, Cutthroat, Easternbrook, Dolly Varden, Brown, Kokanee, Whitefish, Sunfish, Crappies, Bass, and Catfish are the important species.

Anadromous

Salmon (a) King or Chinook, (b) Silver or Coho, (c) Pink or Humpback, (d) Red or Sockeye, and (e) Chum or Dog. It is doubtful if any Chum use the Study Area. In addition to salmon there are steelhead and sea-run cutthroat trout. A very limited number of sea-run cutthroat use the study area.

Distribution of both resident and anadromous species will be discussed under recreational fishing.

EXOTICS

The lowland red fox has become established in the study area. It is a nuisance wherever found and its fur is less valuable than the native red fox. The Opossum was introduced into Washington approximately 30 years ago and has extended its range into the lower fringes of the Study Area.

The introduced upland game birds, Chinese pheasants, chukars, and Hungarian partridges have been discussed above.

These exotic species have not had a significant effect on the Study Area.

RODENTS AND OTHER ANIMALS

There are many kinds of rodents and other small animals in the Study Area including but not limited to the following:

Beaver

Common throughout the area.

Raccoon

Common in lowland areas along streams.

Rabbit

The snowshoe hare and a limited number of cottontail and jack rabbits are found on the Study Area. The small coney or rock rabbit is also a common resident of talus slopes.

Hoary Marmot

Common in the Hudsonian zone and above.

Porcupine

The porcupine is a common resident.

Mountain Beaver

The mountain beaver is a common resident on the West Side and lives in moderate numbers on some of the heavier forested areas on the East Side.

Mice

Many species of mice live within the area. These populations are very prolific and have a pronounced affect on timber regeneration.

Pocket Gophers

The pocket gopher is a common resident of grasslands, meadows, and disturbed sites.

Squirrels

Both tree squirrels and ground squirrels are found throughout the area. The pine squirrel, silver gray squirrel, Douglas's squirrel, and the Cascade squirrel are common residents.

A number of animals are in the nuisance category and control measures are often required for short periods to protect roads and culverts, to allow establishment of seedlings and plantations, or to protect trees and other resources. The principal nuisance animals are: beavers, porcupines, mountain beavers, hares, rabbits, pocket gophers, tree squirrels, ground squirrels, chipmunks, wood rats, mice, shrews, and voles.

Control of these animals is carried out with the advice and guidance of the Washington Department of Game and the Fish and Wildlife Service. The publication, "Wildlife Feeding Injuries on Conifers in the Pacific Northwest" by William H. Lawrence, Nelson B. Kverno and Harry D. Hartwell lists the type of injury to trees and the control methods employed for each species of animal.

In addition to the animals listed above, deer, elk and bear cause injury to conifers. Some grouse also clip buds and needles extensively which impairs the vigor and height of young trees.

Other animals and birds feed on grass and browse seedings and plantations, often causing significant damage.

RARE, VANISHING OR EXTINCT SPECIES

Species that are rare, on the downward trend, or may be entirely extinct are listed below:

Grizzly Bear	Cougar
Wolf	Otter
Fisher	Moose
Wolverine	

None of these species appear to have been abundant since the white men came to this area around 1800.

Grizzly Bear

Grizzly bears were native to the Northern Cascades. They were killed whenever possible because of the raids they made on sheep. There are reports of sheepherders being killed by grizzly bears in early days. It is only occasionally that a grizzly bear has been reported since the 1930's.

Wolf

Small bands of wolves were found in a number of valleys when the first settlers arrived but the animals have apparently disappeared from the range. Reports of wolves occur each hunting season, but authentic records to prove their existence are lacking. The last positive records were from Mt. Rainier Park in 1920 and from Mt. Baker Forest in the 1930's.

Fisher

This rare forest dweller is still present in very low numbers.

Wolverine

The wolverine was probably always rare and there have been no reports of its occurrence in some years. A specimen collected at Grandview to the east of the Snoqualmie during the spring of 1963 was the first state record for the animal in a number of years. This has given rise to speculation that the animal might still exist in very small numbers on the Study Area.

Cougar

The cougar because of exploitation and the settlement of areas required to meet its large home range requirements is an endangered species.

Otter

Otters formerly occupied most every permanent lake or stream at lower elevations. While probably never extremely abundant, they are such wide travelers that their occurrence appeared quite general. Otters are still found in limited numbers but are less numerous than formerly.

Moose

Moose are seen on rare occasions. They should probably be listed as wandering individuals from Canada.

Big Horn Sheep

The Rocky Mountain Big Horn or Mountain Sheep once occupied much of the Cascade range. The most usual wintering places in the early days were canyons with cliffy edges. The encroachment of civilization forced them to winter at higher altitudes. Because of the competition from domestic stock on these higher areas, over-hunting and perhaps diseases transmitted to them by domestic sheep, the bighorn began to disappear. As its breeding potential was not very high, the continual decreasing population finally was extirpated. The bighorn sheep have now been re-established by the State Department of Game.

MANAGEMENT OF FISH AND WILDLIFE POPULATIONS

On Intermixed Public and Private Lands

Under the constitution, the State has the authority and responsibility for management and control of fish and wildlife in trust for its people on all lands and waters within the State, except on lands administered by the National Park Service and Indian lands.

On National Forest Lands

The Washington Department of Game is responsible for protection and management of game, fish, and wildlife resources on National Forest lands just as they are on private lands within the State.

The Washington Department of Fisheries has authority for management and control of commercial fish species.

Animal and Fish Surveys and Studies

The Washington Game Department has the primary responsibility for animal and sport fish surveys and studies on National Forest lands.

The Washington Fisheries Department is responsible for studies and surveys dealing with commercial fishes.

Surveys covering the study area have been conducted to provide information on which to formulate projects to improve the status of existing fish populations. These often consist of recommendations for the installation of specific fishways or protective screens on irrigation, power, and domestic water supply dams. Major surveys include those designed to establish new salmon runs in water flowing from the Study Area which replace those blocked in 1937 by the construction of Grand Coulee Dam. The Columbia River Fisheries Development Program also included the North Cascades area under report title of "Upper Columbia River Planning Report, 1961." There are two 5-year basin study programs in progress; one of the Columbia River drainage and one of the Puget Sound drainage. These programs provide for an examination of the total environment affecting fisheries resources in these drainage systems, including the North Cascades area. They are expected to be of a cooperative nature involving State and Federal agencies.

In addition, the Baker River Fisheries Investigation, started in 1954, is a cooperative effort of the Puget Sound Power and Light Company and the State of Washington. Also in 1954, the City of

Tacoma Public Utilities Commission and the State of Washington undertook surveys of fisheries population of the Cowlitz River. Both studies were directed toward maintaining stocks of fish whose habitat is totally or partially within the North Cascades Area.

The Fish and Wildlife Service also conducts surveys and studies on National Forest lands. The Forest Service often cooperates with various agencies in these studies.

Fish planting and similar activities are carried out on National Forest lands by the Washington Game Department, the Washington State Fisheries Department and the Fish and Wildlife Service. Exhibit No. 9 shows fish planting by the three agencies.

Forest Service Responsible For:

The Forest Service has the responsibility for managing wildlife habitat on National Forest lands.

Thus, joint State-Forest Service action is necessary for effective wildlife management on National Forest land. This joint effort is set forth in the following Cooperative Agreement.

(could be omitted)

TITLE 2600 - WILDLIFE MANAGEMENT

Cooperative Agreement

THE DEPARTMENT OF GAME
STATE OF WASHINGTON

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

This Cooperative Agreement, made in triplicate this 26th day of July, 1960 by and between the Washington Department of Game, hereinafter called the Department, and the United States Forest Service, through the Regional Forester, Region 6, hereinafter called the Forest Service, and

WHEREAS, The Department has been created under the laws of the State of Washington to provide an adequate and flexible system of control, propagation, protection, and regulation of all wildlife in Washington, and

WHEREAS, It is the mutual desire of the Department and the Forest Service to work in harmony for the common purpose of developing, maintaining, and managing all of the wildlife resources for the best interests of the people of Washington and of the United States.

