Bryant and Parkhurst (1950) reported that from 1935 to 1947 most salmon spawning in the Wenatchee River occurred in the upper nine miles below the outlet of Lake Wenatchee. This area is a relatively unimportant segment of the Wenatchee Basin spawning grounds today. Most of the spring chinook spawn in tributaries (Nason Creek, Little Wenatchee, Chiwawa River) while large numbers of summer chinook spawn downstream from Tumwater Canyon. A large run of coho salmon formerly (before the early part of the 20th century) spawned in the Wenatchee River. Of the few coho that presently migrate above Rock Island Dam, most are the result of the hatchery program at Turtle Rock, above Rocky Reach Dam. Few of these are known to move into the Wenatchee to spawn. The Wenatchee and Okanogan River drainages became the major production areas for sockeye salmon in the Columbia River system after Grand Coulee Dam was constructed in 1939 (Mullan 1984). The Wenatchee River also supports a run of steelhead.

The Okanogan River has the greatest amount of available habitat for sockeye salmon in the entire Columbia River system. Sockeye use Lake Osoyoos and about eight miles of the river immediately above the lake for rearing and spawning (Bryant and Parkhurst 1950).

Important steelhead and spring chinook habitat also occurs in the Entiat, Methow, and Okanogan drainages (ODFW 1984c).

4.3.5 Columbia River Above Chief Joseph Dam

The Columbia River extends north into Canada about 300 miles amid steep mountain ranges. It then loops back (the Big Bend) in a southerly direction for nearly 200 miles to its point of origin in Columbia Lake. Salmon were known to have ascended to within a few miles of this lake (Bryant and Parkhurst 1950). Before 1939 (when Grand Coulee Dam was constructed) the Columbia River was a fast-flowing river between Kettle Falls and Grand Coulee Dam, a distance of 103 river miles. Chinook (presumably summer) salmon reportedly spawned in great numbers on gravel bars in the main river just below Kettle Falls from June to October. They also spawned near the mouths of several nearby tributaries (Bryant and Parkhurst 1950). Kettle Falls was flooded by Grand Coulee Dam.

The Arrow Lakes occupy deep, glaciated river valleys and together are about 100 miles in length and over two miles wide. Sockeye salmon reportedly ascended to the Arrow Lakes region (Bryant and Parkhurst 1950).

The plateau section above the Big Bend was the first area in the Canadian segment of the Columbia River where spawning took place. Suitable spawning areas were lacking in the river reach immediately downstream (Bryant and Parkhurst 1950). Fish using this section of the river were probably summer chinook.

Salmon also spawned in the Kettle, Pend Oreille, Kootenai, Sanpoil, Nespelem, Colville, and Spokane rivers.

4.3.6 Snake River Below Hells Canyon Dam

The Snake River is the largest tributary to the Columbia River. Prior to 1850 this drainage provided an estimated 7,206 miles of habitat for salmon and steelhead (Table 15).

A high falls located about six miles above the mouth of the Palouse River renders this stream inaccessible to migratory fish.

Parkhurst (1950a) reported that in 1935 the Tucannon River had numerous good shallow riffles and an adequate number of resting pools well distributed throughout its length. A significant portion of this river that once contained excellent salmon spawning habitat has been severely degraded by poor agriculture and grazing practices.

The gradient of Clearwater River is generally moderate throughout most of its course. Parkhurst (1950a) reported that seven percent of the stream bed was suitable for spawning in 1938. The North Fork Clearwater was totally blocked to upstream migration in 1971 with the construction of Dworshak Dam.

Prior to the early 1900s, the Grande Ronde River drainage was an important producer of salmon and steelhead. Parkhurst (1950a) reported that in 1940-41 the lower mainstem Grande Ronde River had a moderate gradient with numerous shallow riffles and an adequate number of resting pools. The middle segment of the river had extensive spawning areas. Excellent spawning habitat also was reported for a distance of two miles in the upper segment up to Starkey, Oregon. Production habitat is not limited to the mainstem areas,

but includes a number of tributary streams such as the Wenaha, Lostine, Minam rivers and Lookingglass Creek (Thompson and Haas 1960).

The mainstem Salmon River extends for about 400 miles in Idaho. The lower 200 miles has a fairly steep gradient and little suitable spawning area. Parkhurst (1950b) reported that in 1941 the stream bed was heavily silted for about 161 miles from Shoup to Stanley, Idaho. Above Stanley, he observed excellent spawning habitat for about 35 miles. Also, numerous small side channels were present to serve as natural rearing areas for salmonid fry. Conditions in this stretch of the river are currently far different. The reach between the Middle Fork (about 15 miles below Shoup) and the Lemhi River now contains a substantial amount of available gravel. Broad riffles near the mouth of Warm Springs Creek support a substantial portion of the summer chinook spawning in the Salmon River (IDFG 1985). Spring and summer chinook and sockeye salmon, and steelhead use this drainage.

The South Fork Salmon River is a major tributary of the Salmon River. About two-thirds of the river is riffles, the remainder pools. Prior to 1962, when logging production increased, the South Fork contained Idaho's largest summer chinook salmon run (Platts and Megahan 1975). This tributary also supports a steelhead population. Large increases in sediment load resulting from logging operations and road construction in the mid-1960s reduced spawning areas.

The Middle Fork of the Salmon River is also a good producer of spring chinook salmon and steelhead. The major portion of this drainage runs through an undeveloped wilderness area.

The Lemhi River enters the Salmon River at Salmon, Idaho. Parkhurst (1950b) reported a moderate gradient throughout the Lemhi, with abundant, well distributed spawning habitat of excellent quality. The Lemhi River formerly supported a large run of chinook salmon and steelhead. The stream produces few salmon presently.

The Imnaha River is about 75 miles long and flows through an extremely rugged, mountainous area. The gradient is relatively steep throughout its course. The drainage has a large amount of rearing habitat for anadromous

salmonids. Most of this habitat is in good to excellent condition (James 1984). Imnaha Falls, located about 65 miles above the mouth, is reported to be a barrier to salmon (Parkhurst 1950b). Salmon and steelhead habitat in the Imnaha River drainage has suffered only minor degradation.

4.3.7 Snake River Above Hells Canyon

Hells Canyon Dam is the lowest block to upstream migration to major spawning areas in the upper Snake Basin, including the mainstem Snake, Weiser, Payette, Powder, Boise, Owyhee, and Malheur rivers.

Irving and Bjornn (1981) report that over 95 percent of the fall chinook in the Snake River in 1959 and 1960 used habitat upstream from the Hells Canyon Dam site.

Before agricultural development of the basin started in 1931, the Weiser River system was a valuable spring chinook salmon producer. Extensive spawning areas in the mainstem and its principal tributaries were noted in 1941 by Parkhurst (1950b).

The Payette River system was an important spawning and rearing area for spring chinook and sockeye salmon and steelhead before 1900 (Parkhurst 1950b). Large amounts of sockeye salmon spawning and rearing occurred in the lakes in its headwaters. Black Canyon Dam, constructed in 1924 at river mile 39, blocked the entire run of sockeye salmon from the headwater lakes and confined the spring chinook salmon and steelhead runs to the mainstem below the dam (Parkhurst 1950b; Idaho Power Company 1985).

The Powder River mainstem was an excellent salmon stream before agricultural and mining developments resulted in habitat damage in the early 1900s. Parkhurst (1950b) reported that in 1942 less than 10 percent of the streambed was suitable spawning habitat in the lower river because of siltation. The Boise, Owyhee, and Malheur rivers also supported populations of spring chinook salmon.

Chapter 5
CAUSES OF DECLINES IN FISH RUNS AND HABITAT FROM 1850 TO THE PRESENT

5.1 INTRODUCTION

5.1.1 Overview

This chapter contains information pertaining to fishing, hydropower, irrigation, logging, mining, grazing, agriculture, and other activities that harm Columbia Basin salmon and steelhead.

How each type of activity detrimentally affects Columbia Basin salmon and steelhead cannot be ascertained with certainty by collecting numerical data alone. As stated by the Salmon and Steelhead Advisory Commission (1984), "this problem can be described very simply: Destruction and degradation of (spawning, rearing, and migration) habitat has drastically reduced the production of salmon and steelhead and the remaining production frequently has been overfished. These 'simple' problems act in synergy in ways so complexly interrelated it is frequently impossible to isolate cause and effect." This makes it difficult to quantitatively identify and separate the individual causes of salmon and steelhead loss in the Columbia Basin. However, a display of information describing the various detrimental activities can help overcome some of these difficulties and lead to a better evaluation of loss.

The information is organized in a chronological order so each detrimental activity can be traced through time and the magnitude of its effects on salmon and steelhead can be investigated. Where feasible, the information is also organized into the six geographic areas identified in Table 14. The information includes qualitative descriptions and, for each activity, at least one quantitative indicator of the magnitude of the activity over time. Not all the information directly relates to the severity and magnitude of the activity on salmon and steelhead, but is included to aid in measuring the general magnitude of an activity and its possible or probable effect on salmon and steelhead. The quantitative indicators are frequently limited to only a portion of the period from predevelopment to now because that is the

extent of the information available. Site specific information, organized into the six areas identified in Table 14, is compiled in Appendix D.

All of the activities described in this compilation have been individually and collectively harmful to Columbia Basin salmon and steelhead to some extent. The amount of harm attributable to any specific activity has not been determined in this compilation. However, the information could be used to help determine the relative contributions of the harmful activities identified. The Council intends to make such a determination about effects of hydropower operations on Columbia River Basin salmon and steelhead.

