

STATE OF WASHINGTON
Department of Fisheries



DEVELOPMENT OF WASHINGTON STATE
SALMON SPORT FISHERY
THROUGH 1964

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INTRODUCTION

The salmon (*Oncorhynchus* sp.) sport fishery in Washington has emerged from relative insignificance and has developed into a consuming force challenging the commercial salmon industry. In recent years, the popularity of salmon angling has altered the economies of coastal communities and the scene on waters historically fished only by commercial fishermen.

Salmon angling in Washington is not a recent innovation. Swan (1870) discussed the fishing methods traditionally used by Cape Flattery Indians, including hook and line fishing for salmon with herring bait, and described this fishing as "most excellent sport". Swan did not make it clear who considered salmon fishing as sport but it is presumptuous to assume that aboriginal anglers were motivated by only hunger or profit. Pressey (1953) stated that the sport fishery for salmon on Puget Sound has a background at least as long as Washington's statehood (1889).

Washington anglers are oriented toward the marine environment because Puget Sound (Figures 1 and 2) has always been adjacent to the population center of the state and offers compatible, near-lacustrine conditions for boating throughout the year. A year-round fishery developed on Puget Sound because feeding salmon are always present. The angling techniques used to catch salmon on this inland sea, as well as the sport fishery, have progressively spread to Juan de Fuca Strait and the ocean (Figure 3).

Wendler (1960) summarized 10 years (1947 through 1958) of ocean catches for Washington, Oregon, and California and indicated the sport catch of chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon had grown and was accounting for over 20% of the combined commercial and sport catch. A continuance of this trend is inferred by an increasing population, prosperity, and development of equipment for this recreation. Since World War II there has been an accelerating trend toward private boat ownership, the use of large specialized charter craft in the ocean fishing areas, and in the development of small boat anchorages and launching facilities - all contributing to the popularity of salmon angling.

Puget Sound and the Strait of Juan de Fuca,^{1/} but a 1956 Order of the Director of Fisheries established a closure from November 1 through April 14 in the Pacific Ocean.

^{1/} For security reasons, a number of areas on Puget Sound were closed to angling during World War II.

Until 1952 most streams open to trout angling, away from the metropolitan centers of east-central Puget Sound, were at the same time open to salmon. In 1951 it was much simpler to list the waters closed in the salmon angling regulations issued to the public than to list the waters open.

By 1954 only eight streams and two lakes in the Puget Sound basin specifically listed in the regulation pamphlet were open to salmon angling. Elsewhere, along the coast and the Columbia River System, most streams remained open to salmon angling in 1954. By 1955 coastal tributaries north of the Columbia River to Cape Flattery not specifically listed as open in the regulation pamphlet were closed to angling for large adult salmon, and this same provision was extended to the Columbia River system in 1956. In 1961 Puget Sound and Juan de Fuca Strait salmon angling streams were closed each Monday, Tuesday, and Wednesday, with the exception of holidays, from August 2 through November 30. This provision was essentially retained through 1964. From 1959 through 1964 the Columbia River and its tributaries were closed during the month of November. This closure was intended to prevent the taking of chum salmon, (*O. keta*) although there is no evidence that such a harvest existed. In recent years a number of emergency closures have been imposed on Puget Sound streams when salmon returns have been poor or when flows have been low.

Fresh-water salmon angling is now usually restricted to the lower reaches of larger streams holding substantial populations of adult fish. There are currently approximately 1,000 miles of Washington streams open to salmon angling for large adults. In recent years regulations have been established permitting angling for small, sexually precocious males (jacks) in streams that are otherwise closed to salmon angling.

Before World War II, the marine sport fishery was largely confined to portions of Puget Sound near metropolitan centers. Elliott and Shilshole bays at Seattle, The Narrows and Commencement Bay at Tacoma, and the waters surrounding southern Whidbey Island had been fished by sportsmen for many years. After the war, the Juan de Fuca Strait and ocean areas near La Push, Westport, and off the mouth of the Columbia River gained prominence.

The need for statistical information has grown with the popularity of salmon angling. Early efforts to collect sport data were aimed at catch enumeration in only the more popular areas. Later, when angling affected marine areas of commercial fishing importance, it was recognized that biological information from both fisheries was needed.

The methods used to measure the salmon sport fishery vary and these different methods will be discussed for each major area. Because of the difficulty in collecting catch information from Puget Sound and the rivers of the state, salmon anglers beginning in 1964, have been required to use catch records (punch cards). Fresh-water salmon sport catch statistics are scarce, but some information is available from the Columbia, Skagit and other rivers for a number of years. Estimated annual catches and effort from 1938 through 1964 in Washington's marine waters demonstrate the growth of the salmon sport fishery (Table 1).

This is a record of the Washington salmon sport fishery and a summary of pertinent information.

HISTORY OF WASHINGTON SALMON ANGLING REGULATIONS

Regulations affecting salmon anglers on the marine waters of Washington were first effective on July 15, 1921 (State Fish. Bd. Order No. 3, June 16, 1921). Since then the daily bag limits and minimum size restrictions have gradually changed (Table 2). Early regulations permitted a liberal catch in terms of numbers of small fish but a relatively conservative catch in bulk. By 1958 the small fish were excluded from the harvest and although the daily bag limit was reduced to three, the weight limitations were eliminated so that in practice one was then permitted to catch a greater bulk of salmon providing they were of sufficient length. Seasonal closures have never been imposed on the marine sport fishery in

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Basically, the current fluvial size and bag limits have been in effect since 1954 and are as follows: Six salmon over 12 inches in length, not more than two of which may exceed either 20 or 24 inches total length (tl), depending on the stream. On Puget Sound streams, where mature salmon are commonly smaller, the 20-inch partial maximum limit applies, whereas elsewhere the 24-inch limit prevails. Prior to 1954, there was a 6-inch minimum length for salmon in fresh water.

ANGLING METHODS

Boats

With few exceptions, marine salmon angling occurs from boats. Throughout this report, boats are described as "rental", "private" or "charter". Rental boats are maintained by resorts and boathouses located near popular angling sites. These, usually 14- to 16-ft open boats, rent for fees ranging from \$3.00 to \$6.00 per day (Figure 4). Most rental-boat anglers have or accompany owners of, outboard motors but they also may be rented. Private boats are commonly trailered and launched near angling sites, moored on the water, or stored and launched from boathouses (Figure 5). Charter boats are among the largest of the vessels used for salmon angling and are operated by professional skippers who act as guides. Charter fees range from \$10.00 to \$15.00 per day per person. Gear and bait are available to the charter angler for an additional cost. Charter boats are very important in the coastal sport fishing areas and on western Juan de Fuca Strait but few operate on inner Puget Sound or among the San Juan Islands.

Mooching

Pressey (1953) discussed sport fishing methods and gear used on Puget Sound and included drawings of herring baits and techniques. "Mooching" gear (Figure 6 [6]), always involving bait fish, is currently the most common and is used almost exclusively at Westport and off the mouth of the Columbia River. Mooching gear is often trolled and, like other salmon angling gear, it requires motion but this may be effected by

the actions of the wind, wave, tide, the pull of a descending sinker, by reeling, or by rowing.

Pacific herring (*Clupea harengus pallasii*) is the most common mooching bait but the Pacific sandlance (*Ammodytes hexapterus*) is used extensively in northern Puget Sound. The Pacific sandlance is called "candlefish" by Washington anglers and was so termed by Pressey (1953). This fish should not be confused with the eulachon (*Thaleichthys pacificus*), which is rarely used for salmon bait by modern Washington fishermen. Occasionally northern anchovies (*Engraulis mordax*) are taken in the summer months by bait fishermen and sold as bait mixed with herring. Although salmon take the anchovy well, fishermen sometimes complain of their softness.

Modern sportsmen are indebted to early Seattle anglers for some of their mooching techniques. Mr. Harry Dunagan of Seattle, who began fishing on Elliott Bay in 1911, credits Harry Dines and an unknown sportsman with being the first to use "spinners" cut from herring sides on Elliott Bay in 1908 or 1909 (personal communication). According to Mr. Dunagan, these baits were first used by dock anglers along with raw silk lines, gut leaders and flexible natural bamboo rods. These baits were cast with lines coiled on the dock surface, and retrieved by pulling an arm's length of line at a time through the fingers of the other hand (stripping) until a salmon was hooked. Pressey (1953) describes this technique as "spinning" (although it is considerably different from the modern technique thus termed, which involves the use of a fixed-spool reel). Apparently this method developed into mooching - the related form of boat fishing.

Trolling

The "dodger" (Figure 6, [3], and 7) is common on Puget Sound but is giving way to the more recently developed revolving type "flasher" (Figure 6, [4]) on Juan de Fuca Strait. These shiny metal, predominately silver-colored gear apparently attract salmon and move the bait or lure enticingly. The revolving flasher is trolled faster than the dodger and requires more weight to reach a given depth. A large colorful fly, commonly tied with polar bear hair, is often trailed behind a flasher, particularly in the eastern portion of Juan de Fuca Strait. This gear takes chinook, coho, and pink salmon (*O. gorbuscha*).

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Colored, plastic squid-like lures are also being used behind the flasher, although small (3 to 4 inch) herring appear to be the most popular. The combination of dodger and herring is one of the most efficient combinations for catching pink salmon.

Other shiny metal attractors (Figure 6 [2 and 5]) are designed to revolve around a shaft when trolled but add little movement of the lure. The "shovel-and-rudder" was one of the earliest attractors and was used for catching salmon of all sizes. Multiple spinners with earthworms were widely used for small coho, but these are poor for catching larger fish and since 1958 this gear has almost disappeared from Puget Sound.

Artificial "plugs" (Figure 6 [7 and 8]) were once very popular but are now seldom used by Washington salmon anglers except in southern Puget Sound. Currently, a white plastic plug with a red, beveled head-end is the most popular on the southern sound. The gear shown in Figure 6 [7] was once ubiquitous in sport fishing circles but is now uncommon on the sound except at Hope Island at the mouth of the Skagit River. Salmon spoons were once the most common lure but are now used infrequently.

"Coho-flies" (Figure 6 [1]) are fished on the surface, without sinkers or attractors, during the summer and early fall on Juan de Fuca Strait and Puget Sound. These flies have been effective at the western entrance to Juan de Fuca Strait where they have been used by small-boat commercial salmon trollers as well as by sportsmen. Coho flies are trolled faster (an estimated 6-9 MPH) than other salmon lures and are highly selective to coho.

Fresh Water

Stream salmon anglers usually fish their lures or bait (Figure 6, [9]) with sinkers bouncing along, or stationary upon, the bottom while the current furnishes the lure action. "Wobbling" spoons, spinners, and pieces of salmon or steelhead trout (*Salmo gairdneri*) roe (either borax-cured or fresh) are used similarly. This latter bait is especially good for taking jacks.

Discussion

In accordance with the prevailing angling philosophy, that as little mass or drag as possible should separate one from his hooked quarry, many modern Washington anglers avoid heavy gear. Mooching tackle is efficient and generally permits the use of lighter equipment than used with attractors and artificial lures. Mooching makes it possible for more people to angle at one time from a large boat, such as those used for chartering at Westport and Ilwaco, and this also has enhanced its popularity. On Juan de Fuca Strait where the charter fleet and boats are smaller, trolling with revolving flashers is most common. However, the modern trend in Washington angling techniques has been to mooching and away from the use of artificial lures and attractors.

Legitimate salmon angling necessitates the fish taking the hook voluntarily. Doubtlessly, this reaction is often related to feeding. Feeding salmon are more susceptible to modern sport fishing methods than salmon nearly sexually mature. This is apparent on Puget Sound in late summer when frustrated anglers commonly fish unsuccessfully among leaping, splashing chinook and coho. Some of the largest concentrations are of artificially hatched and reared fish and occur in the most accessible waters: Elliott Bay and Shilshole Bay (Seattle) and Budd Inlet (Olympia). Since existing angling pressure and techniques are capable of harvesting only a small portion of returning adult salmon, the magnitude of the sport harvest is dependent on the earlier catches of feeding fish.

INNER PUGET SOUND^{1/}

^{1/}Waters south and east of Whidbey Island including Admiralty Inlet and Hood Canal are hereafter termed "inner Puget Sound".

Introduction

The development of the salmon sport fishery on Puget Sound and Juan de Fuca Strait through 1951 was considered by Pressey (1953). Notable changes in the fishery since this time are as follows:

- 1) The 1958 angling regulations (Table 2) greatly curtailed the harvest of immature salmon on inner Puget Sound.
- 2) The trend toward private boat use rendered obsolete the catch estimate system based on reports from boat rental agencies. In 1964, a new method of estimating catches was adopted, based on anglers' records.
- 3) The catch of chinook salmon on Puget Sound increased with fishing effort through 1958 but decreased thereafter. The fishery for coho showed the same pattern of yield. The first change is attributed to size and bag limits imposed in 1958 and the latter only in part.

Estimation of the Catch

Pressey (1953) briefly discussed the sport catch estimate system used for the 16 statistical areas on Puget Sound and Juan de Fuca Strait. The system was based on monthly reports by the boat renters of the daily catches from rental boats (Figure 8). It was assumed that the numbers of rental boats reported fishing were correct. Some boat renters exaggerated the numbers of salmon taken, others were conservative, and some made mistakes in species identification. Catch samples collected by trained observers were assumed to be representative of daily catches in a statistical area. These samples were compared to the corresponding daily reported catches and the differences for each boat renter were summarized for a year. The reported catches were then adjusted in proportion to their cumulative differences from the sampled catches.

Fishing effort from private boats was estimated by statistical area from private and rental boat counts by qualified personnel at various times throughout a year. Rental boats are characteristic in design and decor and can be easily identified from another boat, from a promontory, or from the air. Only boats containing active fishermen were counted. From the known reported rental boat fishing effort, private boat effort was estimated on the basis of the boat counts. For example, if the yearly summary of counts in a statistical area was 1,000 rental boats and 2,000 private boats, it was assumed that for every rental boat used for fishing there were two private boats. Many private boat catches were sampled

along with the catches of rental boat fishermen. The number of anglers and catches by boat type were recorded in order to relate private boat fishing effort and catches to the rental boat effort and catches.

A Department of Fisheries field survey of Puget Sound sport fishing boats in 1931 indicated there were 2,600 rowboats, 78 outboard motors, and 45 "speedboats" for hire. Pressey (1953) reported 4,000 licensed rental boats on Puget Sound and Juan de Fuca Strait in 1951. By 1956, there were 3,300 licensed rental boats on the sound and strait and by 1963 there were only 1,600. Only a few inner-Puget Sound boathouses currently rent rowboats for fishing (Figure 9).

While rental boats were becoming less prominent, private boats used for sport fishing on the sound and strait increased although not uniformly in all areas (Table 3). In 1963, the count of private boats to each rental boat ranged from 0.9 (Sekiu-Pillar Point) to 97.8 (San Juan Islands).

Since the catch estimate system was based on rental boat activity, the trend toward private boat use prompted the use of a new system beginning in 1964. This system requires the use of free catch records showing the magnitude, date, and area of catches (Figure 10). All salmon anglers are required to carry these wallet-sized punch cards and to record their catches as they occur. This system for the first time provided annual data on the numbers of people involved in the sport and where they lived, and it furnished a basis for fresh-water salmon catch estimates. Punch cards do not limit fishermen to an annual bag limit. If a card is filled a new unnumbered card is available with space for the original serial number of the first card issued in a particular year.

Punch cards were issued by 970 co-operating sporting goods stores, boathoused, resorts, charter boat offices, and other agencies in 32 Washington counties, Oregon, and Idaho. Catch estimates by this system for 1964 were predicated on the catches reported on a random sample of 4% of the cards issued. Four random two-digit numbers were used that corresponded to the last two digits of the serial number of one punch card in each 25-card booklet. These "in-sample" cards were assumed to be representative of the 318,550 issued in 1964. Information from 10,373

in-sample cards used was 87.4% of the number sought with up to three mailed reminders. In-sample catches were expanded by a factor of 30.71 (318,550/10,373).

Species composition and fishing effort in 1964 were estimated weekly by incorporating the salmon catch estimates (from punch cards) with field sampling data. For example, if the average sampled catch per angler trip during a given week at Neah Bay was 0.50 salmon and there were 1,000 salmon taken at Neah Bay during that week, it was estimated that there were two angler trips for each salmon taken - in this example, 2,000 angler trips. Species composition was established by area by using the proportions of the various fishes in sampled catches.

To integrate the old method of estimating catches with the new, both were conducted in 1964 (Table 4). Under the punch-card system there are but 5 statistical areas on the inner sound, where there were 12 areas before under the old system; for purposes of comparison, it was necessary to combine two or more of the inner-sound estimates from the previous system. Elsewhere the areas were unchanged. The correspondence between the two systems was variable by area but it was considered to be good for the state as a whole.

The Salmon Catch

The available annual catch and angling effort estimates through 1964 for marine areas from Cape Flattery eastward into Puget Sound are tabulated in Tables 5 through 23. When area names do not adequately describe a statistical area, geographic descriptions are included.

Coho salmon

Coho angling on inner Puget Sound is largely dependent on resident fish (feeding salmon residing in the area) rather than on ocean-reared fish. Approximately 74% of the annual effort occurs by the end of August, before the main influx of coho arrives from the ocean (Tables 24 and 25). Even in September and October, ocean-reared coho tend to remain numerically subordinate in sport catches to their smaller, sound-reared contemporaries. Apparently catches of resident coho composed the greater part of the State's marine sport catch (in numbers of fish) until 1952 (Tables 1 and 11).

Coho are the most numerous salmon species in catches from 1938 through 1957, but chinook rapidly gained in relative importance during the 1950's, and by 1958 the two species had become equally important in

the harvest (Table 11). In more recent years coho catches and catches per unit of effort have declined to unprecedented levels and the relative position of the two species in the catch has been reversed (Table 11).

Because of the 1958 increase in minimum size, a useful method of appraising the level of the resident coho harvest in relation to the historical catch data is to compare July catches per effort for 1949 through 1957 with those for 1958 through 1964. During the seven years preceding 1958 an average of only 8% of the coho caught in July were less than 16-inches long (Table 26). In this month the smallest proportion of under 16-inch coho occurred in the catch. Harvests of resident coho after 1958 were delayed and usually were most productive (catch per angler trip) in July (Tables 24 and 25). Approximately half of the harvest before 1958 of a given year-class occurred prior to July of the final summer of life for coho but the catch in July was considerably better before 1958 than after (Table 27). A reduction in the resident population, reflected in the 1958 catch (Table 11), became apparent with the onset of the 1958 season, several months before the minimum length was increased.

Chinook salmon

Pressey (1953) noted a decrease in the Puget Sound chinook catch per angler trip between 1939 and 1951 and attributed it to an increase in fishing effort and a diffusion of the harvest. The trend did not persist. Fishing pressure continued to increase through 1957, but so did the chinook catch; catch-per-effort values from 1954 through 1957 are comparable to the highest recorded (Tables 5 and 11).

The decrease in the inner-sound catch per effort since 1959 to the approximate level that prevailed from 1949 through 1953 (Table 11) is attributed to the 1958 increase in minimum size. It is believed that recent chinook catches per effort would rival the best recorded if the minimum sizes had remained constant over the years.

Pink salmon

Catches of Puget Sound resident pink salmon are best shown by the estimates for the Tacoma Narrows and Commencement Bay area (Table 21). Catches here also include ocean-reared fish taken near the mouth of the Puyallup River, but these estimates, except in 1963, primarily reflect

the take of resident fish. Resident pink were important to Tacoma Narrows anglers in 1949, 1953, and 1955, but since 1957 they have appeared infrequently in catch samples.

Sport catches of ocean-reared pink salmon have varied with the abundance of fish returning to northern Puget Sound streams. The substantial increase in fishing effort on Puget Sound in 1963 was due to an unprecedented excellence of pink salmon angling for ocean-reared fish (Table 5). Modern angling techniques appear to be well suited to pink salmon angling and these fish are coveted by the majority of the State's salmon anglers.

Biological Data

Origin of salmon in the catch

Information regarding the origin of salmon caught in Puget Sound, San Juan Island, and Juan de Fuca Strait has been gathered through the years from recoveries of fin-clipped, artificially reared smolts and fry, and recoveries of tagged mature fish in their supposed streams of origin. Fry (1961) summarizes the problems in the fin-marking of salmonids and discusses fin regeneration and mark-wrought low survival rates. Quantification of the yield from streams of origin on the basis of recoveries of tagged fish also has limitations because probabilities for recoveries vary among streams. High proportions of adult salmon returning to hatcheries or artificial barriers are examined, whereas most natural spawning fish are not. Some of the larger rivers, such as the Fraser, Skagit, and Columbia, support commercial net fisheries and these are likely means for recovering tags. Other streams support Indian or sport fisheries but still others have no salmon fisheries. Furthermore, it is unlikely that all tags are returned or that the various harvests occur at comparable rates. Despite these difficulties, marking and tagging data do provide some excellent gross indications of the origin of salmon taken in the sport fishery of Puget Sound and Juan de Fuca Strait.

Chinook salmon. Recoveries of tagged immature Puget Sound chinook and coho have resulted from the following experiments: In 1950, 1952, and 1954 tagging was conducted from a reef-net in Admiralty Inlet in the manner reported by Jensen (1953). In 1950 and 1954, and again in 1955

and 1957 tagging was conducted from purse seine vessels near the Tacoma Narrows during the fall salmon season in the manner reported by Jensen (1956b) and Bayliff (1957). In 1948, 1949, and 1950 troll tagging was conducted over a number of months, as described in an unpublished Washington Department of Fisheries Report (Bayliff, 1953). The troll tagging methods employed during a 1960 tagging experiment at Possession Point are described by Lasater and Haw (1961). During 1950 and 1957 salmon were tagged from a herring trap at Holmes Harbor incidentally with other species, in a manner similar to that described by Pruter (1959).

Only two of the 55 fresh-water chinook recoveries resulting from this tagging were made in river systems outside the Puget Sound and Fraser River basins (Table 28). The data on stream recoveries suggest that many inner-sound second-year chinook north of the Tacoma Narrows originate in areas outside the Puget Sound basin, notably in the Fraser River, whereas all age groups in the Tacoma Narrows area tend to originate in Puget Sound tributaries. The recoveries of fin-marked chinook from Puget Sound substantiate these conclusions.

The magnitude of catch sampling in various inner-Puget Sound areas since 1950, in terms of numbers of angler trips, is shown in Table 29. The salmon in these samples were examined for fin marks. Until 1963, fin marks were rarely observed that were not assignable to releases within the Puget Sound basin. "Marks" involving pectoral fins are the exception, but Fry (1961) indicated these fins are often lost naturally. On Puget Sound in 1963 two adipose-fin-marked chinook were recovered along with one adipose- and left-ventral-fin-marked chinook. Four of these fish were aged as 1961 or 1962 brood (Table 30) and two adipose-marked fish were scale- and length-aged as 1960 brood. The 1959 brood was the last group of marked chinook salmon released into the Puget Sound basin.

Although there were no official adipose-left-ventral-marked chinook of the 1960, 1961 and 1962 broods released along the Pacific Coast, there were 5.1 million adipose-right-maxillary, 1.0 million adipose-left-maxillary, and 0.9 million adipose-left-ventral and left-maxillary-marked fish of the 1962 brood released from salmon hatcheries in the Columbia River system as part of the most extensive salmon-fin-marking program ever conducted

(Zimmer, 1965). The adipose-fin-marked and the adipose and left-ventral-fin-marked chinook salmon recovered on inner Puget Sound were not reported with clipped maxillaries. However, these were apparently Columbia River hatchery chinook and the maxillary clips may have regenerated or were missed by the catch samplers who were unaccustomed to this mark. A small adipose- and right-maxillary-marked chinook taken by the author near Possession Point in January, 1964 was aged as 1961 brood. Five of these apparent in-sample Columbia River marked chinook were taken at Possession Point and one at Point No Point (Table 30). The chinook determined to be of the 1961 brood that were examined for marks in the Possession Point area in 1963 comprised 35% of this brood examined on inner Puget Sound. A year later, 38% of the 1961 brood chinook observed from inner-Puget Sound samples were from the Possession Point area. The 1962 brood chinook examined from the Possession area in 1964 were 61% of the inner-sound sample of second-year fish and those examined at Point No Point represented 11% of this total.