The Forest Service agrees:

(a) To cooperate with the Department in the enforcement of state game and fish laws.

(b) To make available to representatives of the Department such national forest improvements and facilities as would normally be used in wildlife work, provided that they are not being currently utilized by the Forest Service.

(c) To provide the Department with reports and copies of all vital correspondence directly related to this memorandum.

(d) To furnish the Department with copies of the general wildlife reports prepared annually by the Forest Service.

(e) To permit the erection and maintenance of structures needed to facilitate wildlife management activities of the Department within the national forests, provided such structures conform in character and location with the usual requirements of the Forest Service, and their intended use is not in conflict with Forest Service policy.

(f) To practice those forms of land and resource management that will benefit wildlife as fully as practicable, in coordination with the requirements of other uses and values.

(g) To recognize the Department as the agency primarily responsible for determining the means by which game animals, fur animals, and game fishes shall be utilized beneficially.

The Department agrees:

(a) To provide adequate wardens for the normal enforcement of the state game, fur, and fish laws effective upon the national forests.

(b) To make available to the Forest Service such facilities, equipment, and personnel as can be assigned for the prevention and suppression of forest fires on or near the national forests insofar as is compatible with their normal use or duties.

(c) To make or sanction no artificial plant of wildlife which may affect national forest land management until a joint investigation has been made and mutual agreement reached regarding its effect upon all other resources.

(d) To make no use of poisons for the control of predatory animals or other wildlife on the national forests without approval of the Forest Service.

(e) To notify the Regional Forester when special permits to take game and fish out of season are issued, including the locality and wildlife species involved.

(f) To erect no signs or structures and perform no construction or other acts not herein provided for without first securing the concurrence of the Forest Supervisor.

(g) To notify the Forest Service promptly of changes in the game, fur, and fish laws or regulations.

(h) To provide the Forest Service with reports and copies of vital correspondence relating to this memorandum.

(i) To recognize the Forest Service as the agency primarily responsible for determining the proper use of national forest land in the interest of coordination with other uses and values and, to the extent feasible, adjust wildlife populations to avoid damage to the national forests.

The Department and the Forest Service mutually agree:

(a) To cooperate in the restoration and management of wildlife resources of the State of Washington in proper relation with the land use plans of the Forest Service.

(b) To promote a united approach by all interested parties to the problems relating to wildlife and fisheries management.

(c) To cooperate in the formulation and application of practical plans and programs to guide the management of wildlife upon national forest lands.

(d) To meet jointly at least once annually, and more often if necessary, for discussion of matters relating to the management of wildlife resources in or affecting the national forests; and to provide for other meetings at various administrative levels for discussions of law enforcement; educational programs; cooperative studies; plans; wildlife surveys; hunting, fishing, and trapping seasons; and such other matters as may be relevant to the wildlife resources and its habitat.

(e) That all questions pertaining to the cooperative work of the two agencies which arise in the field will be discussed on the ground by the local representatives of the Department and the Forest Service, and that questions of disagreement will be referred to the Regional Forester and to the Director of the Department for decision.

(f) That members of both agencies will refrain insofar as possible from expressing in public a view contrary to the accepted policy and plans of the other agency.

(g) To require as close cooperation as practicable of all Department and Forest Service personnel, including the prompt and complete interchange of information in all matters such as law enforcement, game and fish stocking, predator control, game and fish surveys, emergency feeding, habitat improvement, public education, refuges, and studies.

(h) That whenever a specific area of a national forest is set aside for a program of intensive cooperative wildlife management, which in part or whole will be financed by deposits in a cooperative work fund, separate and individual agreements will be entered into by the parties hereto covering the management of each such national forest or portion thereof.

(i) That each and every provision of this cooperative agreement is subject to the laws of the State of Washington and the laws of the United States.

(j) That nothing in this agreement shall be construed as obligating the Department or the State of Washington in the expenditure of funds or for the future payment of money in excess of appropriations authorized by law.

(k) That nothing in this agreement shall be construed as obligating the Forest Service or the United States Government in the expenditure of funds or for the future payment of money in excess of appropriations authorized by law.

(l) That nothing herein contained shall be construed as limiting or affecting in any way the authority of the Regional Forester in connection with the proper administration and protection of the national forests in accordance with the purpose for which the lands contained therein were acquired and reserved.

(m) That this agreement shall become effective as soon as it is signed by the parties hereto and shall continue in force until terminated by either party upon thirty (30) days' notice in writing to the other of his intention to terminate upon a date indicated.

(n) That no Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made for a corporation for its general benefit.

(o) That amendments to this Cooperative Agreement may be proposed by either party and shall become effective upon approval by both parties.

This agreement supersedes agreement dated August 26, 1955.

WASHINGTON DEPARTMENT OF GAME

Date August 9, 1960 By s/ John A. Biggs
Director

UNITED STATES FOREST SERVICE

Date July 26, 1960 By s/ James C. Iler
Acting Regional Forester

Habitat Management

As man continues his encroachment on and modification of the wildlife habitat, improvement efforts must be increased if game and fish populations are to be maintained at optimum levels which are not in conflict with other values.

The proper management of food, water and shelter on National Forest lands will provide the necessities for a supply of game and wildlife indigenous to the environment. Artificial propagation and stocking have been emphasized in the past, rather than the more fundamental program of providing and maintaining favorable biological environments. Wildlife will survive and produce young if environmental conditions are satisfactory, but civilization has so interfered with the natural envirnoment that management is now necessary to assist the wildlife in adjusting to changed conditions.

Little directly financed habitat improvement work has been done in the Study Area by either the Forest Service or the State Game Department. Such work has necessarily been accomplished through manipulation and regulation of other resources and activities. The coordination of road construction, logging and other resource uses under the direction of the Multiple Use Act, High Mountain Policy and other guides are designed to enhance fish and wildlife values.

The Washington Game Department has done considerable habitat improvement work on its game ranges adjacent to the Study Area. Increased federal expenditures and technical direction for wildlife habitat improvement and coordination work will be needed to meet future demands. As funds may become available, the State and other organizations will also be encouraged to undertake additional direct habitat improvement work.

Recreational Developments and Management of Recreational Use

Wildlife is closely allied to recreation in the National Forests. The rapid increase in recreation has been accompanied by a similar increase in use of the wildlife resource. In the Study Area hunting use has increased from about 180,000 visitor days in 1958 to 420,000 in 1962, and fishing use has increased from about 430,000 to 530,000 visitor days. A continued increase is expected as the population, its income, leisure time, and mobility increases. Improved access and habitat improvement will facilitate fuller development and use of the resource. Recreational use related directly to hunting and fishing should be accompanied by a general leveling as wildlife populations are stabilized and the sportsman's sucess ratio is lowered. Recreational use of the National Forests related entirely to camping will continue to increase.

The recreation industry including tourism is a very important segment of the economy of the State of Washington. Many small communities and individual businesses depend almost entirely upon the recreation industry as a major source of income. Federal lands are visited each year by increasing numbers of hunters, fishermen, tourists, campers, hikers and photographers to enjoy outstanding scenery and yearlong recreational opportunities.

The present and projected hunting and fishing use of the study area will require extensive recreational developments to meet demands, particularly in the lowland areas. These developments include, but are not limited to, campgrounds, hunter camps, trails and roads.

These improvements must be planned for sanitation and to provide for dispersal of hunting and fishing effort to lessen the impact on soil and vegetative resources. Improved trails and methods of feeding and caring for pack and saddle stock in wilderness areas will be required to prevent destructive utilization of forage, timber and soil on choice sites.

Coordination of Other Resource Uses with Wildlife

Most common opportunities for multiple use correlation have been recognized through multiple use planning and established standards. An example is road location and construction standards for the protection of resident and anadromous fish.

Most National Forest lands can be used by game animals in harmony with other uses provided game numbers are kept in balance with their food supply.

Coordination problems are imposed within the resource when deer and elk compete for key winter range or when big game depletes ranges with resultant watershed damage. Game animals and domestic livestock use must be closely correlated to prevent destruction of the soil and forage resources. Excessive game populations are not compatible with timber production when reproduction and young trees are mechanically damaged or heavily browsed. Other activities must be correlated so that streams maintain highest potentials for fish habitat.