5.1.2 Summary of Detrimental Activities

Development of the Columbia River Basin has resulted in considerable harm to salmon and steelhead. The earliest identified negative human impact was fishing. Early harvest focused on chinook; when the chinook harvest declined after 1884, emphasis shifted to steelhead and sockeye (1890-1900), followed by chum and coho (1920s). By 1945, all species had declined significantly.

Other impacts closely followed fishing. By 1900, mining had become important in areas of Oregon, Washington and Idaho. By 1925, there were major increases in land devoted to agriculture, and there were also major advances in irrigation and logging as well. By 1941, large hydropower projects (Rock Island, Bonneville and Grand Coulee dams) had been built. The period 1940-1965 saw major increases in logging and water storage for a variety of purposes including hydropower generation and irrigation.

The following summarizes the detailed information found in this chapter. For purposes of comparison, some of the summary information included refers to fish run data found in Chapter 3. Note that the two lower Columbia River areas and the two Snake River area analyses have been combined in this summary due to difficulties in separating some of the data for these areas.

Logging has been more extensive in the lower Columbia River area than in any other area. The Willamette River drainage has been particularly affected. Early logging practices resulted in sedimentation of spawning areas, blockage of migration by log and log debris dams, and degradation of water quality. Extensive logging was underway in the lower river by 1925.

Agriculture is another important factor in the lower river. Major increases in land devoted to agriculture occurred by 1930. Some specific

locations strongly affected by irrigation include the Umatilla, John Day, McKenzie, Deschutes, Walla Walla, Hood, Santiam, and Touchet subbasins.

5.1.2.2 Columbia River Between Its Confluence with the Snake River and Chief Joseph Dam

Logging has contributed to salmon and steelhead loss in the Middle Columbia area. Logging reached its peak in this area in 1968-69.

Irrigation diversions also have contributed to losses in the Middle Columbia area. They are the primary factor affecting salmon and steelhead runs in the Yakima River Basin; for example, reduction of runs occurred during the 1890-1905 expansion of irrigation in the area. The Okanogan, Methow, and Wenatchee river basins also are affected by irrigation.

Hydropower development had a clear effect on salmon in the Middle Columbia area. Construction of Wells Dam in 1967 caused inundation of summer chinook spawning habitat, and was followed by reduced redd counts.

5.1.2.3 Columbia River Above Chief Joseph Dam

The Upper Columbia River area has been affected little by logging, and less by agriculture and irrigation than other subregions. The major detrimental impacts have resulted from dam construction, including that associated with hydropower generation.

5.1.2.4 Snake River Area

Extensive logging in the Snake River area was initiated about 1963. Historically, irrigation always has been heavier in the Snake River area than in the other three areas. By 1947, the Snake River had nearly twice as much water diverted for irrigation as any other area. At present, nearly half the total water diverted in the Columbia River Basin is in the Snake River area.

Dam construction has strongly affected Snake River salmon and steelhead even though hydropower generation and storage capacity has been less extensive than for the Upper Columbia area. Upstream migration, once blocked at Shoshone Falls, is now blocked for a major portion of the basin by Hells Canyon Dam. In addition, the four hydropower dams in the lower Snake led to the inundation of considerable spawning habitat.

5.2. FISHING

5.2.1 Overview

Commercial fishing on the Columbia River was already an industry by 1861, when Rice and Reed began packing salted salmon 60 miles below Portland (Craig and Hacker 1940). The rapid expansion in the cannery industry reflected an expanding commercial fishery. This held until 1882, when packers noted a decline in salmon and expressed concern about the depletion of the runs on the Columbia River (Craig and Hacker 1940). It is generally accepted that harvest rates contributed to the decline in catches at that time (Beiningen 1976a).

The use of Columbia River salmon and steelhead has undergone great change. As the numbers of white settlers increased, the numbers of Indians and their catches decreased. Initially, the non-Indian catch was entirely within the lower Columbia River and was primarily commercial. In 1912, the ocean troll fishery began competing with the river fishermen. Sport fisheries were not extensive until after World War II, and did not become important until the 1950s (Wendler 1960).

The contributions of different salmon and steelhead stocks to the various fisheries depends in great part on the migration path of the fish. Columbia River chinook salmon exhibit at least two contribution patterns according to recoveries of tagged fish from various locations along the Pacific Coast (Table 16). Fishery managers assume the migration path of tagged chinook salmon represents similar untagged hatchery and wild fish. Columbia River upriver summer chinook, upriver bright fall chinook, and Willamette River spring chinook salmon migrate far to the north and contribute substantially to the troll fisheries in southeastern Alaska, northern British Columbia, and Vancouver Island. Current data suggests upriver spring chinook salmon do not contribute significantly to ocean fisheries. While in the past these upriver stocks made substantial contributions to inriver Indian and non-Indian fisheries, in recent years the runs have been so depressed that traditional fisheries have been closed or severely restricted.

Willamette River spring chinook salmon also appear to have a northerly migration pattern. Unlike the upriver stocks, however, they currently support a large inriver sport fishery and contribute to a limited mainstem commercial fishery.

Table 16 - Percentage distribution of Columbia River chinook among coastal fisheries.[1]

Catch Area	Willamette Springs[2]	Cowlitz Springs[3]	Upriver Springs[4]	Upriver Summer[5]	Fall Tules[6]	Fall Brights[7]
S.E. Alaska	14.0	1.0	0.0	19.8	0.3	23.6
British Columbia						
North	26.6	--	--	13.5	0.8	16.3
Central	2.8	--	--	6.5	0.8	6.2
W. Vancouver Is.	12.7	--	--	18.0	19.9	16.1
Inside areas	1.2	--	--	1.0	4.3	2.0
Total British Col.	43.3	22.9	9.3	39.0	25.8	40.6
Washington/Oregon						
Coastal	5.4	48.0	--	--	39.2	--
Other areas	0.6	1.7	--	--	0.6	--
Total WA/OR	6.0	49.7	1.9	4.0	39.8	3.2
Total Ocean	69.3	73.6	11.2	62.8	65.9	67.4
River Return						
Harvest	12.7	1.4	4.1	0.3	10.7	7.9
Escapement	24.0	25.0	84.8	37.0	19.0	10.6
Total River Return	36.7	26.4	88.9	37.3	29.7	18.5

Source: Columbia River Inter-Tribal Fish Commission (1984).

[1]Catch distribution is subject to change year to year depending on regulations set to allocate catch based on abundance of fish runs, previous years catch, and international and Indian treaties.

[2]Average of recoveries from six tag codes placed on 1976 brood March releases. River return harvest and escapement from Bennett 1984.

[3]Average of recoveries from 15 tag codes placed on 1971 and 1972 brood releases.

[4]Average of recoveries from 11 tag codes placed on 1971 and 1972 brood releases.

[5]Washington Department of Fisheries catch model simulation of 1981 fishing regulations.

[6]Washington Department of Fisheries catch model input data.

[7]Includes small amounts of mixed U.S. and Canadian catches.

The second distribution pattern is typified by the Cowlitz River spring chinook and tule fall chinook salmon, which exhibit a relatively local migration pattern. These stocks are harvested primarily in the Vancouver Island troll and Washington ocean sport and troll fisheries, and support inriver commercial and sport fisheries.

The distribution of coho in the ocean is fairly stock-specific. The "early" stock shows a strong southerly migration while the "late" stock moves primarily to the north. Both stocks are harvested concurrently in the commercial fisheries with fall chinook in the river. There are, however, specific target fisheries on coho (and chinook) in the ocean. In recent years large numbers of coho are taken in the river recreational fishery at the mouth of the river. Relatively few are harvested in the river outside of that area. Once the coho enter the tributary streams, they are again the target of recreational fisheries.

Sockeye salmon, chum salmon, and steelhead contribute primarily to the inriver sport and commercial fisheries. Sockeye salmon are harvested while summer chinook and summer steelhead are present. Steelhead are caught incidentally in commercial fisheries set to harvest other species in August and September.

Many of the fisheries on Columbia River Basin salmon and steelhead simultaneously harvest fish produced by the six areas identified in Table 14. The ocean fisheries and the mainstem Columbia River fisheries below the confluence with the Snake River are two such examples. For this reason, the fisheries in these areas are presented independently of the Table 14 regional breakdown.

5.2.2.1 The Ocean Fisheries

Commercial trolling (towing hook and line behind a boat) for chinook and coho salmon began off the mouth of the Columbia River in 1912 (Craig and Hacker 1940). About 500 boats trolled in this area in 1915, and by 1919 the number of boats had more than doubled (Craig and Hacker 1940). The boats were small and inefficient compared with the larger ocean-going vessels that began to appear in the 1920s (Van Hyning 1951). Until the early 1930s, trolling occurred near the mouth of the Columbia River. After discovering that salmon could be caught in greater numbers on their feeding grounds,

trollers moved farther offshore (about 25 miles) (Smith 1979; Craig and Hacker 1940).

Early catch records are not available because licenses for hook and line fisherman were not required before 1917. It is known, however, that prior to 1917, fairly large numbers of chinook and silver were being taken and the first fairly reliable catch records for 1917 showed that 48,782 chinook and 75,211 silver were taken by licensed trollers (Kauffman 1951).