Most of the Puget-Sound-basin salmon fin-marking experiments (Appendixes 3 and 4) were not designed to indicate contributions of the various artificial production facilities. In most cases only small proportions of the salmon releases were marked and only in some instances were nearly entire liberations marked. The latter was often the case with marked-chinook releases from the Deschutes River and the University of Washington. Marking experiments at other Puget Sound facilities have been of limited scale.

A number of conclusions, consistent with those derived from recovery data in tagging experiments, are gained from these recoveries of fin-marked chinook (Appendix 3) on inner Puget Sound:

1. A greater proportion of the chinook sampled from the southern inner-sound bore Puget-Sound basin marks than those sampled northward.
2. Few of the second-year chinook sampled from the Possession Point area bore Puget-Sound basin marks.
3. The proportions of Puget-Sound-basin fin-marked fish in catches of third- and fourth-year chinook were greater than the proportion in the catch of younger fish, especially in the Possession Point area.

An incorporation of the tag and mark recovery information leads to the following conclusions:

1. Second-year chinook salmon occurring in the inner sound north of Seattle are more likely to originate in streams outside the Puget Sound basin (notably in the Fraser River system) than second-year chinook occurring farther south into the sound.
2. Puget Sound hatcheries are an important source of chinook of all ages south of the Tacoma Narrows and of older fish throughout inner Puget Sound.
3. Columbia River chinook salmon occur in the northern portions of inner Puget Sound.

An inconsistency in the tagging and fin-mark sampling results arose in the Seattle area. Puget Sound hatchery marks appeared frequently here on second-year chinook (Appendix 3), but none of the seven stream recoveries resulting from the Seattle area tagging of immature chinook were made at Puget Sound hatcheries (Table 28).

Coho salmon. Since 1958, coho in the marine sport catch have been almost exclusively third-year fish. Prior to 1958 second-year fish were important beginning in August and became more important with the progression of fall. From December through June the sport harvest has always been essentially restricted to a single year class.

Only 2 of 51 fresh-water recoveries of coho tagged when immature on Puget Sound were reported from streams outside of the basin and these were made in the nearby Fraser and Dungeness rivers (Table 31.) Marine recoveries of inner-sound coho tagged during the winter, spring and summer of their final year of life have also indicated that there is little movement outside of the confines of Puget Sound. Only 4 of 34 recoveries resulting from the 1960 tagging at Possession Point (Lasater and Haw, 1961) were made outside of inner Puget Sound and 6 of 259 from the earlier troll tagging (Bayliff, 1953), Apparently all of the 106 marine recoveries resulting from the 1955 and 1956 purse-seine tagging in the Tacoma Narrows were made on inner Puget Sound. These results indicate that inner-sound coho of the size common in the sport fishery are primarily of local origin. Fin-marking experiments give indications of the importance of local streams to nearby marine sport fisheries (Appendix 4).

Recoveries of marked fish indicate that Puget Sound hatchery coho are most important in harvests from foraging areas nearest to the site of release. This is especially evident with fish released at Minter Creek, the site of the most extensive marking experiments on Puget Sound.

The percentage of marked Minter Creek coho in the Tacoma Narrows catch samples was approximately seven times that of the Possession Point catch samples and three times that of the Seattle area samples. These conclusions are consistent with the distribution of marked 1950 brood coho in Puget Sound based on voluntary reports from anglers (Allen, 1956). In this report Allen stated:

"Utilizing post-card returns only, a comparison of the distribution of Lake Washington and Minter Creek fish indicated that Lake Washington fish tended to favor the northern areas and Minter Creek fish the southern areas."

Pink salmon. The results of pink salmon tagging during June, 1955 from the Tacoma Narrows area were reported by Jensen (1956a). Pink salmon found here at that time primarily originated in northern Puget Sound tributaries. This group of pink salmon apparently remained in the Sound and provided excellent angling throughout the spring of 1955. Ocean-reared pink salmon are usually abundant enough by early August of cycle years to be important to anglers in northern Puget Sound. These fish doubtlessly originate in the pink salmon streams entering Puget Sound since angling is primarily restricted to the direct routes to these streams. Pink salmon are important on the waters from Edmonds north and from the Dosewallips River to the north in Hood Canal. Ocean-reared pink salmon are also important near the mouth of the Puyallup River since this stream supports a spawning population of these fish.

Inner-Puget Sound resident salmon

Although Pacific salmon are noted for distant foraging migrations, this is not always the case. Large numbers of coho, originating in streams tributary to inner Puget Sound, remain in the sound throughout their marine lives (Pressey, 1953 and Allen, 1956). This contention has been supported by tagging (Table 31). A similar situation with regard to

coho exists in Georgia Strait (Milne, 1950). Jensen (1956 demonstrated that the phenomenon occurs in Puget Sound in the case of pink salmon also. Coho and pink salmon with these sedentary habits are typically smaller than their ocean-foraging contemporaries. Salmon remaining in Puget Sound are herein termed "resident".

Resident chinook salmon. In the previous discussion of the origins of feeding chinook frequenting inner Puget Sound, it has been shown that many originate locally. This tendency was strong in southern Puget Sound and less prevalent to the north among second-year fish. These findings suggest that, if there are resident chinook, they are most likely to occur in the southern sound.

Most of the recoveries from immature chinook tagging on the sound have been from the marine fisheries. Since these fisheries cover much of the range of these fish in the sea, the marine recoveries are perhaps more representative of marine migrations than fluvial recoveries are of streams of origin (Table 32). The great majority of these marine recoveries were of chinook tagged during their second year of life. These recoveries indicate that the chinook tagged on the northern sound were predominantly transients, whereas those tagged on the southern sound were residents.

The significance of resident salmon. Tag recoveries indicate that Puget Sound resident salmon have primarily benefited sport fishermen. Despite the fact that Petersen disc tags increases the susceptibility of fish to commercial salmon nets, Jensen (1956a) reported that 78% of reported marine recoveries of resident pink were made by anglers. In Jensen's (1956b) unpublished report on resident coho, he indicates that the disc tags increased their susceptibility to commercial nets but anglers accounted for 76% of the reported harvest. Angling accounted for 23 of 24 recoveries (96%) reported from the Puget Sound harvest of tagged chinook in the 1960 tagging experiment (Haw, 1963).

In contrast the Puget Sound fishing recoveries of immigrating, maturing ocean-reared salmon tagged at Bush Point were primarily by the commercial fishery. Commercial nets accounted for 83% of the coho (there were 796 reported commercial and sport fishing recoveries) and for 96% of the pink (337 recoveries) tagged at Bush Point from 1952 to 1954 (Jensen, 1955).

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Of the recoveries from a similar experiment in 1955, 93.4% of the pink salmon (787 recoveries) and 82.4% of the coho (221 recoveries) were taken in commercial nets. Precise separation of gear type is unavailable, but tagging studies involving immigrating ocean-reared salmon have consistently resulted in relatively few sport fishing recoveries.

Puget Sound offers near-lacustrine boating conditions and is accessible throughout the year to many people. Resident salmon are of great recreational value because they are feeding fish that readily take baits or lures and they are accessible. It would be consistent with good sport fishery management to increase the numbers of these fish. There has been no evidence presented to indicate that resident salmon are racially different from their ocean-reared contemporaries. Allen (1956), after analysing the results of fin-marking of juvenile coho at Bush Point, stated:

"It would appear that the silver salmon in the Bush Point area during the first week in August are destined to remain in the inside population, although the evidence presented cannot be considered conclusive."

Allen's (1956) tentative conclusion that the migration of ocean-bound juvenile coho has moved seaward of Bush Point prior to August of the penultimate year, and the tendency of local hatchery releases to contribute most heavily to local harvests suggest that spacial and chronological manipulations of hatchery releases might increase the populations of resident salmon.

Effect of the 1958 Regulation Change

The 1958 regulation change (Table 2), increasing the minimum length from 12 to 16 inches, had its greatest impact on inner Puget Sound. The regulation change also reduced the bag limit from six to three salmon but this had a minimal impact because the bag limit was difficult to attain. The highest estimated annual average catch per angler trip from waters inside of Cape Flattery was 1.09 salmon (Table 5). This occurred in 1939 when the bag limit was 15 salmon.

The State Fisheries Board's decision in 1922 to raise the minimum size limit from 6 to 18 inches apparently resulted from Smith's thesis (1921) although he did not specifically consider the sport fishery. The regulation was relaxed a month later because of intense public reaction. Since the short-lived 1922 regulation did not alter the harvest of salmon longer than 18 inches, apparently the furor arose over the curtailment of the small salmon catch.

The 1958 change was also controversial. It was implemented to increase the spawning escapement of chinook salmon. The managers of the fishery realized that the change would greatly limit the fishery in Puget Sound, but they believed that eventually the weight of the harvest and the abundance of large salmon would increase.

Coho salmon

Pressey (1953) included monthly estimates for 1951 of the numbers of chinook and coho less than 16 inches long taken on inner Puget Sound. Catch estimates and length samples indicate that 41% of the coho taken by anglers from January, 1950 through June, 1958 were less than 16-inches long (Tables 24 and 26). On the assumption that the lengths of the harvested coho were the same (as indicated in Table 24) and that the estimated catches for the years before 1950 are representative of the earlier catches, we can conclude that 41% of the coho taken from 1938 through 1949 were also shorter than 16 inches.

The increase in minimum length caused a change in the timing of the harvest and concentrated it in the summer (Table 24). Coincidental with the regulation change, however, there was a decrease in the population of resident coho. The reduction in abundance more than offset the increase in weight yield from the delayed harvest. Thus, the recent decrease in the harvest appears for the most part unrelated to the regulations change.

Chinook salmon

Pressey (1953) estimated that 25.76% of the sport catch of chinook in 1951 from Puget Sound were shorter than 16 inches. In 1956 and 1957 the estimated catches shorter than 16 inches were 27.7% and 34.6% respectively. The proportion of chinook under 16 inches in the sport catch varied during the year, peaking in the winter months (Table 33). The chinook harvest was further concentrated into the late spring and summer months by the minimum size increase of 1958 (Table 34).

Unlike Puget Sound coho, chinook harvested from different locations within the sound vary considerably in sizes and ages. A comparison of the length frequencies of chinook in samples from Possession Point and the Tacoma Narrows is presented in Table 35. Puget Sound sport catch sampling data are available for the years 1951 through 1964. These data include length frequencies and catches per angler trip. The magnitude of this sampling, in terms of numbers of angler trips sampled by area, is presented in Table 29. From these data, the average annual catches per effort by age groups were calculated for various inner-sound areas using the length-aging method described by Lasater and Haw (1964). Catches per effort of second-year chinook diminished by about 50% (Table 36). Changes occurred in the age and size composition of the catch after 1958 as a result of the new minimum size limit.

The catch per effort on larger chinook increased, partly because of the wider use of gear selective to larger fish and to some degree because of the protection afforded young salmon by the new minimum size; increases in the catch per effort of third- and fourth-year fish were greatest after chinook receiving full benefit of the change entered the fishery. The average weight of individual chinook taken increased approximately 1.5 lb. (Table 37). The numbers of chinook taken were reduced, but the bulk of the entire catch as well as the catch in bulk per angler trip remained relatively stable (Table 37).

Chinook less than 16 inches taken in Puget Sound were growing fish and predominately at least one year from sexual maturity. At this life stage, in terms of bulk, growth is assumed to greatly exceed the loss from natural mortality. Ricker (1964) calculated bulk losses of chum salmon to the commercial fishery when harvests occur during the penultimate and final years of life. Although chum salmon are generally smaller at maturity than chinook, their longevity is similar. Ricker (ibid) showed that the available bulk increased steadily until the adult-chum salmon returned inshore on spawning migration. Since the harvest of young chinook from Puget Sound after 1958 was delayed but was only comparable to the bulk of the earlier harvest (Table 37), the size limit increase apparently established a lower harvest rate on these fish.

Pink salmon

Washington pink salmon mature in odd-numbered years and are caught in the latter portion of their second and ultimate year of life. Ocean-reared pink salmon enter Puget Sound from late July through mid-September, but another group of these fish apparently spends its marine life within the sound (Jensen, 1956a). Ocean-reared pink salmon are larger than those remaining in Puget Sound; because of their relatively large size, their harvest was unaffected by the 1958 change in minimum size (Table 38). Apparently there have been few pink salmon remaining in Puget Sound since 1957, but the 1958 size limit increase would have curtailed the early development of this fishery had these fish been available (Tables 39 and 40).

The major fishery for the smaller resident pink salmon occurs in the Tacoma Narrows. In 1949, 1953, and 1955 the number of pink salmon harvested here exceeded the catch of coho and chinook. Annual pink salmon abundance, however, was variable and harvests were low in 1939, 1941, and 1951. Many adult ocean-reared pink salmon return to the Puyallup River during August and September and the major fishery for these fish is in Commencement Bay.

Fishing effort

The 1958 regulation change depressed fishing effort where small salmon predominate. After 1958, inner-Puget Sound fishing effort was further concentrated into the summer months (Table 25) and in the years 1958 through 1962 the annual angling intensity was reduced to approximately the level existing 10 years before. The decline in angling effort, however, is partly due to recent low abundance of resident coho.

Discussion

The regulation change, promulgated when spawning stocks of chinook salmon were judged to be deficient, succeeded in providing additional protection for these fish. However, salmon angling participation was also affected.

A harvest of small, growing salmon is *not* inherently wrong, according to rational sport fishery management; rather, regulation restricting sustained recreation *is* wrong. The primary objective of rational sport-fishery management by government agencies should be the provision of maximum sustained recreation and the management scheme attracting the

most participation is, in the absence of better methods of measuring recreation, most likely best. Because of recent failures in Puget Sound resident coho populations, it is difficult to assess the 1958 regulation. Conceivably, an abundance of larger resident coho available during the summer may have increased fishing participation, but this did not happen. From all indications the 1958 regulation depressed fishing effort on inner Puget Sound.

JUAN DE FUCA STRAIT

Introduction

Chinook salmon are available throughout the year in Juan de Fuca Strait, but angling here is a summer activity (Table 41). Light fall and winter angling effort is centered near the more populous communities on the eastern strait and sport fishing is restricted to the summer months to the westward, almost terminating after Labor Day at Neah Bay. The abrupt ending of angling effort is related to the popular vacationing season rather than to a deterioration of the sport. The quality of coho angling is often near its peak when the effort drops.

Because of the remoteness of western Juan de Fuca Strait and the inconvenience of transporting private boats, rental boats are still in the majority (Figure 11). During 1964, approximately 27 charter boats operated on the strait: 19 at Neah Bay, 5 at Sekiu, and 3 on the eastern strait. Strait rental craft are larger than those common on Puget Sound, averaging about 16 ft in length, but charter vessels are smaller than those common at Westport and Ilwaco. During 1964, charter boats operating out of Port Angeles averaged 3.3 passengers per trip, at Sekiu - 2.6, and at Neah Bay - 4.5. In 1963, when angling intensity was high, these boats averaged approximately one additional passenger per trip. Because of the relatively few anglers carried by the Neah Bay charter boats and the accessibility of concentrations of feeding coho salmon, the average catch per angler is consistently high in comparison to those from other Washington ports. From 1961 through 1964 the annual average salmon catch per Neah Bay charter angler trip ranged from 1.9 to 2.7. The Neah Bay charter fleet concentrates on the most abundant salmon species, usually coho. To anglers fishing closer inshore, chinook are of greater relative importance. The charter fleet at Neah Bay should continue to grow and to become more important.

The Salmon Catch

Coho salmon

Coho angling on the strait is dependent on the accessibility of the concentrations of fish. It is most consistently productive in the environs of Neah Bay, where the strait joins the ocean and summer anglers usually encounter feeding coho. Coho catches become progressively less consistent east of Cape Flattery and more dependent on the variable moods and movements of immigrating, maturing coho. The coho harvest in the strait generally increased through 1959 and has since fluctuated about a somewhat lower level (Table 6). Since 1960, anglers fishing the waters east of Neah Bay have shared less of the strait harvest as there seems to have been more spawning migrations of fish than foraging migrations.

Chinook salmon

Catches of chinook from the strait increased rapidly along with angling effort into the early 1950's and were quite stable for the remainder of the decade (Table 6). Since then catches have been less stable but they reached their second highest level in 1964.

Pink salmon

These fish are becoming more important to strait anglers and cycle-year catches have greatly increased in recent years (Table 6).

Biological Data

Size and age of salmon in the catch

Salmon length measurements have been collected from the Juan de Fuca Strait sport fishery for a number of years. Pressey (1953) presented histograms of monthly length frequencies of chinook and coho from the strait during the 1951 summer season. Except for the few chinook shorter than 20 inches these histograms appear to be typical of the fish harvested later. Sport-caught coho are similar in size and life history to those taken from ocean fishing areas.

Chinook salmon harvested on the strait are of a much larger average size than those caught on inner Puget Sound. The average annual calculated dressed weights of sampled strait chinook ranged from 7.6 to 10.6 lb. from 1957 through 1964, and averaged 9.2 lb. These weights were calculated in the same manner as those for chinook from inner Puget Sound (Table 37).

The most intensive annual catch sampling for length and age data from the strait sport fishery was conducted in 1964 from April through September (Table 42). The average calculated dressed weight of individual chinook in this year was 10.6 lb. Chinook with stream nuclei were generally the older fish in a given length interval and were grouped on the short side of length ranges of the various age groups. This is shown in Table 42 by the frequent similarities in the percentages of stream nuclei fish in the length intervals with the percentages of older fish.

The combined numbers of fourth- and fifth-year chinook, comprised an increasing portion of the 1964 monthly age samples through August, except for June (Table 42). This is consistent with the probability that the summer harvest is more dependent on the immigration of older, maturing chinook from the ocean. Third-year fish were dominant, however, during each of the six months in 1964.

Origin of salmon in the catch

Coho salmon. The results of joint coho-tagging experiments at the western approach and in the western strait by the United States and Canada are discussed in unpublished progress reports by Milne, Ball, Jensen and Jewell (1958 and 1959). Coho tagged early in the summer at the entrance to the strait tended to mill in the tagging area. As the season progressed, tagged coho were recovered in increasing numbers eastward and into Puget Sound and Georgia Strait. This sequence of movement is consistent with the typical seasonal progression of the coho sport fishery. Although recoveries from this experiment ranged south to the Nehalem River, Oregon there was no indication of substantial contributions to the coho sport fisheries of the area from streams outside of the Puget Sound and Georgia Strait basins.

Chinook salmon. There were 5 fresh-water recoveries of immature chinook tagged in the U. S. portion of Juan de Fuca Strait (Bayliff, 1953). These chinook were part of a group of 37 tagged in August, 1948 near Port Angeles. Four recoveries were in the Columbia River, 1 of them a year after tagging, 1 after 2 years, and 2 after 3 years. One recovery was in the Fraser River, a year after tagging. These 5 chinook ranged from 35 to 46 cm fork length when tagged. This sparse information is very different from the inner-sound recovery data (Table 28), and indicates a heavy contribution to the strait harvest from the Columbia River.

Recovery data on fin-marked fish substantiate the importance of the Columbia River as a source area. Puget Sound marks are also common in Juan de Fuca Strait, but the mark duplication problem precludes assignment of these fish to a specific source. The Columbia River Fall-Chinook Evaluation Study (Zimmer, 1965) is incomplete but will undoubtedly show that Columbia River hatchery fall chinook are an important source of strait sport-caught chinook.

Much of the summer sport on the strait is dependent on maturing chinook and certainly many of these fish are bound for Puget Sound and Georgia Strait tributaries. Over half (57%) of the 28 recoveries resulting from the tagging of selected small maturing chinook from the Sooke traps on Vancouver Island in 1952 were in the Fraser River area (Milne, 1957). One tagged chinook from this experiment was recovered in the Columbia River.

Jewell (1962) reported on a 1962 tagging experiment conducted at West Beach (near the northeastern end of Juan de Fuca Strait, in which large maturing chinook were tagged from a purse seine vessel from June 17 through September 5. The resulting stream recoveries from this and other experiments (personal communication from E. Jewell) indicate that few maturing chinook at West Beach originate in river systems north of the Fraser or south of the Skagit and that these named streams are the most important producers in this area. Only 23 of the 452 fluvial and estuarial recoveries from both experiments were made outside the Fraser and Skagit rivers areas.

There is no evidence of a significant migration route of maturing chinook to West Beach other than through Juan de Fuca Strait, yet it is unlikely that these large tagged fish were representative of chinook immigrating through the strait. The infrequent appearance of fish tagged at West Beach deeper into Puget Sound suggests the existence of an alternate itinerary through Juan de Fuca Strait that excludes West Beach for chinook bound for central and southern Puget Sound tributaries.

Pink salmon. The pink salmon harvest in Juan de Fuca Strait is dependent on migrations of adult fish from the ocean toward spawning streams tributary to Puget Sound and Georgia Strait. This is circumstantially obvious and it has also been demonstrated by tagging experiments through 1959 (summarized by Vernon, Hourston and Holland, 1964).

Effect of the 1958 Regulation Change

Chinook salmon

Catch sampling and estimates indicate that 17.2% of the chinook salmon harvested in the strait west of Port Angeles from 1957 to July, 1958 were shorter than 20 inches. Only 2.0% of the chinook salmon included in Pressey's (1953) May through September, 1951 length samples were shorter than 20 inches.

Coho salmon

Catch sampling and estimates indicate that 1.2% of the coho salmon harvested in the strait west of Port Angeles from 1957 to July, 1958 were shorter than 20 inches. Only 1.1% of the coho salmon included in Pressey's (1953) June through September, 1951 length samples were shorter than 20 inches.

Pink salmon

Only 0.3% of the pink salmon sampled in the 1957 strait sport fishery were shorter than 20 inches.

Discussion

The 1958 regulation change excluded a significant number of small chinook from the harvest but it had little impact on coho and pink salmon catches. It did not curtail angling effort on Juan de Fuca Strait.

SAN JUAN ISLANDS

Introduction

Catch sampling was begun in the San Juan area in 1962 and until this time catch estimates were based on reports from boat rental agencies. These estimates were made under the assumption that the private to rental boat ratio here was the same as the over-all ratio on Puget Sound and Juan de Fuca Strait. Aerial counts in 1962 and 1963 discredited this assumption (see page 9).

The Salmon Catch

Chinook, coho and pink salmon are all important to anglers in this area. Due to the lack of data regarding the fishery and the extremely high private to rental boat ratios in 1962 and 1963, catch estimates prior to 1964 are considered to be questionable. These circumstances exclude the possibility of establishing trends in the local sport fishery.

Origin of Salmon in the Catch

Coho salmon

Fin-marked salmon have not appeared in the limited sport-catch samples taken from the San Juan Islands area. In 1964 coho and large adult chinook were tagged from purse seine vessels from August 20 through October 3, along the west shore of San Juan Island from Eagle Point to Henry Island (personal communication from E. Jewell). Of 910 recoveries, 82% occurred in the Fraser River area and 6% in other Canadian Georgia Strait streams. The Skagit, Nooksack, and Samish river systems combined accounted for 12% of the stream and estuarial recoveries. Only three stream recoveries were made farther south into Puget Sound. These data suggest that southern Georgia Strait tributaries are the primary contributors to the San Juan Island adult coho fishery.