The Washington Game Department has been very cooperative in setting seasons to control over populations in areas where trees are being damaged.

Timber is the major resource within the Study Area. Many of the timbered areas furnish considerable amounts of forage important to game and livestock. Timber harvest and cultural practices generally benefit wildlife by increasing the production of forage. Timber and wildlife uses do not conflict when wildlife populations are in balance with their food supply.

The entire study area contains the following acreages of forest and non-forest lands:

	Thousands of Acres	%
Commercial forest land	2,858	45
Reserved productive land and wild, wilderness, natural areas, and National Parks.	384	6
Land that will not produce commercial timber crops	3,067	49
	6,309	100

The effect of logging on game in the Study Area must be discussed separately for the two sides of the Cascade Divide.

West of the Cascades the timber is primarily old growth Douglas fir, hemlock and assorted species grown under conditions of an equitable climate with high rainfall. These climatic conditions produce a dense canopy with few natural openings and a relatively poor supply of browse and forbs. Brown states:

> The black-tailed deer populations in most areas of western Washington are constantly fluctuating. Densities are dependent on time and extent of logging or burning. About the only place where stable populations can be found is in the virgin timber areas, and these are so rare they are of little importance in the overall management picture.
>
> In the virgin timber areas, the populations are relatively low. Shortly after logging or burning, there is a tremendous increase in population density. Part of this increase results from an influx from peripheral areas and part comes from an increase in the productivity and survival of the herd. On small areas, the increase in density will be rapid, coming almost entirely from

> immigration. On large areas that have just been opened, the increase in density will be slower and will result largely from increased reproductive and survival rates. 14/

The normal method of timber harvest in the Principal Forest Resource Association* is by staggered clear-cut blocks. This type of harvest produces a very pronounced change in the ecology of the area. After logging the slash is often broadcast burned to reduce the fire hazard and prepare a better seedbed. Spot burning may be done if the entire area is not burned. In any event, the soil dries and soil temperatures increase.

Because these are prime timber producing lands, it is desirable to restock them to trees as rapidly as possible; consequently, young trees are seeded or planted. For a time, often into the following year, or occasionally longer, young trees are the primary green vegetation on the area. At that time the trees are very vulnerable to damage by animals because the open areas are desirable feeding and resting areas for many species of birds and animals. The damage may be mechanical injury caused by trampling, browsing by big game, or feeding on the tree or bark by rodents, rabbits, or mountain beavers.

At the beginning of the next growing season following logging, weeds and browse plants rapidly occupy the site under the favorable conditions of sunlight and moisture. This makes the open area much more attractive to animals and damage to tree reproduction may increase.

It is very desirable to get trees established prior to the time that browse plants occupy the site or an expensive job of brush removal may be required before seeding or planting.

The opening of the tree canopy and consequent high game food production is very beneficial for game. Big game populations rapidly increase to fill the expanded carrying capacity of the habitat. In order to prevent excess populations of game building up with resulting damage to trees and other forage plants, it is necessary to increase game harvest in those areas.

The establishment of trees and protecting them from injury by animals, and at the same time, producing high quality game crops, are priority jobs shared jointly by foresters and game managers.

Logging in the lowland areas west of the Cascades began about 1900. The logging was in large clearcuts which often were too

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14/ The Black-Tailed Deer of Western Washington, Washington State Game Department, p. 56, 1961 by Ellsworth Reade Brown.

* Classification from High Mountain Policy, U. S. Forest Service, 1962.

large and too open to be most desirable for game, because of lack of cover. These reforested areas, some of which are 60 or more years of age, have declined in value as game range. Game populations in Western Washington apparently reached a peck about 1940 as the habitat became fully occupied.

Game range produced by logging is transitory. The highest game populations follow the logging by about ten to twenty years. There is a gradual build-up to a high point and then a gradual decline as the tree canopy again closes.

Brown states:

> The 36,000-acre Research Area on the Clemons Tree Farm, where most of the population data was collected, was considered to be fairly typical of many of the black-tailed deer ranges in western Washington. A type map of the area was prepared in 1950, classifying the vegetation into four successional stages... State 1 consisted of recently logged or burned areas that were just starting to produce deer forage. Stage 2 included areas where shrubs were the dominant vegetation and were considered to be approaching the peak of productivity of deer forage. Stage 3 areas included those where second-growth tree species were dominant and were considered to have reached, or passed, their peak of productivity of deer forage. Stage 4 consisted of dense second-growth or mature old-growth timber areas that were considered to have a low productivity of deer forage.
>
> While making an extensive survey, in 1951, of the game range areas throughout southwestern Washington and the Olympic Peninsula, 145 tenth-acre pellet group transects were counted. These showed an average population of 22 deer per square mile. By successional stages, the indicated populations were: Stage 1, 20 deer per square mile; Stage 2, 22 deer per square mile; Stage 3, 26 deer per square mile; and Stage 4, 15 deer per square mile. These figures are probably high for an overall average, since only the more important deer ranges were surveyed, but they do give some indication of populations. 15/

As logging progressed to higher elevations in the study area smaller clear-cuts, much more favorable to game animals became the rule. Clear-cuts of this type with an increase in "edge" in relation to area and a wide variety of forage have a high

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15/ The Black-Tailed Deer of Western Washington, Washington Game Department, 1961, by Ellsworth Reade Brown, p. 56 & 57.

carrying capacity for game. Maintenance of this capacity requires that new clear-cuts be created as old ones become restocked and gradually diminish in game carrying capacity. Sustained yield logging under present practices can accomplish this objective.

East of the Cascades the climate is drier and the principal timber species is Ponderosa pine. Timber harvest emphasizes the initial treatment of the stand by the removal of designated individual trees on a salvage and risk basis. This is frequently supplemented by the removal of groups of mature timber that is overtopping established young growth. These groups vary in size from one-half acre up to several acres. With opening of the upper crown canopy, more sunlight reaches the understory trees and the forest floor. Some of the moisture that was formerly used by the overstory trees becomes available for grass, forbs and browse. This increases food for animals. Game animals, also increase, and if not controlled, may exceed the limit of the additional food supply.

The removal of mature timber under this system of management does not generally have as severe an impact on the land as clear cutting with slash disposal in the Douglas fir subregion. Areas treated are usually smaller. Changes in the ecology are less abrupt, because care is taken to save and protect established young growth trees. However, changes occur as in the other timber types and the net result is more game food and increased game populations. These populations often cause damage to tree plantations and natural tree reproduction. Some of the associated species types in the Ponderosa pine subregion receive silvicultural treatment similar to that used in the Douglas fir sub-region. The clear-cut areas, however, are usually smaller and less severe slash burning is advocated.

Logging east of the Cascades in the Study Area occurs at higher elevations primarily on game spring, summer and fall ranges. The increase in game populations brought about through an increase in the spring, summer and fall food supply puts an added impact on already heavily used winter ranges. Without increased recreational hunting to remove the surplus animals, overpopulation with consequent range damage and deterioration results.

Demands for good quality domestic, irrigation and industrial water are high and increasing. This necessitates that watersheds be maintained at highest possible production levels.

Impoundments for irrigation and hydroelectric developments are very often detrimental to migratory fish. Proper correlation through provision of fish ladders and other measures are necessary to protect fishery resources.

The harvest of wildlife, including fish in the Study Area, has a beneficial impact upon the local economy. Increased recreational demands for hunting and fishing, coupled with high, big-game numbers, accentuate the need for coordination of use of the forage resource by domestic livestock and big-game.

A healthy winter range is critical for the survival of big game. In those areas of especial importance to game, domestic grazing must be managed to protect wildlife values.

Development of access through trails and roads in the Study Area will permit more efficient use of the game species. The present use of most underdeveloped areas is inadequate to fully utilize game populations now on the areas during regular hunting seasons. By liberalizing game regulations game can be harvested in the high country or when they migrate to the winter ranges.

Big game increases at the rate of approximately 25% to 35% annually, disregarding natural losses. A very substantial number of animals are available for harvest annually in order to avoid losses resulting from depleted ranges.

