AN ANALYSIS OF CONFLICT FOR THE COLUMBIA RIVER SALMON FISHERY

by

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A RESEARCH PAPER

submitted to

THE DEPARTMENT OF GEOGRAPHY

in partial fulfillment of
the requirements for the
degree of

MASTER OF SCIENCE

NOVEMBER 1975

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ABSTRACT: This paper is an analysis of the resource use conflict of the Columbia River salmon fishery. The report discusses the physical setting of the Columbia River, the biology of anadromous salmon, the history of the resource use, hazards to the salmon, fishing techniques, and salmon usage today with its conflicts. There are three main economic groups in the area which are struggling for more of the salmon fishery: the Indians, the corporations, and the sport fishermen. Federal courts have become heavily involved in solving the numerous legal battles, especially the courts of Judges Robert Belloni and George Boldt, as of 1975 the struggle for the salmon fishery is not yet totally resolved.

INTRODUCTION

This report is divided into three major sections. The first section is concerned with the resource, and its physical setting. The second section will deal with development and conflicts of the fishery resource use. Section three is a summary of this report.

- PART ONE -

Purpose

The intent of this report is to analyze the conflict concerning the Columbia River salmon fishery. This will be done with special emphasis placed on the geography of the fishery with its spatial changes through time. The last twenty years will be given additional attention, since this fishery has developed critical problems in this time.

Physical Setting of the Columbia River Basin

The Columbia River Basin comprises approximately 259,000 square miles in the northwestern United States and southwestern Canada. Fifteen percent of the total basin area is in Canada's British Columbia with the remaining eighty five percent within the United States. With a total area of approximately 220,000 square miles, the United States portion of the basin includes most of the region which is referred to as the Pacific Northwest, and comprises approximately seven percent of the nation. The river basin includes most of Washington, Oregon, and Idaho, a large area of Montana, and a small part of Nevada, Utah, and Wyoming. The length of the Columbia River is approximately 1,210 miles. Its main tributary, the Snake River, is about 1,000 miles long and is totally within the United States.

The constraints to this river basin are a few major physical features (map 1).[1] To the east the broad north-south trending belts of the Rocky Mountains constitute the main source of water for the Columbia and

Major Landform Features Of The Pacific Northwest[2]

I. Olympic Mountains

II. Coastal Mountains

III. Klamath – Siskiyou Mountains

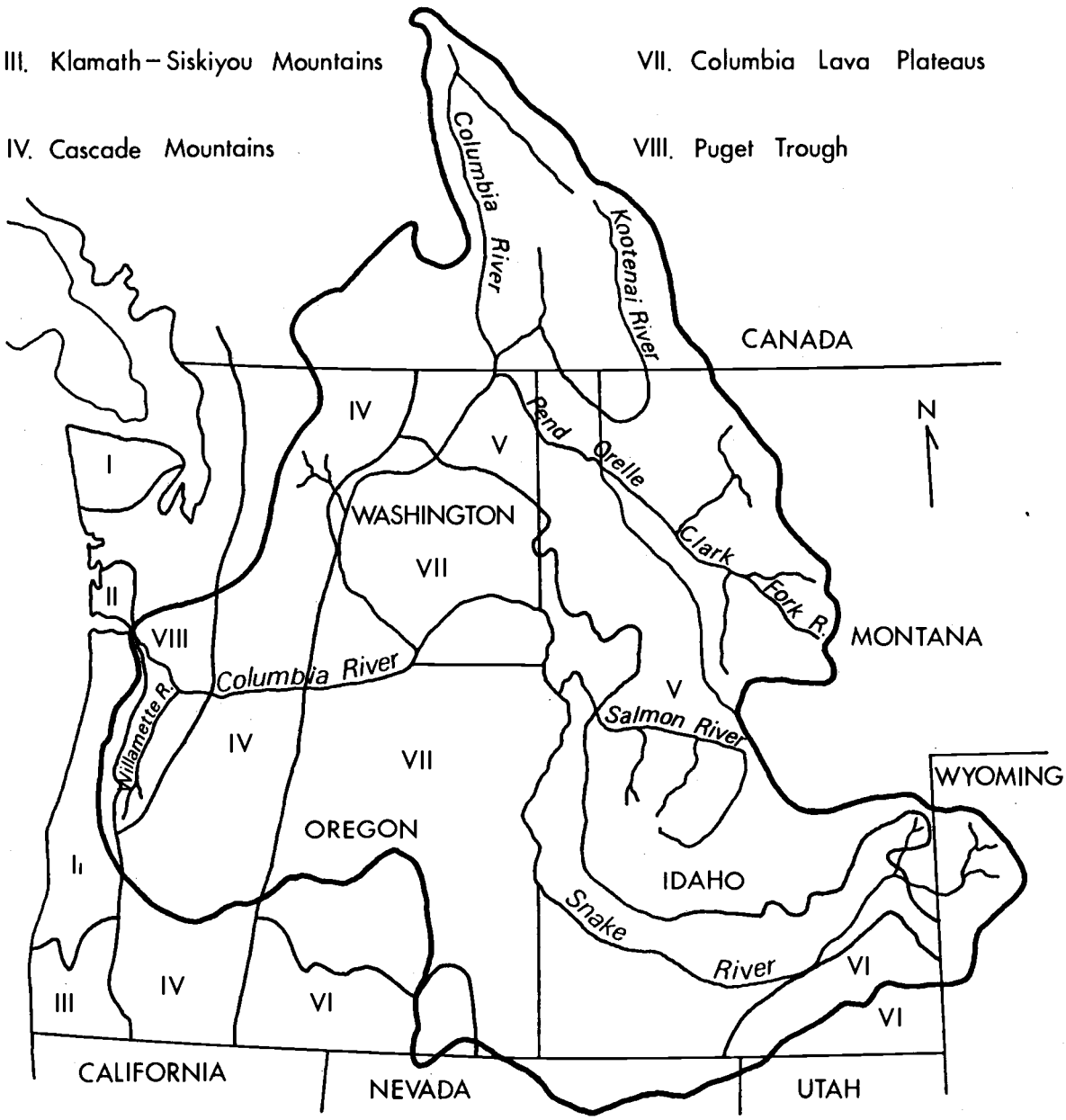
IV. Cascade Mountains

V. Northern Rocky Mountains

VI. Basin and Range

VII. Columbia Lava Plateaus

VIII. Puget Trough



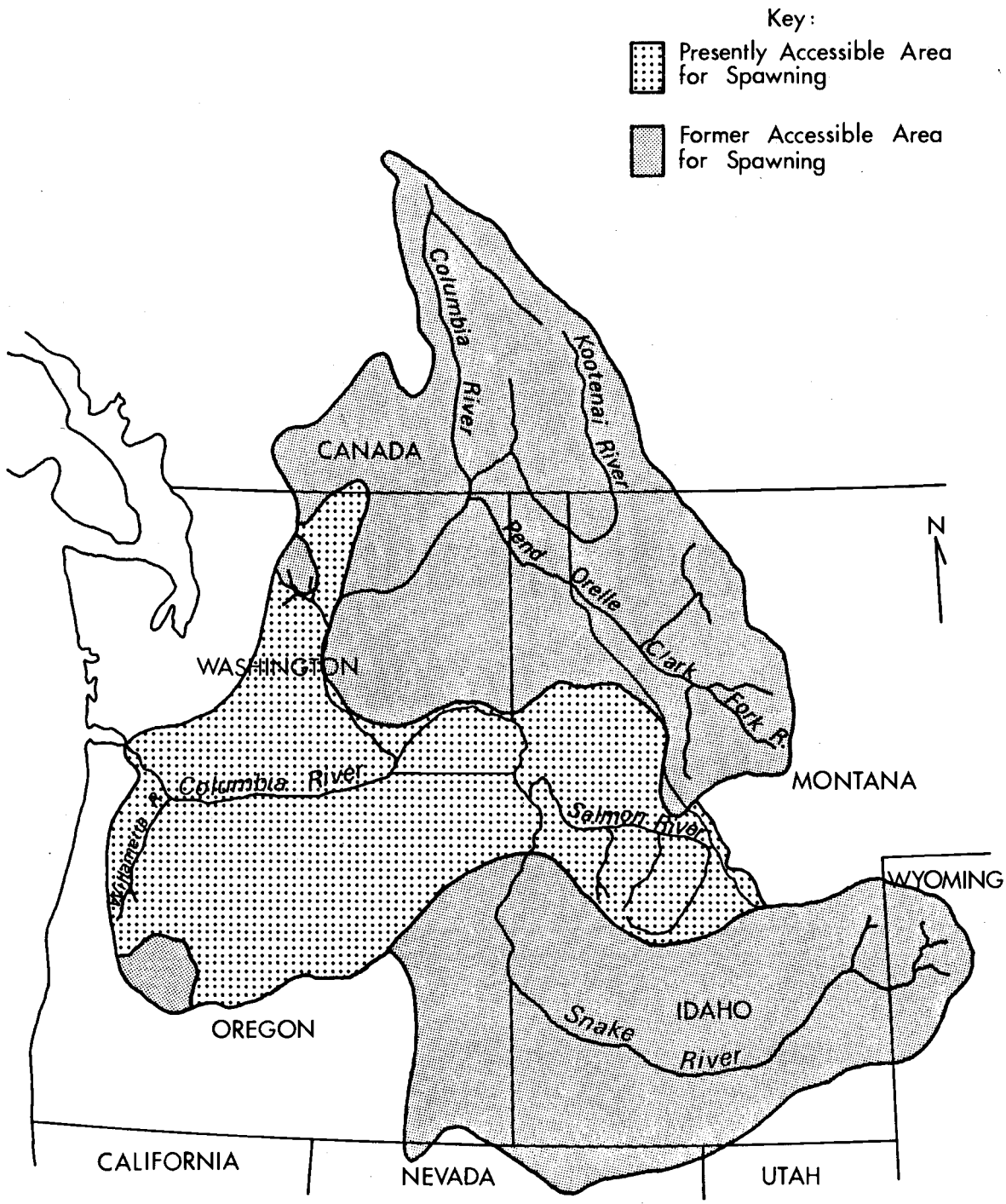
Map 1. Map of the Pacific Northwest and Columbia River system indicating the eight major landform features.

three of its largest tributaries: the Kootenai, Pend Oreille-Clark Fork, and Snake Rivers. In Canada, the part of the basin which extends from the Rocky Mountains to the western boundary, which is formed by the Fraser Plateau and the Monashee Mountains, is a predominantly mountainous region cut by narrow valleys which form the drainage outlets. Westward from the Rocky Mountains in the United States are the Columbia Plateaus. Through this area the Snake and Columbia Rivers have formed deeply incised canyons. The plateaus are bordered to the west by the Cascade Range, which has numerous volcanic peaks, and through which the Columbia River has cut through to form the gorge which bears its name. Between the Cascades and the lower Coast Range lies the southern portion of the Puget Trough, a lowland which the Willamette, Lewis and Cowlitz Rivers drain to the Columbia from their sources in the Cascades (Map 2).[2]

The Salmon: A Living Resource

Five species of Salmon occur on the Pacific coast of the United States and Canada. These, along with a sixth species, occur in eastern Russia and northern Japan. These two regions constitute the major fishery for commercial salmon in the world. All of these salmon are of the genus Oncorhynchus,[3] of the family Salmonidae.[4] The word Oncorhynchus is a melding of two Greek words meaning "hooked snout". Popular and scientific names for the five species of salmon of the Columbia River are as follows: sockeye, Oncorhynchus nerka; pink, O. gorbuscha, coho, O. kisutch; chum, O. keta; chinook, O. tschawytscha.