Chinook salmon

Data regarding 59 recoveries of chinook salmon tagged in 1964 are also available. The Fraser River and the Point Roberts area accounted for 47 of these recoveries. Two were recovered at the mouth of the Samish River and one from the Skagit River estuary. It is apparent that most of the adult chinook in the San Juan Islands area are bound for the Fraser River.

Pink salmon

Experiments conducted during the 1959 pink salmon run, (Vernon et al., 1964) showed that Fraser River stocks vastly outnumbered all others in the San Juan Islands area. Stocks from other Georgia Strait streams were of secondary importance and a very small portion of the population was considered to have originated in northern Puget Sound streams. Pritchard and DeLacy (1944) reached similar conclusions but showed evidence of a somewhat more important contribution from Puget Sound tributaries.

Effect of the 1958 Regulation Change

Immature chinook and coho salmon (see last paragraph, page 16) are available to anglers in the area and the 1958 size limit change doubtlessly had a significant effect on the sport fishery for salmon shorter than 16 inches.

ANGLING SITES AND SEASONS FROM CAPE FLATTERY EASTWARD INTO PUGET SOUND

The following information was gathered from a number of sources including sampling interviews and personal experience. The sites tabulated (Table 43) are the popular ones that have come to the author's attention, but other sites do exist. The place names in quotations are angler vernacularisms.

Chinook Salmon

Marine salmon angling is concentrated in a small fraction of the available area. Favorite sites for feeding chinook salmon are often associated with points of land or other abrupt changes in the shoreline (Figures 12 and 13), where depths range from 50 to 150 ft, particularly where there are sudden changes to these depths, as in depressions or shoals. Typically, the quality of chinook angling fluctuates diurnally. In southern Puget Sound popular fishing times often depend on the tide phase, whereas elsewhere the trend is toward early morning angling. Although chinook salmon are taken throughout the year, fishing for feeding fish is generally poor in late summer and early fall. In winter angling for feeding chinook takes place in certain protected, shallow bays

where they are not available during other seasons. Marine angling sites for maturing chinook are often closely associated with the mouths of spawning streams or the migration routes to these streams. The best fishing for maturing chinook on Puget Sound and Juan de Fuca Strait usually occurs during the early morning hours in August and into early September.

Chinook salmon showing no signs of sexual maturity are called "blackmouth" by Puget Sound and Juan de Fuca Strait anglers, from the coloration surrounding the mandibular teeth, contrasting with the silvery sides. Chinook showing signs of sexual maturity through darkening, jaw metamorphosis, gonadal development or large size, are referred to as "kings". Although it is common knowledge that one species is involved, the question of the proper use of these names is a common source of debate among anglers.

Coho Salmon

Angling sites for feeding coho on Puget Sound and Juan de Fuca Strait are more pelagic in nature, less precisely located than those for chinook, and more noticeably associated with the mixing and meeting of currents (Figure 14). Small feeding coho (Figure 15) are abundant in many areas of the sound, but during their later growing life they congregate in fewer areas. The listings in Table 43 are of the major harvesting sites, beginning in the final winter when appreciable numbers measure 12 inches, and extending through the late marine life. Since 1958 the beginning of the harvest has been delayed approximately 5 months. Maturing ocean-reared coho are taken while enroute to streams of origin, but these fish have always been secondary in importance to resident fish in the inner-sound sport catch. Resident coho in Georgia Strait (Milne, 1950) are sometimes important to San Juan Island anglers.

To the eastward in Juan de Fuca Strait, coho angling is dependent on the immigration of maturing fish during late summer and early fall. Occasionally, feeding fish provide good fishing as early as July in the eastern part of the strait, as occurred in 1957 when a catch sampler at Port Angeles tallied a catch of 195 coho by 78 small boat anglers. These fish were of a size typical of coho being taken in the ocean and comparable

catches were made on the strait during July, 1957. Feeding coho are of greater importance at the western entrance to the strait where they are usually abundant throughout the summer.

Pink Salmon

Resident pink salmon have comprised a large part of the salmon catch in the Tacoma Narrows, and a relatively unimportant fraction elsewhere in the sound. The immigration of ocean-reared fish sustains angling north of the Narrows and throughout the San Juan Islands and Juan de Fuca Strait. In the sound, it is of importance from late July through mid-September. These fish are caught progressively earlier westward in the strait, and at Neah Bay may be important throughout July.

Because of the prominent humped back of the maturing male fish, pink salmon are called "humpies" by Washington anglers.

THE COAST OF WASHINGTON FROM WILLAPA BAY TO LA PUSH

Westport

History

Local residents began salmon sport fishing at Westport in the late 1920's but it was not until the years after World War II that sportsmen from other areas fished in appreciable numbers. Prior to 1952, anglers fished almost exclusively from open boats propelled by outboard motors (kickers) operated by the anglers themselves. Some of these small-boat fishermen crossed the Grays Harbor bar to seek salmon in the open ocean. Their catches were exceptional and the popularity of Westport grew rapidly.

In 1952 the profit-making opportunities at Westport motivated the operation of 8 charter boats. These vessels carried anglers safely across the bar regardless of most weather and tidal conditions and were able to range farther offshore than the smaller kicker craft. By 1953, Westport had become Washington's leading charter fishing port (Figure 16), with 91 of the 134 state guide licenses. The early charter boats were primarily commercial fishing boats (Figure 17) or pleasure boats carrying 4 to 6 persons, but these have been gradually replaced by larger craft

specifically designed to carry 10 or more fishermen (Figure 18). Whereas earlier fishing took place near the bar or inside Grays Harbor, the fleet now ranges south to the Long Beach Peninsula, north to the Quinault River and as far as 20 miles offshore.

The number of angler trips at Westport increased from 32,000 in 1952 to 100,000 in 1956, remained near this level through 1961 and increased sharply to a high of 148,300 in 1964 (Figure 19 and Table 44). The charter fleet has dominated the total sport effort in recent years; in 1964, it accounted for 85% of the angler trips, 89.8% of the chinook and 92.7% of the coho landings. The kicker boat fleet has failed to expand with the charter fleet. The much greater dependence of the small craft on favorable weather and the rough seas over the Grays Harbor bar has held kicker boat trips at relatively stable low levels since the early 1950's (Table 44).

The tremendous growth of the Westport fishery is largely due to three factors: 1) The waters off Grays Harbor attract foraging salmon and are on a major migration route; 2) excellent docking and launching facilities exist; 3) herring became popular as bait, enabling more fishermen to angle simultaneously from a boat. Over 200 charter vessels are now available during the summer season at Westport.

Catch and boat enumeration

The ocean sport salmon season extends from April 15 to October 31. In recent years, checks of sport landings have been made daily from mid-June to mid-September and on weekends during the balance of the season. As boats return to port, the salmon catch by species and the number of fishermen are tallied. Fishing success is calculated for charter and kicker boats separately. The total catch is usually calculated daily by application of catch sampling data to the total effort by boat type as determined from U. S. Coast Guard boat counts.

Since one-third of the boats categorized as "pleasure boats" by the Coast Guard are actually small charter boats, this portion of the pleasure boat count is added to the count of charter boats and the remaining two-thirds with the count of kicker boats. Counts indicate that an average of 5% of the vessels classed as kicker or pleasure make more than one trip per day, especially when two high tides occur during

daylight hours or when fishing improves inside the harbor. This amount is subtracted from the actual count. Charter boats rarely make more than one trip per day, hence no correction of the Coast Guard count of these vessels is necessary.

Distribution of effort and catches

Although the ocean salmon sport fishing season covers 6-1/2 months, nearly 95% of the Westport-based angling effort occurs during the months of June through September (Table 45, Figure 20). Invariably, effort is greatest in July and August. Adverse weather conditions frequently hamper fishing operations early and late in the season.

The actual ocean abundance of chinook and coho and their relative accessibility to Westport-based anglers significantly affect the intensity, location, and direction of the fishing effort. Fishing success and the species composition of the catch can change abruptly. The quality of angling elsewhere relative to the success at Westport can have an important effect on the fishing intensity occurring at any given time, and the abundance and availability of one species can have a pronounced effect on the intensity of fishing on other species.

Chinook salmon. The Westport sport chinook landings from 1955 through 1964 averaged 51,000 fish and ranged from a low of 36,100 to a high of 69,000 (Table 46). The seasonal harvest was predominately of second-year to fifth-year chinook. The relative stability of the seasonal catch totals (Table 44, Figure 19) results from yearly differences in brood year strength being masked by the multiple-age-class character of the fishery. In 1961 third-year fish comprised nearly half of the catch and the dominant group, but in 1963 fourth-year fish comprised nearly half of the sample and the dominant group (Table 47).

A multitude of stocks contribute to the catch (Table 48). Chinook originating from Oregon, British Columbia and California streams have appeared in the landings. Columbia River chinook seems to be the largest single contributor to the Westport chinook catches, although salmon populations from nearby Grays Harbor and Willapa Bay tributaries are harvested throughout the fishing season. These included small runs of spring chinook passing through the fishery from April to June and larger runs of fall chinook available from July through October.

Chinook caught in 1962 and 1963 were sampled to gather sex-length data (Table 49). Males predominated in the samples in both years especially in the samples taken when small fish were abundant. Apparently the small-

and medium-sized males were more available to the fishery than females of corresponding ages. This may have been due to an immigration of precocious males that matured as 2- (jacks) and 3-year-old fish. This may also account for the predominance of females in some of the larger size categories.

In a given season, chinook are numerically dominant in the salmon harvest until early July. However, the greatest numbers of chinook are taken in July and August when coho predominate (Table 46, Figure 20). Early-season fishing effort is generally offshore and bright, medium-sized fish often comprise the bulk of the April, May, and June catches (Figure 21). Fishing intensity shifts noticeably inshore as the season progresses, and small fish become abundant in the landings along with some large fall chinook exhibiting the external signs of impending sexual maturity. Consequently, a greater length dispersion in the catch and lower mean size are often the case as the season advances. The influx of small fish is apparent in the 1962 maturity samples (Table 50), the 1963 length-frequency samples (Figure 21), and the mean lengths by month for the 1961 to 1964 period (Table 51, Figure 22).

Coho salmon. Coho sport landings at Westport averaged 71,940 fish for the period 1955 through 1964 and ranged from 29,000 to 143,000 (Table 52). The catch is assumed to consist primarily of fish in their third and final year of life. Because of the dependence of the harvest on a single year class during any one season, catches are not necessarily dependent on actual ocean abundance. Coho along the Washington coast were not abundant in 1963, yet the Westport sport catch was high due to the availability of a population to the Westport fleet. Abundance along the Washington Coast was considerably higher in 1964, but the below-average availability to Westport fishermen coupled with the availability of chinook resulted in a much lower coho catch than in 1963 (Table 52). Since chinook is the species most coveted, its abundance and availability can greatly affect coho fishing intensity and catch.

Coho landings, like those of chinook, draw from a wide complex of stocks (Table 53). Coho from nearby Grays Harbor and Willapa Bay tributaries undoubtedly are important contributors. The "early" runs pass through the sport fishery and peak in local streams from late September to mid-October, and the "late" runs from late November through December. Because of this difference in timing, the local sport harvest consists primarily of early-run fish.

Terminal gear for coho is usually fished at depths ranging from 10 to 30 ft. Some offshore effort occurs early in the season, but large numbers of coho are usually not available at this time. Coho often begin to dominate the Westport salmon catches early in July and usually predominate for the remainder of the season (Table 52, Figure 20). In the years 1955 to 1964 the highest average monthly landings occurred during August. Fishing intensity gradually shifts, following the coho inshore as the season progresses.

The fish are small in April (3 to 4 lb.), but they grow an average of 1 lb. per month and reach nearly a 10 lb. mean in October. The monthly length-frequency distributions of the 1963 samples (Figure 23) are typical of the normal seasonal growth pattern, although the 1963 fish were somewhat below average in size for the 1961 to 1964 period (Table 54, Figure 24).

Pink salmon. Small numbers of pink salmon appear in Westport sport landings, primarily during odd-numbered years (Table 44, Figure 19). The majority are taken offshore with chinook and coho. Because of the continual expansion of the offshore fishing area, pink salmon catches have increased in recent years. The coastal catch is comprised apparently of Puget Sound or British Columbia stocks as there are no significant Washington coastal runs. The even-year pink salmon caught in 1962 probably originated in the Bella Coola area of British Columbia; these fish became available to the sport fishery during May and June. The 1963 catch of 1,400 pink salmon was small in view of the large numbers that entered Puget Sound. The smaller sport fishery at La Push, to the north, harvested over 6,000 pink during the same season.

The bulk of the catch is taken during July and August; the distribution of the record 1957 catch is typical (Table 55). These fish are taken in their second and final year of life and usually weigh from 3 to 6 lb. but range to 12 lb. in the Westport fishery.

Incidental catch. In addition to the highly prized salmon several other species are landed in the Westport sport fishery. Very small numbers of chum salmon, sockeye salmon, and steelhead trout are taken each year. Of the nonsalmonids, Pacific halibut are highly regarded (Table 56). Lingcod (*Ophiodon elongatus*) are caught in sizeable numbers, as are rockfish (*Sebastes* sp.) and a variety of righteye flounders (Pleuronectiidae),

but none are highly prized. White seabass (*Cynoscion nobilis*) appeared in the sport catch during several years of abnormally warm ocean temperatures prior to 1960. An estimated 267 white seabass were landed in 1958 that ranged in weight from 18 to 49 lb.

Effects of regulation changes

In July 1958, the minimum legal size for salmon caught in the ocean sport fisheries was increased from 12 to 20 inches and the daily bag limit was reduced to 3 fish (Table 2). The change in minimum length altered the size and age composition of the chinook landings, but the reduction of the bag limit had no perceptible effect on the Westport sport fishery.

From 1955 through 1957, when the 12-inch minimum length prevailed, 5,265 sport-caught chinook were measured, and, of these, about 16% were under 20 inches tl (Figure 25). From 1957 to mid-1958 (when the change became effective), 46 of 136 mark recoveries were second-year fish and 26 of these were less than 20 inches. From mid-July 1958 through 1960, 257 marked chinook were noted but only 27 of these were second-year fish over 20 inches. Annual differences in the magnitude of marked hatchery plants, however, also may have affected the proportions of marked fish in different age groups.

From 1955 to 1957, of the 1,993 coho salmon measured only 4.3% were under 20 inches (Figure 26). Most of these fish under 20 inches were taken early in the season (April and May or as jacks in the fall of the year.

Several short-term closures of Grays Harbor and the waters between the jetties at the harbor entrance were imposed in August and September from 1957 through 1961 to prevent an excessive harvest of maturing fall chinook, which were congregated near the entrance to Grays Harbor and subjected to heavy fishing intensity. Offshore fishing effort was directed toward coho. The extent of the chinook congregation at Grays Harbor was determined from several factors: the magnitude of the sport catch of adult chinook, their degree of maturity and external coloration, catch patterns in the Grays Harbor gill-net fishery; and streamflow data. Chinook coloration was classified subjectively as "bright", "dusky", or "dark" (Table 58).

In late September and through late October of the dry year 1957, an emergency closure was imposed in Grays Harbor. Studies begun in 1958 showed dusky or dark maturing chinook to be dominant in the catches from early August to September (Table 58). As a result of these findings, special area closures were again imposed from 1958 to 1961. After 1958, dark chinook were not as prevalent in the catches, and between 1962 and 1964 there were no special closures.

La Push

History

The early growth of the ocean salmon sport fishery at La Push (Figure 1) paralleled that of Westport, with the fishing effort showing a marked increase during the early 1950's (Table 59, Figure 27). Important contributing factors were: 1) construction of a new jetty, 2) improved docking and launching facilities, and 3) proximity of productive fishing areas. In contrast to Westport, the small charter boat fleet (6 - 8 boats) has shown little growth and summertime anglers continue to use outboard-motor-powered craft. The fishing intensity invariably peaks in July and August.

La Push, on the Quillayute Indian Reservation, has failed to share the expansion common to angling ports closer to population centers and has shown a decline in popularity since the peak effort of 1957 (Table 59, Figure 27). The recent failure of La Push to expand as an angling center is attributed to its remoteness and lack of modern tourist facilities.

Catch enumeration

Prior to 1963, sport salmon catches were calculated from data gathered from charter boat log books, boathouse rental and launching receipts, boat counts by the U. S. Coast Guard, personal interviews with boathouse operators, and some catch sampling. During the 1963 and 1964 seasons, sport landings were sampled 5 days per week, including all weekends and holidays. The salmon catch by species, the number of anglers, and boat type were recorded for each party interviewed. The results were applied to the total effort as determined from counts by the Coast Guard based on two-way bar crossings. The catches were

generally calculated on a weekly basis. Because of the nearness of the La Push fishing grounds, there is a high percentage of boats which make two-trips a day and conversion factors have been developed which when applied to the counts by the Coast Guard, yield reasonable estimates of sport boats fishing and the resultant catches (Table 59).

Sport catches

Chinook salmon. The chinook harvested in the La Push sport fishery are predominantly small, and largely second-year fish (Table 60, Figure 28). Large fish are seldom numerous in the landings. Limited mark recovery data have shown that a complex mixture of stocks is present during the open season, April 15 to October 31. The increase in the minimum size limit from 12 to 20 inches in 1958 significantly affected the size distribution and total numbers of chinook landed. In 1957, when the 12-inch minimum prevailed, 31% of the catch sampled was under 20 inches (t1) (Figure 29).

Some offshore charter-boat effort for chinook occurs early in the summer, but most of the charter, kicker, and pleasure boat catches occur within 5 or 6 miles of land. As in the Westport fishery, the mean size of salmon decreases with the progression of the season when a greater proportion of small fish begin to appear in the sport landings.

Coho salmon. Coho contribute most heavily to the total La Push sport salmon landing (Table 59, Figure 27). The catch is composed almost entirely of fish in their third year and shows a growth rate and size distribution similar to that of catches taken elsewhere along the coast. The dependence of the annual harvest on the strength of a single brood year has resulted in considerable fluctuation of the total salmon catch and the catch per angler trip (Table 59, Figure 27).

In a given season sizeable numbers of coho are available to the La Push fishery from June through September. The early charter fleet fishing effort is frequently offshore, but the center of total fishery intensity moves shoreward as the season progresses.

Pink salmon. Pink salmon appear in the La Push sport landings during July and August of odd-numbered years (Table 59, Figure 27) and account for a greater percentage of the total salmon catch than at

Westport. The highest catch occurred in 1963 when 6,100 fish were taken by anglers.

Incidental catch. Small numbers of steelhead trout, chum salmon, and sockeye salmon are taken in the La Push sport landings. Pacific halibut, a variety of other righteye flounders, rockfish, and lingcod also contribute to the over-all catch.

Tokeland

A small sport salmon fishery operates from the port of Tokeland near the entrance to Willapa Bay. The local fleet in 1964 consisted of several commercial crab boats carrying charter anglers and small numbers of kicker craft. Two charter boats operated from nearby South Bend. A larger sport fishery once existed in this area (Table 61) but interest has shifted to Westport in recent years. Because of the rough water on the Willapa Bay bar and the long run to the fishing grounds, Tokeland has been unable to compete with Westport as a fishing base. The charter craft usually cross the bar to fish in the open ocean, but outboard-powered boats are usually restricted to "inside" areas because of the treacherous bar.

Summary

Two important ocean salmon sport fisheries, at Westport and La Push, have developed off coastal Washington between the Columbia River and Cape Flattery. Both began as summer kicker-boat fisheries and were characterized by rapid increases in fishing effort during the early 1950's. La Push continues in this capacity but has shown a decline in popularity in recent years. Westport is now dominated by a wide-ranging charter fleet, one of the largest charter fleets in North America.

The annual coastal sport chinook catches have remained relatively stable because of the multiple-age-class character of the fishery and the diversity of stocks. The 1958 increase in minimum size from 12 to 20 inches has precluded the harvest of many second-year chinook. The coastal sport coho landings are composed almost entirely of fish in their third year and, thus, have fluctuated greatly annually. Pink salmon are relatively unimportant in local sport catches, except at La Push in years of abundance.

THE PACIFIC OCEAN OFF THE MOUTH OF THE COLUMBIA RIVER

History

Angling for salmon in the estuary of the Columbia River was reported by Cobb (1921) to have occurred prior to 1912, when a few local fishermen discovered that salmon could be taken by trolling here. Fishing occurred from skiffs during "safe" (incoming) tides near the villages of Ilwaco and Chinook primarily on weekends and in late August and early September when mature salmon were entering the river.

The common use of larger, more powerful boats just before and following World War II, coupled with the relative ease of catching salmon in the estuarine environment, contributed to the exodus of anglers to the mouth of the river and eventually into the ocean itself (Figure 30) (Wendler, 1960). Temporal expansion also occurred and the sport fishery now operates from mid-June to late September.

As the sport fishery expanded, the boating facilities at the ports of Ilwaco and Chinook became outmoded. These two small villages maintained port facilities for commercial fishing operations and were not prepared for the impact of volume sport fishing occurring after 1950. Foresight and intelligent planning on the part of the citizens of these two areas resulted in the allocation of funds by the U. S. Army Corps of Engineers for the construction and enlargement of small boat basins (Figures 31 and 32). Launching ramps for trailered boats were constructed also. As these facilities became available, Ilwaco attracted anglers from nearby and distant communities.

The fishermen from outside communities introduced a jargon of common names to the fish which locally had been called only chinook and silver (coho) salmon. Chinook salmon are referred to as salmon, "tules (\overline{too} \overline{les})", and kings. Coho salmon are "silversides", hooknose, and silvers.

Local regulations

Sport fishermen in or near the mouth of the Columbia River must contend with an array of both fresh- and salt-water regulations. This is further complicated by different state regulations since the Columbia River is, in its lower reaches, the border between the states of Washington and Oregon. For statistical purposes, salmon caught in a portion of the Co-

Columbia River upstream from the legally-defined mouth of the river are included in the ocean catch. This area lies between the mouth and a line drawn from Grays Point, Washington, to Tongue Point, Oregon, a distance of about 12 miles. Size, bag, and possession limits of the two states coincide in this lower estuarine area. However, in marine waters contiguous to each state and upstream from the Grays Point - Tongue Point line, regulations of each state differ significantly (Table 62).

Estimation of Catch and Effort

Fishermen from Washington and Oregon jointly share in the ocean harvest of chinook and coho at the mouth of the Columbia River. Total daily effort is determined from the number of sport fishing boats observed from the U. S. Coast Guard lookout tower at Cape Disappointment (Figure 33). The observer making this count cannot determine the origin of individual boats so the catch values in this vicinity have been jointly estimated by the Washington Department of Fisheries and the Oregon Game Commission.

In the early years (1946-1956), the fishery occurred almost exclusively from kicker boats, but, as the area gained in popularity in the mid-1950's, charter boats became involved. Washington charter boat (guide) license sales for the Columbia River increased from less than 10 in 1954 to over 90 in 1964. Anglers aboard these craft fared better than those aboard other fishing vessels necessitating changes in the techniques used to enumerate the catch. These changes involved estimating the catch by each of three boat types: charter, pleasure craft or large inboards, and kicker boats (Table 63).

The seasonal beginning of angling here depends on the extent and duration of spring freshet conditions and weather. High runoff with resultant muddy water has limited the estuarial sport harvest to the period after this condition subsides. Effort gradually increases and reaches a peak during the first week in September, usually coinciding with the Labor Day weekend. Figure 34 depicts the average configuration of daily fishing effort for the period 1959-1964. Within the framework of an average 4-month season, the weekly cyclic increase in effort is readily apparent. The sharp decline in effort after Labor Day is induced by a reduction in the number of vacationing fishermen rather than a lack of fish. Excellent coho fishing prevails until the end of September.