Small game species generally are underharvested in underdeveloped areas because there is insufficient incentive for hunters .

Fish populations are normally greatly underharvested in the more inaccessible areas, even though the habitat may not be as productive as streams and lakes at lower elevations. The few who pack into the high country lakes virtually find a fisherman's paradise.

Habitat Research

The Pacific Northwest Forest and Range Experiment Station has responsibility for range and wildlife habitat research on National Forest lands. For many years a branch research center under direction of the Pacific Northwest Station has operated at Wenatchee, Washington. In addition to work performed by the Experiment Stations, numerous administrative studies are carried on by the National Forest Administration under their guidance. Some of these studies are in cooperation with the Washington Game Department.

Research needs for fish, wildlife and big game ranges are as follows:

1. To determine the physiological and ecological requirements of principal forage plants.

2. To evaluate problems arising from production and use of forage, timber, wildlife and water on the same lands and to determine the best methods of integrating and coordinating management of the various resources.

3. To determine relative use of forage by big game and livestock on summer range and certain portions of the spring-fall range.

4. To determine methods and species for artificially revegetating big game ranges.

5. To determine methods of preventing animal damage to tree reproduction.

6. To determine practical means of reseeding mountain ranges in need of improvement.

7. To determine reasons why some areas have little or no game whereas apparently identical areas support game animals.

In addition to habitat research needs, it is also important that further investigation develop the following:

1. The best methods for determining the number of game animals using a given area. This is basic to effective game range management and control.

2. A reliable and current monetary evaluation of (system for placing a dollar value on) fish and wildlife resources, uses, and associated activities.

3. The effect of logging on a tributary to a fish bearing stream.

4. A proper evaluation of the important wildlife by-products involved in the enjoyment activities of photography, camping, hiking, bird watching and the many other aesthetic values.

5. Reasons why bears strip bark from trees. This is now the subject of a cooperative research program in Northwest Washington.

On Other Public Lands

The State has no jurisdiction over wildlife on Mt. Rainier National Park. The park is a wildlife sanctuary and no hunting is allowed; consequently there is little, if any, management of wild animal populations.

Bear, mountain goats and a few deer are the only large animals that live in the park year-round. It provides some summer range for deer and elk.

There is little fishing management within the area. Some fish have been planted by both State and Federal agencies.

USE OF FISH AND WILDLIFE RESOURCES

Sportsmen derive tremendous enjoyment from fishing and hunting. The annual harvest of fish and game within the Study Area in 1962 amounted to 536,000 fishermen days and 422,000 hunter days.

Recreational Hunting

The Washington Department of Game estimates that game animals of the Study Area make up approximately 27 percent of the State big game supply and account for about 298,000 hunting days for big game. See 1962 map of Washington Game Department hunting seasons and game bag limits and 1962 map of mountain goat hunting seasons in the Appendix.

Data on deer population, harvest, etc. for 1962 are listed in Exhibit No. 10. The total deer harvest for the 11-year period, 1952-62, was approximately 177,000. The 1962 harvest was 12 percent of the estimated population. Exhibit No. 10 shows that the harvest ranged from a high of 18 percent of the population in 1953 to a low of eight percent in 1957. Special doe seasons occur in portions of the Study Area whenever the Washington Game Department determines that deer populations are too high in specified localities.

Exhibit No. 15 presents information on population, harvest, man-days, bag limits and seasons for deer and other big game animals on the Study Area.

A small portion of the Study Area is now closed for protection of municipal water supplies. It is imperative that the watersheds be managed under a multiple use concept if recreational hunting and fishing are to be maintained.

EXHIBIT NO. 15
1962 Game Statistics
North Cascade Study Area
(Data from Washington Game Department)

	Population Estimate	Harvest	Hunter Man-Days	Avg. Man-days/animal	Bag Limits	Seasons
Deer	140,000	15,800	162,000	10	1 per license holder	Regular Oct. 13 to Nov. 10 High country - Sept. 8 to 23 Various for special doe seasons
Elk	14,600	2,400	119,000	20	1 bull per license holder	Regular Nov. 8 - 18 Special cow seasons
Mt. Goats [1/]	8,000	300	4,000	8	One of either sex	Regular Sept. 8 to 23
Bear	12,000	1,300	13,000	10	No limit 1 per year	On west side Sept. 8 to Nov. 4 On east side Sept. 1 to Nov. 10

Data on deer and elk property damage payments made to owners of private land are available by counties only. In the ten counties comprising the zone of influence, 269 damage claims have been filed and $48,491 paid in the period 1952 to 1963. No allocation of damage caused by wildlife in the Study Area is attempted.

1/ Permit hunting by drawing

Overuse of Key Ranges

Almost the entire Study Area is used by big game in summer. Big game ranges are currently overstocked in most areas. Occasional severe winters act as a leveling influence in controlling game numbers. The last controlling winter was 1955-56 when possibly half of the deer perished in many parts of Washington. Winters since then have been mild and open.

Competition between deer and domestic livestock occurs in summer on high mountain meadows and ridge tops where sheep, cattle, and horses are grazed. Deer and livestock compete for forage on key winter ranges. The extent of direct competion depends upon the severity of the winter. Deep snow, for instance, forces deer to low elevations, largely outside the National Forest boundaries.

Logging

The effects of timber management and logging on game range have been discussed previously under Habitat Changes Due to Fire and Other Man-made Causes.

Fire

Fire has a beneficial effect on some game ranges. It opens up the forest canopy in heavy timber areas and permits the growth of species of plants more beneficial to game. Fire also eliminates mature browse plants that have grown beyond reach of deer. The subsequent new growth furnishes a new source of browse.

Water impoundments have adverse effects on deer winter range in instances where the flooded river valleys eliminate deer winter ranges.

Deer

According to Washington Department of Game reports few deer are lost through disease. In winters of prolonged cold and deep snow, considerable numbers of deer die from malnutrition. The last significant die-off of deer occurred in the winter of 1955-56.

Deer hunting on the west side of the North Cascades is concentrated in the vicinity of access roads, alpine meadows, logging roads and in and around clear-cut land. The thick brush and heavy timber deter travel away from roads and provide cover in which it is difficult to locate or approach deer.

The more open timber types on the east side of the Cascades gives hunters an opportunity to spread out thus lessening hunter concentrations.

Deer damage seedlings on lower elevation tree plantations by eating the terminal branches. They also suppress growth of young trees by browsing on the lateral branches. In some areas deer damage has been severe enough to require replanting.

Elk

The Roosevelt or native elk occurs on the west side of the North Cascades. Olaus Murie[16]/ found no evidence to indicate that Rocky Mountain elk were native on the east side of the Cascades. They were introduced to the east side in 1912 and are now generally found from south of Lake Wenatchee to the Yakima Indian Reservation.

Elk are prime game animals. Their significance to hunters is not proportional to their numbers. 1962 data pertaining to elk population, harvest, seasons, etc., are listed in Exhibit No. 11. Washington Game Department reports that 18,703 elk were harvested from the Study Area in the 11-year period 1952 to 1962. The majority of these elk were taken from Yakima and Kittitas Counties.

The amount of property damage attributed to elk has not been reported by the Washington Game Department. It is included in the amount mentioned previously in the discussion on deer damage.

Most key ranges of elk in the Study Area are currently overstocked. Elk compete directly with livestock for forage on the key winter ranges of lower elevations and in the higher mountains where their summer ranges overlap.

Elk habitat is benefited by fire and clear-cut logging. Water impoundments and agriculture deprive elk of necessary winter ranges. Spring, summer and fall livestock grazing on areas where elk are often forced by deep snow to forage in winter, significantly limits the number of elk the range will support.

Concentrations of elk hunters is largely controlled by Washington Game Department big game regulations.

Goats

Mountain goats were protected in Washington from 1925 until 1947. In 1948 hunting was resumed on a permit basis. Hunters concentrated in the most accessible areas and threatened to over-harvest some local goat herds. Permits are now issued for specific areas

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16/ Elk of North America, 1951, Olaus Murie

which spreads the goat harvest over most of the goat range. The number of goat permits has increased from 150 in 1948 to 880 in 1962. Exhibit No. 12 shows the 1962 estimated mountain goat population harvest and seasons.