From 1936 to 1960, trends in fall chinook landings varied depending on the area fished (Van Hyning 1973). Central Oregon coastal landings increased until 1957, then declined sharply. Landings off the Columbia River (Oregon and Washington) increased until 1952, then gradually declined. The Washington coastal area landings increased rapidly until 1955, then declined sharply. Landings for the west coast of Vancouver Island gradually increased until 1948, sharply increased until 1959, and then declined. Both northern British Columbia and southeastern Alaska have had long-term declines (Van Hyning 1973). Trends for three geographically related areas that include Oregon, Columbia River, and the Washington Coast showed increased landings followed by a decline. Van Hyning (1973) suggests that stocks in this area were unable to withstand the high level of catches in the early and mid-1950s. With the exception of the Alaskan catch, the ocean commercial harvest of fall chinook and coho salmon increased from the early 1960s to mid-1970s (Beiningen 1976a). Since 1976, however, ocean trolling and landings have been significantly reduced. Washington troll effort for all areas off the coast peaked in 1976 with 58,900 days fished, but declined to 1,100 days fished in 1984. Chinook catch by the Washington non-treaty troll fleet declined from 335,200 in 1976 to 9,000 in 1984. Washington troll-caught coho declined from 1,347,300 in 1976 to 23,400 in 1984 (PFMC 1985a).

A marked decrease in the average age of fall chinook caught by the commercial ocean fishery is evident when comparing the period 1919-1930 to 1949-1963 (Van Hyning 1973). These comparisons were based on samples from the Columbia River to northern British Columbia, an area where Columbia River chinook are abundant. In the later period, young fish comprised a larger portion of the landings, while older fish virtually disappeared. Average size also decreased. These trends are typical of an overexploited population

and indicate that the ocean fishery significantly affected chinook populations (Van Hyning 1973).

Ocean sport fishing for salmon developed off the mouth of the Columbia River during the 1950s (Wendler 1960). Prior to 1951, the fishery at the mouth of the Columbia River was entirely in the estuary and consisted mainly of mature chinook salmon (Van Hyning 1973). This fishery operated during the peak of the fall chinook run between mid-August and early September. After 1951, the sport fishery moved offshore, and coho salmon and immature chinook salmon became an important component of the catch. The estimated annual ocean sport chinook harvest increased from about 35,000 fish in 1949 to nearly 130,000 fish in 1956, then leveled off at about 100,000 fish (Van Hyning 1973). Fishing effort (trips) also increased during this period, from about 80,000 to over 400,000 per year. From 1960 to 1975, the ocean sport catch of fall chinook and coho salmon continued to increase in all areas (Beiningen 1976a). This rise in ocean sport catches reflects both rapid expansion of the fishery and larger numbers of fish from expanding hatchery operations (Chaney and Perry 1976). Ocean sport catches declined since 1976 as more restrictive fishing regulations were enacted. For example, in 1984, the Washington ocean recreational catch of chinook was only 7,000 for all areas off the coast compared with 170,700 in 1976 (PFMC 1985a).

Ocean fishing also caused mortalities of small chinook salmon caught, then released by trollers. For example, in 1957, when over one million chinook were landed in the troll fishery from central Oregon to Vancouver Island, trollers released an estimated additional 250,000 chinook, of which 100,000 may have died. Van Hyning (1973). To account for hooking mortalities, harvest managers multiply the landed catch of chinook and coho by 1.04-1.10 to obtain an estimate of the number of legal-sized fish killed in the fishery but not landed (Mongillo 1984).

5.2.2.2 Mainstem Columbia River Fisheries Below the Confluence with the Snake River

A major Indian dip net (hand held nets with long handles dipped into the water from strategic positions along the shore) fishery was located at Celilo Falls on the Columbia River until 1957 when The Dalles Dam pool inundated the falls. While Indians fished many parts of the Columbia River watershed, they

were particularly numerous at Celilo Falls. Catch records show an increase in chinook and steelhead catches from 1928 to the early 1940s, with a subsequent slight overall decline in chinook landings and a relatively stable catch for steelhead until 1957 (Figure 6). A year-round dip net fishery still exists in the area between Bonneville and McNary dams known as Zone 6 (Figure 7), but catches are small (Edwards 1985).

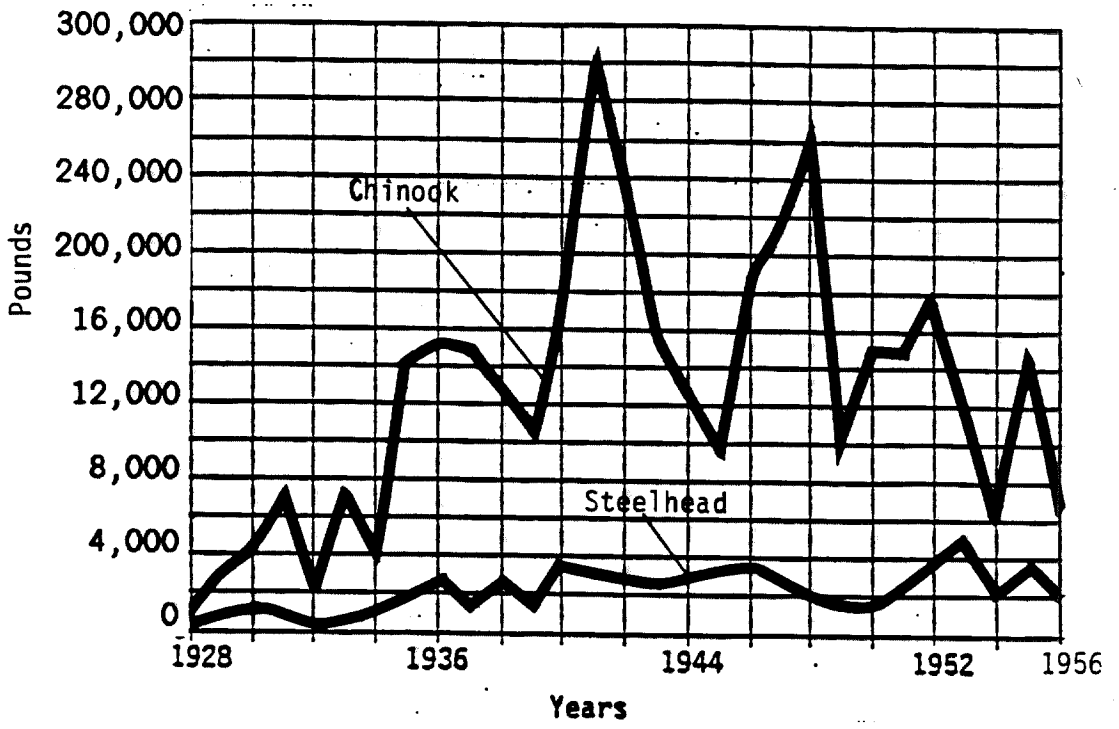


Figure 6. Celilo Falls Indian dip net landings (Schoning, Merrill and Johnson 1951; Fish Commission of Oregon and Washington Department of Fisheries 1972).

After Celilo Falls was inundated, the Indian fishery changed gear type from primarily dip net to primarily set gill net (nets anchored in the water that catch fish by the gills). Indian catches in Zone 6 rapidly increased from a low of 4,500 fish in 1960 to a high of about 150,000 fish in 1975 and 1976 each as shown by Figure 8 (see also Appendix A, Table A-2). This result reflects both increased effort by Indian fishermen and federal court decisions interpreting the rights of Indian tribes to specific shares of the resource. Depressed stocks resulted in a decline in Zone 6 catches to a low of about 45,000 fish in 1983 (ODFW 1985a). In 1984, increased returns of steelhead and sockeye once again bolstered the total catch in Zone 6 to over 150,000 fish.