Daily entry into the fishery typically begins prior to 5:00 AM and peaks between 6:00 AM and 7:00 AM (Figure 35). Most boats leave the various boat basins in Washington and Oregon about the same time. If inclement weather prevails, the pattern of entry remains essentially the same except that boats leave port after weather conditions moderate. A boat count is made daily between 10:00 AM and 11:00 AM or approximately when a nadir occurs in the entry-exit pattern. The daily total effort value is adjusted for boats which leave the fishery before or after the count is made. The basic statistic used to estimate the total catch of salmon is personal interview data applied to the boat count for a specified time period.

The required estimates for the analysis of calculation of the ocean catch of salmon near the mouth of the Columbia River include:

Total Anglers	TA
Total Chinook	TChi
Total Coho	TCo
Total Salmon	TSal, and the standard errors of these estimates

The strata used are boat types (charter, pleasure, and kicker) within weeks, and the data are collected and reported in this manner. Boat counts supply the number of vessels fishing on any given day. Determination of boat type effort is made randomly throughout the season as the boats are outbound from the ports of Ilwaco, Washington and Warrenton, Oregon. These counts determine the proportions of the three boat types in the sport fishing fleet, since catch sampling indicates a different catch per effort for each boat type. In addition, types of different boats were not being sampled (their users interviewed) in the proportion that they occur in the fishery.

The data collected, by boat type, at the time of interview includes:

Number of Boats	B
Number of Anglers	A
Number of Chinook	Chi
Number of Coho	Co

For the purpose of analysis, the data are sorted by strata and for each boat type within each week. The following formulae are used to determine the appropriate estimates for each strata:

$$TA = \frac{(A)}{(B)} BC$$

$$TChi = \frac{(Chi)}{(B)} BC$$

$$TCo = \frac{(Co)}{(B)} BC$$

$$TSal = \frac{(Chi + Co)}{(B)} BC$$

boat count for the strata. The appropriate formulae are used to obtain the variances of the estimates and the resulting standard error^{1/}.

^{1/} Statistics Department of Oregon State University, Corvallis, Oregon.

The Salmon Catch

The annual catch of both chinook and coho salmon begins in mid-June, increases sharply in early August, and declines just as sharply in early September. Chinook catches peak slightly later than coho, although catches of the latter species remain relatively high well into September (Figure 36).

The dominant species caught between 1946 and 1953 was chinook (Figure 37). These harvests occurred mainly in the estuary during the time the Columbia River fall run was migrating upstream. Chinook catches have remained relatively stable despite increased fishing effort. Temporal expansion and spatial expansion into the ocean, coupled with the use of herring as bait, resulted in the catch of feeding salmon, particularly coho. This species is highly vulnerable to angling in the ocean, and catches have increased in nearly direct proportion to the number of anglers (Table 64).

Biological Data

Chinook

The early recorded sport fishery (1946 through 1956) at the mouth of the Columbia River was aimed primarily at catching chinook salmon migrating upstream to spawn. The catch of these fish inside the river mouth was partially a function of gear and fishing method. Anglers utilized plugs and wobbling spoons in "holes" where chinook were known to congregate.

Because of the relatively complex life history of chinook salmon, considerable effort was expended to learn more about this species in the sport fishery even though the catch remained subordinate to coho salmon.

There was some numerical increase in the catch of chinook as the fishery moved seaward, but the average size of the fish decreased. This appears to be due to the change from angling in an environment in which salmon have ceased or slowed feeding, to one where salmon feed actively. From experimental tagging of chinook conducted in 1957, Heyamoto (1963) concluded that the ocean immediately north and south of the Columbia River was a small-fish area. Length frequencies of the chinook sport catch substantiated the presence of small fish (Figure 38). After 1958, landings were restricted to fish in excess of 20 inches, but previously chinook catches included fish as short as 12 inches (tl). Age analysis of the chinook catch has shown a predominance of 2-year-old fish (Table 65). For the years of record, the numbers of 4-year-old chinook have declined and the catch consists largely of fish in their second and third year.

Maturity studies were undertaken on sport-caught chinook less than 28 inches (71 cm fl) landed at Ilwaco during 1957 and from 1961 through 1964 (Figure 39). Maturity was determined subjectively by examining the gonads. Chinook salmon were considered "mature" if they were judged to be in the process of becoming spawners during the calendar year when they were killed. Otherwise, they were judged "immature". Data are available for one year (1957) when the minimum legal total length was 12 inches. All second- and third-year chinook were less than 28 inches fl. In the 1957 study, some chinook as small as 13 inches fl were judged mature. Studies in this and subsequent years indicated a gradual increase in maturity with size. Small chinook (both mature and immature) are always present in the fishery, but the proportions of mature fish taken vary with time (Table 66, Figure 40). Immature chinook dominate the catch except during the final 3 weeks of August. This timing conforms to the pattern of the spawning migration of the fall chinook into the Columbia River. The September harvest is again conducted primarily on small immature chinook since the mature fish have emigrated from the fishing area.

With few exceptions, the mature segment of chinook less than 66 cm fl were males and all fish greater than 75 cm fl were mature. The sex ratio of males to females in the catch varied annually from 1.25 to 1.90 for the year 1957 and from 1960 through 1964 (Table 67).

Coho

It has been assumed that coho salmon in the Columbia River (ocean) sport fishery mature predominantly in their third year. Throughout the fishing period coho maintain a single dynamic length mode (Figure 41). Only rarely are fish under 20 (approximately 47 cm fl) inches tl observed or reported (Figure 42). The average seasonal size of coho salmon in the harvest varies between 64 and 72 cm fl, with an upper limit at near 83 cm fl. Average weight in the sport harvest varies between 8 and 12 lb. Coho in excess of 22 lb. have been encountered here. The seasonal growth rate varies between 1.3 to 2.5 cm fl per month (Figure 42).

Gross areas of production to the fishery

The proportional contribution of Columbia River origin chinook and coho to the fishery at the river mouth is unknown. Significant numbers of unduplicated fin-marked salmon originating in several watersheds and from the Columbia River system have been recovered in the fishery. Chinook salmon from Oregon coastal streams such as the Rogue and Umpqua rivers; and from Spring Creek, Kalama and Klickitat rivers (tributary to the Columbia) have been taken here. Coho salmon from watersheds along the Oregon and Washington coasts and tributaries of the Columbia River have contributed heavily to the sport fishery at the mouth of the river. In 1964 an unduplicated coho fin mark (adipose and right ventral) from the Washougal River (Columbia River system) was common in the sport harvest at the mouth of the river and in nearly all sport fisheries from southern Oregon to Westport, Washington.

Incidental Catches

Other species are taken by anglers incidental to the coveted salmon (Table 68). By weight, rockfish are most common of these followed by lingcod and Pacific halibut. Fishes grouped under "Other" in Table 68 include sharks (blue [*Prionace glauca*], and soupfin [*Galeorhinus zyopterus*]), greenlings (*Hexagrammos* sp.), sculpins (Cottidae), Pacific hake (*Merluccius productus*), surfperches (Embiotocidae), sable fish (*Anoplopoma fimbria*), steelhead, and cutthroat trout (*Salmo clarki*).

Effect of the 1958 Regulation Change

The new size restriction imposed on the fishery in 1958 (Table 2) did not alter species composition of the catch at the mouth of the river. Because of other factors, however, emphasis has shifted from chinook to coho salmon. This shift resulted from expansion of the fishery into the ocean and the change in the methods of angling. It had little effect on the catch of coho since nearly all were 20 inches tl (about 18 inches fl) when they became available to the fishery (Figure 42). On the catch of chinook, its effect was considerable since, before 1958, approximately 20% of the chinook salmon sampled were less than 20 inches tl (about 18 inches fl) (Figure 41).

FRESH-WATER SALMON ANGLING

Fresh-water angling for returning adult salmon is popular in communities adjacent to the lower Columbia River system and northeast Puget Sound, as well as in southwest Washington. Elsewhere, notably in the metropolitan centers of central Puget Sound where there are few streams open to salmon angling, one often hears the opinion that streams should be salmon spawning sanctuaries and closed to all salmon angling.

The fresh-water salmon harvest is, in some ways, more rational than occurs at sea:

1. The formidable problem of racial identification is largely solved in fresh water.
2. There is assurance that the harvested salmon have attained their maximum bulk.
3. A salmon fishing trip to a local stream is usually less expensive than one to the sound or ocean. (If angling is to be managed for maximum recreation, then expense is an important consideration.)
4. A large part of the fresh-water harvest is comprised of jacks and there is every indication that these fish constitute an ideal harvest.

Fresh-water angling also has at least four shortcomings:

1. Salmon in streams are usually more difficult to take by angling than those feeding at sea (for the resource to be of maximum recreational value, many people must share in a liberal harvest).
2. The migration of adult fish into fresh water often comes after the optimum season for outdoor recreation.
3. The quality of maturing fish often quickly deteriorates in fresh water.

4. High stream flows, a reluctance of mature salmon to "bite", and turbidity may curtail the fresh-water harvest so that it may be suboptimal.

Rational salmon management for maximum recreation includes both marine and fresh-water angling in selected areas.

The catch estimate systems used in Washington through 1963 have seldom been applicable to the fresh-water areas. Salmon punch-card returns in 1964 furnished the best data on stream catches to date (Table 69). On the basis of these returns, it was estimated that approximately 6% of the Washington sport salmon catch was taken in fresh water, but stream anglers in 1964 had a strong tendency not to record jacks (both chinook and coho) on salmon punch cards. As will be shown, these sexually precocious males are often numerically the most important segment of the fresh-water sport catch and special regulations have been adopted to facilitate their harvest (Table 70). In addition, some anglers incorrectly used the marine area code at the mouth of the river system where they were fishing to record their stream catches.

Bag and size limits for fresh-water salmon angling (Page 4) allow a liberal harvest of jacks but not of females, which are apt to be larger than the maximum length limit. The minimum size limit of 12 inches excludes juvenile fish from the harvest but it would exclude some jack coho in catches from Puget Sound streams. The pre-1954 6-inch minimum size limit resulted in the harvest of some juvenile salmon. Following is a summary of information gathered on salmon angling from some important Washington streams:

Columbia River System

Columbia River

Sport fishing for salmon in the Columbia River began in the late 19th century. Local newspapers referred to the "heavy runs" of salmon sought near the mouth of nearby tributaries by "many" sportsmen prior to 1920. The tributaries referred to included the Cowlitz, Kalama, Willamette (Oregon), and Lewis rivers (Figure 43).

Angling occurred from shore or from small rowboats, some of which anchored in "hoglines" at the mouth of a tributary or near an obstruction which delayed salmon migration. The hogline is a row of boats resulting

when one boat is anchored or tied firmly to the bottom or shore and several other boats are permitted to anchor or tie-up directly alongside. The lure used by the hogline fishermen was worked by the action of the current; the anglers merely waiting for the fish to strike. The use of larger boats with powerful motors did not noticeably alter this practice and it is still employed on several tributaries and in the main stem Columbia River (Figure 44). Sport trolling, another early method, in areas of salmon concentrations occurred prior to 1912 (Ore. Game Comm. Bull., Jan., 1960). Craig and Hacker (1940) indicated that the Indians in the Columbia River trolled for salmon using smelt attached to single hooks for bait as early as 1855.

Salmon angling on the Columbia River is traditionally oriented toward chinook. Cobb (1921) reported that fishermen living along the lower Columbia River prior to 1912 discovered salmon could be taken by trolling off the bar at the river mouth. Also, at Oregon City and other places on the Willamette River a number of chinook salmon were caught each year by sportsmen while trolling. Anglers, apparently relying on this tributary during the early portion of the 20th century, fished from January through June.

Prior to 1963 estimation of the annual sport catch of salmon from the Columbia River, including the Washington tributaries, was sporadic and based on rental boat reports, personal interviews, and post card surveys (Columbia River Progress Reports, 1956-59). Estimated catches during September and October ranged from 4,000 to 7,000 chinook and a few coho salmon. During years when surveys were conducted, the boat fishermen consistently landed most of the fish. These estimates were used as an index to the magnitude of the catch rather than an exact measure of the harvest. In September and October of 1963 and 1964 a sport fishery census, financed by the Federal government, was conducted in the area from Puget Island to the Klickitat River. Calculated catches in each of the 2 years, including both Washington and Oregon anglers, were 5,300 and 5,500 chinook and 1,200 and 9,700 coho, respectively. Voluntary returns of rental boat reports broadly indicated the configuration of catch and fishing effort in the main stem Columbia River below Bonneville Dam (Figure 45).

The catch of chinook salmon occurs from mid-March to mid-October with seasonal modes in late April and early May, June, August, and September. These peak catch periods correspond to the appearance in the river

of spring-, summer-, and fall-run chinook. Low June effort, occurring during summer freshet conditions, produces a high return to the fishermen but does not truly reflect the fishery's condition. Similar angling intensity and resulting high catches per effort again occur in October. Fishing for anadromous trout (*Salmo* sp.) is common in July and early August and results in increased effort without an increased salmon catch. The preponderance of the catch in late August and September stems in part from the significant numbers of fall chinook salmon utilizing tributaries below Bonneville Dam. In this case, high angling pressure tends to reduce individual boat returns but it increases the catch. This catch is later than the fall chinook run, as measured in terms of fish counts at Bonneville Dam, which peak prior to mid-September and suggest that the fishery is operating on stocks that have delayed in the Columbia River before entering lower river tributaries to spawn.

Spring and summer chinook destined for areas above Bonneville Dam migrate through the lower river on rising waters and do not linger in the fishing areas. Figure 45 depicts generally the sport fishing harvest on certain stocks of chinook only in the lower Columbia River and does not include the harvest of upriver-bound fish in areas not covered by this report. Spring and summer chinook migrate into tributaries located in eastern Washington, Oregon, and Idaho, and their harvest by sport fishermen, particularly in Idaho, has increased significantly in recent years (Bjornn and Ortman, 1964). Salmon angling has been unlawful in the Columbia River system above Rock Island Dam (near Wenatchee) since 1943.

The harvest of coho salmon below Bonneville Dam appears to be minor as greater emphasis is placed on catching chinook salmon. Coho catches occur primarily during the first week in September (Figure 45).

Biological information on size, sex, and age is available for the Columbia River fresh-water salmon catch only in 1963 and 1964. Prior to these years, however, boathouse operators tended to report catches according to fish size partly because of the difference in bag limit between jacks and the larger, older fish. The gear used to catch salmon does not materially change as the different stocks of fish migrate through the fishing areas, but as the season progresses a gradual change in the size composition of the chinook catch occurs (Table 71).

Cowlitz River

Although catch estimates are only available for 1964, salmon angling has been popular in the Cowlitz for many years when the entire river, except in the vicinity of Cowlitz Falls, was open. Angling closures upstream from a point 1 mile above Castle Rock, beginning each September 1 and ending December 1, were initiated in 1956. The river has been closed above Mayfield Dam since 1962. The entire river has been subjected to the 1959 through 1964 November closure (see Page 3).

Toutle River

Since 1959, approximately 15 miles of the Toutle, upstream from a bridge 5.5 miles above its mouth, have been open to general salmon angling. The closed 5.5 mile area where chinook salmon spawn is unique in Washington since it involves the lower-most portion of a river with an upstream fishing area. From 1956 through 1958, the 15 miles of stream above this closed area were open to coho but closed to chinook salmon, while the lower 5.5 miles were open to all salmon species except during a complete closure in September and October. Before 1956, the entire river was open to salmon angling. The harvest is predominately coho.

Lewis River

Although the Lewis has been closed to salmon anglers above Ariel Dam for many years, its lower-most 13 miles have always been open. A salmon hatchery is located 15 miles from the river's mouth and 5 miles below the dam. Except for a permanent closure within 1,400 ft of the dam, 7 miles of stream below the dam have been subject to various controversial regulations: through 1955 fishing was permitted throughout the year; in 1956 and 1957 the area was closed from September 25 through November 30; in 1958 it was closed entirely; from 1959 through 1964 most of the area remained closed but a 2-mile stretch below the hatchery was open only from September 5 through 25.

The upper end of this 2-mile section, appropriately termed the "Hatchery Hole", is a popular site for angling. During the September 5 through 25 seasons in 1959, 1960, and 1961, on the basis of boat counts and creel-census data, catch estimates were made for the harvest occurring only from the Hatchery Hole:

<u>YEAR</u>	<u>CHINOOK (excluding jacks)</u>	<u>JACK CHINOOK</u>	<u>COHO</u>
1959	266	147	0
1960	252	512	24
1961	208	267	0

Some of the 1964 fish, as evidenced by the reported catches from April through July (Table 69), were probably spring-run chinook taken near or in the mouth of the Lewis River that were actually bound for areas above. The earlier creel census work in the river indicates that the catch from this stream is predominately chinook.

Snake River

There was no catch sampling on the Washington portion of the Snake River in 1964, nor apparently had there been any earlier. The salmon catch is thought to be almost entirely chinook. This stream was open the entire year, except during November, in 1964. High flows and turbidity during the peak abundance of chinook are important deterrents to salmon angling in the Washington portion of the Snake River.

Tucannon River

Approximately 40 miles of the lower Tucannon have been open to salmon angling since 1958, from the third Sunday in May through June 30. Prior to 1958, the entire river was open from the third Sunday in May through July 5.

The Tucannon River is a small, swift stream and notably lacking in deep pools. Concern over the possible overharvest of spring chinook by anglers resulted in catch estimates using creel census data and angler counts in 1962 and 1963.

<u>YEAR</u>	<u>ESTIMATED SPRING CHINOOK CATCH</u>
1962	220
1963	130

In 1964, the salmon catch from the Tucannon (Table 69), as in the past, was thought to be entirely chinook.

Yakima River

The lower portion of this stream was open to salmon angling to a point 400 ft below Sunnyside Dam in 1964, from May 15 through October 31. Similar regulations were in effect for a number of years prior to 1964. The spring chinook in the Yakima River have been sought by anglers for many years.

Angler counts and creel census work on the river immediately below Sunnyside Dam between May 13 and June 10, 1963 resulted in an estimated sport catch of 365 spring chinook for this period and in this area. An estimate made similarly during a comparable period in 1963 was 41 chinook. The salmon sport catch from the Yakima is almost entirely spring chinook.

Chehalis River System

Chehalis River

The Chehalis has long been popular for salmon angling. It has been open to salmon angling below the town of Elma since 1955, but for many years previously the entire river was open. This portion of the river flows slowly and its banks are steep, brushy, and ill-suited for angling. Trolling, a form of fishing uncommon in Washington streams, is popular on these relatively placid waters.

The November-January catch (Table 69) is almost entirely coho and the July through September catch, almost entirely chinook. Both species are doubtlessly important during October. There are no catch sampling data available from the Chehalis, and these conclusions are based on the known movements of fish through the Grays Harbor fisheries and casual

observations of the river sport harvest. Both chinook and coho jacks are known to be important in sport catches throughout the Chehalis River system.

Satsop River

In 1963 and 1964, the Satsop River was open to salmon angling downstream from the mouth of the West Fork from November 20 through March 31. It was closed from 1952 through 1962 except for jack salmon, and prior to 1952 it was open (Table 70).

Because of the closure on other types of salmon angling, the August through October catch (Table 69) is probably jacks. The November through January harvest is predominately coho. A late run of large coho enters the Satsop River during late November and December.

Humptulips River

Approximately 7 miles of the lower Humptulips River has been open to salmon angling the year round and an additional 15 miles upstream has been open from November 20 through the following March 31 from 1955 through 1964. Prior to 1954 the entire river was open.

The species composition of the Humptulips salmon catch, as well as the movements of adult salmon into the river, are similar to those in the Satsop River.

Queets River

This stream has been open to salmon angling except in 1955 when it was not specifically listed in the regulation pamphlet as being open. Sport-catch-sampling data is unavailable. Chinook salmon predominate in Indian-net catches from May through September and the later harvest also includes coho salmon. Casual observations indicate that jack-chinook salmon are common in sport catches.

Hoh River

The Hoh has been open to salmon angling except in 1955, when it was not specifically listed in the regulation pamphlet as being open. Catch sampling data are lacking from the Hoh but the species composition of the sport catch from the river (Table 69) is similar to that from the Queets. Jack chinook are important in catches from this stream.

Nooksack River

This stream was open from 1954 through 1964 below the confluence of the North and South forks. Prior to 1954 the entire river was open to salmon angling. Sport catch sampling data are lacking. In addition to chinook and coho, the Nooksack hosts a large population of pink salmon during odd-numbered years, and three species are probably important to the river's anglers. Water turbidity is a frequent deterrent to angling.

Skagit River

An important salmon sport fishery has existed for many years on the Skagit River. Since 1951, approximately 27 miles of the river below the mouth of Gilligan Creek have been open to salmon angling. The Skagit River upstream from a point $5/8$ miles above the "confluence" (actually the divergence) of the North and South forks was listed as closed in the 1951 regulation pamphlet. The upstream boundary, however, was opened to Gilligan Creek on July 31, 1951. From 1943 through 1950 the salmon angling boundary on the Skagit was farther upstream at the mouth of Baker River. From 1954 through 1964 the river from Gilligan Creek to the mouth of Baker River was open to coho angling from mid-October through mid-November.

Closures were imposed on the Skagit each Monday, Tuesday and Wednesday (excluding holidays) in 1960, a year before they were imposed on all Puget Sound salmon angling streams, but these closures extended from June 13 through August 31. Additional "midseason" closures were imposed on the Skagit during late July and early August from 1960 through 1964. These closures resulted in periods of from 10 to 12 consecutive days when no salmon angling was permitted.

Below the town of Mount Vernon, the river's seaward flow divides into the North and South forks. The approximately 7-mile length of the North Fork (Figure 46) is the most popular salmon angling area on the river. Between July 5 and September 5, 1955, daily sampling visits were made to eight boat launching sites in the salmon angling area. The information gathered from the operator of the facility or from anglers at these locations resulted in an estimated chinook catch of 705 for the period of the survey alone. Reports submitted by operators of two boat

rental agencies on the North Fork, the counted ratios of these rental boats among all of the boats and bank anglers, as well as catch sampling resulted in the following estimates for 1962 and 1963:

<u>YEAR</u>	<u>ANGLER TRIPS</u>	<u>CHINOOK</u>	<u>COHO</u>	<u>PINK</u>
1962	20,040	1,750	350	0
1963	35,830	1,613	390	9,150

The lower Skagit River is a large glacial stream; after prolonged warm weather, it is often too turbid for good angling. In recent years an estimated 75% of the salmon angling effort has been from boats. The average catch per angler is higher for boat fishermen than for bank fishermen. From 1961 through 1964, chinook catches by bank anglers sampled have ranged from 74% to 85% (average 80%) jacks. Chinook catches by boat anglers during the same period have ranged from 26% to 59% (average 44%) jacks. It is the common practice on the Skagit to fish from an anchored boat and when a large fish is hooked, to untie a line fastened to an anchor buoy and drift with the hooked fish. Bank anglers are without this option and they apparently find it more difficult to land the large fish. The banks of the Skagit are often overgrown and so steep that the movements of bank anglers are restricted.

Pink salmon angling is popular on the river from late August through September of cycle years, when these fish contribute more heavily to the sport fishery than chinook or coho.

Stillaguamish River

From 1952 through 1964 this stream was open to salmon angling below the confluence of its North and South forks at Arlington (Figure 47). Prior to 1952 the forks were also open.

During the 1959, 1961, and 1963 spawning migrations of pink salmon into the Stillaguamish River, tagging was conducted at a location approximately 9 miles above the mouth to estimate the spawning population. Populations (P) were estimated by means of the following formula (Vernon et al., 1964):

$$P = \frac{TS}{t}$$

spawned-out carcasses examined, and 't' the number of tags recovered in 'S'.