Mountain goats do not normally damage crops or property on private land because they range at elevations generally above these areas. Washington Game Department studies show that goats have over-grazed and trampled some of their winter ranges which has caused erosion in places. The poor condition of some of their range areas appears to be having a definite impact on goat populations. There is little or no competition for forage between mountain goats and domestic stock or other species of wildlife. In some places clear-cut logging improves goat habitat. Fire may be beneficial by creating additional range. It is detrimental when fire destroys forage on winter ranges. Some goats, no doubt, die of disease, but fragmentary studies only have been made on this subject. Some goats are probably lost each winter through snow slides.

Bears

Bears are game animals in the Study Area except in Mt. Rainier National Park. They have not attained the big game status in Washington that they have in many parts of the United States, but their attractiveness as a game animal is increasing. Bears are hunted to some extent with hounds. Statistics on bear populations, harvest, hunting seasons and bag limits furnished by the Washington Game Department, are included in Exhibit No. 12.

Some damage to coniferous trees in the 20 to 40-year age class is done by bears at lower elevations. Bears do not compete significantly for food with domestic stock or other wildlife. Vegetation which comes in after fires and logging operations makes better habitat for bears than exists on heavily forested areas. No diseases have been reported which appreciably reduce bear numbers. Hunter distribution is determined largely by the number and location of access roads, since bears are difficult to hunt in dense forests and brushy terrain.

Bears become a nuisance around campgrounds and summer homes at times. This type of bother with some damage must be expected if bears are present in any numbers. Only rarely do they endanger domestic livestock or human life.

Small and Upland Game

As listed in Exhibit No. 16, the principal small and upland game animals hunted in the Study Area are grouse, rabbits, band-tailed pigeons and mourning doves. The habitats of quail, partridges and pheasants are mostly on the fringes or outside the boundary

of the Study Area. See Hunting Seasons and Bag Limits Regulations in the Appendix.

The number of grouse harvested depends upon several factors such as weather conditions and deer hunting intensity. Washingt n Game Department studies indicate that even in heavily hunted areas not over 5 per cent of the grouse population is taken. On the east side of the Study Area investigations have demonstrated that grazing of domestic stock has a detrimental impact on grouse populations. Logging on the West Side benefits grouse by creating an additional food supply in clear-cut areas.

EXHIBIT NO. 16

1962 Small and Upland Game Statistics
North Cascades Study Area
(Data from Washington Game Department)

Species	Population Estimate	Game Harvest	Hunter Man-Days	Average Man-Days of Effort Per Species	Bag Limits	1962 Season
Rabbits: West Side)) East Side)	250,000	5,000			5 per day 5 per day	9/8 to 3/31 10/13 to 2/28
Grouse - all species		73,000	100,000	.7	3 per day--6 possession limit	9/8 to 11/18
White-tailed ptarmigon	5,000 10,000					No open season
Band-tailed pigeon	200,000	5,000	5,000	1	8 birds daily	9/1 to 9/30
Mourning Dove	20,000	2,000	2,000	1	10 per day--20 possession limit	9/1 to 9/30
Chukar partridge	1/	2/	2/	2/	3 mixed	10/13 to 12/31
Valley Quail	1/	2/	2/	2/	3 mixed	10/13 to 12/31
Chinese Pheasants	1/	2/	2/	2/	3 cocks	10/13 to 12/31
Hungarian partridge	1/	2/	2/	2/		

1/Occasional
2/No figures available

Predatory Animals

Coyotes and cougars furnish a small amount of recreational hunting. Coyotes provide big game hunters with opportunities for rifle practice when encountered in areas where the game being hunted would not be distrubed. Some cougar hunting with dogs may persist. Since bounties are no longer paid on predators, little is known now regarding the number of animals killed. With big game populations at a high level, predators have no noticeable effect on their total numbers.

Recreational Fishing

There are four types of sport fisheries in the State of Washington. (See Washington State Department of Fisheries Sport Fishing Regulations, 1962, in Appendix)

1. Salt Water Sport Fishing

The most important sport fishery area from the standpoint of total fishermen trips and fish caught is Puget Sound from its southern extremity to the Canadian border and the Strait of Juan de Fuca. Fisherman trips increased from 231,000 in 1939 to 791,000 in 1957, and catches of salmon increased from 252,000 to 636,000 in the same period.

Salmon sport fishery catch on the ocean, the Strait of Juan de Fuca, and Puget Sound for the period 1954 through 1958 was 262,000 King salmon, 330,000 Silver salmon, and approximately 70,000 Pink salmon. With the increased fishing pressure since 1958, more complete surveys of the catch, and a large run of Pink salmon, the salmon sport fishery for 1962 exceeded one million fish.

Major streams that produced these fish are: Nooksack, Skagit, Stillaguamish, Skykomish, Snoqualmie, Green, Puyallup, Nisqually, Chehalis, Cowlitz, Methow, Entiat, Wenatchee and Yakima.

There is no closed season for sport salmon fishing in Washington. Bag limits have been reduced from no limit to three fish over 20 inches in length, except the Columbia River where the limit is two salmon over 24 inches in length.

The adjusted 1958-1962 average saltwater sport salmon catch of fish originating in the North Cascades Study Area was 497,361 salmon harvested in 904,656 angler days. The number of anglers is unknown and cannot be determined.

EXHIBIT NO. 17

The 1958-62 Oregon-Washington average recreational salmon landings of fish, attributable to North Cascades Habitat, Excluding catches above the mouths of Puget Sound and Columbia Rivers[1]. (Based on adjustments by use of factors shown in footnotes.)

Species	Puget Sound[3]	Washington[3] Offshore	Oregon[4 & 5] Offshore	Total
Chinook	102,433	55,481	36,987	194,901
Silver	100,339	111,654	70,416	282,509
Pink	19,546	405		19,951
	222,318	167,540	107,403	497,361[2,6,7]

1. Source: "1962 Washington Sports Salmon Fishery" Washington Department of Fisheries Progress Report

*2. Catch per angler factor of 0.55 = 904,656 angler days.

*3. Factor of .75 used to convert Washington catch to North Cascades Habitat.

*4. Factor of .50 to convert Oregon catch to North Cascades Habitat.

*5. Oregon catch follows division of Washington-Oregon commercial offshore landings.

*6. Weight factor conversion for recreational chinook and silver salmon catches:

Chinook: 12.3 lbs.
Silver: 5.9 lbs.

7. Total pounds:

Chinook	2,397,282 lbs.
Silver	1,666,803 lbs.
Pink	89,779 lbs.
	4,153,864 lbs.

(Above data furnished by Washington Fisheries Department)

The management of the land is of extreme importance to the migratory fishery resource because the streams are the spawning grounds for a large part of the anadromous fish populations of the State. (See Anadromous Fish map in Appendix) The quality of the spawning habitat determines to a large extent the populations of young fish that migrate to the ocean. This greatly affects the salmon and steelhead ocean fishery extending from Alaska to California. The troll

fishery operates on a mixture of stocks from many rivers and streams along the Pacific Coast.

The capacity of streams to produce fish is directly related to the quality of the watershed. Activities of man often tend to conflict with fish production through the various forms of stream blockage and pollution.

2. Sport fishing in streams for salmon, steelhead, sea-run cutthroat and resident species.

The steelhead is the most important species harvested in fresh water sport fishery. Streams west of the Cascades are not highly productive for resident species for they are being used heavily by populations of migratory fish. See Exhibit No. 18. Fishing for resident species is somewhat curtailed by the minimum size limit of seven inches designed to protect small migratory steelhead.

Steelhead punch cards received in 1960 show that Washington fishermen statewide took an estimated 148,281 steelhead. This was the largest catch since 1955-56 when 161,624 fish were landed, and the third largest take on record.

EXHIBIT NO. 18

Stream Mileage within North Cascades Study Area, accessible to Anadromous Fish, including Distance made available by Stream Improvements since 1953.