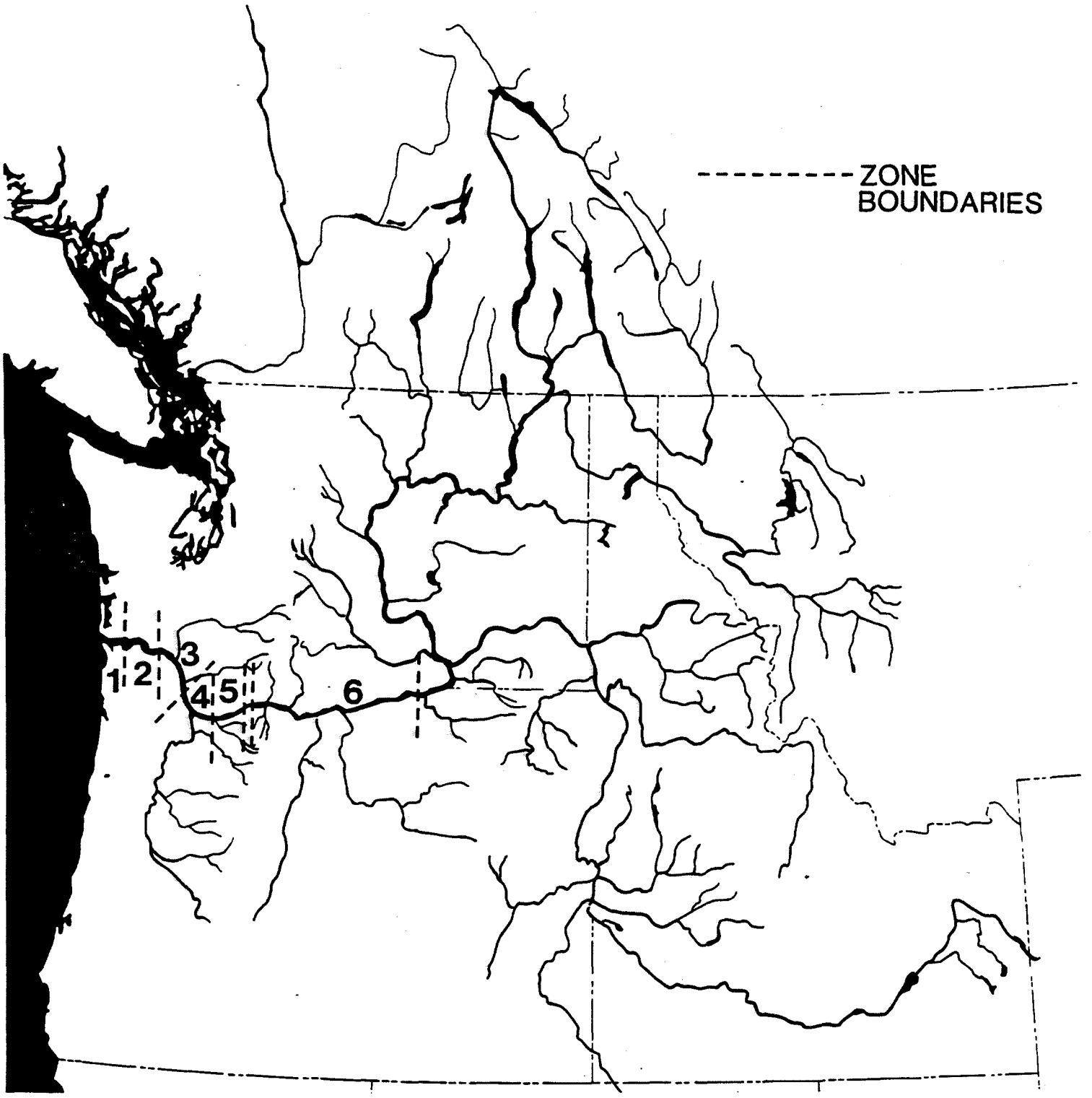


Figure 7. Commercial Fishing Zones in the Columbia River Basin

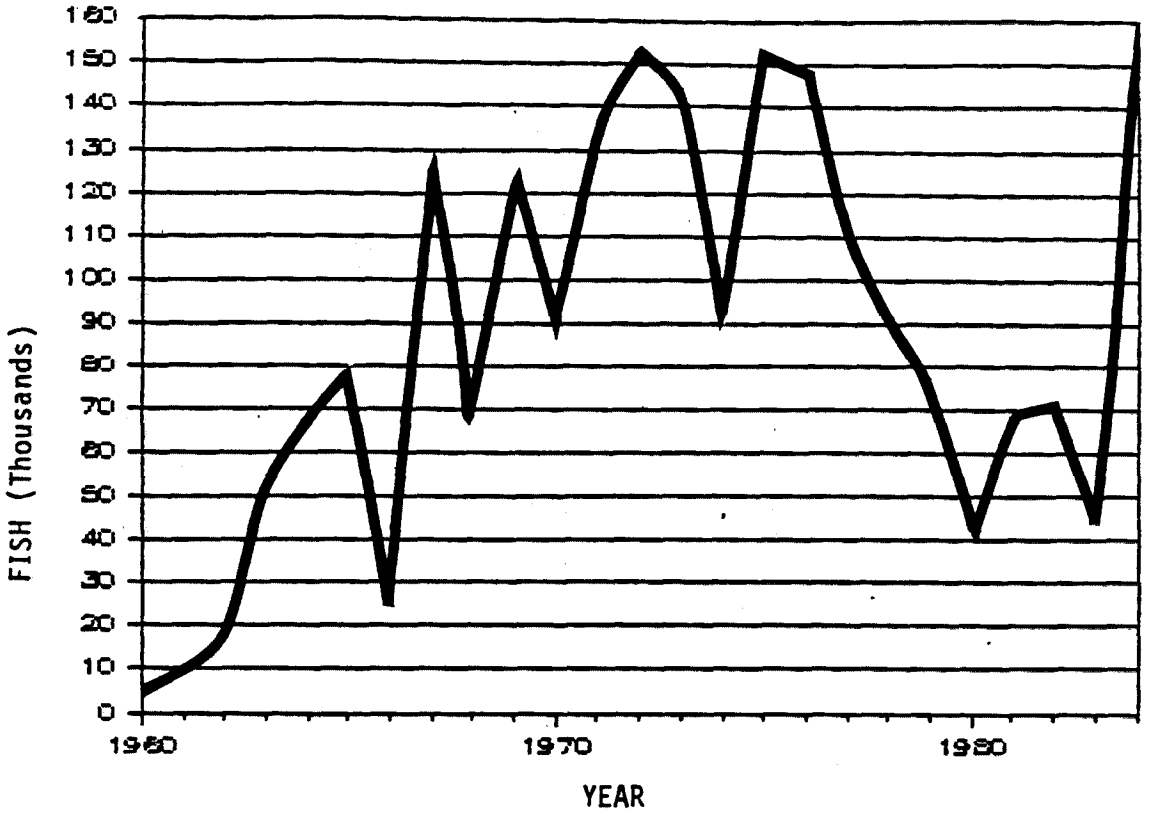


Figure 8. Columbia River commercial Indian catch of salmon and steelhead (ODFW 1985a).

Commercial landings of chinook salmon in the lower Columbia River (below the mouth of the Deschutes River until 1957, below Bonneville Dam after 1957) have been recorded since 1866 (Figure 9). These numbers represent only the amount of fish caught in the lower river and therefore generally do not include ocean harvest and escapement past the lower river commercial fishery (note that catch includes some coho troll catch, partly of origins outside the Columbia Basin). Prior to 1880 fishermen concentrated on harvesting summer chinook in this fishery. By the end of the 1880s, noticeable declines in summer chinook led fishermen to shift their efforts to spring and fall chinook and then to other salmon species and steelhead by 1889 (Beiningen 1976a). Peak commercial catches of chinook and coho occurred in 1883 and 1925, respectively (Craig and Hacker 1940). In general, a relatively steady decline in lower Columbia River commercial landings has occurred since the 1920s for all species (see Appendix A, Figures A-1 through A-12). Commercial landings for all species are tabulated in Appendix A (Table A-1).

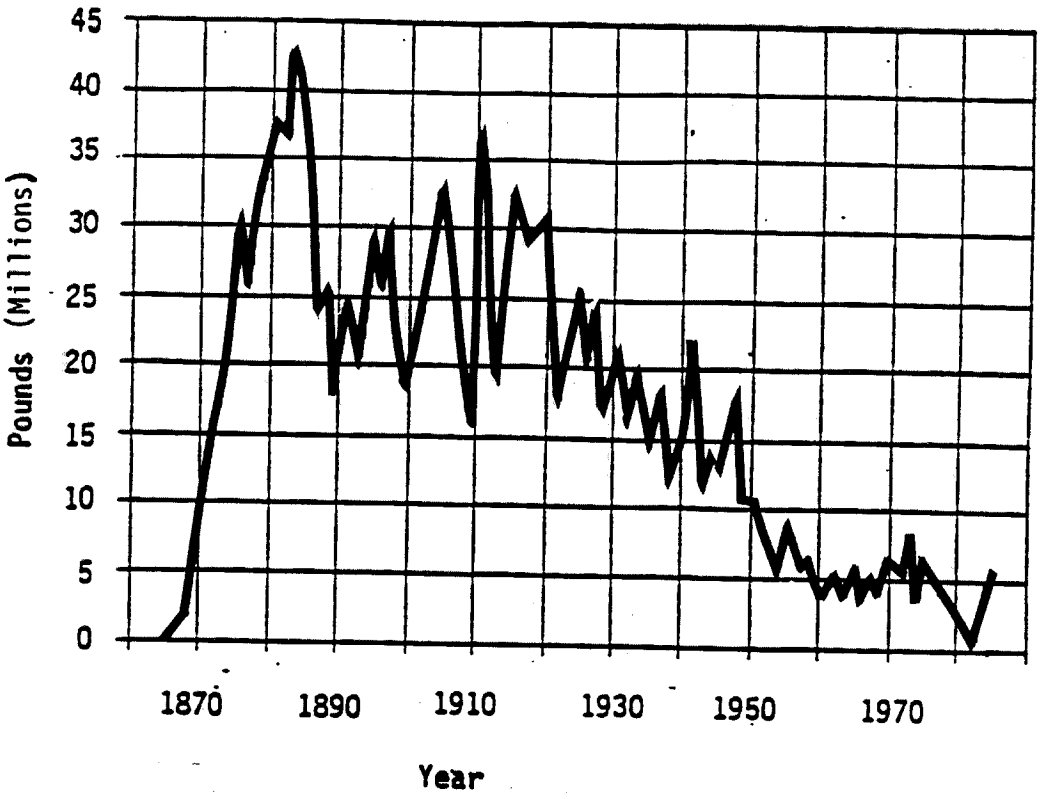


Figure 9. Commercial landings of chinook salmon in the Columbia River (Cleaver 1951; Beiningen 1976a; ODFW 1985a).

Currently, commercial fishing occurs in the lower Columbia River below Bonneville Dam, with special closed areas to protect fish at dams, at the mouths of certain tributaries and adjacent to hatcheries. The commercial fishery area below Bonneville Dam is fished using drift gill nets (nets drifted through the water that catch fish by the gills). The percentage of the spring chinook run harvested by commercial fisheries on the lower mainstem is depicted in Figure 10. A decline in catch is evident.