A number of the pink salmon tagged from the Stillaguamish River were taken by anglers. If it is assumed that 1) all of these tags were returned 2) tagged fish were as susceptible to sport gear as those untagged, and 3) the number of tagged fish that moved downstream after the fish had ascended the river was insignificant, the sport catch above the tagging site can be estimated as follows:

$C = \frac{t_r}{t} S$, where 'C' is the sport catch above the tagging site and ' t_r ' is the number of tags recovered by anglers.

There are approximately 6 miles of stream open to salmon angling above the tagging site and 9 miles below. On the basis of an instantaneous aerial count of anglers on September 8, 1963, when 350 anglers were observed in the salmon fishing area, and an instantaneous count in the same area on foot on August 31, 1963, when 340 anglers were observed and interviewed, it is estimated that 60% of the angling effort and catch of pink salmon occurs below the tagging site. On these bases, recent pink salmon sport catches from the Stillaguamish are estimated to be of the following magnitudes (estimated spawning escapements are included):

<u>YEAR</u>	<u>ESTIMATED PINK SALMON CATCH</u>	<u>ESTIMATED SPAWNING ESCAPEMENT</u>
1959	3,700	125,000
1961	3,500	125,000
1963	16,500	640,000

Pink salmon angling on the Stillaguamish River occurs primarily over the period from the last week in August through the first week in October. The even-year catches (Table 69) in the Stillaguamish River are predominately coho although some chinook are taken.

Lake Washington

Lake Washington and Lake Sammamish have been open to salmon angling from mid-October through November since 1952. Prior to 1952 these lakes were open to salmon angling the entire year. The limited season was designed to permit a liberal harvest of coho salmon but a minimal catch of chinook. The salmon fishery for adult salmon on Lake Washington is currently centered in the area adjacent to the mouth of the Sammamish

River at the north end of the lake. There is some fishing effort at the mouth of the Cedar River, but the popularity of this location declined with the establishment of the 1952 season.

A number of annual catch estimates have been made for Lake Washington since 1950, but most of these were apparently made with little supporting data. Annual chinook catch estimates have ranged from a low of 15 to a high of 134 while coho catch estimates ranged from 155 to 2,196.

Lake Washington salmon anglers troll for coho with a variety of artificial lures. Some creel-census data have been collected at the mouth of the Sammamish River where adult-coho catches per effort appear to be higher than near the mouth of the outlet of Lake Washington in salt water. In recent years, in terms of numbers of salmon, the greatest sport catch from the lake occurs in late spring and early summer. These are juvenile chinook salmon, ranging from 6 to 10 inches tl and they are taken at various locations on Lake Washington and Lake Sammamish. These fish, predominantly in their second and third years of life, are not legal sport fish but many are mistaken for trout or kokanee (*O. nerka*).

Puyallup River

Since 1954 the salmon sport fishery has been limited to the lower 17 miles of the Puyallup River and has been permitted only during September and October. Chinook, coho and pink salmon have all been important to anglers. Creel census data collected during 1956 revealed a low salmon catch per effort. The sport-caught salmon observed in 1956 totaled 8 large chinook, 15 coho and 28 jack chinook salmon.

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A P P E N D I X I

Tables 1 through 71

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Table 1. Annual estimates of salmon sport catch (in numbers of fish) and effort for the marine waters of Washington ^{1/} including the area off the mouth of the Columbia River, 1938 through 1964.

Year	Angler trips ^{2/}	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	303,000	67,700	0.22	109,700	0.36	0	0	177,400	0.59
1939	231,000	86,500	0.37	155,400	0.67	10,100	0.04	252,000	1.09
1940	260,000	88,800	0.34	128,600	0.50	0	0	217,400	0.84
1941	271,000	81,300	0.30	187,800	0.69	12,800	0.05	281,900	1.04
1946	356,400	84,400	0.24	109,700	0.31	0	0	194,100	0.54
1947	382,000	95,200	0.25	123,300	0.32	19,200	0.05	237,700	0.62
1949	571,800	103,700	0.18	217,600	0.38	88,100	0.15	409,400	0.72
1950	576,800	114,700	0.20	200,800	0.35	0	0	315,500	0.55
1951	658,000	138,900	0.21	210,800	0.32	28,600	0.04	378,000	0.55
1952	716,600	212,800	0.30	250,500	0.35	0	0	463,300	0.65
1953	707,000 ^{3/}	148,600	0.21	211,800	0.29	73,900	0.10	434,300	0.61
1954	807,800 ^{3/}	218,500	0.27	253,700	0.31	0	0	472,200	0.58
1955	837,100 ^{3/}	228,300	0.27	265,900	0.32	91,100	0.11	585,300	0.70
1956	956,000	318,100	0.33	385,800	0.40	0	0	703,900	0.74
1957	964,100	330,900	0.34	454,100	0.47	83,900	0.09	868,900	0.90
1958	814,400	230,100	0.28	301,200	0.37	0	0	531,300	0.65
1959	750,100	188,800	0.25	279,900	0.37	39,800	0.05	508,500	0.68
1960	778,300	189,300	0.24	122,700	0.16	0	0	312,000	0.40
1961	971,200	198,700	0.20	271,400	0.28	38,200	0.04	508,300	0.52
1962	1,107,000	211,600	0.19	385,700	0.35	1,800	-	599,100	0.54
1963	1,432,200	263,400	0.18	424,500	0.30	428,000	0.30	1,115,900	0.78
1964	1,252,700	206,900	0.17	328,900	0.26	0	0	535,800	0.43

^{1/} From 1938 to 1946 estimates are only for the waters east (inside) of Cape Flattery. Estimates for the area off the mouth of the Columbia began in 1946, Westport in 1952, and La Push in 1953. Estimates for the Tokeland charter boat catch (Willapa Bay) began in 1954 and continued only through 1957.

^{2/} An angler trip is defined as a day or any part of a calendar day that an individual spends salmon angling.

^{3/} The estimate does not include angler trips at La Push.

Table 2. Daily bag and minimum size regulations for the marine salmon sport fishery, 1921 to 1964.

Year	Minimum total length	Daily bag limit
1921 (7/15)	6 inches	3 salmon over 15 inches in length and 25 between 6 and 15 inches in length, provided the aggregate weight of those between 6 and 15 inches in length does not exceed 20 pounds.
1922 (2/20)	18 inches	3 salmon
1922 (3/30)	10 inches	25 salmon, provided the aggregate weight of the catch does not exceed 20 pounds and one additional salmon.
1935 .	12 inches	15 salmon, provided the aggregate weight of the catch does not exceed 20 pounds and one additional salmon
1941	12 inches	10 salmon, provided the aggregate weight of the catch does not exceed 20 pounds and one additional salmon.
1944	12 inches	6 salmon, provided no more than 3 exceed 24 inches in length.
1958 (7/10)	16 inches (East of Tongue Point in the Strait of Juan de Fuca and Puget Sound) 20 inches (West of Tongue Point in the Strait of Juan de Fuca and the Pacific Ocean)	3 salmon.

Table 3. Estimated annual ratios of private boat fishing trips to rental boat fishing trips on Washington marine waters within (east) Cape Flattery, 1949 through 1963.

Years	Private boat trips/rental boat trips
1949	0.29
1950	0.31
1951	0.21
1952	0.39
1953	0.61
1954	0.66
1955	0.86
1956	0.91
1957	0.94
1958	1.36
1959	1.29
1960	1.35
1961	1.86
1962	3.53
1963	4.19

Table 4. Comparison of estimated 1964 sport salmon catches (numbers of fish) calculated from anglers' returns on punch cards (new method) and computed from the monthly rental boat reports and U. S. Coast Guard boat counts (old method).

Marine area codes <u>1/</u>	Coho		Chinook		Total salmon	
	New method	Old method	New method	Old method	New method	Old method
1	89,000	95,900	22,100	22,100	111,100	118,000
2	53,200	72,300	49,900	68,000	103,100	140,300
3	9,200	10,000	1,900	2,300	11,100	12,300
4	36,300	23,500	8,800	5,800	45,100	29,300
5	19,900	13,300	26,400	23,800	46,300	37,100
6	3,100	3,200	10,800	8,400	13,900	11,600
7	7,200	45,100	9,000	18,400	16,200	63,500
8 <u>2/</u>	2,000		3,600		5,600	
9	27,700	18,400	12,000	14,800	40,300	33,200
10	7,600	4,500	13,900	7,900	21,500	12,400
11	6,100	2,700	18,400	14,800	24,500	17,500
12	2,900	2,800	5,000	8,000	7,900	10,800
Total	264,200	291,700	182,400	194,300	446,600	486,000

1/ See Figure 10.

2/ 1964 boathouse reports were unavailable from this area.

Table 5. Estimated annual sport catches and effort on Juan de Fuca Strait, the San Juan Islands and inner Puget Sound (Washington marine waters adjacent to Cape Flattery and eastward, excluding the Pacific Ocean to the south), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	303,000	67,700	0.22	109,700	0.36	0	0	177,400	0.59
1939	231,000	86,500	0.37	155,400	0.67	10,100	0.04	252,000	1.09
1940	260,000	88,800	0.34	128,600	0.50	0	0	217,400	0.84
1941	271,000	81,300	0.30	187,800	0.69	12,800	0.05	281,900	1.04
1946	316,000	61,000	0.19	107,100	0.34	0	0	168,100	0.53
1947	343,000	82,400	0.24	120,100	0.35	19,200	0.06	221,700	0.65
1949	531,300	92,500	0.17	214,800	0.40	88,100	0.17	395,400	0.74
1950	536,800	98,100	0.18	198,500	0.37	0	0	296,600	0.55
1951	609,500	131,700	0.22	208,900	0.34	28,600	0.05	369,200	0.61
1952	650,600	147,800	0.23	230,500	0.35	0	0	378,300	0.58
1953	631,700	121,400	0.19	190,200	0.30	73,900	0.12	385,500	0.61
1954	697,600	179,400	0.26	208,600	0.30	0	0	388,000	0.56
1955	695,800	163,400	0.23	214,400	0.31	90,100	0.13	467,900	0.67
1956	757,200	207,700	0.27	248,900	0.33	0	0	456,600	0.60
1957	775,900	251,000	0.32	301,500	0.39	79,000	0.10	631,500	0.81
1958	647,100	165,100	0.26	203,600	0.32	0	0	368,700	0.57
1959	577,200	122,600	0.21	160,500	0.28	39,200	0.07	322,300	0.56
1960	600,800	105,200	0.17	53,200	0.09	0	0	158,400	0.26
1961	775,900	132,000	0.17	122,300	0.16	37,500	0.05	291,800	0.38
1962	845,100	129,200	0.15	114,400	0.13	400	-	244,000	0.29
1963	1,157,100	175,300	0.15	178,000	0.15	420,500	0.36	773,800	0.67
1964	978,100	108,500	0.11	112,800	0.12	0	0	221,300	0.23

Table 6. Estimated annual sport catches and effort on Juan de Fuca Strait (Washington marine waters adjacent to Cape Flattery and eastward to Point Wilson, including the waters west of Whidbey Island that are north of Point Partridge), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	600	-	0	-	0	-	600	-
1939	-	3,900	-	1,200	-	0	-	5,100	-
1940	-	4,400	-	300	-	-	-	4,700	-
1941	-	4,200	-	1,100	-	0	-	5,300	-
1946	-	8,600	-	600	-	0	-	9,200	-
1947	-	11,500	-	2,800	-	2,100	-	16,400	-
1949	-	16,000	-	4,700	-	700	-	21,400	-
1950	55,500	24,100	0.43	15,400	0.28	0	0	39,500	0.71
1951	89,000	39,800	0.45	18,900	0.21	1,200	0.01	59,900	0.67
1952	94,700	38,700	0.41	32,400	0.34	0	0	71,100	0.75
1953	99,200	32,300	0.33	42,100	0.43	9,300	0.09	83,700	0.85
1954	104,100	46,300	0.44	31,800	0.31	0	0	78,100	0.75
1955	84,300	33,800	0.40	28,800	0.34	15,300	0.18	77,900	0.92
1956	77,100	31,900	0.41	36,000	0.47	0	0	67,900	0.88
1957	102,300	39,400	0.38	73,300	0.72	29,600	0.29	142,300	1.39
1958	148,100	43,000	0.29	78,800	0.53	0	0	121,800	0.82
1959	132,100	46,400	0.35	82,900	0.63	24,700	0.19	154,000	1.17
1960	94,200	21,800	0.23	17,400	0.18	-	0	39,200	0.42
1961	118,600	38,700	0.33	47,600	0.40	12,700	0.11	99,000	0.83
1962	87,400	18,400	0.21	34,600	0.40	400	-	53,400	0.61
1963	152,700	22,100	0.14	57,500	0.38	149,500	0.98	229,100	1.50
1964	217,700	46,000	0.21	59,300	0.27	0	0	105,300	0.48

Table 7. Estimated annual sport catches and effort, at Neah Bay (Juan de Fuca Strait and the waters of the Pacific Ocean that are adjacent to Cape Flattery, eastward to the Sekiu River), 1950 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1950	13,300	6,200	0.47	6,500	0.49	0	0	12,700	0.95
1951	27,600	15,500	0.56	6,800	0.25	900	0.03	23,200	0.84
1952	20,300	13,900	0.68	5,700	0.28	0	0	19,600	0.97
1953	22,200	9,700	0.44	23,600	1.06	5,600	0.25	38,900	1.75
1954	27,200	11,600	0.43	20,700	0.76	0	0	32,300	1.19
1955	26,900	14,600	0.54	12,600	0.47	4,200	0.16	31,400	1.17
1956	15,000	9,200	0.61	18,400	1.23	0	0	27,600	1.84
1957	38,700	12,800	0.33	37,200	0.96	12,900	0.33	62,900	1.63
1958	36,000	9,400	0.26	33,800	0.94	0	0	43,200	1.20
1959	35,800	5,000	0.14	42,800	1.20	11,900	0.33	59,700	1.67
1960	32,100	4,100	0.13	8,300	0.26	0	0	12,400	0.39
1961	41,900	8,000	0.19	33,600	0.80	5,900	0.14	47,500	1.13
1962	28,800	5,200	0.18	25,400	0.88	400	0.01	31,000	1.08
1963	43,400	5,700	0.13	28,400	0.65	49,100	1.13	83,200	1.92
1964	49,600	8,800	0.18	36,300	0.73	0	0	45,100	0.91

Table 8. Estimated annual sport catches and effort at Sekiu and Pillar Point (Juan de Fuca Strait from the Sekiu River eastward to Tongue Point), 1950 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1950	24,600	12,400	0.50	5,800	0.24	0	0	18,200	0.74
1951	44,700	16,800	0.38	7,500	0.17	100	-	24,400	0.55
1952	42,600	18,500	0.43	6,500	0.15	0	0	25,000	0.59
1953	43,700	16,400	0.38	8,600	0.20	1,100	0.03	26,100	0.60
1954	46,700	23,300	0.50	5,300	0.11	0	0	28,600	0.61
1955	35,600	11,500	0.32	4,100	0.12	1,300	0.04	16,900	0.47
1956	35,700	15,600	0.44	9,700	0.27	0	0	25,300	0.71
1957	47,200	18,900	0.40	26,300	0.56	13,300	0.28	58,500	1.24
1958	70,300	16,700	0.24	33,900	0.48	0	0	50,600	0.72
1959	60,600	20,600	0.34	30,400	0.50	12,000	0.20	63,000	1.04
1960	54,900	16,900	0.31	8,700	0.16	0	0	25,600	0.47
1961	58,800	28,800	0.49	13,400	0.23	6,500	0.11	48,700	0.83
1962	39,400	6,500	0.16	8,600	0.22	0	0	15,100	0.38
1963	57,500	9,700	0.17	21,400	0.37	51,300	0.89	82,400	1.43
1964	95,800	26,400	0.28	19,900	0.21	0	0	46,300	0.48

Table 9. Estimated annual sport catches and effort on East Juan de Fuca Strait (Juan de Fuca Strait from Tongue Point eastward to Point Wilson, including the waters west of Whidbey Island that are north of Point Partridge), 1950 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1950	17,600	5,500	0.31	3,100	0.18	0	0	8,600	0.49
1951	16,700	7,500	0.45	4,600	0.28	200	0.01	12,300	0.74
1952	31,800	6,300	0.20	20,200	0.64	0	0	26,500	0.83
1953	33,300	6,200	0.19	9,900	0.30	2,600	0.08	18,700	0.56
1954	30,200	11,400	0.38	5,800	0.19	0	0	17,200	0.57
1955	21,800	7,700	0.35	12,100	0.56	9,800	0.45	29,600	1.36
1956	26,400	7,100	0.27	7,900	0.30	0	0	15,000	0.57
1957	16,400	7,700	0.47	9,800	0.60	3,400	0.21	20,900	1.27
1958	41,800	16,900	0.40	11,100	0.27	0	0	28,000	0.67
1959	35,700	20,800	0.58	9,700	0.27	800	0.02	31,300	0.88
1960	7,200	800	0.11	400	0.06	0	0	1,200	0.17
1961	17,900	1,900	0.11	600	0.03	300	0.02	2,800	0.16
1962	19,200	6,700	0.35	600	0.03	0	0	7,300	0.38
1963	51,800	6,700	0.13	7,700	0.15	49,100	0.95	63,500	1.23
1964	72,300	10,800	0.15	3,100	0.04	0	0	13,900	0.19

Table 10. Estimated annual sport catches and effort for the San Juan Islands (Washington marine waters east of Vancouver Island and north of Deception Pass), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	500	-	800	-	0	0	1,300	-
1939	-	1,500	-	3,200	-	-	-	4,700	-
1940	-	2,700	-	3,000	-	0	0	5,700	-
1941	-	500	-	3,000	-	100	-	3,600	-
1946	-	1,000	-	5,200	-	0	0	6,200	-
1947	-	1,400	-	9,300	-	200	-	10,900	-
1949	-	1,000	-	3,200	-	600	-	4,800	-
1950	11,100	900	0.08	2,000	0.18	0	0	2,900	0.26
1951	11,500	1,100	0.10	2,600	0.23	300	0.03	4,000	0.35
1952	6,500	500	0.08	1,100	0.17	0	0	1,600	0.25
1953	9,300	1,100	0.12	2,900	0.31	100	0.01	4,100	0.44
1954	18,400	1,700	0.09	8,300	0.45	0	0	10,000	0.54
1955	26,300	2,500	0.10	9,300	0.35	400	0.02	12,200	0.46
1956	10,800	1,200	0.11	1,600	0.15	0	0	2,800	0.26
1957	13,900	3,700	0.27	6,500	0.47	1,000	0.07	11,200	0.81
1958	17,100	2,400	0.14	5,100	0.30	0	0	7,500	0.44
1959	20,400	2,600	0.13	5,300	0.26	1,000	0.05	8,900	0.44
1960	16,300	1,300	0.08	2,500	0.15	0	0	3,800	0.23
1961	89,200	3,700	0.04	24,900	0.28	5,900	0.07	34,500	0.39
1962	259,400	14,500	0.06	29,500	0.11	0	0	44,000	0.17
1963	299,400	29,200	0.10	59,200	0.20	50,600	0.17	139,000	0.46
1964	137,500	9,000	0.07	7,200	0.05	0	0	16,200	0.12

Table 11. Estimated annual sport catches and effort on inner-Puget Sound (marine waters south and east of Whidbey Island including Admiralty Inlet and Hood Canal), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	66,600	-	108,900	-	0	0	175,500	-
1939	-	81,100	-	151,000	-	10,100	-	242,200	-
1940	-	81,700	-	125,300	-	0	0	207,000	-
1941	-	76,600	-	183,700	-	12,700	-	273,000	-
1946	-	51,400	-	101,300	-	0	0	152,700	-
1947	-	69,500	-	108,000	-	16,900	-	194,400	-
1949	483,200	75,500	0.16	206,900	0.43	86,800	0.18	369,200	0.76
1950	470,200	73,100	0.16	181,100	0.39	0	0	254,200	0.54
1951	509,000	90,800	0.18	187,400	0.37	27,100	0.05	305,300	0.60
1952	549,400	108,600	0.20	197,000	0.36	0	0	305,600	0.56
1953	523,200	88,000	0.17	145,200	0.28	64,500	0.12	297,700	0.57
1954	575,100	131,400	0.23	168,500	0.29	0	0	299,900	0.52
1955	585,200	127,100	0.22	176,300	0.30	74,400	0.13	377,800	0.65
1956	669,300	174,600	0.26	211,300	0.31	0	0	385,900	0.57
1957	659,700	207,900	0.32	221,700	0.34	48,400	0.07	478,000	0.72
1958	481,900	119,700	0.25	119,700	0.25	0	0	239,400	0.50
1959	424,700	73,600	0.17	72,300	0.17	13,500	0.03	159,400	0.38
1960	490,300	82,100	0.17	33,300	0.07	0	0	115,400	0.24
1961	568,100	89,600	0.16	49,800	0.09	18,900	0.03	158,300	0.28
1962	498,300	96,300	0.19	50,300	0.10	0	0	146,600	0.29
1963	705,000	124,000	0.18	61,300	0.09	220,400	0.31	405,700	0.58
1964	622,900	53,500	0.09	46,300	0.07	0	0	99,800	0.16

Table 12. Estimated annual sport catches and effort at Skagit Bay and Deception Pass, 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1939	-	800	-	0	0	0	0	800	-
1940	-	1,500	-	100	-	0	0	1,600	-
1941	-	700	-	0	0	0	0	700	-
1946	-	1,100	-	100	-	0	0	1,200	-
1949	11,100	800	0.07	100	0.01	0	0	900	0.08
1950	11,200	600	0.05	100	0.01	0	0	700	0.06
1951	18,000	1,200	0.07	500	0.03	100	0.01	1,800	0.10
1952	18,600	1,300	0.07	500	0.03	0	0	1,800	0.10
1953	13,700	1,200	0.09	300	0.02	0	0	1,500	0.11
1954	16,400	1,200	0.07	200	0.01	0	0	1,400	0.09
1955*	36,400	1,600	0.04	600	0.02	15,400	0.42	17,600	0.48
1956	10,000	600	0.01	100	-	0	-	700	0.01
1957	10,000	700	0.01	100	-	200	-	1,000	0.01
1958	7,600	500	0.01	100	-	0	0	600	0.01
1959	8,800	1,500	0.02	200	-	0	0	1,700	0.02
1960	11,000	1,700	0.15	300	0.03	0	0	2,000	0.18
1961	21,700	2,500	0.12	900	0.04	800	0.04	4,200	0.19
1962	7,500	300	-	0	0	0	0	300	-
1963	23,100	900	0.04	0	0	0	0	900	0.04
1964	63,100	3,600	0.06	2,000	0.03	0	0	5,600	0.09

*Includes estimates for the Skagit River.