Puget Sound Drainage

Nooksack River	20	miles	
Skagit River	118	"	
Stillaguamish River	18	"	(1)
Snohomish River	52	"	(2)
Puyallup River	40		
	248		

Columbia River Drainage

Okanogan River	8	miles	
Methow River	140	"	
Entiat River	28	"	
Wenatchee River	80	"	(3)
Yakima River	128	"	
Cowlitz	4	"	
	388		
TOTAL			636

(1) 20 miles made accessible by fishways
(2) 28 miles made accessible by fishways
(3) 44 miles made accessible by stream clearance

(Data furnished by Washington Fisheries Department)

The steelhead bag limit is two fish per day, maximum six steelhead per week and not to exceed 30 per year. Seasons vary in length from January 1 to February 28 and in a few cases to March 15.

The anadromous fish map in the Appendix shows streams in the Study Area. If funds were available to remove or build ladders over barriers, many additional miles of spawning area could be made available.

Information on harvest of the river fishery is available only for steelhead.

EXHIBIT NO. 19

Ten-Year Average - Washington Recreational Steelhead Fisheries Attributable to North Cascades (5). (Based on adjustment by drainages as indicated.)

Location	Fish (Number)	
Columbia River Drainage		
Columbia River:		
Ilwaco to Bonneville Dam (75% of total) (1)	14,550	
Above Bonneville Dam (50% of total) (2)	4,097	
Methow River (100%) (3)	173	
Okanogan River (100%) (3)	18	
Entiat River (100%) (3)	100	
Wenatchee River (100%) (3)	1,145	
Yakima River (75%) (4)	1,119	
Cowlitz (75%)	7,081	
Total		28,283
Puget Sound Tributaries		
Skagit (75%)	11,142	
Green (75%)	8,463	
Puyallup (75%)	8,469	
Skykomish (75%)	4,389	
Snohomish (75%)	2,988	
Stilliguamish (75%)	2,200	
Nooksack (75%) (1961-62 only)	1,568	
Total		39,219
Grand Total		67,502
Angler days (factor 4.5 days per fish) (5)		302,759

1. Factor of .75 used to adjust total catch to North Cascades.
2. A larger proportion of the catch in the Columbia River below Bonneville Dam is of North Cascade origin, decreasing above Bonneville Dam.
3. Fully influenced by North Cascades drainage.
4. White Pass Highway divides Yakima River system.
5. Washington Department of Game 1962 Steelhead punch card analysis.

(Data furnished by Washington Fisheries Department)

3. Lowland Lake Fishing

Lowland lakes have an advantage over streams in that their high nutritive content makes hatchery plantings more successful. Also, statistics show that hatchery fish planted in lakes grow faster than fish planted in streams.

In 1950 over 80 percent of Washington's accessible lake acreage contained populations of coarse and undesirable species. A program of lake rehabilitation was started for the purpose of eliminating warm water species so the lakes could be planted with trout.

The value of rehabilitation is readily seen by the results. Before rehabilitation, Liberty Lake produced an average of 5,000 game fish a year. After treatment it produced over 300,000 annually. Bay Lake produced only 1000 pounds per year before treatment, and 30,000 pounds per year afterward.

The lowland lake program has taken the pressure off stream fishing. Lowland lakes open a month earlier than the streams and this additional month gives the steelhead and salmon additional time to migrate from the streams prior to opening of the trout season. The daily limit for trout, whitefish and steelhead is 12 fish or not to exceed six pounds and one fish.

The major lowland lakes on the Study Area and their size in square miles follow: Chelan (40) Ross (18) Kachess (7) Cle Elum (6) Keechelus (4) Wenatchee (4) Bumping (3) - a total of 82 square miles, or approximately 52,000 acres. Chelan and Ross Lakes have a fish population that is lightly utilized at present because of inaccessibility. Two of the above lakes have recently been treated to remove undesirable rough fish and are back in production. Chemical treatment of two others would probably increase the production of game fish 20 to 30 times.

4. High Mountain Lakes Fishery

High mountain lakes are fished lightly at present because of the difficulty of access. If more fishermen used these lakes it would decrease the fishing intensity now concentrated so heavily on the lowland lakes. In recent years the State Game Department has expanded plantings in these lakes through the use of the airplane.

Walcott[17] defines a high lake as one above 2499 feet in elevation. His book, Lakes of Western Washington, lists 888 in the counties in the zone of influence west of the summit of the Cascades. It is estimated 800 of these are in the Study Area. Information on lakes in the Study Area east of the Cascades is presently unknown. A conservative estimate of the total high mountain lakes on the Study Area is 1200 to 1400.

17/ Lakes of Western Washington, E. Walcott

Commercial Uses of Fish and Game

Marten, otter, mink, and weasel are commercially trapped in the Study Area. See Exhibit No. 20. Exhibit No. 14 shows the gross value of pelts both statewide and from the Study Area for the period 1947 to 1962. By agreement between the Forest Service and the Washington Game Commission, commercial beaver trapping is excluded from the Study Area.

The combined range of these fur-bearers extends from the National Forest boundaries well up toward the crest of the Cascades. Otter and mink habitats are confined largely to streams and lakes.

From 1947 to 1962 Washington Game Department data show that 23,966 trapping licenses were issued for the entire state. Of this number, 11,914 or about 50 per cent were issued for the Study Area. The number of licenses decreased from 1,219 in 1947 to 298 in 1962.

EXHIBIT NO. 20

Fur Harvest by Species and Price of Pelts

1947 - 1962

	Total Statewide	Total Study Area	Price of Pelts*			
			Highest	Date	Lowest	Date
Marten	11,174	10,160	21.00	1947	3.00	1961
Otter	9,812	2,454	30.50	1959	17.50	1949
Mink	92,718	40,242	33.50	1947	10.00	1961
Weasel	7,564	3,826	1.90	1950	.40	1958

*Washington Game Department estimate of total fur value was approximately $25,000 in 1962.

Harvest of fur-bearers in recent years has declined because of the low market value. If the price for pelts should increase, trapping could produce a sizable income from the Study Area.

Fisheries

The streams of the Study Area furnish a large part of the spawning grounds for commercial food fish in the Columbia and Puget Sound drainages as shown by Exhibits Nos. 21 and 22.

EXHIBIT NO. 21

1958-60 Average Pounds Combined Washington & Oregon Commercial Landings, Columbia River, Attributable to North Cascades Habitat (1)

Species	Pounds (2)
Salmon	
Chinook	3,836,089
Silver	112,743
Sockeye	441,914
Chum	49,174
Pink	6,522
Steelhead	1,037,814 (3)
Smelt	1,150,570 (3)
Shad	310,908 (3)
Sturgeon	248,649 (3)
	7,194,383

(1) Source: Washington Department of Fisheries 70th Annual Report 1960. pp 195-196.

(2) Recorded poundage converted by a factor of .75 to obtain weight attributable to North Cascade habitat.

(3) Oregon Fisheries Statistics 1950-53, Contribution No. 22, February 1956.

(Data furnished by Washington Fisheries Department)

EXHIBIT NO. 22

The 1935-61 Oregon-Washington Average Commercial Salmon Landings, in Pounds, Attributable to North Cascades Habitat, other than Columbia River (4). (Based on adjustments by use of factors shown in footnotes.)

Species	Puget Sound (1)	Washington (2) Offshore	Oregon (3) Offshore
Chinook	529,194	3,834,352	2,556,235
Silver	699,750	5,167,960	3,445,315
Sockeye	2,765	1,527	.....
Pink	367,396	187,436	.....
Chum	3,693,465	2,329	.....
	5,292,570	9,193,604	6,001,550
TOTAL			20,487,724

1. Factor of .75 used to convert landings to North Cascades contribution.

2. Factor of .75 used to convert Washington offshore landings. Convention waters, International Pacific Salmon Fisheries Commission excluded for Sockeye and Pink Salmon catch totals.

3. Factor of .50 used to estimate Oregon offshore contribution. Sockeye, Pink and Chum landings excluded for Oregon.

4. Source: Washington Department of Fisheries, 71st Annual Report, 1961. Pages 145-147, 151, 171-172, 174 and 178-179.

(Data furnished by Washington Fisheries Department)

Predatory Animals

Predatory Animals have virtually no commercial value in the Study Area.