The Columbia River Drainage Basin



Map 2. Map of the Columbia River system showing area accessible to salmon for spawning now as opposed to natural spawning area before settlers arrived. (The 1965 Status Report of the Columbia River Fishery)[1]

The Pacific Salmon, being an anadromous species, breeds and spends varying portions of its life in fresh water, then travels to the ocean to feed and grow to maturity. This is in contrast to pelagic species which are born and mature solely in the ocean. Each of the five species of salmon have different life histories. The most important differences between the species is the length of time the fish lives in fresh water or salt and weight at maturity.

Salmon are born in streams or rivers 10 to 700 miles from the sea. The eggs are laid in the fall and incubate through the winter, commonly under several feet of snow and ice. In late winter, they become alevins, tiny fragile creatures with relatively large eyes and sack-like appendages. In the spring they emerge from the gravel as inch long fry. In the stream, river or nearby lake, depending on the species, they feed and grow for a year or more. Then in a spring, during the season of freshets, the young fish head downstream to the ocean. They are called fingerlings during this phase of their lives, and are up to four inches in length. Once in the ocean, they spend varying amounts of time ranging up to five years, eating heavily and growing rapidly. In early summer of their maturing year they begin to go back to their home streams, navigating by a means which is still somewhat of a mystery to man.

They cease feeding as they enter fresh water, living the rest of their lives on stored body fats. They may struggle for weeks against rapids, falls, obstructions such as fallen logs and rocks until, injured and travelworn they reach the waters of their birth. The female digs a nest, or redd, in the gravel by hollowing out a cavity that can be as

much as 18 inches deep. The female prefers a place in the riffles where the fast running water will supply an ample supply of oxygen to the eggs. As many as 8,000 eggs are deposited in the gravel, which may be weeks after the spawner has reached the gravelbeds. After the eggs have been deposited , the male will fertilize them by covering them with milt. When the spawning is complete, the salmon's life cycle is finished. Soon all the salmon die and their bodies drift downstream.

Though all five species of the Columbia River salmon have much in common in their life cycles, there are some major differences. Below is a more specific description of the various life cycles of salmon found in the Columbia.

Sockeye

On the Columbia River the Sockeye is known as "bluebacks", but to the Alaskans as "reds". This fish has become especially valuable due to its high oil content and its ability to hold its red color in the can.

From June to November the adult sockeye leave the ocean feeding grounds to spawn to their native streams. This movement into fresh water coincides with suitable water temperatures in the river.

Each spawning area has its own distinct "race", which must live on its own, independent of other races. Some groups migrate over 700 miles inland and travel at speeds of more than thirty miles per day while other groups may travel less than twenty miles per day and spawn in streams closer to the ocean. Sockeye spawn in streams which have lakes in the watershed, for young sockeye do not survive unless they

spend at least one year in a lake before migrating to sea. They may stay as long as three years in a lake before leaving for the ocean.

From early May to the end of June young sockeye fingerlings leave their lakes and move downstream for the ocean. From the mouth of the Columbia they move rapidly out for thousands of miles into the Gulf of Alaska and the North Pacific where they feed voraciously. In their third year in the ocean, they begin to develop sexually, and between this time and their sixth year they return to their native streams to spawn.[5] At their maturity the sockeye salmon will average six and one half pounds.[6] However, the older fish may reach twelve pounds.

Males at the spawning areas have a humped back and a sharply hooked nose, while the female sockeyes will retain their normal shape. Both sexes experience a color change. They turn from their normal blue-tinged silver color to varying shades of red when they reach their spawning grounds. Those in rivers and streams close to the ocean turn a dull brownish red. The ones in the more distant up-river areas hundreds of miles from the ocean turn a brilliant crimson.

Sockeye which through either accident or design become "lake-locked" and never reach the ocean are called "kokanee," "Kickaninny" or "little redfish." These sockeye which live their lives exclusively in fresh water and also die after spawning are identical in their life cycle to sea-going sockeye, except that they are usually must smaller. The greater feeding potential of the open ocean is easily illustrated by the average six-fold difference in size between the freshwater "kokanee" and their sea-going kin.[7]

Pink

Pink salmon are also known to fishermen as "hump-backs" or "humpies." They live only two years and have a relatively simple life style. The adults leave the ocean in late summer and fall and normally spawn in streams not fed by lakes, a short distance from the sea. This seems to be why relatively few pinks are captured in the Columbia (table 2). In the following spring after spawning, the tiny one-inch fry drift directly downstream to the Pacific as soon as they emerge from the gravel. Of all the salmon, except chums, pinks spend the least time in fresh water. Except for their six month period of incubation in the gravel as eggs, and spawning migration, they spend their entire two years in the rich ocean feeding areas of the North Pacific.[8] The pink grows rapidly in the ocean and an average adult will weigh four pounds.[9]

At the spawning grounds the males develop an extremely humped back. Females do not change shape. Both sexes change color from a bright ocean silver to pale grey on the back with a white to yellowish belly. Unlike the sockeye, the grey pink salmon at their spawning grounds are difficult to see.

Chum

Chum salmon, known as keta, are the last Pacific salmon to enter fresh water, usually in the late fall. Their spawning grounds are normally only in the lower reaches of the river, rarely more than 100 miles inland. The eggs are laid in the gravel from December to February with the fry emerging in the spring. Chum fry are slim, long and silvery with a blue-green iridescence quite distinct from the fry of

other Pacific salmon. The fry go immediately to the ocean without any residence in either stream or lake as the sockeye do. In its third or forth year the chum reaches maturity.[10] At maturity the chum will average eight pounds.[11]

At the spawning grounds the chum are easily distinguished from other salmon by the distinct dark verticle bars along the flanks of the fish. Its color ranges through blacks and greys to a drab reddish hue in the advanced stages of spawning. Males develop such a strongly hooked nose that their dog-like teeth become totally exposed.

Coho

Coho salmon are the most popular game fish of the entire salmon family. They are known as "blueback" when caught before full maturity, and also as "silvers".

Adult coho migrate upstream in September and October and spawn in late November and December. The coho choose streams close to the ocean, although some may journey as far as 400 miles inland.

Young coho fry remain in their spawning stream for a full year after emerging from the gravel, and due to this they are exposed more than the other species to the dangers of floods, droughts, stream pollution, predation and other hazards. After living in the stream for a year, they swim down to the ocean where they feed for sixteen to eighteen months. The age of a mature coho is normally three years.

Some male coho attain sexual maturity at the end of their first summer in the ocean, and return to their home spawning grounds as "jacks" which weigh two to three pounds. In the spring of their second

year at sea, coho become known as "bluebacks." They are then in their third year of growth, having spent the first year in fresh water, and weigh from three to four pounds. In the fall, merely five months later, they have grown to a size of six to twelve pounds and are then fully mature, ready for migration back to their native stream.

Chinook

Chinooks salmon may be seen in upstream migrations almost any month of the year, however they favor the spring and fall. Their spawning area extends from a few miles to more than 1,000 miles inland, with the early runs making the longest journey. Most of the young chinook fry go directly to sea very soon after hatching but others will remain in a lake or river for one or even two years before going to the sea.

Their life in the sea is not as rigidly set as are other species. Mature chinooks will range from three to seven years of age. The majority are four or five years old when they return home to spawn and range in weight from ten to fifty pounds.[12] However, the average is twenty pounds.[13] Some giants have been taken by commercial fishermen which weigh over a hundred pounds. The record is 120 pounds. Chinook are the largest of the salmon and live the longest.

Chinook are hard to see on their spawning grounds as they usually choose wide deep rivers. Unlike other salmon, the body shape of the male does not change while spawning. Their color turns from bright silver of their sea life to a dark brown, often times nearly black. Males and females appear very similar, except for the males' larger size.

Hazards To The Salmon

Salmon have a number of natural enemies and the death toll is enormous. Of the approximately 3,000 eggs deposited by a sockeye, about 100 will become fingerlings and reach the Pacific Ocean. Of these, twenty percent will return as adults with the best of conditions. If ocean survival rates are poor, as little as two or three percent will return to their native streams.[14]

Some of the hazards facing the salmon are man made. These include pollution, hydro-electric dams, logging operations and fishing. However, nature itself is the most dangerous enemy to the salmon, for lethal changes in fresh and salt water environments take the greatest death toll of young fish. Before man became a large predator of salmon, nature maintained a balance in salmon runs through periodic disasters such as floods, droughts and landslides. Even without these harsh equalizing forces, the runs are kept at reasonable levels by the sheer weight of numbers on spawning grounds. When too many fish returned, lack of available gravel beds caused large numbers to die without spawning.

The salmon are sensitive animals and are susceptible to injury or death through environmental changes. Abnormally high or low water temperatures can kill, as can an inadequate amount of oxygen in the water. The rate of growth of embryos from egg to alevin stage is in part determined by the water temperature. Unusual temperatures can result in the emergence of fry from the gravel at an unsuitable time. Water on the spawning grounds that is too warm can be fatal. The ideal

temperature is 56 degrees Fahrenheit (13.3°C).

The amount of water in a stream regulates the number of fish it can support. During periods of low flow, fewer fish can survive, because of the great competition for food and living space. Shallow water is far more subject to extreme temperature changes and oxygen amounts can be rapidly reduced. Unusually high water flows can be equally harmful as floods can eliminate stream bank vegetation which contribute shade and a source of food, destroy food organisms in the stream, and disturb spawning gravel. When floods subside, fish are often stranded and die in isolated pools.

Availability and quality of spawning gravel is also very important. It is necessary that the gravel remains clean and porous through the winter so the water can seep through and bring adequate supplies of oxygen to the embryonic fish within the eggs. In many areas there is a shortage of suitable gravel in water of proper depth and flow. It is common to see spawning salmon fighting for the same nesting site. When this occurs the first eggs deposited are destroyed by succeeding females building their nests at the same site.