Table 13. Estimated annual sport catches and effort for Admiralty Inlet (Admiralty Inlet and its connecting bays from Point Partridge southward to Double Bluff on Whidbey Island), 1940 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1940	-	1,900	-	3,200	-	0	0	5,100	-
1941	-	600	-	500	-	0	0	1,100	-
1946	-	2,500	-	17,200	-	0	0	19,700	-
1947	-	1,200	-	9,400	-	1,500	-	12,100	-
1949	24,700	2,900	0.12	16,000	0.65	6,200	0.25	25,100	1.02
1950	32,900	2,400	0.07	22,400	0.68	0	0	24,800	0.75
1951	33,500	3,300	0.10	13,800	0.41	4,800	0.14	21,900	0.65
1952	32,100	2,700	0.08	20,400	0.64	0	0	23,100	0.72
1953	31,700	1,600	0.05	7,600	0.24	7,700	0.24	16,900	0.53
1954	25,000	3,500	0.14	7,300	0.29	0	0	10,800	0.43
1955	26,700	3,000	0.11	17,100	0.64	8,200	0.31	28,300	1.06
1956	32,600	5,300	0.16	16,400	0.50	0	0	21,700	0.67
1957	38,400	1,900	0.05	17,800	0.46	6,100	0.16	25,800	0.67
1958	31,000	6,200	0.20	5,900	0.19	0	0	12,100	0.39
1959	19,600	2,400	0.12	3,200	0.16	2,900	0.15	8,500	0.43
1960	10,400	1,300	0.12	600	0.06	0	0	1,900	0.18
1961	54,500	12,500	0.23	3,100	0.06	3,100	0.06	18,700	0.34
1962	19,600	8,200	0.42	2,000	0.10	0	0	10,200	0.52
1963	92,600	16,800	0.18	6,000	0.06	95,000	1.03	117,800	1.27
1964*	153,800	12,600	0.08	27,700	0.18	0	0	40,300	0.26

*Includes all of marine area 9 (see Figure 10).

Table 16. Estimated annual sport catches and effort for Port Gardner - Port Susan (Port Gardner, Port Susan and that portion of Possession Sound north of Mukilteo), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	6,400	-	3,700	-	0	-	10,100	-
1939	-	9,600	-	5,500	-	2,800	-	17,900	-
1940	-	8,900	-	10,000	-	0	-	18,900	-
1941	-	5,800	-	6,400	-	2,400	-	14,600	-
1946	-	6,900	-	4,100	-	0	-	11,000	-
1947	-	3,200	-	4,100	-	3,000	-	10,300	-
1949	41,900	7,700	0.18	12,100	0.29	12,300	0.29	32,100	0.77
1950	32,200	5,300	0.16	5,800	0.18	0	0	11,100	0.34
1951	37,100	3,700	0.10	6,500	0.18	4,900	0.13	15,100	0.41
1952	28,600	3,500	0.12	8,300	0.29	0	0	11,800	0.41
1953	45,900	3,700	0.08	6,600	0.14	8,800	0.19	19,100	0.42
1954	32,000	4,100	0.13	7,900	0.25	0	0	12,000	0.38
1955	34,200	5,800	0.17	9,900	0.29	6,700	0.20	22,400	0.65
1956	52,700	16,700	0.32	11,500	0.22	0	0	28,200	0.53
1957	58,100	17,000	0.29	16,400	0.28	9,900	0.17	43,300	0.75
1958	30,100	4,100	0.14	3,200	0.11	0	0	7,300	0.24
1959	32,100	2,200	0.07	5,200	0.16	2,100	0.07	9,500	0.30
1960	77,300	4,800	0.06	2,300	0.03	0	0	7,100	0.09
1961	72,400	2,000	0.03	6,200	0.09	2,700	0.04	10,900	0.15
1962	35,900	2,900	0.08	2,300	0.06	0	0	5,200	0.14
1963	103,800	1,900	0.02	7,800	0.08	60,300	0.58	70,000	0.67
1964	See Table 13.								

Table 17. Estimated annual sport catches and effort at Saratoga Passage (Saratoga Passage and its connecting bays south of Skagit Bay), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon angler
1938	-	11,800	-	18,700	-	0	0	30,500	-
1939	-	11,600	-	11,400	-	2,800	-	25,800	-
1940	-	7,000	-	20,900	-	0	0	27,900	-
1941	-	10,300	-	39,400	-	2,400	-	52,100	-
1946	-	11,200	-	19,600	-	0	0	30,800	-
1947	-	11,900	-	16,100	-	3,500	-	31,500	-
1949	30,400	7,800	0.26	10,900	0.36	2,600	0.09	21,300	0.70
1950	22,800	5,200	0.23	4,800	0.21	0	0	10,000	0.44
1951	24,400	7,200	0.30	3,800	0.16	1,400	0.06	12,400	0.51
1952	22,700	4,500	0.20	4,000	0.18	0	0	8,500	0.37
1953	25,200	10,500	0.42	3,800	0.15	1,800	0.07	16,100	0.64
1954	35,300	12,900	0.37	6,700	0.19	0	0	19,600	0.56
1955	41,800	15,400	0.37	9,900	0.24	1,900	0.05	27,200	0.65
1956	19,900	5,800	0.29	2,000	0.10	0	0	7,800	0.39
1957	41,800	18,600	0.44	10,400	0.25	1,600	0.04	30,600	0.73
1958	28,900	6,800	0.24	4,600	0.16	0	0	11,400	0.39
1959	34,600	9,600	0.28	4,800	0.14	800	0.02	15,200	0.44
1960	32,000	3,500	0.11	500	0.02	0	0	4,000	0.13
1961	63,200	13,100	0.21	4,000	0.06	2,800	0.04	19,900	0.31
1962	21,500	5,500	0.26	2,200	0.10	0	0	7,700	0.36
1963	31,400	8,500	0.27	1,600	0.05	6,800	0.22	16,900	0.54
1964	See Table 13.								

Table 18. Estimated annual sport catches and effort at Ballard (Puget Sound waters south of President Point to West Point at Seattle; and east of Bainbridge Island and Agate Passage), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	2,400	-	6,600	-	0	0	9,000	-
1939	-	1,700	-	5,500	-	0	0	7,200	-
1940	-	5,900	-	8,400	-	0	0	14,300	-
1941	-	6,200	-	4,700	-	0	0	10,900	-
1946	-	4,300	-	7,400	-	0	0	11,700	-
1947	-	3,100	-	10,500	-	3,600	-	17,200	-
1949	59,400	2,900	0.05	7,600	0.13	2,300	0.04	12,800	0.22
1950	67,300	4,400	0.07	11,300	0.17	0	0	15,700	0.23
1951	55,900	4,000	0.07	13,800	0.25	1,300	0.02	19,100	0.34
1952	57,900	5,700	0.10	15,300	0.26	0	0	21,000	0.36
1953	41,800	5,200	0.12	9,000	0.22	600	0.01	14,800	0.35
1954	42,900	8,100	0.19	10,900	0.25	0	0	19,000	0.44
1955	42,200	8,100	0.19	5,400	0.13	200	-	13,700	0.32
1956	52,100	13,700	0.26	11,700	0.22	0	0	25,400	0.49
1957	41,000	16,200	0.40	12,800	0.31	400	0.01	29,400	0.72
1958	41,500	10,200	0.25	7,500	0.18	0	0	17,700	0.43
1959	35,900	6,800	0.19	3,100	0.09	100	-	10,000	0.28
1960	39,100	7,500	0.19	1,400	0.04	0	0	8,900	0.23
1961	42,000	8,900	0.21	1,000	0.02	100	-	10,000	0.24
1962	58,800	7,500	0.13	5,400	0.09	0	0	12,900	0.22
1963	50,100	9,300	0.19	4,000	0.08	1,200	0.02	14,500	0.29
1964*	143,700	13,900	0.10	7,600	0.05	0	0	21,500	0.15

* Includes all of marine area code 10 (see Figure 10).

Table 21. Estimated annual sport catches and effort for the Tacoma Narrows and Commencement Bay (Puget Sound waters south of Point Richmond, in West Passage, and south of Maury Island in East Passage, but including Quartermaster Harbor; to Point Gibson on Fox Island but excluding Carr Inlet), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	7,900	-	7,900	-	0	0	15,800	-
1939	-	8,900	-	4,900	-	1,000	-	14,800	-
1940	-	8,900	-	2,800	-	0	0	11,700	-
1941	-	6,100	-	800	-	700	-	7,600	-
1946	-	11,200	-	7,400	-	0	0	18,600	-
1947	-	24,300	-	5,200	-	0	0	29,500	-
1949	80,700	14,300	0.18	31,200	0.39	37,800	0.47	83,300	1.03
1950	100,500	24,400	0.24	49,200	0.49	0	0	73,600	0.73
1951	104,500	41,800	0.40	42,500	0.41	3,400	0.03	87,700	0.84
1952	114,400	40,500	0.35	31,200	0.27	0	0	71,700	0.63
1953	100,700	24,900	0.25	19,300	0.19	25,900	0.26	70,100	0.70
1954	119,000	20,600	0.17	21,100	0.18	0	0	41,700	0.35
1955	93,000	26,700	0.29	16,400	0.18	23,300	0.25	66,400	0.71
1956	158,500	41,700	0.26	31,900	0.20	0	0	73,600	0.46
1957	124,600	58,700	0.47	25,900	0.21	6,400	0.05	91,000	0.73
1958	112,700	27,200	0.24	5,700	0.05	0	0	32,900	0.29
1959	75,300	7,600	0.10	9,500	0.13	1,100	0.01	18,200	0.24
1960	104,100	14,300	0.14	1,500	0.01	0	0	15,800	0.15
1961	71,000	15,000	0.21	1,000	0.01	900	0.01	16,900	0.24
1962	76,000	20,900	0.28	7,000	0.09	0	0	27,900	0.37
1963	78,500	21,800	0.28	2,100	0.03	5,000	0.06	28,900	0.37
1964*	214,800	18,400	0.09	6,100	0.03	0	0	24,500	0.11

* Includes all of marine area Code 11 (see Figure 10).

Table 22. Estimated annual sport catches and effort on South Puget Sound (Puget Sound waters south of Point Gibson but including all of Carr Inlet), 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	3,600	-	300	-	0	0	3,900	-
1939	-	6,000	-	200	-	0	0	6,200	-
1940	-	6,100	-	100	-	0	0	6,200	-
1941	-	11,300	-	100	-	0	0	11,400	-
1946	-	1,500	-	300	-	0	0	1,800	-
1947	-	2,200	-	900	-	0	0	3,100	-
1949	7,500	2,000	0.27	500	0.07	0	0	2,500	0.33
1950	7,600	1,500	0.20	200	0.03	0	0	1,700	0.22
1951	8,600	2,000	0.23	300	0.03	100	0.01	2,400	0.28
1952	12,200	2,100	0.17	300	0.02	0	0	2,400	0.20
1953	12,400	2,300	0.19	400	0.03	1,100	0.09	3,800	0.31
1954	41,600	11,700	0.28	1,900	0.05	0	0	13,600	0.33
1955	40,300	12,600	0.31	2,200	0.05	500	0.01	15,300	0.38
1956	43,200	13,500	0.31	1,600	0.04	0	0	15,100	0.35
1957	28,300	11,100	0.39	600	0.02	0	0	11,700	0.41
1958	10,900	6,800	0.62	100	0.01	0	0	6,900	0.63
1959	16,500	5,000	0.30	100	0.01	100	0.01	5,200	0.32
1960	19,800	3,800	0.19	0	0	0	0	3,800	0.19
1961	17,800	2,600	0.15	0	0	0	0	2,600	0.15
1962	45,500	14,800	0.33	1,700	0.04	0	0	16,500	0.36
1963	47,600	19,200	0.40	0	0	0	0	19,200	0.40
1964	See Table 21.								

Table 23. Estimated annual sport catches and effort for Hood Canal, 1938 through 1964.

Year	Angler trips	Chinook	Chinook/ angler	Coho	Coho/ angler	Pink	Pink/ angler	Salmon	Salmon/ angler
1938	-	10,600	-	5,300	-	0	0	15,900	-
1939	-	2,800	-	5,700	-	0	0	8,500	-
1940	-	2,800	-	5,300	-	0	0	8,100	-
1941	-	4,400	-	5,300	-	300	-	10,000	-
1946	-	4,700	-	4,400	-	0	0	9,100	-
1947	-	4,900	-	6,300	-	200	-	11,400	-
1949	33,300	8,300	0.25	11,100	0.33	400	0.01	19,800	0.59
1950	38,100	6,100	0.16	8,000	0.21	0	0	14,100	0.37
1951	41,800	4,200	0.10	9,900	0.24	400	0.01	14,500	0.35
1952	52,300	6,200	0.12	14,300	0.27	0	0	20,500	0.39
1953	51,300	5,500	0.11	12,000	0.23	800	0.02	18,300	0.36
1954	57,900	11,300	0.20	9,600	0.17	0	0	20,900	0.36
1955	67,500	10,600	0.16	16,300	0.24	400	0.01	27,300	0.40
1956	57,100	13,100	0.23	14,000	0.25	0	0	27,100	0.47
1957	63,300	9,600	0.15	15,100	0.24	300	-	25,000	0.39
1958	36,300	9,700	0.27	7,600	0.21	0	0	17,300	0.48
1959	35,600	6,200	0.17	5,600	0.16	100	-	11,900	0.33
1960	29,800	7,300	0.24	700	0.02	0	0	8,000	0.27
1961	56,600	8,000	0.14	6,400	0.11	1,600	0.03	16,000	0.28
1962	83,900	8,000	0.10	5,700	0.07	0	0	13,700	0.16
1963	69,300	16,000	0.23	7,800	0.11	6,600	0.10	30,400	0.44
1964	47,500	5,000	0.11	2,900	0.06	0	0	7,900	0.17

Table 24. Percentages of annual inner-Puget Sound sport coho harvest taken by month before and after July 1958.

Month	1938 to 1958		1958 to 1964	
	Average	Range	Average	Range
January	4.5	0.2-12.1	-	0-0.1
February	6.8	2.3-11.8	-	0-0.2
March	11.2	4.0-26.8	0.5	0.1-1.0
April	8.8	3.4-16.7	1.9	1.1-3.4
May	9.9	5.9-14.9	5.9	3.3-10.4
June	7.9	4.6-12.8	11.8	5.2-18.0
July	12.2	6.1-17.7	24.5	16.4-27.6
August	14.6	8.6-18.3	24.5	21.9-27.7
September	13.7	8.6-22.1	22.9	13.3-32.2
October	5.8	3.7-8.4	6.9	3.4-10.9
November	1.9	0.5-4.4	0.9	0.1-2.9
December	2.7	0.3-6.6	-	0-0.1

Table 25. Monthly percentages of the annual fishing effort (angler trips) on inner Puget Sound from 1938 to 1958 and 1959 to 1964.

Month	1938 to 1958		1959 to 1964	
	Average	Range	Average	Range
January	2.4	1.8 - 3.9	1.8	1.2 - 2.3
February	2.7	1.2 - 4.2	2.7	1.5 - 5.6
March	3.5	2.8 - 4.3	2.1	1.6 - 2.8
April	4.9	3.9 - 7.3	3.1	2.2 - 3.9
May	8.9	7.2 - 11.0	6.9	6.0 - 7.6
June	10.8	9.3 - 13.0	11.1	8.8 - 12.9
July	17.0	14.5 - 19.3	19.3	15.3 - 23.5
August	22.5	20.8 - 24.3	28.3	20.1 - 35.5
September	16.7	13.1 - 19.1	16.6	14.2 - 20.0
October	6.6	4.9 - 9.0	4.2	1.9 - 7.6
November	2.2	1.5 - 3.0	2.3	0.8 - 5.8
December	1.8	1.2 - 3.0	1.6	0.7 - 2.8

Table 26. Average monthly percentages of sampled inner-Puget Sound sport-caught coho less than 16 inches in total length, January, 1950 to June, 1958.

Month	Per cent shorter than 16 inches	
	Average	Range
January	98	93 - 100
February	95	85 - 100
March	89	72 - 100
April	60	47 - 86
May	31	20 - 52
June	10	2 - 20
July	8	5 - 11
August	14	9 - 24
September	20	8 - 39
October	37	21 - 57
November	77	25 - 95
December	98	96 - 100
Annual	41	32 - 49*

* The range excludes calculation for 1958 since sub-16-inch salmon were legal only to July 10, 1958.

Table 27. Average sampled coho catches per angler trip in July, at various locations on inner Puget Sound, 1949 through 1957 and 1958 through 1964.

Angling location	Catch per angler trip	
	1949 through 1957	1958 through 1964
Admiralty Inlet	0.47	0.07
Point No Point	0.49	0.14
Possession Point	0.49	0.33
Port Gardner	0.11	0.05
Saratoga Passage	0.07	0.07
Seattle-Bremerton	0.20	0.07
South Puget Sound	0.19	0.04
Hood Canal	0.25	0.14
Average (all areas)	0.28	0.11

Table 28. Inner-Puget Sound immature chinook tagging areas, ages of tagged fish* and the locations of fresh-water recoveries.

Tagging area	Numbers recovered	Stream
Second-year chinook (age 1+)		
Admiralty Inlet	1	Soos Creek ** (Duwamish River System)
Point No Point	2	Fraser River
	1	Little White Salmon River (Columbia River System)
Possession Point	9	Fraser River
	2	Deschutes River **
	1	Skagit River
Holmes Harbor	4	Fraser River
Elliott Bay (Seattle)	6	Fraser River
	1	Bear Creek*** (Lake Washington System)
Tacoma Narrows	9	Soos Creek**
	2	Voight Creek** (Puyallup River System)
	1	Bear Creek***
Third-year chinook (age 2+)		
Admiralty Inlet	1	Minter Creek**
	1	Soos Creek**
Point No Point	1	Nisqually River
Possession Point	3	Soos Creek**
	1	Duwamish River
	1	May Creek** (Snohomish River System)
	1	Fraser River
	1	Nooksack River
Tacoma Narrows	1	Soos Creek**

Continued next page.

Table 28 continued.

Tagging area	Numbers recovered	Stream
Fourth-year chinook (age 3+)		
Admiralty Inlet	1	Columbia River
	1	Soos Creek**
Age Unknown		
Saratoga Passage	1	Fraser River
Admiralty Inlet	2	Soos Creek**
	1	Skagit River

* Ages determined by the method described by Lasater and Haw (1964).

** Tags recovered at Puget Sound artificial salmon production facilities.

*** Tags recovered at a facility where kokanee (O. nerka) were trapped for cultural purposes.

Table 29. Completed angler trips on inner Puget Sound sampled by year and area.

Year	Fishing areas							
	Admiralty Inlet	Point No Point	Possession Point	Port Gardner	Saratoga Passage	Seattle-Bremeton	So. Puget Sound	Hood Canal
1950	1,637	801	5,393	1,460	232	4,276	6,719	556
1951	2,434	777	5,040	723	321	4,641	6,215	480
1952	746	1,560	4,707	0	0	3,432	7,649	266
1953	37	1,627	3,988	31	100	2,377	12,845	77
1954	164	116	4,461	0	0	3,289	7,627	0
1955	0	78	7,133	0	0	2,263	11,468	0
1956	835	1,060	2,956	0	0	1,999	4,496	0
1957	334	1,201	2,418	0	444	2,123	4,700	0
1958	168	206	1,693	0	247	1,193	2,096	0
1959	542	178	3,455	345	31	1,774	2,589	0
1960	32	403	3,649	320	12	1,885	2,412	0
1961	339	274	5,186	162	0	2,366	1,610	0
1962	254	581	4,544	456	240	2,509	1,883	497
1963	462	616	5,351	182	612	2,045	1,474	449
1964	304	604	4,344	84	285	1,029	1,418	636

Table 30. Numbers of possible 1961 and 1962 brood lower Columbia River hatchery marked chinook recovered on inner Puget Sound in 1963 and 1964.

Sampling year	Recovery area	Sample size	Brood year	Numbers of marks
1963	Possession Point	278	1961	2
1964	Possession Point	203	1961	1
	Possession Point	219	1962	2
	Point No Point	40	1962	1

Table 31. Tagging areas and locations of fresh-water recoveries of inner-Puget Sound immature coho, tagged in their ultimate year of life.

Tagging area	Numbers recovered	Months tagged	Stream
Point No Point	1	July	Skagit River
Possession Point	2	May	Soos Creek (Duwamish River) *
	2	April, May	Skykomish River (Snohomish River)**
	2	April, May	May Creek (Snohomish River) *
	2	July, August	Baker River (Skagit River)**
	1	May	Clark Creek (Skagit River) *
	1	August	Sauk River (Skagit River)
	1	May	Dungeness River *
	1	March	Bear Creek (Lake Washington)***
Saratoga Passage	1	April	Bear Creek***
	1	April	Clark Creek**
Elliott Bay	2	March	Issaquah Creek (Lake Sammamish) *
	2	January, February	Bear Creek***
	2	January, March	Soos Creek *
	1	January	Skagit River
	1	January	Lake Washington
	1	March	Minter Creek *

Continued next page.

Table 31 continued.

Tagging area	Numbers recovered	Months tagged	Stream
Tacoma Narrows	5	March, April, May	Voight Creek (Puyallup River) *
	2	May	Puyallup River
	7	June	White River (Puyallup River)**
	4	February, April, May	Skagit River
	1	April	Baker River **
	1	June	Lake Washington
	1	April	Fraser River
	5	May, June	Minter Creek *
	1	June	Soos Creek *

* Tags recovered at Puget Sound salmon hatchery racks.

** Tags recovered where salmon are trapped and transported around barriers.

*** Tags recovered at a rack where kokanee were trapped for cultural purposes.

Table 32. Numbers (and percentages) of marine recoveries of tagged inhere-Puget Sound immature chinook by marine tagging areas, recovery areas and durations of liberation.

Months between tagging and recovery	Recovery area	Tagging areas *			
		North Sound	Mid-Sound	South Sound	Total
0-6	Puget Sound	67 (45.6)	24 (80.0)	56 (49.6)	147 (50.7)
	Georgia Strait	8 (5.4)	0	0	8 (2.8)
	Ocean	3 (2.0)	0	0	3 (1.0)
6-18	Puget Sound	21 (14.3)	3 (10.0)	36 (31.9)	60 (20.7)
	Georgia Strait	13 (8.8)	2 (6.7)	2 (1.8)	17 (5.9)
	Ocean	6 (4.1)	0	1**(0.9)	7 (2.4)
18-30	Puget Sound	3 (2.0)	1 (3.3)	13 (11.5)	17 (5.9)
	Georgia Strait	12 (8.2)	0	0	12 (4.1)
	Ocean	11**(7.5)	0	3 (2.7)	14 (4.8)
30-42	Puget Sound	1 (0.7)	0	2 (1.8)	3 (1.0)
	Georgia Strait	0	0	0	0
	Ocean	2 (1.4)	0	0	2 (0.7)
Total		147 (100.0)	30 (100.0)	113 (100.0)	290 (100.0)

* The North Sound tagging area includes the waters adjacent to southern Whidbey Island (Possession Point, southern Saratoga Passage, Point No Point, and Bush Point). The Mid-Sound area includes tagging at Elliott Bay, Shilshole Bay and Manchester. The South Sound tagging occurred in and adjacent to the Tacoma Narrows.

** Includes one recovered in Juan de Fuca Strait.

Table 33. Average monthly percentages of sampled inner-Puget Sound sport-caught chinook less than 16 inches in total length, 1951, 1956, and January to June of 1958.

Month	Per cent less than 16 inches	
	Average	Range
January	65	42-80
February	58	44-67
March	54	27-73
April	44	28-57
May	42	25-59
June	15	13-18
July	15	9-23
August	15	2-35
September	5	2-35
October	7	1-11
November	20	13-23
December	46	44-47
Annual	29	26-35

Table 34. Percentages of annual inner-Puget Sound sport-caught chinook harvest by month before and after July 1958.

Month	1938 to 1958		1959 to 1964	
	Average	Range	Average	Range
January	8.0	2.4-16.4	5.3	3.1-7.8
February	7.1	2.3-15.3	4.9	2.8-8.3
March	7.3	3.3-22.1	3.5	2.5-5.5
April	8.3	3.6-19.4	5.3	3.5-7.5
May	9.2	3.6-15.3	11.5	7.4-14.2
June	9.7	1.6-17.5	13.1	10.9-15.3
July	12.8	2.2-18.3	15.7	9.6-18.7
August	14.0	7.5-19.4	19.4	13.4-27.3
September	9.6	6.7-19.5	8.5	5.9-14.7
October	4.0	1.4-6.4	4.0	1.4-7.0
November	4.0	0.9-7.7	4.0	1.5-6.3
December	6.2	1.3-13.9	5.0	1.6-11.7

Table 35. Comparison of length frequencies of inner-Puget Sound sport-caught chinook salmon sampled in the Possession Point and Tacoma Narrows areas in May 1957.