ECONOMIC VALUES OF FISH AND WILDLIFE RESOURCES

The economic values of fish and wildlife resources have never been fully determined. The only values assigned are those that are defensible when compared with other economic fields. The values involved in aesthetics, including appreciation, photography and the many other intangibles, have never been adequately defined or fully evaluated, but their importance to the health and moral fiber of people is well recognized.

The Governor's report on Outdoor Recreation in Washington dated February 1963 states:

> A hunting and fishing survey showed that the traditional and popular sport of hunting and fishing alone annually provides more than 100 million dollars worth of business from the 750,000 Washington sportsmen.

It is estimated the fish and game of the North Cascade Study Area, and fish raised in water of the area, provides a substantial part of this 100 million dollars annual expenditure paid for or spent in pursuit of the wildlife resource.

> Wildlife resources probably have a relative importance in the economy of Washington unsurpassed in any other state and equaled in very few. There are probably many states that enjoy larger expenditures by non-resident sportsmen, and probably numerous states in which larger total expenditures are made by all sportsmen, both resident and non-resident; but there are probably few, if any, others in which hunting and fishing outlays represent a larger proportion of income-creating expenditures within the state.[18/]

The attached information on wildlife values has been developed by the Fish and Wildlife Service from the figures used by the Inter-Agency Committee on Water Resources Sub Committee on Evaluation Standards of May 24, 1960. The values represent the amount of profit a private operator could expect to make on this volume of hunting and fishing if the study area were a private enterprise operated for profit. It does not include expenditures for pursuit of fish or game or money spent for

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18/ An Evaluation of Wildlife Resources in the State of Washington, Pullman, Washington, 1956 by Robert F. Wallace.

specialized equipment. It represents the amount a hunter or fisherman would be willing to pay for his sport, if he did not have free access, over and above the amount spent for licenses, travel, equipment and miscellaneous expenses.

The figures given are the best ones available at present and they are subject to future revision. There are no precise figures in this field.

Exhibit No. 23

Annual Economic Values of Fish and Wildlife Resources. 1/

	Man Days in thousands	Value Factor	Value in thousands	
1. Fishing - Recreational				
a. Resident (fish) Lake & Stream Fishery	536	1.50	804	
b. Steelhead Fishery (anadromous)	303	5.00	1,515	
c. Saltwater Salmon	905	6.00	5,430	
d. Smelt Dipping	18	1.50	27	
Total Fishing Value				$7,776
2. Big Game Hunting				
a. Deer	162	4.50	729	
b. Elk	119	6.00	714	
c. Bear	13	4.50	58	
d. Goats	4	6.00	24	
Total Big Game Value				$1,525
3. Small Game				
a. Grouse	100	2.00		$ 200
Total Annual Recreational Value of Fish and Wildlife Resources				$9,501

1/ Using Inter-Agency Committee on Water Resources Subcommittee on Evaluation Standards of May 24, 1960.

Commercial Fishing Contribution

Wallace, in his Evaluation of Wildlife Resources in the State of Washington, believes it is reasonable to consider anadromous fish as products of the waters in which they spawn. Thus, money paid to commercial fishermen for their catch is directly related to those waters.

The current yearly income value of the North Cascades contribution to commercial fisheries production is computed by the Washington Fisheries Department to amount to $12,484,630.

The estimated annual expenditures by hunters and fishermen is as follows:

Exhibit No. 24

Estimated Annual Expenditure by Hunters and Fishermen

Recreational fishing	$ 21,715,000
Big Game hunting	4,770,000
Upland Game hunting	635,000
	$ 27,120,000

According to the Fish and Wildlife Service the figure given in Exhibit No. 23 of $9,501,000 is entirely separate from sportsmen expenditures; thus could logically be added to the figures of $12,484,000 for commercial fisheries and $27,120,000 shown in Exhibit No. 24 to make a total of $49,105,000 as an indication of the monetary worth of the wildlife resource.

The figures shown in Exhibit No. 24 were derived by converting the man-days of fishing and upland game hunting from information provided by the Washington Game Department to number of fishermen and hunters. State and National survey figures are given in annual expenditure per fishermen or upland game hunter and are used in this conversion. For example, the average fishermen fished 9.5 days per year according to the 1955 National survey. The average upland game hunter hunted 8.5 days per year. The number of big game hunters is based on the 1962 big game tags sold.

Dollar values were taken from An Evaluation of Wildlife Resources in the State of Washington, 1956, by Robert F. Wallace. These figures are $116, annual fisherman expenditure; $54 for upland game and $67 per big game hunter.

(The 1955 National Survey shows $73.38 expenditure per big game hunter and the 1960 figure is $55.07.)

The above figures are the latest statewide and National survey data available.

The calculations from which the summary figures were derived are shown in detail below.

1. Recreational Fishing Expenditures — Fishermen

a.	Lake and Stream	536,000 Man Days ÷ 9.5 =	56,400
b.	Steelhead	67,502 Fish ÷ 2 =	33,700
	(1962 Game Department Survey - Average Fisherman caught two steelhead annually.)		
c.	Saltwater Salmon	905,000 Man Days ÷ 9.5 =	95,200
d.	Recreational Smelt Fishing	18,000 Man Days ÷ 9.5 =	1,900
		Total Fishermen	187,200

187,200 x $116 = $21,715,200 Total Expenditure by Sport Fishermen.

2. Big Game Hunting Expenditures

The number of big game hunters using the area was found by totaling the 1962 big game tags sold and multiplying by 25%. (The Study Area comprises approximately 25% of the State big game range)

	Tags 1962
Deer	228,058
Elk	56,036
Bear - none required	None
Goat	703

Statewide Total Big Game Hunters 284,797

284,797 x 25% = 71,199 hunters
71,199 x $67 = $4,770,333 Annual Expenditure by Big Game Hunters

3. Upland Game Hunting Expenditures

100,000 Man Days ÷ 8.5 = 11,765 hunters
11,765 Hunters x $54 = $635,310
Total Expenditure by Small Game Hunters

4. Trapping income of approximately $25,000 annually as shown in Exhibit No. 14 is not included because it is an item of income rather than expenditure. Trapping, although of minor importance, does have both an economic and recreational potential.

Commercial and Recreational Fishing

A discussion by the Washington Fisheries Department on fisheries catch and values follows:

> Exhibits Nos. 21 and 22 reflect increased commercial fisheries on minor species and the time at which steelhead was legally made a recreational fish in Washington in 1935. This latter change does not represent an actual loss. In the Columbia River, these fish now show in the Oregon commercial catch records. Also, substantial increases have been made in the recreational take of steelhead, which by application of weight conversion factors used in Exhibit No. 6, would increase the average landings of these species in the Columbia River area by another 28,283 fish or 282,830 pounds, Exhibit No. 19. This poundage has not been included in Exhibit No. 21 in order that a value for recreational fishes may be computed.
>
> The Cowlitz River is the only stream producing smelt in the Columbia River system, which originates in the North Cascades. The main Columbia River commercial catch of smelt, when added to those of the Cowlitz River, account for 75% of the total Columbia River landings, Exhibit No. 21. On this basis, an estimate of 360,000 pounds of smelt or a minimum of 18,000 recreational man days should be added to the value computed for the recreational steelhead fishery. This is distinct from the poundage contribution of the commercial fishery listed in Exhibit No. 21. Recreational values attributable to steelhead or other non-commercial fishing effort will have to be determined species by species.
>
> Recreational fishing for minor species, adjusted for the influence of the North Cascades water as was done in the case of the commercial species, cannot be supported by similar statistical data. An estimate of 25,000 man days is made based upon the relative weight these fisheries have in relation to the recreational steelhead and smelt fisheries.

Recreational catches of salmon of North Cascades habitat, are shown in Exhibit No. 17. The conversion factors employed in Exhibit No. 6 do not apply in Exhibit No. 17 because sports fish of smaller size may be taken than is legal for commercial landings. The total poundage is provided as a footnote to Exhibit No. 17.

Recreational catches of steelhead on the Oregon shore of the Columbia River are not considered in this report. It is assumed that these would generally not be of North Cascades origin.