Silt and other organic materials such as bark, wood chips and leaves, can be harmful. Food and oxygen can be reduced due to poor light penetration and resulting slow growth of plant life, and eggs can be suffocated and bottom dwelling fish food organisms smothered by the foreign elements.

Dangers which threaten the salmon in fresh water are also present in the ocean. These include abnormal water temperatures, poor light penetration, and the presence of predators. Also, variations in salt

concentration of the water in the estuary can influence growth rates and survival. If the salmon survive these physical hazards, it must contend with predators such as seals, sea lions, killer whales and bears. Birds and larger fish prey on the fry andfingerlings while they are in the streams and rivers.

Pollution

Pollution can be considered or defined as anything which unnaturally alters the quality of water, of which there are two basic types - organic and inorganic. Organic includes wastes from sewage disposal systems, meat, fruit and vegetable processing plants and sawmills. These wastes contain materials which are consumed by bacteria that live in all natural waters. When organic pollution is excessive, the bacteria cannot decompose of it.[15] The polluting effect of organic materials is directly correlated to the amount of oxygen taken up by microorganisms bringing about the decomposition of the material. If large quantities of dissolved oxygen are removed from the water as a result of this decomposition, conditions tend to become anaerobic which causes a foul smell and death in nearly all forms of plant and animal life. The intensity of pollution is estimated by determining the amount of oxygen used up in one liter of the water at twenty degrees centigrade for five days. This amount of oxygen which is used up is known as Biochemical Oxygen Demand (B.O.D.). This is stated as mg per liter or parts per milliliter (p.p.m.) and a B.O.D. of twenty is considered satisfactory.[16]

When untreated sewage decomposes, large amounts of oxygen are

consumed by the bacteria, and often a stretch of stream or river will become completely devoid of oxygen. Also, sewage sometimes will release simple chemical compounds which act as fertilizers for some aquatic plants, and excessive algae or other plant growth can kill salmon. Nearly all sewage pollution problems can be eliminated through artificial pretreatment of wastes.

Another very dangerous form of pollution is caused by the introduction of inorganic wastes into the water. These can radically change the salmon's environment through physical and chemical actions.

The effluent from pulp mills is one of the more familiar of this type of pollutant, but they can also come from metal plating plants, fertilizer plants, any type of mine, or from any industry which includes in its wastes harmful chemical compounds. Aerial spraying of insecticides can prove deadly to salmon.[17] Large scale spraying of forest areas with D.D.T. in the United States and Canada have, in the past, caused severe fish mortalities.[18] There have been a number of cases where pilots have inadvertantly killed thousands of salmon fingerlings. Modern detergents are also another pollutant that can be very deadly.[19]

Logging

As mentioned earlier, salmon are very sensitive to environmental changes. Many of the habitat requirements of salmon are found in streams which run through forested areas. The tree canopy provides shade which keeps down the water temperature. Ample riverside vegetation contributes directly to the salmon's food supply by insects falling into the water and indirectly by supplying leaf litter that soon

becomes detritus in the streams and provides a food supply for many of the aquatic invertebrates. The trees and undergrowth also provide shelter and cover to the fish and give stability to the stream banks. There is a slow run-off of water in forest areas as the soil is very permeable and has a high storage capacity which lessens the chance of flash floods and drought. The trees also increase the surface area for the evaporation and interception of rain.[20]

Careless logging practices take a heavy toll of salmon, much of it by direct destruction of spawning areas by dragging logs through the streams, building roads along the banks, falling trees across narrow streams, and the driving of free or boomed logs down shallow rivers. Log driving can erode stream banks, cause heavy silting which destroys eggs and bottom plants and gouge the gravel beds, making them useless to the salmon. However, a well managed forest can be an excellent soil and water retainer, but extensive clearcut logging increases the run-off to dangerous levels. Clearcutting and other poor forestry habits can cause wild fluctuations in water flows, bank erosion, silting and temperature extremes.

Dams

High dams such as Grand Coulee are of the more effective man-made fish killers, and despite millions of dollars each year for research, no way has been found to provide successful coexistence of highest dams and large salmon runs on the same river. The record of dams and salmon easily shows that where big dams exist, the salmon runs are mere fractions of their pre-dam size.[21]

In 1973 the Columbia River was almost totally harnessed from Bonneville to Grand Coulee except for a stretch between McNary and Priest Rapids dams, and the lower Snake River is also dammed. Beside eliminating a large portion of the breeding grounds of the anadromous salmon, these dams have made a steeplechase the salmon must hurtle both in their ascent and descent of the river.

The fish that spawn in the upper reaches of the Columbia system (and will spawn nowhere else) have to negotiate Bonneville, The Dalles, John Day, McNary, Priest Rapids, Wanpum, Rock Island, Rocky Reach, and Wells dams. That is a total of nine which have an accumulated height of 612 feet in a stretch of 400 miles. At each of these obstructions they must find the entrances to the fish ladders, adjust to the new currents and other conditions of the resservoirs, and still have enough strength to reach their native spawning grounds and spawn.

Young salmon going to the ocean must make the same journey in reverse, going through the blades of the turbines of the powerhouses or over the spillways. In either case the perils are enormous: many are decimated, others die in the still waters of the now calm river from bubble disease induced by supersaturation of nitrogen in the water, the young salmon are eaten in large numbers by predators, which have increased since the river has been converted into a series of calm lakes. It has been discovered that the young salmon are ineffective in finding their way downstream through the many miles of slack water. This is mainly due to the water being impounded at the time of year the migrants should be carried by freshets to the sea. The ones which do leave the reservoirs find only the turbine systems as outlets and

many are killed by the spinning blades or quick pressure changes.[22]

Speaking at a seminar concerning reservoirs at Oregon State University in October of 1969, Lawrence Korn of the Oregon Fish Commission said:

> "We have presently little idea how efficiently fish pass the impoundments on the Columbia River. We know more about passage efficiency at dams on tributaries such as the Willamette and the Deschutes Rivers. Water currents have been markedly changed in the reservoirs, or even eliminated, thus confusing juvenile salmon and in many instances preventing them from going downstream. Reservoirs also encourage the upsurge of predators like scrap fish which feed on the salmonids. Finally the water levels and amounts discharged at the dams are not determined by needs of fish but demand for power, irrigation water, and flood control. Flow may be too high at times or warm for fish passage, or so low and polluted that the oxygen content is inadequate for fish life."

Many times the downstream travelers are delayed in their migration because their built-in "time clocks" become disoriented. Howard L. Raymond of the National Marine Fishery Service found that before John Day reservoir was formed young chinook salmon traveled from Ice Harbor to The Dalles dam in 14 days on the average at eighteen kilometers (10.8 miles) per day. After the reservoir was filled the chinook were slowed down to eleven kilometers (6.6 miles) per day, and it took them twenty two days to cover the same distance.

Not only does a change in the flow pattern seem to slacken fish movements but according to Donold L. Park of the Seattle Biological Laboratory of the National Marine Fishery Service, the season for downstream migration is also changing:

> "Historically, most juvenile chinook salmon have migrated down the Columbia River in the spring when the environmental factors were most favorable for their survival. Flows were generally high, water temperatures were within optimal ranges

> for salmon, the river was sufficiently turbid to protect them from predators, and no impoundments delayed their migration to the sea... Now the juveniles have to migrate down an almost totally impounded river during July and August, when environmental conditions... are far from optimum. By mid-July the spring runoff is usually completed, flows are reduced, water temperatures begin to rise, and the water clears up and thus affords little protection from predators."

Much work is being done to solve the downstream migration. In 1968, losses of downstream migrants were ten to fifteen percent at each dam. If the losses are accumulated between the Salmon River and the lower Columbia, the downstream population of young salmon ends up being 43 percent of the original amount that left Idaho. In other words, three out of five young salmon migrants never reach the ocean.[23]

In an interview with Mr. Zirges of the Oregon Fish Commission, Mr. Zirges stated that the fish ladders around many of the dams have had dissapointing results. He stated that these fish ladders are "not very efficient".[24]

Fishing

Aside from the dams, fishing by both commercial and sport interests takes an enormous amount of salmon from each years run. However, due to the complexities of this aspect the Columbia fishery, fishing will be discussed in greater detail later in this paper.

- PART TWO -

Columbia River Indian Salmon Fishery

The lower Columbia River area, from about The Dalles to the sea, was inhabited by a group of people, divided into numerous bands anthropologists call Chinook. Salmon for protein and eulachon for edible oil were the only fish the Chinooks took in quantity. Eulachon came up from the sea in vast numbers each spring and were easily taken, while the salmon required a more organized attack. Much is known about the old Indian fishery of the Columbia River system mainly from the diaries and reports of the early explorers such as Lewis and Clark (1803-1806); David Thompson, geographer of the Northwest Company who explored the Columbia from its origins to mouth in 1807-1811; David Douglas, the Scottish botanist for whom the Douglas-fir is named, who collected plants for the London Horticultural Society in the 1820's; and many others.

On August 3, 1805, when the Lewis and Clark expedition was in the vicinity of the Lemhi River in Idaho, a tributary of the Salmon River, and not very far from the summits of the Rocky Mountains, Meriwether Lewis recorded in his dairy: "An Indian gave me a piece of fresh salmon roasted, which I ate with relish. This was the first salmon I has seen and convinced me we were in the waters of the Pacific Ocean." Lewis realized that by following the salmon's track for hundreds of miles, the expedition would eventually reach the ocean.

A few weeks later, on October 24, when the expedition had reached Celilo Falls, Captain Clark wrote in his dairy: "This village lay in

the prosperous area of the jumping salmon where life was good and where the red men had time to contemplate on Life and God," Radiocarbon dating of artifacts located in the vicinity by Professor L.S. Cressman indicates that these Indians had been living here probably as long as 11,000 B.C.

Lewis and Clark were fascinated by the fishery and collected much valuable data about it. On a crude sketch map of the Columbia, from below the entrance of the Snake River to a considerable distance above the Wenatchee River, Clark delineated about a hundred groups of lodges or fishing stations where the Indians were engaged in catching, drying, or pulverizing salmon. In one day's journey of twenty one miles the expedition passed twenty nine lodges, each housing five or six families. Large quantities of split and drying fish hung on scaffolds outside and sometimes even inside the wooden huts.

Clark noted:

> "The multitude of this fish is almost inconceivable. The water is so clear that they can readily be seen at the depth of fifteen or twenty feet, but at this season they float in such quantities down the stream, and are drifted ashore, that the Indians have only to collect, split and dry them on the scaffolds."