Cm fork length	Per cent of sample	
	Possession Point (n=185)	Tacoma Narrows (n=265)
25-29	4.3	3.0
30-34	48.1	15.1
35-39	34.1	25.3
40-44	8.1	7.5
45-49	1.6	4.9
50-54	1.6	7.9
55-59	2.2	15.1
60-64		10.9
65-69		5.3
70-74		2.6
75-79		1.5
80-84		1.0
85-89		0.4
90-94		
95-99		0.4
Average length	35.3 cm	46.8 cm

Table 36. Average age composition of the annual sampled catch of chinook salmon (per angler trip) on inner-Puget Sound by angling area before and after the 1958 regulation.

Angling area	Average annual catch (numbers of chinook) per angler trip					
	Second-year fish		Third-year fish		Fourth-year fish	
	1949-58	1959-64	1949-58	1959-64	1949-58	1959-64
Admiralty Inlet	0.11	0.08	0.02	0.02	.005	.013
Point No Point	0.12	0.10	0.09	0.19	.019	.050
Possession Point	0.17	0.07	0.03	0.05	.002	.008
Port Gardner	0.10	0.05	0.01	0.01	.004	.007
Saratoga Passage	0.28	0.13	0.03	0.04	.012	.009
Seattle-Bremerton	0.28	0.13	0.08	0.11	.006	.026
Tacoma southward ^{1/}	0.12	0.06	0.08	0.12	.030	.054
Hood Canal	0.02	0.04	0.02	0.12	.006	.034
Average	0.16	0.08	0.05	0.08	.012	.025

^{1/} Ages were determined in the manner described by Lasater and Haw (1964).

Table 37. Calculated annual dressed^{1/} (head on) weights^{2/} of chinook taken in inner Puget Sound, 1955 to 1963.

Years	Angler trips	Chinook			Average weight of individual chinook in pounds
		Numbers	Pounds	Pounds per trip	
1955	591,500	127,100	386,400	0.59	3.04
1956	669,300	174,600	584,900	0.87	3.35
1957	659,700	207,900	532,200	0.81	2.56
1958	481,900	119,700	347,100	0.72	2.90
1959	424,700	73,600	345,200	0.81	4.69
1960	490,300	82,100	330,900	0.67	4.03
1961	568,100	89,600	556,400	0.98	6.21
1962	498,300	96,300	372,700	0.75	3.87
1963	705,000	124,000	468,700	0.66	3.78
1955-58 avg.	606,600	157,300	462,700	0.75	2.96
1959-63 avg.	537,300	93,100	414,800	0.77	4.52

^{1/} Dressed weight is approximately 85% of round weight.

^{2/} Weights were calculated in the manner described by Fry and Hughes (1951).

Table 38. Comparison of lengths of pink salmon sampled from the Tacoma Narrows and western Juan de Fuca Strait (Sekiu and Neah Bay), June 26 through July 10, 1957.

Cm fork length	Per cent of sample	
	Tacoma Narrows (n=31)	W. Juan de Fuca St. (n=58)
37-38	3.2	
39-40	22.6	
41-42	45.2	
43-44	25.8	1.7
45-46		
47-48	3.2	
49-50		1.7
51-52		1.7
53-54		36.2
55-56		24.1
57-58		20.7
59-60		10.3
61-62		1.7
63-64		1.7
65-66		
Average length	41.6 cm	55.4 cm

Table 39. Average monthly percentages of sampled, sport-caught pink salmon less than 16 inches total length, Tacoma Narrows, 1953, 1955, and 1957.

Month	Per cent less than 16 inches	
	Average	Range
March	96.9	92.6 - 100
April	85.8	78.0 - 94.2
May	40.2	30.8 - 36.5
June	0.6	0 - 1.5

Table 40. Monthly percentages of the annual sport harvest of pink salmon in the Tacoma Narrows before 1958.

Month	Before 1958 (1953, 1955 and 1957)		After 1958 (1954, 1961 and 1963)	
	Average	Range	Average	Range
January	0.4	0 - 0.9	0	-
February	0.2	0 - 0.5	0	-
March	4.9	0.6 - 10.0	0	-
April	15.3	3.0 - 32.8	0.2	0 - 0.7
May	17.0	9.8 - 22.5	13.0	0 - 38.5
June	30.8	7.8 - 57.9	5.8	0 - 15.1
July	17.4	3.7 - 30.5	3.2	1.6 - 6.3
August	8.1	5.0 - 12.9	50.0	17.0 - 67.9
September	5.9	3.9 - 8.9	27.8	22.4 - 30.5

Table 41. Monthly percentages of angling effort and salmon harvest (number of fish), on Juan de Fuca Strait from 1955 through 1964.

Month	Angler trips	Chinook	Coho	Pink	Salmon
January	0.3	0.9			0.3
February	0.5	1.6			0.5
March	0.7	1.7			0.5
April	1.1	2.5	0.1		0.8
May	3.7	7.2	0.5		2.5
June	12.0	19.1	4.5	0.8	8.3
July	25.5	24.1	25.0	35.9	27.0
August	38.8	31.1	43.4	53.9	41.8
September	15.5	8.1	25.8	9.4	16.8
October	1.0	1.5	0.7		0.8
November	0.5	0.9			0.3
December	0.4	1.3			0.4

Table 42. Size and age composition of monthly sport-catches of chinook (April through September, 1964) in Juan de Fuca Strait.

Fork length (cm)	Per cent	Numbers aged	Calculated per cent age* composition and stream nuclei** (SN)				
			2	3	4	5	SN
			<u>April</u>				
(n = 358)							
≤ 45	0.3	0					
46-50	5.4	4		5.4			4.1
51-55	17.0	12	1.4	15.6			4.3
56-60	25.9	18		25.9			0
61-65	19.0	12		19.0			0
66-70	18.0	14		10.3	7.7		7.7
71-75	9.5	11		5.2	4.3		2.6
76-80	3.4	4		0.9	2.6		2.6
81-85	1.2	3			1.2		
86-90	0	0					
91-95	0	0					
96-100	0.3	0					
> 101	0	0					
Total	100.0	78	1.4	82.3	15.8	0	21.3

April average length - 62.1 cm, average dressed weight 6.4 lb.

* The year of life at capture.

** Chinook thought to have spent over a year in fresh water before migrating to sea. Only 4 fish had scales interpreted as representing a stay of more than 2 years in fresh water.

Table 42 continued.

Fork length (cm)	Per cent	Numbers aged	Calculated per cent age composition and stream nuclei (SN)				
			2	3	4	5	SN
(n = 250)		<u>May</u>					
≤ 45	0.4	0					
46-50	2.0	3	0.5	1.3	0.2		
51-55	19.2	20	4.8	12.5	1.9		3.8
56-60	25.2	24		21.2	2.6	1.3	3.2
61-65	16.0	19		12.6	3.4		0.3
66-70	14.8	19		7.4	7.4		3.0
71-75	9.6	10		2.4	7.2		
76-80	5.6	8			4.2	1.4	1.4
81-85	4.0	8			2.7	1.3	1.3
86-90	1.6	3			1.1	0.5	0.5
91-95	0.8	0					
96-100	0.8	1			0.8		
≥ 101	0	0					
Total	100.0	115	5.3	57.4	31.5	4.5	13.5

May average length - 63.6 cm, average dressed weight 7.0 lb.

Continued next page.

Table 42 continued.

Fork length (cm)	Per cent	Numbers aged	Calculated per cent age composition and stream nuclei (SN)				
			2	3	4	5	SN
(n = 733)		<u>June</u>					
≤ 45	0.2	1	0.2				
46-50	3.3	4	1.7	1.7			1.7
51-55	5.8	12	0.5	5.3			1.9
56-60	12.6	23	0.5	12.1			6.7
61-65	13.7	17		12.1	1.6		2.4
66-70	10.0	21		9.0	1.0		1.0
71-75	14.0	27		12.4	1.6		1.6
76-80	19.4	36		12.4	7.0		0.5
81-85	11.3	27			9.1	2.1	2.1
86-90	6.4	14			4.6	1.8***	1.4
91-95	2.1	5			1.3	0.8	0.8
96-100	0.7	3			0.5	0.2	
≥ 101	0.5	0					
Total	100.0	190	2.9	65.0	26.7	4.9	20.1

June average length 70.6, average dressed weight 10.5 lb.

*** Includes one sixth-year fish.

Table 42 continued.

Fork length (cm)	Per cent	Number aged	Calculated per cent age composition and stream nuclei (SN)				
			2	3	4	5	SN
			<u>July</u>				
(n = 1,325							
≤ 45	0.9	1	0.9				
46-50	4.0	1	4.0				
51-55	9.2	10	3.7	5.5			4.6
56-60	9.9	15	0.7	9.2			5.3
61-65	9.9	15	0.7	7.3	2.0		2.0
66-70	7.6	15		7.1	0.5		1.0
71-75	12.2	30		9.3	2.8		2.4
76-80	17.0	57		11.3	5.1	0.6	2.1
81-85	16.2	54		3.0	12.6	0.6	1.2
86-90	7.5	27			7.2	0.3	0.3
91-95	3.7	16			2.3	1.4	0.5
96-100	1.8	6			1.5	0.3	
≥ 101	0.1	0					
Total	100.0	247	10.0	52.7	34.0	3.2	19.4

July average length - 72.3 cm, average dressed weight 10.9 lb.

Continued next page.

Table 42 continued.

Fork length (cm)	Per cent	Numbers aged	Calculated per cent age composition and stream nuclei (SN)				
			2	3	4	5	SN
			<u>August</u>				
(n = 971)							
≤ 45	2.3	8	2.0	0.3			0.6
46-50	6.1	13	4.7	1.4			0.9
51-55	8.9	21	4.7	3.8			3.0
56-60	9.8	28	2.1	7.4		0.4	3.1
61-65	8.4	24		6.7	1.7		3.2
66-70	8.6	22		6.6	2.0		2.3
71-75	10.0	32		7.5	2.5		2.2
76-80	12.3	51		6.8	5.3	0.2	1.5
81-85	12.5	45		0.8	11.4	0.3	0.6
86-90	10.0	43			8.4	1.9	1.9
91-95	7.2	24			5.7	1.5	0.6
96-100	3.0	12			2.5	0.5	
≥ 101	0.9	4			0.2	0.7***	
Total	100.0	327	13.5	41.3	39.7	5.5	19.9

August average length - 72.5 cm, average dressed weight 11.5.

Table 42 continued.

Fork length (cm)	Per cent	Numbers aged	Calculated per cent age composition and stream nuclei (SN)				
			2	3	4	5	SN
		<u>September</u>					
(n = 107)							
≤ 45	5.6	2	2.8	2.8			2.8
46-50	10.2	4	5.1	5.1			5.1
51-55	13.0	3	8.7	4.3			4.3
56-60	17.7	5	7.0	10.7			3.5
61-65	8.3	5	0	5.0	3.3		3.3
66-70	18.6	10	0	15.0	3.6		3.7
71-75	6.6	5	0	2.6	4.0		2.6
76-80	3.6	1				3.6	3.6
81-85	2.7	1			2.7		
86-90	5.5	4			1.4	4.1	2.8
91-95	3.8	3			1.3	2.5***	2.5
96-100	2.7	1				2.7***	2.7
101	0.9	0					
Total	99.2	44	23.6	45.5	16.3	12.9	36.8

September average length - 64.3 cm, average dressed weight 8.3 lb.

Table 43. Temporal and spatial distribution of the angling effort on Juan de Fuca Strait, Puget Sound and among the San Juan Islands.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
<u>Tacoma - Southern Puget Sound (Fig. 3)</u>									
Commencement Bay	X	X		X		X	All year	Early AM	Winter effort for small salmon greatly reduced since 1958.
Point Brown		X		X		X	Late summer	Early AM	
Quartermaster Harbor	X						Early winter	AM	Fishing area near entrance to harbor.
Point Dalco	X						All year	Flood tide	
Tacoma Narrows	X		X		X		All year	Tide change	Marks the southern limit for major angling sites for feeding coho on Puget Sound. The major area on the Sound for resident pink salmon angling.
Point Defiance	X	X		X		X	Spring-summer	Tide change	One of the most popular sites for chinook angling on Puget Sound.
Point Evans	X						Winter	Ebb tide	Fished almost exclusively by mooching from drifting boats.
Day Island	X						All year	Flood tide	Fishing area on west side of island.
Wollochet Bay	X						Early winter	Tide change	Fishing area along shorelines near the entrance to bay.
"Sandspit"	X			X			All year	Tide change	Located off northwest tip of Fox Island.
"Concrete Dock", Fox Point and Point Gibson	X	X					Winter, Late summer	Tide change	Located along southeast shoreline of Fox Island.
Henderson Bay	X	X					Winter, Late Summer	Early AM High slack tide	Immature chinook taken in shallow water at head of bay in winter; maturing chinook taken off mouth of Minter Creek in late summer.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
Anderson Island	X	X					All year	Tide change, ebb tide	Fishing area at southern tip of island.
Johnson Point	X						Spring, summer	Early tide changes	The most popular fishing site in the Olympia area.
Cooper Point	X						Spring	Tide changes	
Steamboat Island	X						Spring	Tide changes	Fishing area at northern end of island.
Hartstine Island	X						Spring	Tide changes	Fishing area at northern end of island.
Budd Inlet		X					Late summer	Early AM	Despite the large runs of maturing Deschutes River bound chinook returning to the head of the inlet, a substantial fishery has not developed.
Seattle - Bremerton (Figure 3)									
Elliot Bay and Shillshole Bay	X	X	X	X			Late summer - winter	Early AM	Winter effort for small salmon reduced since 1958. Immature coho catches occurred prior to 1958 in winter. Heavy late summer effort for maturing chinook.
"The Trees"	X						All year	AM	Located due east from Point Jefferson.
Manchester	X		X			X	Winter		Fishing effort greatly reduced since 1958. Yielded exceptionally high catches per effort of sub-16-inch coho. Fishing area west of Blake Island and north to Orchard Point.
Battle Point, Point White and Washington Narrows	X						Winter		

Continued next page.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)				Popular angling times		Remarks	
	Chinook		Coho		Season	Diurnal		
	I	M	I	M				
<u>Seattle - Bremerton</u> (continued)								
Agate Passage	X					Late winter	Ebb tide	Fishing area at east end of passage and apparently associated with the immigration of spawning herring.
Point Jefferson	X					All year	AM	
<u>Possession Point Area</u> (Figure 3)								
Possession Point	X		X			Spring - summer	Early AM late ebb tide	Main fishing area in the 25 - 150 ft depths southwest of the point. Most important area on Puget Sound for resident coho.
Edmonds, Richmond Beach	X		X			Winter	AM	Most popular fishing sites near ends of oil docks.
Meadowdale			X			Early spring and late summer	AM	Early spring effort for small coho greatly reduced since 1958. The shoreline between Meadowdale and Mukilteo is heavily fished for pink salmon.
<u>Point No Point</u> (Figure 3)	X		X			All year	Ebb tide	Fishing effort is concentrated on northern side of point.
<u>Admiralty Inlet</u> (Figure 2)								
Double Bluff	X		X			Spring - summer	Ebb tide	Favorite fishing area is along the southwestern shoreline forming the western extremity of Useless Bay. Sandlance bait is a favorite here.
Mutiny Bay						Late summer	Early AM	

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
<u>Admiralty Inlet</u> (continued)									
"Windmill Hole"	X						Late spring and early summer	Late PM	Located at the northern extremity of Mutiny Bay. Sandlance bait is favorite here.
Bush Point, Lagoon Point	X		X			X	Summer	AM	The highest catches per effort of maturing pink salmon on Puget Sound occur here.
Admiralty Head	X		X			X	Winter - summer	AM	Fishing area on west side of Admiralty Head. Has the reputation as being the most consistent area on Puget Sound for Pacific halibut (<u>Hippoglossus stenolepis</u>).
Point Wilson, Marrowstone Point, Liplip Point	X		X			X	All year		Fished by local anglers.
<u>Port Gardner - Port Susan and Saratoga Passage</u> (Figure 2)									
Mission Bar	X		X			X	Summer	AM	Located at seaward edge of the Snohomish River delta. Popularly considered to be the State's finest angling area for large chinook into the 1930's. The quality of the angling appears to have deteriorated here more than anywhere else on Puget Sound.
Kayak Point	X						Winter - spring		Once a popular angling site.
Camano Head and Gedney (Hat) Island	X		X			X	Spring - summer	AM	Fished heavily in summer.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
<u>Port Gardner - Port Susan and Saratoga Passage (Figure 2)</u>									
Mukilteo	X		X			X	Winter - summer	AM	Mukilteo shoreline fished heavily for pink salmon.
Saratoga Passage	X		X	X		X	All year	AM	Fishing effort scattered along shore lines of the passage.
East Point and Snatelum Point	X						Winter - spring		
Holmes Harbor and Dines Point	X						Winter - spring		A favorite fishing location is near the herring trap located on the west shore near the southern end of Holmes Harbor. A popular local method of fishing entails lightly hooking a live herring and letting it swim about on an unweighted line.
<u>Skagit Bay and Deception Pass (Figure 2)</u>									
Hope Island						X	Spring - summer		The largest chinook consistently taken from Puget Sound are taken here. Anglers troll the island's east end on the flood tide and its west end on the ebb. This is the only site on the Sound where mooching gear is not used. Currently, large spoons of one design are used almost exclusively whereas in past years artificial plugs have been used with similar uniformity.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times Diurnal	Remarks	
	Chinook		Coho		Pink				
	I	M	I	M	I	M			
<u>Skagit Bay and Deception Pass (Figure 2)</u> (continued)									
Deception Pass	X	X	X				Spring - summer	Ebb tide	A large eddy formed on the ebb tide near the Whidbey Island shore of Deception Pass immediately west of the bridge has been fished heavily in recent years. The common practice here is to remain stationary under power, while using mooching gear.
<u>Hood Canal (Figure 3)</u>									
Hazel Point	X		X			X	Spring - summer	Early AM	
Jackson Cove	X						Winter - spring	AM	
Oak Head and Pleasant Harbor	X						Year around	AM	Chinook are taken within the confines of Pleasant Harbor during winter and outside at other times.
Point Misery	X			X			Spring - summer	AM	Resident coho frequently are important from spring through summer among the tide rips between Oak Head and Point Misery.
Hoodsport	X	X		X		X	Late summer	Early AM	This site has developed since the establishment of the salmon hatchery on Finch Creek.
Dewatto						X	Fall	AM	Concentrations of large coho are present here from late September through November. Angling is unusual here in that coho flies are presently the most popular lure and the coho appear to be larger than those elsewhere on the Sound.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
<u>Hood Canal (continued)</u> (Figure 2)									
"Indian Hole"	X	X		X			Spring - fall		Located just east of the Skokomish River delta.
"Bald Point" (Ayres Point)	X			X			Spring - fall	Early AM	
<u>San Juan Islands</u> (Figure 2)									
William Point, Carter Point, Hale Passage, Limestone Point, East Sound, Tide Point, Guemes Channel, Fidalgo Head and Lopez Pass	X						Winter		The presence of salmon at these sites appears to be associated with the abundance of herring. The average size of these chinook is much larger than the winter fish taken from inner-Puget Sound.
Point Lawrence	X	X		X			Spring - summer		This appears to be the most popular summer angling site in the San Juan Islands.
Sares Head, Lummi Rocks, north end of Cypress Island, Open Bay, North Bay and Obstruction Pass	X			X			Spring - summer		
Point Roberts	X	X		X			Spring - summer		Due to the unique political geography, most of the anglers here are Canadians.

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)										Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal					
	I	M	I	M	I	M							
<u>East Juan de Fuca Strait (Figure 2)</u>													
West Beach	X	X		X			X		Spring - summer				
Cape George and Diamond Point	X	X		X			X		Spring - summer				
Port Discovery and Washington Harbor (Sequim Bay)	X								Winter				
Dungeness Spit	X	X		X			X		Spring - summer				Maturing spring chinook bound for the Dungeness River are taken near the mouth of this river in May. The waters near the outer end of the spit are fished in the summer.
Green Point	X	X		X			X		All year				
Ediz Hook	X	X		X			X		All year				Feeding chinook are taken close inside the spit during the winter. The waters near the end of the spit are fished at other times.
Fresh Water Bay and Crescent Bay	X	X		X			X		Summer			AM	
<u>Sekiu and Pillar Point (Figure 1)</u>													
Sekiu	X	X		X			X		Spring - summer			AM	During the spring the waters from Sekiu Point west to the mouth of the Hoko River are the most popular. During the summer, the waters east of here also become popular.

Table 43 continued.

Angling sites	Species taken										Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal					
	I	M	I	M	I	M							
<u>Sekiu and Pillar Point</u> (Figure 1) (continued)													
"Coal Mine"	X	X		X				X		Summer	AM		Located between Sekiu and Pillar Point.
Pillar Point	X	X		X				X		Summer	AM		The coastline within a mile of the point is fished heavily. There is a rather poor public boat ramp near the point where private boats are launched.
<u>Neah Bay</u> (Figure 1)										Winter			Some feeding chinook have been taken inside the bay in recent years.
Neah Bay	X	X		X				X		Summer	AM		Fishing effort is concentrated along the eastern shore and at the northern and southern extremities of the island.
Weedah Island	X	X		X				X		Summer	AM		
Koitolah (Garbage) Point	X	X		X				X		Summer	AM		The waters just outside of the kelp lining these shore lines are popular sites for large chinook.
Chibahdehl (Midway) Rocks, "Slant Rock", "Mushroom Rock", Tatoosh Island, "The Gut".	X	X		X				X		Summer	AM		A group of barren rocks, the largest lying approximately 1,500 yd south of Fuca Pillar.
"Skagway Rocks"	X	X								Summer			Located at the entrance to Juan de Fuca Strait. Large concentrations of feeding coho are usually available throughout the summer.
"Whistler" (Buoy)										Summer			

Table 43 continued.

Angling sites	Species taken (M = mature, I = immature)						Popular angling times		Remarks
	Chinook		Coho		Pink		Season	Diurnal	
	I	M	I	M	I	M			
Nesh Bay (Figure 1) (continued)									
Mukkaw Bay, Spike Rock and Father and Son (Rock)		X					Summer		Fished by charter boat anglers and a few adventurous small boat fishermen who share these sites with commercial trollers

Table 44. Summary of estimated effort and catches in the Westport ocean salmon sport fishery, 1952 through 1964.

Year	Charter boat trips	Kicker boat trips	Angler trips	SALMON CATCH IN THOUSANDS.				Salmon catch/trip
				Chinook	Coho	Pink	Total	
1952	*	12,400	32,000	54.0	16.0	-	70.0	2.18
1953	2,600	6,300	24,600	10.0	10.0	-	20.0	0.81
1954	6,600	7,200	55,000	23.0	25.0	-	48.0	0.87
1955	9,200	8,000	76,600	49.0	29.0	1.0	79.0	1.03
1956	11,500	8,300	100,000	69.0	66.0	-	135.0	1.35
1957	12,000	9,600	111,600	56.0	98.0	3.0	157.0	1.41
1958	10,000	7,000	85,300	36.0	47.0	-	83.0	0.97
1959	9,000	6,100	86,900	41.0	60.0	0.1	101.1	1.16
1960	9,300	5,800	90,500	43.0	32.0	-	75.0	0.83
1961	9,900	6,500	95,000	45.0	57.0	0.3	102.3	1.08
1962	12,300	9,800	132,300	50.0	143.0	1.4	194.4	1.47
1963	15,000	12,700	142,200	52.0	117.0	1.4	170.4	1.20
1964	15,800	8,800	148,300	68.0	72.0	-	140.0	0.95

* Charter effort of 8 boats included in kicker category.