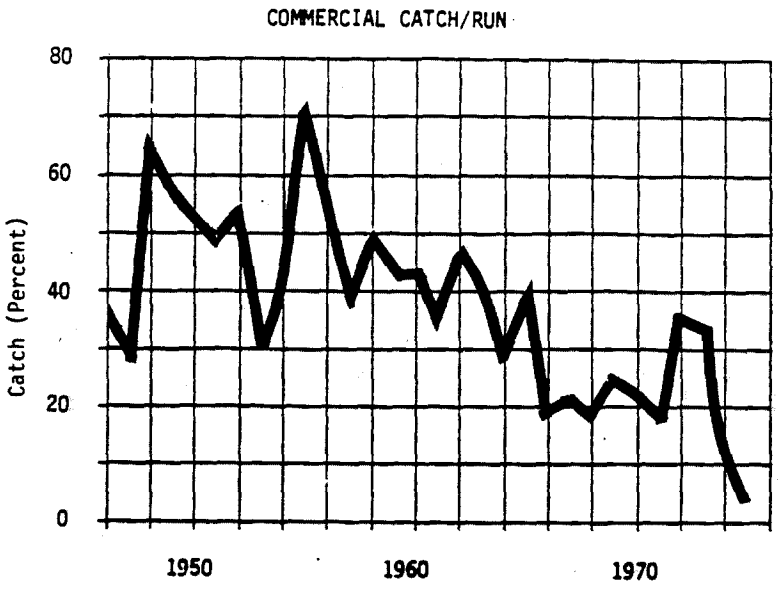
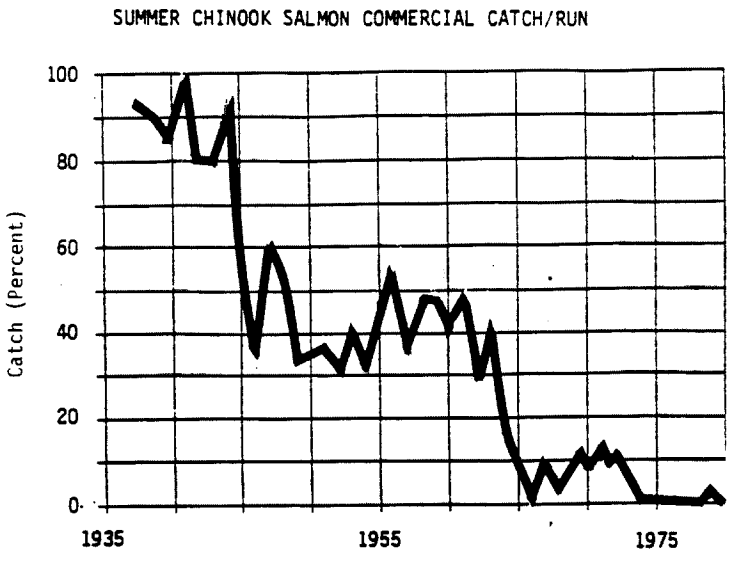


Figure 10: Percentage of the run of spring chinook caught by the commercial fishery in the mainstem Columbia River (Chaney and Perry 1976).

Declines in the lower mainstem Columbia River commercial catches of summer chinook, sockeye, and winter and summer steelhead also are evident, as indicated in Figures 11 and 12. Summer chinook historically have made a significant contribution to the Columbia River harvest. Commercial fisheries harvested nearly 90 percent of the summer runs in the late 1930s and early 1940s (USFWS 1981). From 1945 to 1963, the average annual harvest of all commercial fisheries decreased to 42 percent of the summer run. The percentage of the fall chinook run harvested by the commercial fisheries in the lower mainstem Columbia River declined from a high of 84 percent in 1941 to a low of 35 percent in 1959 (Fish Commission of Oregon and WDF 1972).



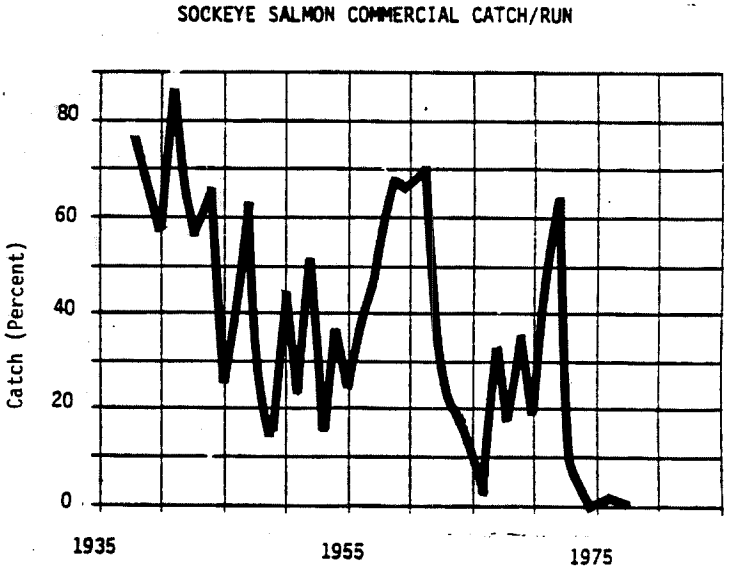
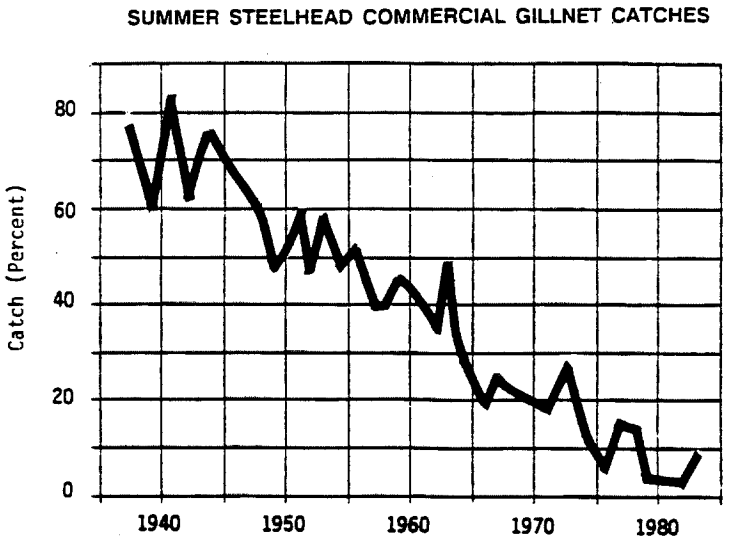


Figure 11. Percentage of the run of summer chinook and sockeye salmon caught by the commercial fishery in the lower mainstem Columbia River (Mullan 1984; USFWS 1981).



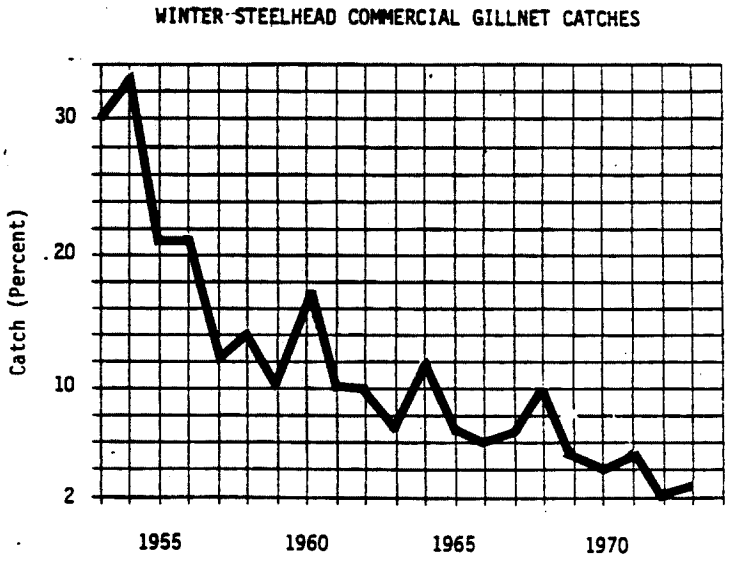


Figure 12. Percentage of the run of summer and winter steelhead caught by the commercial fishery in the lower mainstem Columbia River (Chaney and Perry 1976; ODFW 1985a).

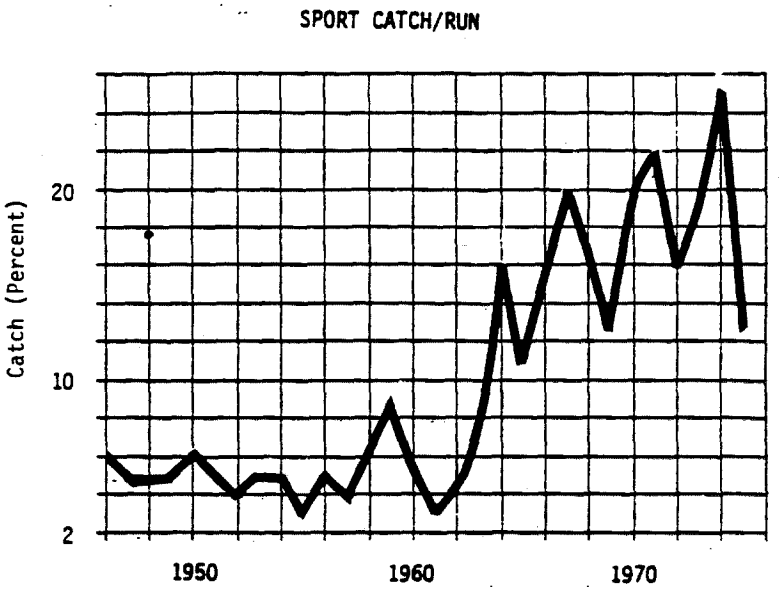


Figure 13. Percentage of the run of spring chinook caught by the commercial and sport fisheries in the mainstem Columbia River (Chaney and Perry 1976).