In some areas, the main village was only occupied in winter when fishing would cease. In the spring or summer, the tribe would move to its fishing grounds.

At different places along the Columbia Lewis and Clark observed the Indians making pemmican:

> "The manner of doing this is by first opening the fish and exposing it to the sun of their scaffolds. When it is sufficiently dried it is pounded between two stones until it is pulverized, and is then placed in a basket about two feet long and one in

> diameter, neatly made of grass and rushes, and lined with the skin of a salmon stretched and dried for the purpose. Here they are pressed down as hard as possible and the top is covered with the skins of fish, which are secured by cords through the holes of the basket... The whole is then wrapped up in mats, and made fast by cords over which mats are thrown again."

Each of the baskets weighed 90 to 100 pounds and twelve made a stack. In one village, Clark counted 107 stacks totaling approximately 10,000 pounds. Much of the pack was bartered with members of very distant tribes who came from as far away as British Columbia and beyond the Rocky Mountains.[25]

The early explorers of the Columbia River Basin Indians estimated the original Indian population in the early 1800's to be about 50,000. It has been estimated that the total annual catch of salmon by the Columbia River Basin tribes in the early 1800's was approximately 18,000,000 pounds. A series of epidemic diseases brought by the white man went through the many tribes killing thousands of people. By 1851, the Indian population was under 10,000, or less than 20 percent of its level at the time of the white man's arrival. It seems certain that this great reduction in population contributed to the reduced catches of salmon during mid-century. It was not until the late 1870's that commercial catches of salmon on the Columbia matched the amount caught by the original Indian population.

The Indian fishing grounds were located on all major tributaries of the Columbia as well as on the Columbia itself. Some of the more famous and important grounds were at Kettle Falls, Celilo Falls, Cascade Rapids and The Dalles. Prominent tributary grounds were located at San Poil River, Salmon Falls (on the Snake River), Willamette River Falls,

and the falls of the Spokane River.[26]

The early Indians used a variety of fishing gear and methods for harvesting the salmon, all of which were quite efficient even by present-day standards. Fish traps, or weirs, which were constructed of willows and other flexible woods and supported by poles or tripods, were placed across the smaller tributary streams which feed the Columbia. Dip nets were employed before the white man appeared in this basin, and except for the modern materials now used in their construction, have survived in the original form. Dip nets were plunged into eddies in the river, most often below falls or rapids where the salmon congregate. The dip nets were either swept downstream in the current and then raised from the water with a scooping motion or held stationary until the fish were felt striking against them. Wooden platforms for the fishermen to stand on were often constructed at favorable locations.

Seins up to eight feet deep and 300 feet long made of wild hemp or cedar fiber were widely used. Floats which were made from dry cedar supported the net at the surface. The leadline (formed the flat, circular stones with holes bored through their centers) was attached to the bottom of the sein. Canoes from fifteen to fifty feet long were used to deploy the net around schools of salmon. The seins were then hauled ashore by ropes attached to the ends of the net.

The Indians had other methods for capturing salmon. Wicker baskets supported by long poles, of which the bases were anchored in rocks of the stream bed, were suspended below the falls, and broad wooden frames were spread above. Many of the fish trying to leap the falls would strike the frames and were thrown back into the baskets. This technique

was used extensively at Kettle Falls and continued to be used there until the area was flooded in the late 1930's by the reservoir of the Grand Coulee Dam. Spears were used often to take salmon at falls and in small tributaries. Hook-and-line trolling gear was towed by the Indians from canoes in the Lower Columbia River. The early explorers did not clearly document in their journals the use of gill nets, but it seems probable that they were used.[27]

Ownership of fishing sites was tightly controlled among the Indians. Around Celilo Falls the south, or Oregon side, belonged to the Wasco band and the other side, or Washington side, to the Wishrams. Indians from distant places were sometimes invited to share fishing stations.

By marriage, inheritance, payment for wives, and an occasional purchase, ownerships became scattered and an individual might have had a share of a very productive lagoon or eddy far from his home village. There were also communal fishing sites at weirs and elsewhere, and reciprocal rights by which individuals traded fishing privileges.[28]

INDIAN FISHERY RIGHTS WITH ITS CONFLICTS

Before 1957, when a dam at The Dalles eliminated the ancient Indian fishery at Celilo Falls, the Washington and Oregon Fish Commissions developed regulations for commercial fishing on the Columbia above the Bonneville that was applicable to both Indians and non-Indians. After 1957 the area above the dam was closed to net fishing, but the Indians were allowed to take salmon for subsistence and ceremonial purposes. For some years the Indians abided by the regulations and then they began to fish with nets above the dam and sell their catches, which was

against the commissions' regulations.

Efforts by the states to negotiate reasonable settlements were not successful, though a few tribes adopted some voluntary restraints. In the summer of 1964 the Indians defied the order of the Washington and Oregon Fish Commissions forbidding fishing of the summer chinook run, which had fallen to critical levels. From 1960 to 1965, Indian fish harvests by nets in areas closed to commercial fishing jumped from 45,000 to nearly 1,000,000 pounds.[29] In the spring of 1966 the Oregon Fish Commission tried to enforce its regulations by the use of the state police. Several Indians were arrested, but not many were found guilty in court. Beginning in 1968 the Indians and their lawyers began a long and complex court fight for what they believed to be their rights.

Indian Treaties in the Northwest

Indian fishing rights of today are based on a series of treaties negotiated between the Indian tribes and the United States government in the mid-1850's. The treaties are not thought of as a grant of rights to the Indians, but a grant of rights from them, a reservation of those not granted. The Indian tribes usually reserved an exclusive fishing right on their reservations. In many cases this also applies to streams and rivers bordering the reservation.

Most of the treaties in the Columbia River Basin area also gave the Indians the right of taking fish at all usual and accustomed grounds and stations off reservations "in common" with all the citizens of the Territory. The question of off reservation fishing rights of the Treaty

Indians and the degree, if any, to which those rights may be state regulated by Washington and Oregon, has been a subject of intense and continuing controversy for more than 100 years.

The Conflict

The great importance of salmon in the traditional ways of Indians in this area is well known and undisputed. Until fairly recent times there were plenty of salmon and regulation of Indian fishing was unnecessary. However, when it became apparent that the anadromous fish runs needed greater protection if they were to survive, the initial approach by state fishery management agencies was to severely limit the Indian off-reservation fishing.

The commercial catch of salmon in the Pacific Northwest is of several million fish each year. Also, the sport catch of salmon and steelhead exceeds a million fish annually. Indian fishermen in recent years have only taken less than ten percent of this total annual catch.[30]

Fishing Rights Court Cases

As a framework for this section, there follows here a chronology of recent legal developments in the treaty fishing rights dispute which involves cases in Oregon, Washington, and Idaho. Though some of the cases were of fishing interests outside the Columbia River Basin, they have had a direct influence on legal activities here.

On November 4, 1963 the Washington Department of Fisheries and Game filed suit in State Court to establish state authority to prohibit net fishing by the Indians in off-reservation river fisheries. Indians

later appealed that adverse ruling to U.S. Supreme Court.

On May 27, 1968 the U.S. Supreme Court ruled that the State of Washington could restrict Indian net fishing when necessary for the conservation of the resource. The court returned this case back to the State Court to determine if existing regulations were "necessary."[31]

On September 13, 1968 the Indians with their lawyers petitioned the United States District Court for an injunction to prevent enforcement of the "necessary" state regulations. George Dysart, Assistant Regional Solicitor of the Department of the Interior, argued that money paid to the Indians was not for their fishing rights but for "essentially a flowage easement over these areas." Meaning that the Indians could not only catch all the fish needed for their subsistence on reservations but they had "the right to go to their usual and accustomed fishing places to take fish free from the interference by the state or others." The only restraints the Indians recognized were those necessary to prevent the destruction of the runs. And then, only the tribes could prescribe the regulations, not the state.

Judge Robert C. Belloni of the United States District Court accepted Dysart's arguments and decided that the state of Oregon:[32]

> "must so regulate the taking of fish that, except for unforeseen circumstances beyond its control, the treaty tribes and their members will be accorded an opportunity to take, at their usual and accustomed fishing places by reasonable means feasible to them, a fair and equitable share of all fish which it permits to be taken from any given runs."

This decision gave the Indians a private and lucrative fishing preserve on 130 miles of the Columbia from the Bridge of the Gods near Cascade Locks to the Umatilla River.[33]

On July 5, 1969 U.S. District Judge Robert Belloni came to a decision in the case of Sohappy v. Smith (United States v. Oregon) and on August 8, 1969 the Washington Departments of Fisheries and Game asks State Superior Court for further clarification of state regulatory authority and Indian fishing pursuant to 1968 Supreme Court decision. The case of United States v. Washington was filed in U.S. District Court on September 18, 1970 in Tacoma.

The area covered by the case of United States v. Washington is that portion of the state west of the Cascade Mountains and north of the Columbia River drainage area, and includes the American part of the Puget Sound watershed, the watersheds of the Olympic Peninsula north of Grays Harbor watershed, and the off-shore waters near those areas. The Sohappy v. Oregon (United States v. Oregon) case involves the regulation of off-reservation Indian treaty right fishing in the Columbia River watershed. The decisions by the judges, Robert Belloni in Oregon and George Boldt in Washington, were very similar in that the judges ruled the state's authority over Indian treaty right fishing is limited to minimal regulation which is "necessary" for the preservation of the fishery resource. However, Judge Boldt went further in recognizing the role of tribal self-regulation, holding that where a tribe demonstrates to the satisfaction of the court that it is able and willing to self-regulate in a manner that protects the fish runs, any further state regulation is not necessary and may not be exercised. Judge Belloni's decision was not appealed. The Boldt decision was appealed to the Ninth Circuit Court of Appeals in San Francisco.

One of the most important aspects of the decision in United States

v. Washington deals with the tribal self-regulation of their members' off-reservation treaty right fishing, While observing the Supreme Court decision giving states the power to regulate off-reservation fishing to preserve the resource, Judge Boldt decided that where a tribe demonstrates to the satisfaction of the court that it is able and willing to self-regulate in a manner that will protect the fish runs, then any further state regulation is not necessary and may not be exercised.

Judge Boldt established a series of qualifications and conditions that must be achieved and maintained by a tribe before gaining self-regulating status.

The necessary qualifications are:

"a) Competent and responsible leadership.

b) A well organized tribal government competent to adopt and apply proper regulations.

c) Indian personnel trained and competent to enforce the regulations.

d) Readily available fisheries experts to advise on regulations.

e) An officially approved membership roll.

f) Membership certification and appropriate I.D. cards with photograph."