Omitted from this report are values of:

1. Recreational Salmon fishing above the mouth of the Columbia River, and above the mouths of Puget Sound tributaries as has been listed for steelhead in Exhibit No. 19.

2. Recreational fishing in Puget Sound tributaries for migratory species other than salmon or steelhead.

3. Unknown landings of silver salmon by Canadian vessels involving fish of Puget Sound origin.

Identification:

There are presently no techniques by which fish of a particular Puget Sound or Columbia River tributary system can be identified in fisheries comprising various mingled stocks, in areas remote from nursery and spawning streams. Where identification is shown it is based upon knowledge of the most probable origins of such species and their known spawning ranges.

Summary of Fish Values on Study Area:

1. Recreational Fisheries (adjusted)

(a) Salmon	904,656 angler days
(b) Steelhead	303,750 angler days
(c) Smelt	18,000 angler days
(d) Lakes & Streams (trout)	
(e) Minor species	25,000 angler days

2. Commercial Fisheries (adjusted)

Food poundages listed in Exhibits Nos. 21 and 22 total 27,682,107 pounds. The estimated value to Washington's commercial fisheries in 1961 is listed as $53,246,494 for 117,843,300 pounds of landed weight, or 0.451 average price per pound. The current yearly income value of the North Cascades contribution to commercial fisheries production is computed by these factors to be $12,484,630.

In addition to the business generated by the wildlife resource, the Study Area produced approximately the following:

Game Meat	2,300,000 pounds
Sport-caught Trout, Steelhead and Salmon	5,100,000 pounds
	7,400,000 pounds of edible meat and fish

At a nominal average figure of 25 cents per pound, the 7,400,000 pounds would amount to $1,850,000.

MANAGEMENT NEEDS

Development of Management Plans

Comprehensive wildlife plans are needed to more precisely correlate wildlife resources with range and forest management responsibilities and practices. Such plans are being prepared and will be completed by January 1966.

The principal management needs involve:

1. Determinations of the total forage production of ranges.

2. Equitable allocations of forage to livestock and wildlife.

3. More reliable methods of ascertaining wildlife numbers.

4. Adequate game regulations which will maintain a balance between forage production and utilization by livestock and wildlife.

5. Developing public access roads through both private and National Forest lands.

6. Reducing deer damage to tree plantations.

7. Protection of spawning beds and habitat improvement for migratory and native fish populations.

Habitat Improvements

Many acres of deteriorated range land need to be improved by browse and grass seeding. It is usually necessary to reduce wildlife and livestock uses in order to re-establish desirable species. In the drier parts of the Study Area, better distribution and larger populations of both game animals and birds would result from the installation of wildlife water supply projects. Populations of tree nesting ducks would increase on streams and lake by providing duck nesting platforms or boxes.

Many miles of streams and acres of lakes could be improved for for fishery habitat by structures, fences or planting of vegetation.

Effective Correlation with Other Resource uses to Prevent Damage to Habitat

Forest Service regulations and plans are quite adequate for correlation of wildlife with other resources and to prevent damage to habitats. More field personnel with wildlife backgrounds are needed to effectively implement Forest Service regulations and plans, and to correlate the many resource activities. Increased public relation activities would produce wider dispersion and better appreciation of Forest Service wildlife objectives and practices. Additional in-service awareness of wildlife values would help in more effectively correlating wildlife with other National Forest resources.

Adequate Harvests

Personnel closely associated with game populations and their habitats strongly feel that adequate game harvests are not made each year. Possibly more liberal bag limits and hunting seasons would help correct any excess game populations in the Study Area.

As additional timber harvest roads are constructed more areas are made accessible to hunters and fishermen. In addition to these roads some roads are needed which are designed expressly to permit hunters and fishermen to reach relatively inaccessible areas.

The states of Washington and Oregon maintain joint management programs for the regulation of commercial fisheries of the Columbia River. Ocean fisheries involving both Columbia River and Puget Sound stocks are under general study by the Pacific Marine Fisheries Commission as well as coordinated management by Washington and Oregon. Pink and sockeye salmon of Puget Sound origin come under management programs formulated by the International Pacific Salmon Fisheries Commission. Chum and silver salmon of Puget Sound origin are managed by Washington. Adequate harvests are part of the larger management program.

The State of Washington conducts habitat improvement projects alone, and in conjunction with federal, municipal and private agencies. These improvements are in the form of stream clearance, fishways, screens, artificial spawning facilities, erosion control, and pollution abatement projects. The present needs have not been met adequately.

FUTURE DEMAND AND SUPPLY

Probable Trends in Use of Area for Recreational Hunting and Fishing

One of the outstanding economic factors is the rapid population growth during and since World War II. The population increase in the zone of influence was approximately 24 percent from 1950 to 1960. Whereas in the state of Washington it was 19.9 percent for the same period.

Cause of population growth is attributed to activities in the fields of electrical power, agriculture and use of natural resources. The importance of these activities in the Study Area varies from east to west and south to north. Agriculture, including farming and livestock ranching, is the important industry east of the Cascades. Lumbering is most important on the west side. West side timber values exceed those of the east side agricultural industry. The value of the various economic activities tends to decrease toward the north because of the less favorable climate, lowering in elevation of the life zones, lower productivity, rugged terrain and lack of accessibility.

The wildlife resource, in combination with other recreational pursuits, is one of the very great attractions of the Pacific Northwest, and particularly that of the Study Area. The population growth, coupled with an increasing demand and a game supply not yet fully utilized, means that wildlife will be of even more value in the future than it has been in the past. The statistics for the State of Washington shown in the following tabulation also indicate that hunting and fishing will likely increase.

Comparative Population Increases 1/
1950 - 1960

Area	1950	1960	% Increase
Seattle 2/	844,572	1,107,213	31.1
Tacoma 2/	275,876	321,590	16.6
State of Washington	2,378,963	2,853,214	19.9
State of Oregon	1,521,341	1,768,687	16.3
National	151,325,798	179,323,175	18.5

1/ U.S. Census of Population 1960, Number Inhabitants
2/ Standard Metropolitan Statistical Area

Wildlife resources and their utilization can be increased to help meet rising public demands by such measures as:

1. More efficient harvest of fish and game crops.
2. Increasing access facilities.
3. Developing and improving water areas.
4. Intensifying management of the land for wildlife production.

Big-game rangelands can be made more productive by grass seeding, browse planting, fertilization, controlled burning, eradication of undesirable forage species, thinning of overstory timber, and other practices. Adjustments in livestock use on ranges where there is competition for forage could also increase the production of big game.

The acquisition of adjacent private lands, or the opening of these lands to game and hunters by their owners, can increase the total big game supply and thus provide more recreational use for hunters.

Additional species of game, such as bighorn sheep, can probably be made available for harvest with proper culture and management practices.

Exotic species that might be more productive than native animals under altered ecological conditions could be introduced if desirable.

Lengthened hunting seasons, special seasons or bag limits, or seasons at times of the year other than those in normal usage could increase the total man-days hunting on the area.

Small game hunting could be expanded through increasing food production and thus increasing the number of animals produced by the habitat.

Introduction of exotic small game species could probably increase abundance in certain areas.

Research to determine factors that control cyclic abundance and scarcity in certain species might be applied to hold populations at higher than average levels.

Waterfowl populations can be increased through habitat improvement such as nesting boxes, tubs or platforms, and by creation of new impoundments. Control of land use during nesting season can be effective in increasing number of birds that reach adulthood.

Fish

Future increased demands for fish can be met only by more intensive use of the habitat in both natural and artificial production efforts.

Additional fish habitat can be created by the construction of impoundments. The area of present reservoirs could be materially increased by higher dams. Increased production of commercial or sports fish is possible either in the present basins or by providing more consistent stream flows within the drainage systems.

Artificial salmon and steelhead spawning channels, natural oxbows and steelhead rearing ponds are proven management tools that can increase production.

The Fish and Wildlife Service estimates that approximately 100 miles of major streams and 500 miles of tributary streams within the Study Area could be developed for anadromous fish by construction of fish ladders, log jam removal or stream improvement.