Inriver harvest rates generally were high for sockeye salmon before 1938 (Mullan 1984). In 1934, about 98 percent of the run was harvested. Since 1938, commercial catches of sockeye salmon have declined. Virtually none were harvested from 1977 to 1982 (Mullan 1984). In 1983, about 1,800 sockeye salmon were harvested commercially above Bonneville Dam (ODFW 1985a). In 1984 and 1985, the tribal catch figures increased to 22,500 and 46,800. A non-tribal sport fishery for sockeye was initiated in 1984 that caught 9,100 fish. In 1985, 29,600 fish were caught in the non-tribal fishery (CRITFC, personal communication).

The percentage of the spring chinook run harvested inriver by commercial and sport fisheries on the mainstem Columbia River for the period 1946 to 1975 is depicted in Figure 13. Inriver sport catch increased from 1961 to 1974. Since 1975, inriver sport catch has declined.

From 1963 through 1983, the sport catch of steelhead trout in the mainstem lower Columbia River has declined (Figure 14).

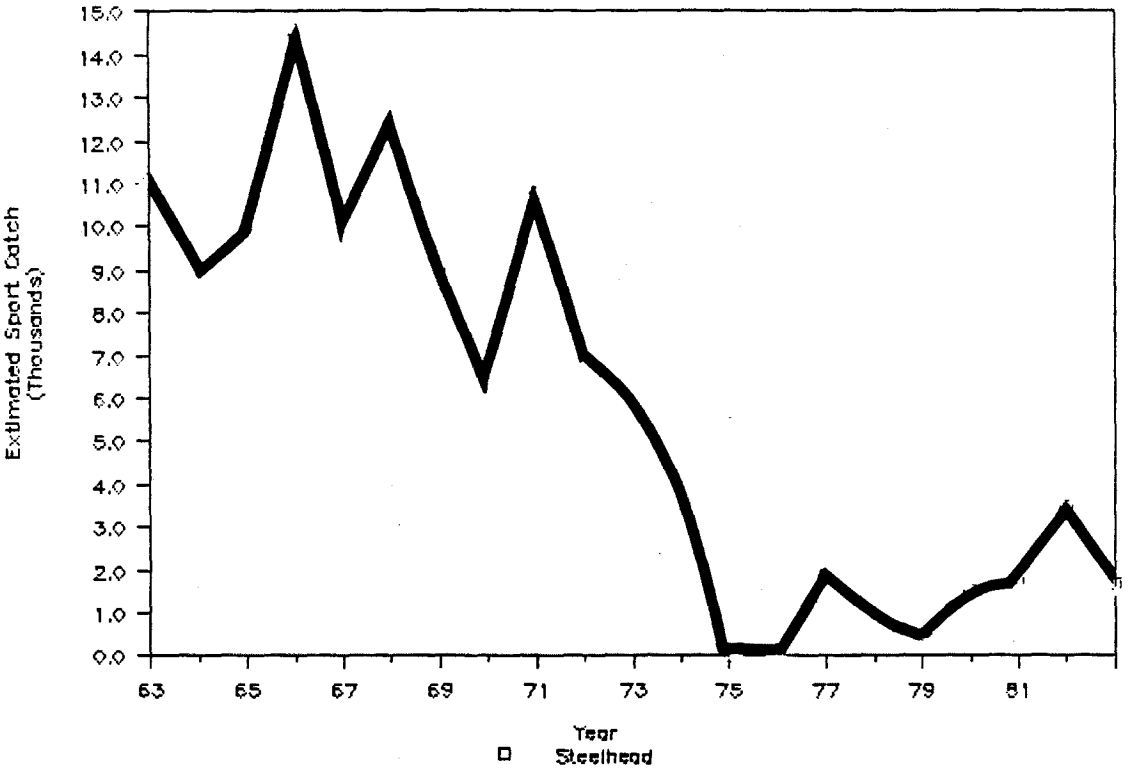


Figure 14. Lower Columbia River steelhead sport catch (ODFW 1985c).

5.2.3 Fisheries in Six Areas of the Columbia River Basin

5.2.3.1 Columbia River Below Bonneville Dam

Sport chatch records for spring chinook in tributaries below Bonneville Dam show an increasing trend in recent times. Spring chinook catches in the Willamette Basin have generally increased since 1946 (Appendix A, Figures A-109). Catches in the Cowlitz, Kalama, and Lewis rivers show an increasing trend since 1970 (Appendix A, Figures A-110, A-111, A-112).

Fall chinook sport catches in the Willamette and Sandy basins showed no definite trends in the 1970s (Appendix A, Figures A-113, A-114).

Coho sport catch in the Clackamas Basin increased in the late 1970s (Appendix A, Figure A-115). Coho catch in the Oregon tributaries below Bonneville Dam show no definite trends (Appendix A, Figure A-116).

Winter steelhead sport catch records are available since the early 1970s for tributaries below Bonneville Dam. Steelhead catch shows no definite trend

in the Sandy Basin (Appendix A, Figure A-117), the Oregon tributaries below Bonneville Dam (Appendix A, Figure A-118), and the Kalama Basin (Appendix A, Figure A-119). Catch in the Cowlitz increased in the late 1970s (Appendix A, Figure A-120). Steelhead catch in the North Fork Lewis has increased in the 1980s (Appendix A, Figure A-121). Note that data was not available for the Lewis in 1980 and 1981 because of the eruption of Mt. St. Helens.

5.2.3.2 Columbia River Between Bonneville Dam and Its Confluence with the Snake River

Chinook sport catch records for tributaries in this area of the Columbia Basin have remained relatively stable or declined. Chinook catches in the Hood, Deschutes, John Day, Umatilla/Walla Walla, Wind and Klicktat basins illustrate these trends (Appendix A, Figures A-122, A-123, A-124, A-125, A-126, A-127, A-128). Note that with the exception of the Deschutes, sport catches have been small. Also, the John Day River has been closed to salmon fishing since 1977 due to small run sizes.

Coho salmon sport fishing has occurred in the Hood River (Appendix A, Figure A-129). No trends are apparent for coho catches in this basin in the 1970s.

Steelhead sport catch during the twenty year period from 1963 to 1983 display varying patterns. The Hood River catch has generally increased since the early 1960s (Appendix A, Figure A-122). Catches in the Deschutes, John Day, and Umatilla/Walla Walla basins have generally declined (Appendix A, Figures A-123, A-124, A-125).

5.2.3.3 Columbia River Between Its Confluence with the Snake River and Chief Joseph Dam

Early catch records of salmon in this area are fragmentary. Prior to development, approximately 160,000 fish were caught annually in the Yakima River system by about 4,000 Yakima, Klickitat, and Priest Rapids Indians (Robison 1957).

The Methow, Wenatchee, Okanogan and Yakima rivers also supported large fisheries. Fish landing statistics for Indian fishermen in the middle Columbia River area give a partial indication of harvest levels from 1947 to 1974 (Figure 15). From the 1950s to early 1970s, annual Indian catches have

declined in the Okanogan River for sockeye salmon and in the Yakima River for chinook salmon.

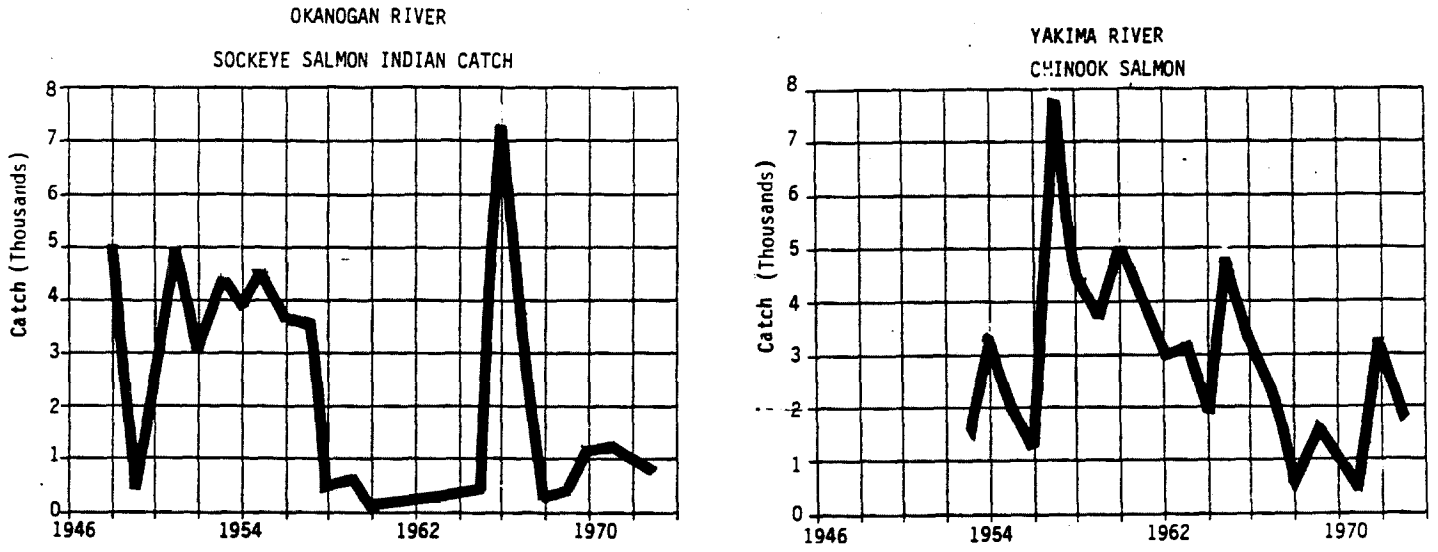


Figure 15. Indian catches of sockeye salmon in the Okanogan River and chinook salmon in the Yakima River (Beiningen 1976b).