The conditions specified are:

"a) Adopt full and complete tribal fishing regulations, including reasonable and necessary conservation restrictions, after consultation with state agencies.

b) Permit state monitoring of off-reservation Indian Fishing.

c) Provide on and off-reservation catch reports to state."

Judge Boldt has ruled that the Yakima and Quinalt tribes are now fully qualified for their self-regulation, and several other tribes are

expected to qualify soon.[34]

The U.S. Supreme Court decided on November 19, 1970 in the "Puyallup II" case to uphold Indian rights to net fish commercially for steelhead and returned the case to the state court to work out an allocation formula for the steelhead which is equitable to both the sport fishermen and Indians.

On June 8, 1972, the Idaho Supreme Court follows the Sohappy case and holds, in State v. Tinno, that Idaho cannot regulate Indian treaty fishing "unless it clearly proves regulation of the Indians' fishing in question to be necessary for preservation of the fishery." As a part of its conservation program, the state "must extend full recognition to these rights and the purposes which underlie them."

On February 12, 1974, U.S. District Court Judge George Boldt rendered a decision in the case United States v. Washington and on March 22, 1974, the Interim Plan for the implementation of the decision in United States v. Washington is approved by the judge and placed into effect.

This Interim Plan did not alter the rights decided by the court to belong to treaty Indians, but it did modify the duties of both the Indians and state in order that the rights of the Indians and duties of the state may eventually be fully realized. The tribes that are found to be self-regulating are not bound by the Interim Plan so long as they continue to meet the qualifications and conditions established by the court on February 12.

A major feature of the Interim Plan was that as of June 4, 1974, all Indian off-reservation fishing places were closed unless specifically

opened by tribal regulations filed in court.

The Plan also provided the following:

1) "The state will recognize provisions of tribal regulations subject to the state's right to challenge them in court) and any Indians fishing contrary to tribal regulations will be subject to that state's law as they apply to the general public.

2) The tribes have to give the state an opportunity to review tribal regulations before they are filed with the court.

3) The state will make significant reductions in non-Indian fishing as necessary to achieve the ultimate objectives of the February 12 decision. Mathematical precision is not required, but in making reductions, the state must do so consistent with the concept of permitting a full harvest of fish.

4) States and tribes will monitor the fishery and exchange data."

In April of 1974 Indian tribes and defendants (State Department of Fisheries and the State Game Commission, their respective directors, and the Washington Reef Net Owners Association) of the United States v. Washington case appealed Judge Boldt's decision to U.S. Ninth Circuit Court of Appeals in San Francisco.[35] In early June of 1975 that court ruled in favor of Judge Boldt's decision of February 12.

In August of 1975, Judge Belloni issued an order to make Oregon and Washington enact new fishing regulations before allowing any fall chinook salmon to be harvested by anyone from the Columbia River or the Pacific Ocean. The new regulations are to allow the treaty Indians a larger portion of the catch. The regulations that the states must prepare must include the ocean catch in establishing the Indian allocation. The new regulations must also limit the total catch so the species is not endangered.[36]

On September 1, 1975, Judge Belloni amended a federal injunction intended to assure the treaty tribes an opportunity to catch a large share of fall run chinook salmon in the Columbia River.

A vital point in the injunction is that the number of fall run chinook caught in the ocean must now be taken into consideration in developing a formula to insure that the Indians get a chance to catch their fair share of salmon in accordance with the treaties of 1885. In his original order, the judge said that new regulations must assure the tribes the chance to take fifty percent of the fall chinook salmon run. Now the Indians have the chance to take fifty percent of the chinook run that is in the Columbia, plus the fish that are in the ocean.

Bob Thompson of the Oregon Fish and Wildlife Commission said the ruling means that Washington and Oregon fishery officals will have to provide for escapement upstream of substantially more fish from the ocean and lower river. He stated that this can only be done by strictly limiting the catches of fishermen in the ocean and lower river.[37]

In late October of 1975, Judge Boldt signed an order establishing an advisory board in order to reduce the number of Indian fishing issues brought before him. The formal order was drawn after parties of the fishing dispute told the judge that they were making progress in forming an advisory board. Under this plan, contested issues are given to the advisory board, which will try to work out differences without a formal hearing in front of the judge. Only those issues not resolved by the board would eventually go for formal consideration.[38]

COMMERCIAL SALMON FISHERY

Although the Oregon country was first explored by white men seeking furs which could be sold in European and Chinese markets at huge profits, the commercial potential of the fisheries were not entirely overlooked. The Hudson's Bay Company, which was primarily involved in the fur business, supplemented the food supply at its trading posts with salmon purchased from the natives. In 1823 salmon began to be exported by the men at Fort George (Astoria). However, Fort Langley on the Fraser River was thought to be a more suitable location for the business and a saltery was established there.[39]

Fur traders all along the Columbia exported salmon to outside markets. The Hudson's Bay Company shipped salted salmon to the markets of London to Honolulu. Columbia River salmon were introduced to the Californian and eastern markets. The withdrawal of British interests from the Columbia after 1846 left the development of this fishery entirely in American control.

In the early 1850's, settlers entered the fishing industry in increasing numbers and by 1861 commercial salmon fishing had attained quite a status. The quantity of salmon used by settlers and traders from 1820 to 1865 probably did not offset the decreased Indian usage after the Indian population had been so drastically reduced by the epidemics. Thus, the salmon catch from 1835 to 1965 was probably less than any other thirty year period during the previous several hundred years.[40]

American traders trying to get into the Columbia fish business

met with little success at first. In 1829 Captain John Domins of Massachusetts, commanding the brig Owyhee, entered the river to pick up a cargo of salmon, spent two summers in the area, but was able to pack only fifty barrels. He bought the salmon from the Indians mostly in exchange for tobacco.

Captain Nathaniel Wyeth of Cambridge, Massachusetts, made a useless overland trip to the Columbia in 1832, returned two years later on a combination fur and fishing venture and established a trading post at the mouth of the Willamette River on Sauvie Island. However, this trip was also a failure.

Other easterners were more successful. Captain John Couch of Newburyport, Massachusetts, one of the founders of Portland, reached the Columbia River in 1840, packed a cargo of salmon, and returned home. He returned in 1842 and established a saltery at Willamette Falls, which is now Oregon City.

By 1854 large quantities of salmon were being salted around Astoria at the mouth of the Columbia and at Cascade Falls 150 miles upriver. These fish were shipped to the east coast, Hawaii, and South America. Also at this time immigrants began to flood the Oregon country. In 1859 Oregon had become a state with about 60,000 people and the Washington Territory was home for about 12,000 settlers.

These new residents demanded roads and railroads through the mountains and the removal of the Indians, who had massacred the ambitious missionaries Dr. Marcus Whitman and his wife at Walla Walla in 1847 and conducted the Cayuse War in 1847-1850. Major Isacc Ingalls Stevens, the governor of the Washington Territory and a tough West

Pointer, was determined to oblige the settlers. After inducing some of the Puget Sound tribes to cede their lands to the United States, he called for a council of the Yakima, Umatilla, Nez Perz', Cayuse, and other tribes of the Columbia River Valley to meet with him in council at Walla Walla. With a mixture of force and suavity he persuaded the chiefs to accept removal to reservations in return for payment of approximately one million dollars. Like other agreements negotiated by Stevens, the treaty guaranteed the Indians "the right to fish at their usual and accustomed grounds and stations as long as the river flowed," a right that was to have enormous consequences in the struggle to exploit the salmon of the Pacific Northwest.[41]

The Early Canneries on the Columbia

In 1866 the Humes and partner Andrew Hapgood moved their canning operations from the Sacramento River to the Columbia River. They chose a heavily wooded cliff in Wahkiakum County, Washington as the site for their salmon cannery. That year they packed 4,000 cases of forty-eight one pound cans, doing all the work by hand. The next year they packed 18,000 cases. The salmon were caught in two small gill nets and the fishermen were paid fifteen cents for each fish, while the canned product brought sixteen dollars a case.

With the discovery of this "river of gold", other canneries soon moved in. By 1873 there were eight canneries on the Columbia, a peak of fifty-five was reached ten years later, with Astoria, then a colorful town inhabited mainly by Chinese cannery workers, as the heart of the industry. There were also canneries at Westport and Ilwaco on the

lower Columbia, on the Willamette near Portland, at The Dalles, and as far upstream as the mouth of the Deschutes. Nearly every major coastal stream in Oregon also had one or more salmon canneries.

The Columbia River pack increased rapidly from 100,000 cases in 1869 to 630,000 cases in 1883, when about 43 million pounds of salmon were captured. At this time, only the largest salmon, the chinook, was taken. Not for another thirty years would this level be reached again, and then only because all species were being utilized. About 4,000 persons were employed in canneries on the Columbia River at their height, of whom about 90 percent were Chinese working for pitiful wages under exploitive Chinese contractors.[42] These workers hand packed the chinook in hand-made cans.

The commercial chinook salmon catch reached its peak production during 1881-1885, coincident with the operation of the maximum number of canneries. By 1890 the number of canneries had dropped to twenty-one. The combined pack of these canneries had dropped to 436,000 cases. The reduction of canneries and production was due mainly to a reduction in the number of chinook salmon available.[43]

Old Fishing Gear

In the early commercial fishery, gill nets were the original gear used by the settlers. Soon, fish wheels, seines, and traps were also employed for salmon capture. Purse seins were used for a time at or near the mouth of the Columbia River. In the early 1900's trolling for salmon began in the nearby ocean waters. Legislation since that time has eliminated many types of gear, such as the fish wheel, beach seines

and traps.

However, in the early days, most of the salmon taken were captured in the river from Astoria upstream. Gill nets or seines were deployed from sailboats twenty two to twenty four feet long. In 1889 there were about 2,000 of these craft in operation on the Columbia. When gasoline motors came along they replaced the sail and by 1910 almost the entire fishing fleet was motorized.

Approximately 60 percent of the catch was then captured with drift gill nets and the rest mostly with seines. Some of the seines were over 2,400 feet long. The larger ones had to be pulled by teams of horses, two double teams on the tail end on the beach and as many as five teams on the lead end. This horse seining was mostly confined to the lower seventy miles of the river.

Some fishermen used set nets, which were made of gill-net webbing placed in a fixed position close inshore, at a slough or eddy, and thus intercepting the salmon as they rested before continuing their journey. In 1936 set nets were banned in the state of Washington, and some years later all seines and fixed gear were banned in Oregon. Now only the Indians can use set nets.

One of the most unusual devices developed was the fish wheel. S.W. Williams, who built the first one in 1879, claimed that it could capture 14,000 fish a day. It was most efficient in narrow channels where there was swift running water to rotate the wheel. The fish were guided into the revolving dippers and down a chute into a larger bin within the structure of the framework which supports the rotor. Some of the wheels had long leads of piling running out into the river to help

direct the salmon into the scoops. By 1899 there were seventy-six wheels on both sides of the Columbia River. The Seufert Company, which had a cannery at The Dalles, owned or leased twenty-seven wheels at one time operating on both sides of the river.

Their best wheel caught 417,855 pounds of salmon in 1906 and their next best took 290,365 pounds in 1923. In contrast to this, an average catch by an Astorian gill netter was 20,000 pounds each year. By 1926 the company was operating only twelve wheels with three of them on the Washington side and nine on the Oregon side. At their peak the fish wheels took five percent of the total catch on the Columbia, but there was so much opposition to the wheels from the gill netters that the Oregon legislature outlawed them in 1926 and the Washington legislature in 1934.

Traps were used to catch salmon as they approached from a downstream direction. The trap was a pile and web structure with leads reaching to the shore and a spiller or pot out in the water. These traps accounted for about one-fifth of the annual catch until they were banned in both Oregon and Washington.

The efficiency of much of this old fishing gear depended on the water conditions. Set nets and gill nets worked best during periods of cloudy water and in the dark. However, traps and seines that operated in such a way as to enclose a school of fish and confine them to a small space, from which they were easily removed into the hold of the boat setting the net, worked best during periods of low, clear water since the fish must actually see the web and follow it along in order to be taken. Since the Columbia River is normally muddy in May and June,

gill nets and set nets tended to be most effective at that time of year when the spring chinook and sockeyes were migrating.[44]

MODERN COMMERCIAL FISHERY

Today, most of the salmon caught commercially are captured by gill nets.[45] The gill net is basically an entangling device, usually placed across migration paths from a drifting boat. It is a simple device which can be handled by one or two men from small boats. It is most effective when the fish are fairly uniform in size and are running. This net is most effective when used at night. Monofilament nylon gill nets have been developed in recent years, but their use has been prohibited in fishing areas all along the Pacific Coast.[46] By varying the amount of weight (leadline) used at the bottom, the net may be submerged to the bottom, floated to the surface, or held at an intermediate depth. Gill nets may be anchored to a fixed position (set nets) or permitted to drift downstream. Both set and drift nets have been employed on the Columbia River, but presently, only the drift gill nets are allowed by law. The exception being the Indians. To them the set gill nets are the primary gear used to catch salmon.

Most drift gill nets now used are the fully submerged type, or diver, and are operated with the deadline touching the bottom of the river. This type of bottom fishing requires that the bottom be free of all debris which could snag the nets. Gill net fishermen cooperate with each other in removing bottom obstructions, such as snags and sunken logs, and have developed exclusive "drift" rights. A "drift" is a section of the river channel, often from two to five miles long,

down which a net can be drifted before being picked up. To keep the net stretched tight and comply with regulations, the fishermen have to tie one end of the net to the fishing boat as it drifts downstream.

Shortly after the diver net appeared on the Columbia, it was modified into a trammel net. It has a curtain of larger mesh webbing hung one either side of a regular gill net. The gill net between the larger nets hangs loosely and to a greater depth. A fish striking from either side passes through the larger meshed outer webbing, hits the smaller meshed gill net inside and carries it through the large mesh net on the other side. The fish is trapped in the sack, or pocket, formed by the two nets now intertwined. Trammel nets are used mostly as diver nets. A variation of the Trammel net is the addition of an apron, which floats ahead of the main net and catches fish which attempt to jump over the net.

Chinook, sockeye, coho, and chum salmon are all harvested by gill nets in the river, with chinook constituting most of the catches. However, the amount of the total catch varies each year (Table 2 and Figure 2). Commercial gill net fishing by non-Indians now takes place from the mouth of the Columbia River to within five miles of Bonneville Dam, a distance of approximately 140 miles.

Fishing Seasons

Since the early 1900's, the fishing season has been the same for Washington and Oregon fishermen. The seasons have been progressively shortened over the years. In 1838, there were 272 open-season days for commercial fishermen below Bonneville Dam, however, in 1964, there were

83 days (Fig. 1). The main fishing season has normally opened about May 1 and continued until the latter part of August. It is then often opened again for a few weeks beginning in early September. Fishing is not permitted on weekends. The largest landings usually have occured from May through September.[47] According to Mr. Zirges of the Oregon Fish Commission, the fishing season for one year is dependent upon what the fish run was like the previous year (Table 1). Due to this, each yer may have a different length of fishing.[48]

SPORT FISHING

Management of the Columbia River Fishery is controlled by the fish and game agencies of Washington and Oregon. Their task is to regulate both sport and commercial fishing with the aim of maximizing the salmon runs on a perpetual basis and yet give both groups a chance to take the maximum number of salmon. To do this many biologists study each and every phase of the fishery, make continual forcasts, and carefully monitor the river.

With the steady decline of the runs, commercial fishing seasons were reduced from 272 days in 1938 to 77 days in 1971 so as to give the stocks an opportunity to build back up. The type of gear used by both groups is tightly regulated.

Along with the drop in commercial fishing there has been an enormous growth in sport fishing.[53] However, the sport fishery has changed significantly during the past ten years. While the overall sport fishing has intensified, many prime fishing sites have been flooded out by the construction of large and small dams.[54] Therefore, the

Number of Commercial Fishing Days per Year.[49]

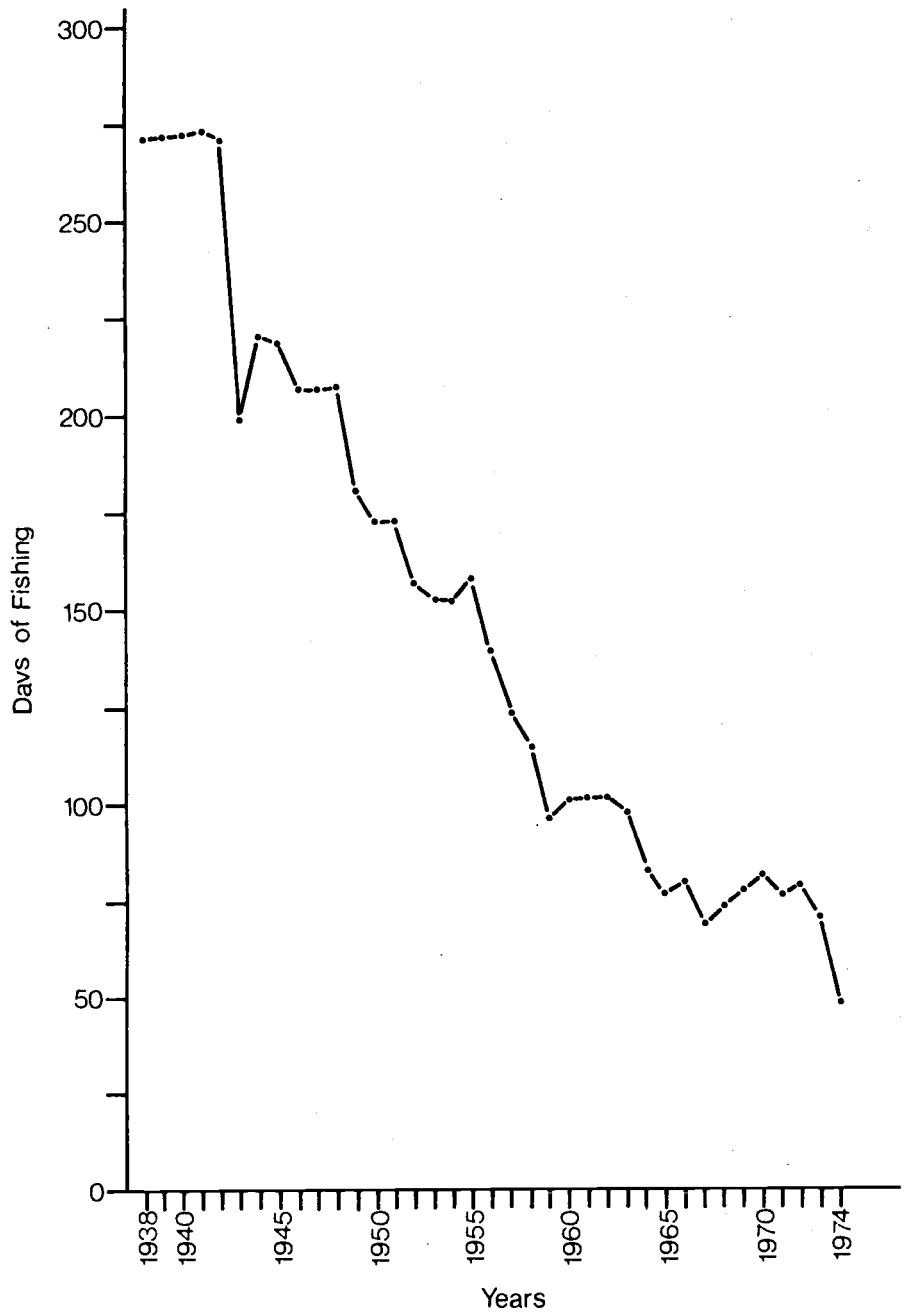


Figure 1. Note the almost steady decline in fishing days per year since 1938.