The middle Columbia River and its tributaries support important recreational fisheries. Over 1,000 salmon have been taken in the Wenatchee drainage in recent years, targeting on hatchery spring chinook (Appendix A, Figure A-130). Steelhead catches have also been high in some areas, particularly in the Methow and Columbia River above Wells Dam.

Except for Wenatchee River spring chinook, spring and summer chinook and steelhead sport catch information is not available for the Wenatchee, Entiat and Methow rivers (ODFW 1985c).

5.2.3.4 Columbia River Above Chief Joseph Dam

Catch records for this area are limited to Indian catches before Grand Coulee Dam blocked anadromous fish migration in 1939. Little Falls, Kettle Falls, and the Sanpoil area were primary Indian fishing sites in the upper Columbia River. A major Indian basket and spear fishery was located at Kettle Falls. This fishery was used heavily by several upriver tribes.

Likewise, a major fishery was located on the Spokane River at Little Falls until Little Falls Dam was built in 1911. Both of these fisheries were equivalent in numbers of people and, perhaps, numbers of fish taken at The Dalles/Celilio Falls (Scholz et al. 1985).

On the Spokane River at Little Falls missionaries saw 400-800 salmon a day taken during the summer fishing season in the years 1839 to 1848 except for one year (1843) when the run failed to materialize (Drury 1963, 1976). John Work (1830) reported that 700 to 800 salmon per day were taken at Little Falls. L. P. Beach, a cadastral surveyor who surveyed the Spokane River in 1862 reported that the Indians at Little Falls put up at least 250 tons of dried fish during the salmon season (Scholz et al. 1985). As late as 1909 the Indians gathered at Little Falls and caught many salmon (Schotz et al 1985).

Pete Lemery of the Colville Confederated Tribes reported in 1938 that Indians caught 1,353 salmon at Kettle Falls in 1929 and 1,500 in 1931. Earlier estimates of catch at Kettle Falls between the 1840s and the early 1900s range from 900-2,000 daily and hundreds of thousands annually (Scholz et al. 1985). In 1932, when Rock Island Dam was completed, Indians caught 400 salmon. The catch dropped to 263 in 1933 followed by a catch of 139 in 1934.

On the Little Spokane River, Indians reportedly caught about 2,000 salmon in 1883 (Bryant and Parkhurst 1950). David Douglas noted in 1825 that 1,500 to 2,000 salmon a day were speared by Indians. In 1882, 20,000 salmon were seen drying in Indian lodges on the Little Spokane River (Gilbert and Evermann 1894). In 1883, 2,000 salmon were caught on the Little Spokane (Scholz 1985). Steelhead were also taken on this river. The Spokane Falls site also produced many thousands of salmon. Charles Cherapkin, a Coeur d'Alene tribal member, in a letter to President Roosevelt in 1936, estimated that in the period circa 1882, 150,000 salmon were harvested annually by Indians along the length of the Spokane River.

No commercial fishing has occurred in this area. No information was found to indicate whether a sport fishery ever occurred in this area for salmon and steelhead.

5.2.3.5 Snake River Below Hells Canyon Dam

A commercial catch of 2,600 pounds of sockeye salmon is reported from Alturas Lake in 1881 (Ortmann 1970).

The Snake River and its tributary the Salmon River once supported large Indian fisheries (see Chapter 3). For Indians in this area, ceremonial and subsistence catches of chinook have been affected by recent small escapement (USFWS 1981).

Spring and summer chinook once supported a large sport fishery in Idaho, primarily in the Salmon River drainage (USFWS 1981). However, declines in abudance led to a closure of the Snake River harvest in 1965. The decline in abundance and harvest of the Snake River drainage spring chinook stocks is reflected in a shift in location of the harvest. Prior to 1969, fish were harvested from wild stocks throughout the mainstem Salmon River and its major tributaries. Since 1969, fish from hatcheries on the Little Salmon River and in the Clearwater River drainage have become an increasingly important part of the harvest (USFWS 1981).

Spring chinook sport catch information for the Middle Fork and mainstem Salmon rivers is displayed in Figures A-131 and A-132 respectively (see Appendix A).

Idaho anglers harvested an average of 23,000 chinook salmon annually before construction of Ice Harbor Dam on the Snake River in 1961 (Figure 16). Between 1961 and 1969, sport harvest averaged 10,000 chinook annually. The chinook fishing season was closed in Idaho from 1979 to 1984 because of low escapement (Pollard 1985a). The Snake River drainage in Idaho was closed to harvest of summer chinook from 1965 until present and was closed for spring chinook fishing in 1965, 1975 and 1976. The spring chinook season in 1985 was open only on the Little Salmon River. Preliminary estimates indicate a sport catch of 2,000 salmon and an Indian harvest of 4,000 salmon (Richards 1985).

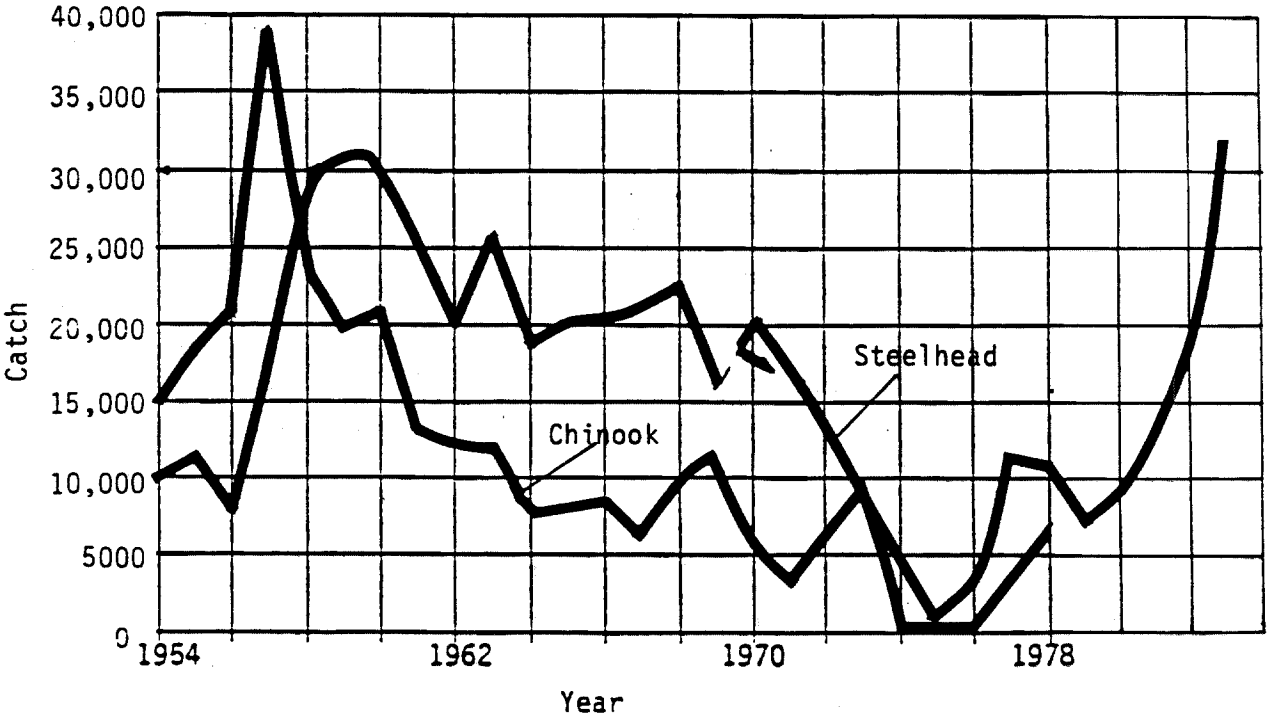


Figure 16. Idaho sport harvest estimates of chinook salmon and steelhead (Pollard 1985a). (Discontinuous curves reflect season closures.)

Sport harvest of spring chinook has declined in other tributaries of the Snake River, such as the Grande Ronde and Imnaha rivers, from the late 1950s to late 1970s (Appendix A, Figures A-133, A-134). The Imnaha River drainage has been closed to salmon and steelhead sport fishing since 1974 (James 1984). Figure A-134 (Appendix A) displays the results of a brief lifting of the Imnaha closure in 1977.

Washington Department of Game annual angler catch estimates starting in 1947 indicate that the sport catch of steelhead in the Tucannon River ranged from less than 100 to over 900 adults until the fishery was closed in 1974 (Appendix A, Figure A-135).

The summer steelhead race is the largest of the Snake River anadromous fish runs. Overall, the steelhead sport catch declined from 1961 to the late 1970s. However, the estimated harvest of steelhead in 1983 totaled 32,262, the highest catch since steelhead harvest estimates were begun in 1954 (Pollard 1985a). Good fishing conditions and increased hatchery production, along with improved survival of juveniles, have contributed to the recent

improvement in Idaho (Pollard 1985a). Steelhead sport catches for the Clearwater and Imnaha basins are displayed in Figures A-136 and A-137 respectively (Appendix A).