Table 1. Columbia River Commercial Fishing Seasons Below Bonneville Dam, 1938-74 [50]

Year	Days Open to Fishing: January March	April May	June July	August	September December	Total
1938	59.50	26.50	52.00	21.50	112.50	272.00
1939	59.50	26.50	52.00	21.50	112.50	272.00
1940	60.50	26.50	52.00	21.50	112.50	273.00
1941	59.50	28.50	52.00	21.50	112.50	274.00
1942	59.50	25.50	53.00	21.50	112.50	272.00
1943	31.00	16.25	35.25	21.25	96.00	119.75
1944	41.25	18.00	42.75	22.50	96.00	220.50
1945	40.25	18.00	42.75	22.50	96.00	219.50
1946	31.00	16.25	42.75	21.50	96.00	207.50
1947	31.00	16.25	42.75	21.50	96.00	207.50
1948	32.00	25.25	33.75	21.25	96.00	208.25
1949	31.00	26.50	32.50	22.50	68.25	180.75
1950	31.00	21.00	31.50	22.50	68.25	174.25
1951	31.00	21.00	31.50	22.50	68.25	174.25
1952	32.00	21.00	22.75	21.50	60.00	157.25
1953	31.00	21.75	19.00	21.50	60.00	153.25
1954	31.00	21.75	19.00	21.25	60.00	153.00
1955	31.00	21.75	23.25	22.50	60.00	158.50
1956	32.00	23.00	22.75	18.25	44.00	140.00
1957	31.00	21.75	22.25	18.75	31.00	124.75
1958	31.00	11.75	26.00	16.50	30.00	115.25
1959	14.00	22.00	24.50	17.25	20.00	97.75
1960	15.00	23.25	25.25	18.50	19.00	101.00
1961	14.00	26.25	26.50	18.50	16.00	101.25
1962	14.00	26.25	25.75	18.50	17.00	101.50
1963	14.00	22.00	26.50	17.50	18.00	98.00
1964	15.00	21.25	7.50	17.25	22.00	83.00
1965	14.00	16.25	2.00	17.75	26.75	76.75
1966	14.00	21.75	1.00	20.75	22.75	80.25
1967	14.00	10.25	7.75	15.75	22.00	69.75
1968	19.00	7.75	6.00	12.00	30.00	74.75
1969	16.00	10.00	6.50	18.50	27.25	78.25
1970	14.00	16.00	4.00	13.00	35.00	82.00
1971	14.00	10.00	6.00	13.00	34.00	77.00
1972	15.00	19.00	6.00	12.00	27.00	79.00
1973	12.00	18.00	0.00	10.00	32.00	72.00
1974	9.00	1.00	0.00	10.00	29.00	49.00

Table 2. Columbia River Commercial Salmon Landings For Oregon and Washington From 1956 Through 1974 in Pounds [51]

	Oregon	Washington	Total
1953			
Chinook	4,926,600	3,073,100	7,999,700
Chum	148,000	101,200	249,200
Pinks	4,500	600	5,100
Sockeye	79,100	67,100	146,200
Coho	686,100	697,800	1,383,900
Total	5,844,300	3,939,800	9,784,100
1954			
Chinook	3,843,100	2,753,000	6,596,100
Chum	186,100	133,900	320,000
Pinks	----	----	----
Sockeye	126,500	78,900	205,400
Coho	403,200	591,700	994,900
Total	4,594,900	3,377,500	7,972,400
1955			
Chinook	5,996,000	3,662,500	9,658,500
Chum	80,000	45,800	125,800
Pinks	7,000	12,600	19,600
Sockeye	57,000	143,500	200,500
Coho	712,900	847,600	1,560,500
Total	6,861,900	4,712,000	11,573,900
1956			
Chinook	5,936,100	3,050,100	8,986,200
Chum	21,500	24,200	45,700
Pinks	----	----	----
Sockeye	159,800	137,900	297,700
Coho	771,300	842,900	1,614,200
Total	6,888,700	4,055,100	10,943,800
1957			
Chinook	3,974,000	2,384,900	6,358,900
Chum	16,300	15,700	32,000
Pinks	21,600	17,100	38,700
Sockeye	189,700	61,000	250,700
Coho	632,600	632,000	1,265,000
Total	4,834,200	3,111,100	7,945,200

	Oregon	Washington	Total
1958			
Chinook	4,247,800	2,489,800	6,737,600
Chum	52,400	36,900	89,300
Pinks	----	----	----
Sockeye	533,800	191,800	725,600
Coho	318,200	413,000	731,200
Total	5,152,200	3,131,500	8,283,700
1959			
Chinook	3,171,900	1,773,400	4,945,300
Chum	27,200	15,800	43,000
Pinks	1,200	300	1,500
Sockeye	473,100	172,800	645,900
Coho	320,900	441,800	762,700
Total	3,994,300	2,404,100	6,398,400
1960			
Chinook	2,862,100	1,341,600	4,203,700
Chum	9,300	6,000	15,300
Pinks	----	----	----
Sockeye	291,400	105,200	396,600
Coho	360,800	434,900	795,700
Total	3,523,600	1,887,700	5,411,300
1961			
Chinook	3,000,700	1,561,200	4,561,900
Chum	12,000	5,400	17,400
Pinks	100	100	200
Sockeye	106,200	52,400	158,600
Coho	710,600	974,900	1,685,500
Total	3,829,600	2,594,000	6,423,600
1962			
Chinook	3,900,300	1,847,900	5,748,200
Chum	28,900	18,500	47,400
Pinks	----	----	----
Sockeye	33,600	19,100	52,700
Coho	844,900	945,100	1,790,000
Total	4,807,700	2,830,600	7,638,300

1963

	Oregon	Washington	Total
Chinook	3,334,500	1,467,700	4,802,200
Chum	9,000	6,300	15,300
Pinks	3,900	1,100	5,000
Sockeye	30,200	19,200	49,400
Coho	939,700	1,086,300	2,026,000
Total	4,317,300	2,580,600	6,897,900

1964

Chinook	3,385,000	1,523,800	4,908,800
Chum	14,500	9,900	24,400
Pinks	----	----	----
Sockeye	50,250	18,600	68,850
Coho	2,195,800	1,500,300	3,696,100
Total	5,645,500	3,052,600	8,698,100

1965

Chinook	4,560,200	1,811,000	6,371,200
Chum	4,600	2,800	7,400
Pinks	40,600	13,400	54,000
Sockeye	11,800	13,200	25,000
Coho	2,698,800	2,673,300	5,372,100
Total	7,316,000	4,513,700	11,829,700

1966

Chinook	2,925,400	1,328,100	4,253,500
Chum	7,300	3,800	11,100
Pinks	----	----	----
Sockeye	6,800	11,800	18,600
Coho	4,524,900	2,272,100	6,797,000
Total	7,464,400	3,615,800	11,080,200

1967

Chinook	3,576,700	1,981,300	5,558,000
Chum	7,700	1,900	9,600
Pinks	118,400	53,900	172,300
Sockeye	117,400	106,800	224,200
Coho	4,425,900	2,870,000	7,295,900
Total	8,246,100	5,013,900	13,260,000

1968

	Oregon	Washington	Total
Chinook	2,857,300	1,831,900	4,689,200
Chum	2,200	900	3,100
Pinks	----	----	----
Sockeye	62,000	36,600	98,600
Coho	1,262,400	1,385,200	2,647,600
Total	4,188,900	3,254,600	7,443,500

1969

Chinook	3,961,700	2,217,800	6,179,500
Chum	2,800	1,200	4,000
Pinks	10,300	13,500	23,800
Sockeye	71,400	34,100	105,500
Coho	1,614,700	1,462,300	3,077,000
Total	5,660,900	3,728,900	9,389,800

1970

Chinook	4,617,700	2,494,300	7,112,000
Chum	4,900	3,100	8,000
Pinks	----	----	----
Sockeye	40,700	16,400	57,100
Coho	5,193,500	2,959,500	8,153,000
Total	9,857,100	5,473,300	15,330,100

1971

Chinook	4,025,400	2,475,400	6,500,800
Chum	3,100	2,900	6,000
Pinks	100	400	500
Sockeye	163,400	126,200	289,600
Coho	2,483,500	3,509,800	5,993,300
Total	6,675,500	6,114,700	12,790,200

1972

Chinook	3,674,800	2,314,500	5,989,300
Chum	10,000	6,000	16,000
Pink	----	----	----
Sockeye	153,700	126,200	279,900
Coho	1,301,900	1,858,700	3,160,600
Total	5,104,400	4,305,400	9,409,800

1973

	Oregon	Washington	Total
Chinook	4,887,200	3,665,200	8,552,400
Chum	11,300	6,700	18,000
Pink	----	----	----
Sockeye	84,600	74,400	159,000
Coho	542,600	1,362,100	1,904,700
Totals	5,525,700	5,108,400	10,634,100

1974

Chinook	2,171,400	1,457,100	3,628,500
Chum	6,200	4,500	10,700
Pink	----	----	----
Sockeye	1,200	800	2,000
Coho	1,170,300	1,311,600	2,481,900
Totals	3,349,100	2,774,000	6,123,100

Note: Location of salmon landings does not necessarily mean location of fish harvest. Salmon are landed at packing plants which are subject to a variety of influences that determine plant location, such as tax rates, available labor, and transport facilities. Therefore, because more chinook are landed in Oregon than Washington, does not necessarily mean that more chinook are located in Oregon's portion of the river system than are in Washington's. A dashed line indicates that too few were caught to be considered significant, or no reports were turned into the federal government.

Total Annual Catch Of All Salmon From 1953 Through 1974[52] on the Columbia River Below Bonneville Dam, in Pounds.

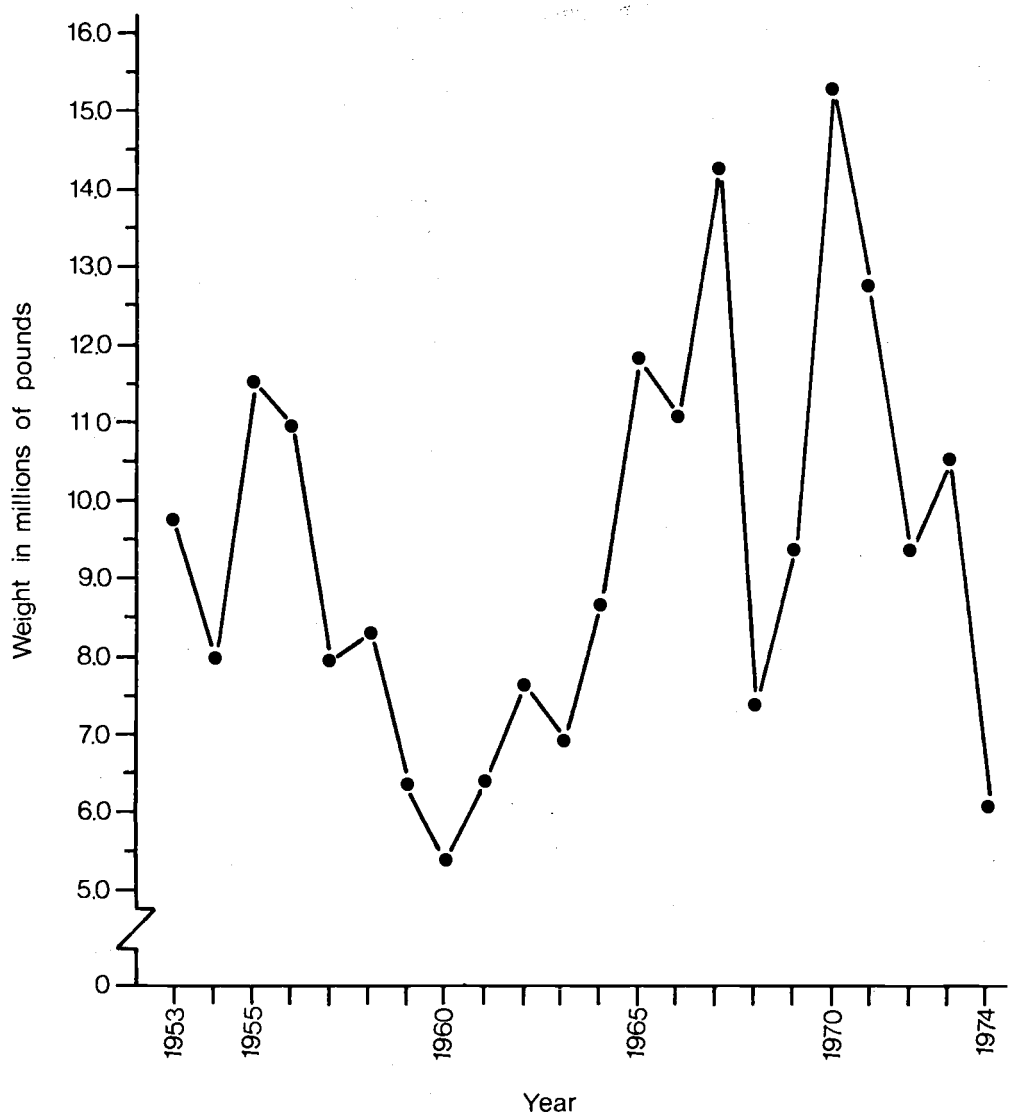


Figure 2. The increase following the low harvest of 1960 is mainly due to successful hatching, breeding and release of fingerlings.

increase in sport fishing does not mean that there is an increase in the salmon available to the fishermen.

The salmon fishermen support a recreational industry of considerable magnitude and economic importance. The number of licensed anglers on the Columbia River jumped from 40,000 in 1946 to 200,000 in 1970, and their catch of coho and chinook jumped from 26,000 to 265,000. Salmon are fished from all sizes of boats and also from the shore.

Angling federations and clubs have considerable political influence and sometimes engage in bitter struggle with commercial fishermen and Indians for a larger portion of the salmon catch. In the early 1960's sportsmen's groups headed by the Izaak Walton League started a drive to have all nets banned from the Columbia. They succeeded in placing a measure on the Oregon ballot but they were beaten by a well organized and well financed campaign of the commercial salmon industry. Later, sharp increases in runs of coho salmon in the Columbia, due to a breakthrough in artificial production of coho, abated that major conflict between sport and commercial interests.

However, the conflict is not completely resolved.[55] A staff proposal to reduce the daily catch of salmon from the present three fish to two fish per day was unanimously turned down by the Oregon Fish and Wildlife commissioners at a public hearing on October 25, 1975 to establish the 1976 fishing regulations. This was to apply to both the river and ocean. Apparently the staff proposed this new limit to begin complying with the federal court order to make more salmon available to the treaty Indian tribes. The vote against the proposal was unanimous following a half a day of protests from individuals and angling groups.

Chairman Allan L. Kelly was adament about "taking it out on sport anglers" before the commission has been able to work out with tribal lawyers a comprehensive plan which would be designed to divide the salmon equitably while maintaining a good fish management practice. Representatives of the charter boat industry in Oregon pointed out that Washington would not likely change its present three fish limit policy, which would leave the Oregon charter boat people at a disadvantage.

However, the commission did reduce the daily limit of salmon to two fish on the lower Willamette River. The commission also warned that the gillnet season will be reduced on the lower Willamette.[56]

PART THREE

Summary

The Columbia River salmon fishery has a long history. Since approximately 11,000 B.C., the Indians of the Pacific Northwest used the salmon as the most important part of their diet even during the winter. Moreover, it is known that Columbia River tribes traded some of their catch to other Indian tribes as far away as the east side of the Rocky Mountains.

The Columbia River salmon as a resource has been placed under great stress, especially during the past thirty years. Due in large part to dam construction and fishing, the quantity of salmon has decreased. Moreover, the demand for salmon, especially by sportsmen, has increased as the resource has decreased. The entire population wants more salmon, however, the entire population does not want these fish for the same reason. There are three basic interests for the salmon in this region's population, each wants more of the salmon fishery resource: the sport fishermen, the commercial fishermen, and the Indians. The sport fishermen generally feel the salmon are most beneficial to this area as a recreational resource.

The sport fishermen have formed political groups and have exerted political influence in the Oregon Legislature. In the early 1960's they tried to better their situation by creating a bill which would have outlawed net fishing on the Columbia. That bill was defeated on election day due, in large part, to another group, the equally well organized and well financed commercial fishermen.

The commercial fishermen see the salmon as a resource base to an entire industry which directly and indirectly employs thousands of people in this area and not simply as a sort for those with leisure time. They see the salmon as the economic resource to their livelihood. Since 1960 success in artificial propagation and distribution of salmon fingerlings has only somewhat deflated this conflict between the sport and commercial fishermen.

Currently both the commercial interests and the sports fishermen are opposed by the third major user of salmon, the treaty Indians. The Indians have claimed in federal court that they have been denied their right to "take fish at all usual and accustomed grounds and stations" on and off the reservation due, in part, to the construction of dams and the subsequent flooding of their fishing stations. This flooding of their fishing areas has reduced their take of the salmon.

In the mid-1850's the Indians signed treaties to go to reservations. However, they were given the right by the treaty to "take fish at all usual and accustomed grounds and stations" off the reservation as well as on the reservation. At that time there was no scarcity of salmon and there was plenty for both the Indians and the settlers. Later, as the salmon became less abundant, that clause of the treaty caused some social unrest and the clause has been recently disputed in federal court.

Federal judges have ruled that the Indians have been denied their treaty right to utilize the salmon. Judges Belloni and Boldt have been deeply involved in this controversy. Judge Belloni ruled in the case of United States v Oregon that the state must give the Indians an

opportunity to attempt to take fifty per cent of the salmon both in the Columbia River and those salmon which are off the coast.

The legal fight for the Columbia River salmon fishery has continued to the present since it began in 1963, especially between the treaty Indians and the commercial fishermen. There is much concern by the sport and commercial fishermen as to how the state will allow the Indians to attempt to take their fifty per cent of the fishery. Commercial fishermen fear there will need be a cut-back in their take of the fishery, since it has been announced that there will be no reduction of salmon captures for the sport fishermen. At this time no one knows how the court's ruling will effect the commercial fishermen. It seems likely that the legal fight for the salmon fishery is not yet over.

FOOTNOTES

Footnote #	Source
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2.	U.S. Dept. of Interior, The Columbia River (Washington D.C. Bureau of Reclamation, 1947), p. 49, 50.
3.	_____, Salmon: The Living Resource (Vancouver, British Columbia: Agency Press, 1967), p. 7.
4.	op. cit. Footnote #3, p. 7.
5.	op. cit., Footnote #3, p. 2.
6.	Maurice E. Stansby, Industrial Fishery Technology, (New York: Reinhold Publishing Corporation, 1953), p. 107.
7.	op. cit., Footnote #4, p. 10.
8.	op. cit., Footnote #4, p. 10.
9.	Slansby, op. cit., Footnote #5, p. 108.
10.	op. cit., Footnote #4, p. 10,11.
11.	Slansby, op. cit., Footnote #6, p. 102.
12.	op. cit., Footnote #4, p. 14, 15.
13.	Stansby, op. cit., Footnote #6, p. 108.
14.	op. cit., Footnote #4, p. 14,15.
15.	op. cit., Footnote #4, p. 14,15.
16.	Derek Mills, Salmon and Trout: A Resource, its Ecology, Conservation and Management (Edinburgh: Oliver and Boyd, 1971), p. 160.
17.	op. cit., Footnote #4, p. 15.
18.	Mills, op. cit., Footnote #16, p. 156.
19.	op. cit., Footnote #4, p. 15.

Footnote #	Source
20.	Mills, op. cit., Footnote #16, p. 165.
21.	op. cit., Footnote #4, p. 15.
22.	Anthony Netboz, The Salmon; Their Fight for Survival, (Boston: Houghton, Mifflin Company, 1974), p. 294, 295.
23.	Nelboz, op. cit., Footnote 22, p. 296, 297.
24.	Interview with Mr. Zirges, Oregon Fish Commission, Newport, Oregon, 10 October 1975.
25.	Netboz, op. cit., Footnote 22, p. 268.
26.	A.T. Pruter, "Commercial fisheries of the Columbia River", in Fishery Industrial oesearch vol. 3, no. 3 (Washington, D.C.: U.S. Department of the Interior; Bureau of Commercial Fisheries), p. 22,23.
27.	Pruter, op. cit., Footnote 26, p. 26.
28.	Netboz, op. cit., Footnote 22, p. 269.
29.	Netboz, op. cit., Footnote 22, p. 303.
30.	Netboz, op. cit., Footnote 22, p. 302.
31.	Special Assistant to the Secretary of the Interior, Pacific Northwest Region, Indian Fishery Rights in the Pacific Northwest. (Portland, Oregon, n.p., 1974), p. 1.
32.	Netboz, op. cit., Footnote 22, p. 303.
33.	Netboz, op. cit., Footnote 22, p. 303.
34.	op. cit., Footnote 31, p. 12,13,14.
35.	op. cit., Footnote 31, p. 2,3.
36.	Oregonian, 21 August 1975.
37.	Oregonian, 1 September 1975.
38.	Oregonian, 26 October 1975.
39.	Netboz, op. cit., Footnote 22, p. 274.
40.	Pruter, op. cit., Footnote 26, p. 27.

Footnote #	Source
41.	Netboz, op. cit., Footnote 22, p. 275.
42.	Nelboz, op. cit., Footnote 22, p. 277.
43.	Pruter, op. cit., Footnote 26, p. 28.
44.	Netboz, op. cit., FOotnote 22, p. 280.
45.	James A. Crutchfield and Giulio Pontecorvo, The Pacific Salmon Fisheries (Washington, D.C., 1968), p. 39.
46.	Crutchfield and Pontecorvo, op. cit., Footnote 45, p. 39.
47.	Pruter, op. cit., Footnote 26, p. 30.
48.	Zirges interview, op. cit., Footnote 24.
49.	Graph based on Table 1.
50.	Fish Comm. of Oregon and Wash. Dept. of Fisheries, Status Report: Columbia River Fish Runs and Commercial Fisheries, 1938-1974, 1974 Addendum, vol. no.
51.	U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fishery Service. U.S. Fish and Wildlife Service (Fishery Stats of U.S.), Stat Digest 1953-1974.
52.	Graph based on Table 2.
53.	Netboz, op. cit., Footnote 22, p. 303, 304.
54.	Pacific Northwest River Basins Commission, 2nd Status Report on Anodromous Fish Runs of the Col. River (Vancouver, 1974), p. 5.
55.	Netboz, op. cit., Footnote 22, p. 304.
56.	Oregonian, 26 October 1975.