5.2.3.6 Snake River Above Hells Canyon Dam

Commercial fishing was carried on in the vicinity of Glenns Ferry and at scattered intervals downstream from the mouth of the Boise River to Huntington. The fishermen commonly used seines about 300 feet long, that were pulled over the fishing area with a rowboat on one end and a horse on the the shore end (Ortmann 1970).

Evermann (1896) reported a commercial catch of 4,207 chinook salmon on the Snake River between Huntington and Auger falls, September to November 1894.

E. E. Sherman, fishing below Upper Salmon Falls in 1893, reported that he caught about seven tons of salmon that year (probably a combination of summer and fall chinook). In 1894, Sherman reported that he took about six tons (Ortmann 1970).

Liberty Millet, also fishing below Upper Salmon Falls, reported his 1892 season's catch was between seven and eight tons and that he caught as many as 200 fish in at a single haul. (Ortmann 1970).

Nine fishermen working the Snake River between Huntington and Weiser in September and October 1894 reported catching 2,985 chinook salmon and 3,966 steelhead trout (Ortmann 1970).

William O'Brien, Weiser, Idaho, reported his 1888 and 1894 catches of steelhead were respectively 2,250 and 1,000 fish (Ortmann 1970).

Sockeye populations in Payette Lake were once large enough to support a commercial fishery. Between 1870 and 1880 commercial sockeye catches were estimated to range from 30,000 to 75,000 pounds per year. In 1888, the catch at Payette Lake dropped considerably with only two catches of 800 and 600 pounds each reported.

5.2.4 Regulation of Fishing

5.2.4.1 Columbia Basin Fisheries

The increasing exploitation of salmon and steelhead in the Columbia River during the late 1880s required regulation of the commercial fishery in the lower Columbia River. During this period, every conceivable type of fishing

gear was used year around without control. Regulation of commercial gear began in 1866. Table 17 summarizes when certain types of fishing gear were eliminated from the Columbia River.

Table 17 - Years that certain fishing appliances were prohibited from the Columbia River.

Gear	Year	
	Oregon	Washington
Gaffs, spears, foul hoods	1901	unknown
Purse seines	1917	1917
Whip seines	1923	1923
Haul (drag) seines	1949	1935
Set nets	1949	1935
Traps	1949	1935
Fish wheels	1927	1935

Source: Wendler (1961).

Seasonal regulations governing commercial fishing began in 1877. Minimal efforts were made to enforce these early regulations. From 1877 to 1908, fishing regulations enacted independently by Oregon and Washington complicated enforcement efforts. One of the most significant regulatory actions was the ratification by Congress in 1918 of the Columbia River Compact between the states of Oregon and Washington (see Act of April 8, 1918, Pub. L. No. 65-123,40 Stat. 515 (1918); Wash. Rev. Code Ann. § 75.40.010, Ore. Rev. Stat. § 507.010). The compact provided for regulation of the commercial fisheries in concurrent waters of the Columbia River by mutual consent, with each state having one vote. The tribes and Idaho are not members of the compact and therefore have no vote in determining regulations for this portion of the river. Gear and season regulations governing commercial fishing from 1866 to 1963 are summarized in Tables 18 and 19 for Oregon and Washington.

Table 18 - Commercial[1] gear regulations[2] on the Columbia River, Oregon and Washington[1] --1866 to 1961.[2]

Year	Oregon	Washington	Regulation
1866		X	Unlawful to build a fish trap that would reach more than two-thirds of the way across or wholly prevent the passage of fish up and down the Walla Walla River
1871		X	Unlawful to build or place a fish trap, weir, seine, or net that would reach more than two-thirds of the way across freshwater streams or creeks, or that would wholly prevent the passage of fish either up or down. The above gear was not to be used in lakes.
1878	X		First year of gear regulation. Specified minimum mesh sizes and spacing between slats on traps. Also required traps and weirs to have an opening to permit the free passage of fish during the weekly closed period.
1879		X	Passed legislation similar to the 1878 legislation of Oregon.
1890		X	Fixed gear could not extend more than halfway across any channel or slough.
1891	X		Fixed gear could not extend more than one-third of the way across a channel or slough.
1893		X	Specified the maximum length of fixed gear and the minimum distances between such gear.
1897		X	Minimum size of mesh of fixed gear specified.
1898	X		A fish wheel could not be prepared to take fish during a closed season.

1 All commercial fishing for salmon and steelhead in the Columbia River Basin occurs in the mainstem below McNary Dam. This area is outside the state boundaries of Idaho.

2 Source: Wendler (1966).

Table 18 (cont)

Year	Oregon	Washington	Regulation
1899	X	X	Chinese sturgeon line prohibited.
1901	X		Gaffs, spears, and foul-hooks prohibited.
1907	X		Purse seines prohibited
1909	X		Purse seines permitted in Columbia River if licensed.
1913	X		Maximum length of fixed gear and minimum passageways between such gear specified.
1915	X	X	Length of appliances could not be more than one-third width of the river. Gill net minimum mesh of 5 inches. Further regulation of fixed gear (Oregon only). Also provided for licenses for trolling in the Columbia River and for purse seines (Oregon only).
1917		X	Purse seines prohibited in the Columbia River. Regulations provided for a v-shaped opening in trap leads, to be opened during closed periods. Hook-and-line fishing in the Columbia licensed.
1917	X		Purse seine fishing prohibited in Columbia River. Commercial trolling license required.
1919	X		Illegal to have purse seine on the Columbia River even if not fishing.
1921		X	Saltwater hook-and-line fishing licensed (possibly meant troll).
1923	X	X	Whip seines prohibited in the Columbia River.
1927	X		Fish wheels prohibited in Oregon waters. Unlawful to use traps or seines above Cascade Locks in Oregon waters. Gill net maximum length set at 250 fathoms.
1935	X		Seines again permitted east of Cascade Locks.
1937	X		Maximum length for gill nets abolished in Oregon.
1949	X		Drag seines, traps, and all fixed gear prohibited; this act not in effect until 9/14/50 due to an injunction which allowed fixed gear to operate until that date.

Table 18 (cont)

Year	Oregon	Washington	Regulation
1955	X	X	Mesh size restriction went into effect from June 20 to July 15 below Bonneville Dam from July 14 to July 30 above the dam. Unlawful to use mesh size less than 5 1/4 inches during above period.
1956	X	X	Same as above from June 20 to June 29 below Bonneville Dam and from July 4 to July 17 above the dam.
1957-1961	X	X	Illegal to fish above Bonneville Dam for commercial purposes. Maximum length of gill net set at 250 fathoms (1,500 feet).
1962	X	X	Mesh restriction in effect from June 23 to July 15 prohibiting use of mesh less than 5 inches.
1963	X	X	Mesh restriction in effect from June 15 to July 15 prohibiting use of mesh less than 5 inches.

Table 19 - Seasonal regulations governing commercial fishing on the Columbia River by year, 1877 to 1942.1/

Year	Oregon	Washington	Regulation
1877		X	March, April, August, and September closed to salmon fishing. May, June, and July had a weekly closed period from 6 p.m. Saturday to 6 p.m. Sunday.
1878	X		Same as above except that April was open to fishing subject to weekly closed period.
1879		X	1977 Regulation changed to agree with 1878 Oregon regulation.
1880	X		Weekly closed period from sunset Saturday to sunset the Sunday following at any season of the year.
1881		X	September open to fishing. No weekly closed period provided.
1890		X	Closed seasons from March 1 to April 10 and from August 10 to September 10.
1891	X		Closed seasons made to conform with those of Washington. Weekly closed period from 6 p.m. Saturday to 6 p.m. the Sunday following.
1895		X	Weekly closed period done away with.
1898	X		Closed season from 12 m. February 15 to 12 m. April 15, and from 12 m. August 10 to 12 m. September 10.
1899	X		Spring season closed from 12 m. March 1 to 12 m. April 15.
1899		X	Closed season from 12 m. March 1 to 12 m. April 15, and from 12 m. August 10 to 12 m. September 10. No mention of weekly closed periods.

1/ Source: Wendler (1961).

Table 19 (cont)

Year	Oregon	Washington	Regulation
1901	X		Closed season from 6 a.m. March 1 to 6 a.m April 15, and from 6 a.m. August 15 to 6 a.m. September 10. Weekly closed period from 6 p.m. Saturday to 6 p.m. the Sunday following from April 15 to August 15.
1901		X	Fall closed season shortened 5 days by moving starting time back to 12 m. August 15.
1903	X		Weekly closed periods removed.
1905		X	Spring closed season began 12 m. March 15, and the fall closed season 12 m. August 25. The fishing season was thus lengthened 25 days.
1908	X		Initiated petitions were passed at a general election which radically changed the season and the legal gear, but these regulations were repealed before they had been in effect long.
1909	X	X	Fishing season began on January 1 of the calendar year, closed on March 1, was reopened on May 1 and allowed to progress to August 25. The season reopened on September 10. Closed periods occurred during the entire months of March and April, and from August 25 to September 10. All seasons began at 12 noon and closed at 12 noon.
1937	X	X	Spring season opened on April 26 thus allowing an additional 5 days fishing time.
1938	X	X	Spring season opened May 1.
1941	X	X	Spring season opened April 29 and closed August 26.
1942	X	X	Spring season opened May 1 and closed August 26.

Go To Next Part