Table 45. Angler trips by month, Westport sport fishery, 1957 through 1964.

Year	MONTH							Total
	April	May	June	July	August	Sept.	Oct.	
1957	771	4,901	15,921	26,174	42,417	20,929	439	111,600
1958	321	3,607	13,420	20,673	28,168	17,205	1,856	85,300
1959	152	3,879	10,859	18,597	34,119	16,661	2,594	86,900
1960	238	2,258	6,190	26,306	36,816	16,863	1,830	90,500
1961	277	3,742	10,148	29,452	31,889	17,609	1,844	95,000
1962	570	3,748	18,166	41,657	47,985	19,572	560	132,300
1963	702	4,848	18,950	48,770	46,768	20,692	1,480	142,200
1964	894	4,618	26,252	46,083	46,206	21,776	2,437	148,300
8 year average	491	3,950	14,980	32,214	39,296	18,913	1,630	111,500
Per cent	0.4	3.5	13.4	28.9	35.3	17.0	1.5	100

Table 46. Chinook salmon catch by month, Westport sport fishery, 1955 through 1964.

Year	MONTH							Total
	April	May	June	July	August	Sept.	Oct.	
1955	-	550	21,045	14,306	9,559	3,772	74	49,306
1956	-	1,652	7,939	18,849	33,003	7,181	341	68,965
1957	420	1,858	7,021	23,891	16,417	6,633	19	56,259
1958	236	2,506	7,618	7,136	12,353	5,760	502	36,111
1959	18	4,103	5,706	9,203	16,667	4,282	1,154	41,133
1960	252	561	3,419	17,476	18,422	3,439	156	43,725
1961	148	558	3,933	18,220	19,056	3,270	191	45,376
1962	172	528	4,840	19,511	17,992	6,543	115	49,701
1963	355	1,283	9,648	21,103	15,737	3,818	157	52,101
1964	154	3,307	23,904	23,969	11,113	5,147	401	67,995
10 year average	176	1,691	9,507	17,366	17,032	4,985	311	51,067
Per cent	0.3	3.3	18.6	34.0	33.4	9.8	0.6	100

Table 47. Ages and weights of chinook salmon by 5-cm intervals, Westport sport fishery, 1961 and 1963.

1961

Fork length in centimeters	Calculated round wt*(1b)	Number by age class										Total	
		1 ₁	2 ₁	3 ₂	3 ₁	4 ₂	4 ₁	5 ₂	5 ₁	6 ₂	6 ₁		
45 - 50	2.5 - 3.5	5	47	2									54
51 - 55	3.7 - 4.8	3	92	17	2								114
56 - 60	5.1 - 6.3	2	83	45	21	2							153
61 - 65	6.7 - 8.2		29	32	46	5	1						113
66 - 70	8.2 - 10.5		3	17	82	3	5						110
71 - 75	11.0 - 13.2			4	118	16	14	1	1				154
76 - 80	13.8 - 16.3			3	116	7	40	1	2				169
81 - 85	17.0 - 19.9			1	39	3	139	2	4				188
86 - 90	20.7 - 23.9				5	1	124	3	10	2			145
91 - 95	24.8 - 28.6						33		32	1			66
96 - 100	29.6 - 33.9						3	1	27			1	32
101 - 105	35.3 - 39.7								3			1	4
Total		10	254	121	429	37	359	8	79	3	2		1,302
Per cent		1	20	9	33	3	28	1	6	-	-		100
Per cent by age		1	20	42		30		7		-			100
1963													
45 - 50	2.5 - 3.5	26			2								28
51 - 55	3.7 - 4.8	31	3	6		1							41
56 - 60	5.1 - 6.3	19	17	14		5	1						56
61 - 65	6.7 - 8.2	5	6	16		12	1						40
66 - 70	8.2 - 10.5	1		24		21	2	3					51
71 - 75	11.0 - 13.2	1		38		21	9	3					72
76 - 80	13.8 - 16.3			36		23	44	15	1				119
81 - 85	17.0 - 19.9			17		3	75	13	4	1			113
86 - 90	20.7 - 23.9			3		2	69	9	6				39
91 - 95	24.8 - 28.6						19	5	6	1	2		33
96 - 100	29.6 - 33.9						10		4				14
101 - 105	35.0 - 39.7						4					1	5
106 - 110	41.0 - 46.3						1		1			1	3
Total		0	83	26	156	88	235	48	22	2	4		664
Per cent		0	13	4	23	13	35	7	3	-	1		100
Per cent by age		0	13	27		49		11		1			100

*Dressed weights were calculated by means of the formula of Fry and Hughes (1951) and were multiplied by 1.17, which is the "traditional" factor used by the Washington Department of Fisheries for converting dressed salmon weights to round weights.

Table 48. Probable origins of chinook salmon from unduplicated double-fin mark recoveries, Westport sport fishery, 1960 to 1964.

Area	Origin
California	San Francisco Bay, Sacramento River, American River
Oregon	Nestucca River, Rogue River, Umpqua River
Columbia River Drainage	Toutle River, Klickitat River, Wildhorse River, Spring Creek, Elokomina River, Little White Salmon River, Clackamas River, Oxbow Hatchery, McNary Spawning Channel
Washington	Nemah River, Puget Sound Salt Water Lagoons, Deschutes River

Table 49. Chinook salmon sex ratio data by 5 cm intervals, Westport sport fishery, 1962 and 1963.

Fork length in cm	1962				1963			
	Number		Per cent		Number		Per cent	
	Males	Females	Males	Females	Males	Females	Males	Females
45 - 50	30	22	57	43	27	5	84	16
51 - 55	48	23	68	32	37	8	82	18
56 - 60	34	15	69	31	53	7	88	12
61 - 65	31	14	69	31	27	15	64	36
66 - 70	29	16	64	36	43	13	77	23
71 - 75	38	35	52	48	49	26	65	35
76 - 80	41	74	36	64	57	65	47	53
81 - 85	59	85	41	59	58	59	50	50
86 - 90	64	66	49	51	60	44	58	42
91 - 95	33	28	54	46	21	14	60	40
96 - 100	14	12	54	46	9	7	56	44
101 - 105	3	4	43	57	5	1	83	17
106 - 110	6	1	86	14	3	0	100	0
Total	430	395	52	48	449	264	63	37

Table 50. Maturity of chinook salmon in catches, Westport sport fishery, August through October, 1962.

Month	Adults		Immatures	
	Numbers	Per cent	Numbers	Per cent
August	360	35	658	65
September	249	24	802	76
October	51	88	7	12
Total	660	31	1,467	69

Table 51. Monthly mean fork lengths (in centimeters) of chinook salmon in the Westport sport harvest, 1961 through 1964.

Year	April	May	June	July	August	Sept.	Oct.	Cumulative
1961 No. mean	23 77.8	107 75.1	247 74.5	384 71.3	373 72.5	140 61.3	14 68.1	1,288 71.6
1962 No. mean	55 79.5	115 77.6	367 70.6	686 70.9	587 66.7	463 64.6	41 80.0	2,313 70.1
1963 No. mean	103 79.0	182 78.5	1,252 75.4	1,710 69.8	1,079 72.2	180 74.1	- -	4,506 72.7
1964 No. mean	19 72.2	191 73.4	1,679 69.3	2,428 69.6	1,517 72.1	653 71.2	- -	6,487 70.4

Table 52. Catches of coho salmon by month, Westport sport fishery, 1955 through 1964.

Year	April	May	June	July	Aug.	Sept.	Oct.	Total
1955	-	-	810	5,990	14,163	7,366	530	28,859
1956	-	-	1,577	20,038	27,668	15,451	765	65,499
1957	-	251	4,533	16,722	65,139	9,959	399	97,003
1958	-	26	1,534	7,085	17,123	20,179	597	46,544
1959	-	24	2,131	13,468	32,103	10,667	1,929	60,322
1960	-	15	753	8,006	15,892	6,570	1,185	32,421
1961	1	4,504	3,708	14,081	12,516	20,419	1,844	57,073
1962	455	3,268	25,093	37,428	64,926	11,390	169	142,729
1963	226	2,175	4,311	56,370	32,971	18,784	1,847	116,684
1964	65	40	6,028	11,200	30,832	21,774	2,324	72,263
10 year average	75	1,030	5,048	19,039	31,333	14,256	1,159	71,940
Per cent	0.1	1.4	7.0	26.5	43.6	19.8	1.6	100

Table 53. Probable origins of coho salmon from unduplicated double-fin mark recoveries, Westport sport fishery, 1960 through 1964.

Area	Origin
California	Mad River, Eel River
Oregon	Alsea River, Millicoma River
Columbia River Drainage	Clackamas River, Washougal River, Speelyai Creek, Little White Salmon River, Hood River, Lewis River, Big Creek, Gnat Creek, Elokomin River, Cascade Hat, Bear Creek
Washington	Minter Creek, Baker Lake, Grays Harbor, Puget Sound Salt Water Lagoons, Melbourne Lake

Table 54. Monthly mean fork lengths (in centimeters) of coho salmon and calculated round weight* (in pounds), Westport sport fishery, 1961 through 1964.

		April	May	June	July	Aug.	Sept.	Oct.	Cum.
1961	No. sampled	-	291	429	316	499	343	76	1,954
	Mean length	-	55.2	59.1	62.7	66.7	69.1	71.3	63.3
	Mean rd. wt.	-	4.42	5.37	6.42	7.84	8.83	9.90	6.62
1962	No. sampled	67	182	1,128	894	934	564	33	3,802
	Mean length	52.4	56.7	59.5	63.6	65.9	69.9	69.3	63.0
	Mean rd. wt.	3.85	4.75	5.48	6.72	7.55	9.18	8.92	6.52
1963	No. sampled	79	288	361	2,255	1,335	619	-	4,974
	Mean length	50.6	54.1	58.9	62.1	64.6	66.5	-	62.5
	Mean rd. wt.	3.52	4.18	5.31	6.23	7.06	7.77	-	6.36
1964	No. sampled	-	-	343	1,101	2,912	1,529	41	5,926
	Mean length	-	-	57.6	62.4	65.6	69.3	62.6	65.5
	Mean rd. wt.	-	-	4.98	6.33	7.43	8.92	10.51	7.40

* See footnote to Table 47.

Table 55. Calculated monthly catches of pink salmon, Westport sport fishery, 1957.

Month	Catch
April	0
May	0
June	41
July	850
Aug.	1,980
Sept.	89
Oct.	0
Total	2,960

Table 56. Calculated annual catches of Pacific halibut, Westport sport fishery, 1960 through 1964.

Year	Catch
1960	1,500
1961	1,000
1962	160
1963	100
1964	150

Table 57. Ages of marked chinook in the Westport sport fishery before and after the establishment of the 20-inch minimum size.

Period	1957 to July 10, 1958					July 11, 1958 through 1960				
	Age	2	3	4	5	Total	2	3	4	5
No. sampled	46	79	11	0	136	27	140	81	9	257
Per cent	34	58	8	0	100	11	54	32	3	100

Table 58. External coloration of adult chinook salmon and area closures, Westport sport fishery, 1958 to 1962.

Year	Bright		Dusky		Dark		Sampling period	Area* closures
	Number	Per cent	Number	Per cent	Number	Per cent		
1958	254	33.4	456	58.2	74	9.4	8/7 to 10/5	Area 2
1959	568	69.4	230	28.1	21	2.6	8/3 to 10/4	9/9 to 10/27 Area 2
1960	420	82.4	79	15.5	11	2.2	8/25 to 9/25	8/25 to 9/4 Area 1 & 2
1961	988	77.2	277	21.7	14	1.1	8/13 to 10/15	8/22 to 9/2 Area 1 & 2
1962	706	68.0	3.8	30.0	17	2.0	8/4 to 10/5	8/21 to 9/1 None

* Area 1 is Grays Harbor and Area 2 is between the jetties at the harbor entrance.

Table 59. Calculated salmon catches and fishing effort in the La Push ocean sport fishery, 1953 through 1964.

Year	Charter trips	Kicker** trips	Angler trips	Chinook	Coho	Pink	Total	Fish per angler trip
1953	-	-	-	2,500	3,600	-	6,100	-
1954	-	-	-	3,600	3,600	-	7,200	-
1955	-	-	-	3,000	7,000	-	10,000	-
1956	250	7,600	20,000	7,000	20,000	-	27,000	1.35
1957	600	7,900	22,000	5,200	15,000	1,900	22,100	1.02
1958	390	5,600	16,000	4,000	11,000	-	15,000	0.95
1959	450	3,800	11,000	1,800	9,400	500	11,700	1.04
1960	620	2,900	9,000	3,400	2,900	-	6,300	0.68
1961	280	3,700	10,500	1,200	6,600	400	8,200	0.78
1962	580	4,300	13,200	2,500	9,400	-	11,900	0.90
1963	520	4,900	15,100	3,500	13,300	6,100	22,900	1.51
1964	-	-	13,200	2,300	10,000	-	12,300	0.92

* Minimum size increased from 12 to 20 inches total length on July 11, 1958.

** Includes "pleasure" boats effort.

Table 60. Chinook age and sex samples by 5-cm intervals, La Push sport fishery, 1963.

Fork length in cm	Age class *								Sex**			
	2 1	3 2	3 1	4 2	4 1	5 2	5 1	6 1	Total	Males	Females	Total
45 - 50	54	1	5						60	48	6	54
51 - 55	35	3	2						40	37	5	42
56 - 60	15		2	1					18	12	3	15
61 - 65	3	1	3	4					11	6	3	9
66 - 70	3		9						12	3	6	9
71 - 75	1		12		4				17	10	3	13
76 - 80			7	1	11				19	9	8	17
81 - 85			3	2	13	2			20	12	8	20
86 - 90				1	16				17	9	9	18
91 - 95					12	3	3		18	5	8	13
96 - 100					6		2	1	9	1	5	6
101 - 105					1		2		3	0	3	3
Total	111	5	43	9	63	5	7	1	244	152	67	219
Per cent	45	2	18	4	26	2	3	-	100	69	31	100

*Includes unsexed fish

**Includes fish with regenerated scale samples

Table 61. Estimated annual salmon sport catches and angling effort (from log book records) of the Tokeland charter boat fishery, 1954 through 1957.

Year	Charter trips	Angler trips	Chinook	Coho	Total salmon	Catch/trip
1954	40	200	15	450	465	2.38
1955	75	400	400	250	650	1.75
1956	165	800	350	850	1,200	1.50
1957	95	550	200	850	1,050	1.86

Table 62. Current (1964) Washington and Oregon sport fishing regulations seaward of and above the mouth of the Columbia River.

	Washington	Oregon
<u>Season</u>	Ocean: April 15 - October 31 River: Entire year	Entire year Entire year
<u>License</u>	Not required	Required
<u>Punch card</u>	Required, but free	Required
<u>Annual limit</u>	None	20 salmon
<u>Daily bag limit</u>	Ocean: 3 salmon Estuary: 2 salmon River: 6 salmon, but only 2 over 24 inches.	2 salmon 2 salmon 12 salmon, but only 2 over 12 inches.
<u>Possession limit</u>	Ocean: 6 salmon Estuary: 4 salmon River: 6 salmon	4 salmon 4 salmon 20 salmon, but in a 7 day period only 10 over 12 inches.
<u>Minimum total length</u>	Ocean: 20 inches Estuary: 22 inches River: 12 inches	22 inches from April 20 to Oct. 31 22 inches 6 inches

Table 63. Estimated number of boat trips by boat type in the Columbia River (ocean) sport fishery 1957 through 1964.

Boat type	1957	1958	1959	1960	1961	1962	1963	1964
Charter	1,290	1,910	2,880	3,000	4,130	4,983	6,016	6,590
Pleasure	Count	combined		8,600	10,600	10,518	10,263	12,140
Kickers			9,400	14,870	14,968	14,311	9,040	
Total	14,600	19,000	19,200	21,000	29,600	30,469	30,600	27,800

Table 64. Total effort and catch estimates for the Columbia River (ocean) sport fishery for 1946 through 1964 (Oregon - Washington combined).

Year	Number boats	Angler trips	Number chinook	Number coho	Total salmon	Salmon per angler trip	Period for which catch was estimated
1946	14,900	40,400	23,400	2,600	26,000	0.64	Aug. 24 - Sept. 7
1947	13,600	39,000	12,800	3,200	16,000	0.41	Aug. 24 - Sept. 1
1948	15,600	47,500	12,000	3,000	15,000	0.32	Aug. 24 - Sept. 5
1949	13,900	40,500	11,200	2,800	14,000	0.35	Aug. 24 - Sept. 4
1950	15,000	40,000	16,600	2,300	18,900	0.47	Aug. 24 - Sept. 2
1951	17,200	48,500	7,200	1,900	9,100	0.19	Aug. 24 - Sept. 3
1952	11,800	34,000	11,000	4,000	15,000	0.44	Aug. 24 - Sept. 1
1953	18,500	50,700	14,700	8,000	22,700	0.45	Aug. 10 - Sept. 15
1954	15,700	55,000	12,500	16,000	28,500	0.52	Aug. 1 - Sept. 15
1955	20,000	64,300	12,500	15,200	27,700	0.43	Aug. 1 - Sept. 15
1956	20,000	78,000	34,000	50,000	84,000	1.08	Aug. 1 - Sept. 15
1957	14,600	54,000	18,500	38,700	57,200	1.06	July 3 - Sept. 15
1958	19,000	66,000	25,000	39,600	64,600	0.99	June 1 - Sept. 15
1959	19,200	75,000	23,400	50,000	73,400	0.99	June 1 - Sept. 30
1960	21,000	78,000	37,700	34,600	72,300	0.93	June 30 - Sept. 30
1961	29,600	89,000	20,500	85,500	106,000	1.18	June 11 - Sept. 30
1962	30,500	116,400	29,900	118,900	148,800	1.28	June 7 - Sept. 15
1963	30,600	117,800	32,600	116,200	148,800	1.26	June 10 - Sept. 22
1964	27,800	113,100	28,100	134,100	162,200	1.43	June 15 - Sept. 20

Table 65. Numbers and percentages of age classes of chinook salmon in the Columbia River (ocean) sport harvest in 1957, 1959 through 1964.

Age	1957		1959		1960		1961		1962		1963		1964		Mean per cent
	Per cent	Total catch	Per cent	Total catch	Per cent	Total catch	Per cent	Total catch	Per cent	Total catch	Per cent	Total catch	Per cent	Total catch	
2	35.0	6,475	33.5	7,839	66.8	25,184	32.2	6,601	44.6	13,202	46.6	15,192	36.9	10,369	44.6
3	31.0	5,735	31.0	7,254	25.7	9,689	33.8	6,929	33.4	9,886	23.7	7,726	39.5	11,100	30.6
4	33.0	6,105	30.0	7,020	7.5	2,827	27.3	5,596	16.9	5,002	24.5	7,987	18.6	5,226	20.9
5	1.0	185	5.5	1,287	-	-	6.7	1,347	4.9	1,450	4.6	1,500	5.0	1,405	3.8
6	-	-	-	-	-	-	-	-	.2	60	.6	195	-	-	0.1
Totals		18,500		23,400		37,700		20,500		29,600		32,600		28,100	

Table 66. Percentages of weekly samples of chinook salmon judged mature, by sex, during 1963, Columbia River (ocean) sport fishery.

Week ending	Per cent of males mature	Per cent of females mature
July 21	36.7	35.1
28	35.7	22.5
Aug. 4	31.2	12.7
11	85.2	93.5
18	75.4	57.5
25	67.7	68.2
Sep. 1	59.4	50.9
8	29.6	23.1

Table 67. Sex ratio of chinook salmon in the Columbia River (ocean) sport fishery, 1957 and 1960 through 1964.

	1957	1960	1961	1962	1963	1964	Total
Number males	161	398	84	1,272	158	342	2,254
Number females	86	221	44	683	126	243	1,317
Total	247	619	128	1,955	284	585	3,571
Ratio Males:females	1.87:1	1.80:1	1.90:1	1.86:1	1.25:1	1.40:1	1.71:1

Table 68. Columbia River (ocean) sport catch of miscellaneous species 1960 through 1964.

Year	Number fish				Total
	Rockfish	Lingcod	Pacific halibut	Other	
1960	20,970	119	79	271	21,439
1961	12,742	1,560	551	3,333	18,186
1962	6,539	378	360	3,182	10,459
1963	7,526	463	102	4,554	12,645
1964	15,600	478	40	2,606	18,924

Table 69. Estimated 1964 salmon sport catches, from punch-card returns, in major fresh-water areas.

River	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Columbia	13	21	975	3,947	2,211	1,473	867	1,027	3,096	379	54	33	14,096
Cowlitz	24	8	60	736	302	34	3	110	671	210	50	35	2,243
Toutle		2		6				47	855	308	6	4	1,228
Lewis			5	10	19	12	2	32	872	83	5	5	1,045
Snake					53	17	216	2	29	5			322
Tucannon					95	258			2				355
Yakima					148	12	7	2	5	7			181
Chehalis	43			2			12	68	148	496	173	170	1,112
Satsop	80	7				5		44	46	49	27	187	445
Humtulpips	2	2				2	12	22	78	156	44	134	452
Queets	2	5				22	58	90	46	45	17	2	287
Hoh				5	22	34	180	226	87	49	39	2	644
Nooksack		7	2		7	2		61	207	245	68	2	601
Skagit													
Chinook			4	25	97	68	370	497	58				1,101
Coho							4	107	172	232	29	13	557
Stillaguamish							10	22	114	10			156
Lake Washington							2			559	122	2	685

Table 70. Angling regulations designed specifically for jack salmon.

Years (inclusive)	Areas affected	Provision
1955 - 1961	Any stream in Grays Harbor and Pacific Counties	Lawful to take jack salmon from 12 to 20 inches long.
1956 - 1958	Columbia River tributaries otherwise closed to chinook but open to angling for other than salmon	Lawful to take jack-chinook salmon less than 24 inches long.
1960 - 1962	Streams and lakes only open to angling for fishes other than salmon	Lawful for persons legally angling to take not more than 4 incidentally-caught jack salmon between 12 and 16 inches long.
1962	Tributaries to the Pacific Ocean, Willapa Bay and Grays Harbor between the Columbia River and Cape Flattery	Lawful to take jack salmon between 12 and 20 inches long.
1963 - 1964	Tributaries to Puget Sound and Juan de Fuca Strait east of Tongue Point (near Port Angeles)	Lawful for persons legally angling for fishes other than salmon to take not more than 4 incidentally caught jack salmon between 12 and 16 inches long.
1963 - 1964	Tributaries to the Pacific Ocean and Juan de Fuca Strait west of Tongue Point	Lawful for persons legally angling for fishes other than salmon to take not more than 4 incidentally-caught jack salmon between 12 and 16 inches long.

Table 71. Percentages of large and jack $\frac{1}{2}$ /chinook, reported by boathouse operators, from the Columbia River (fresh water) sport fishery - mouth of Cowlitz River to Bonneville Dam, 1954 through 1959.

Months	Number of fish recorded	Per cent large	Per cent jacks
April - May	28	55.5	44.5
June - July	210	49.0	51.0
August - September	3,513	32.0	68.0
October	195	12.3	87.7

$\frac{1}{2}$ / Chinook less than 24 inches total length.

A P P E N D I X II

Figures 1 through 47

Pages 137 through 182

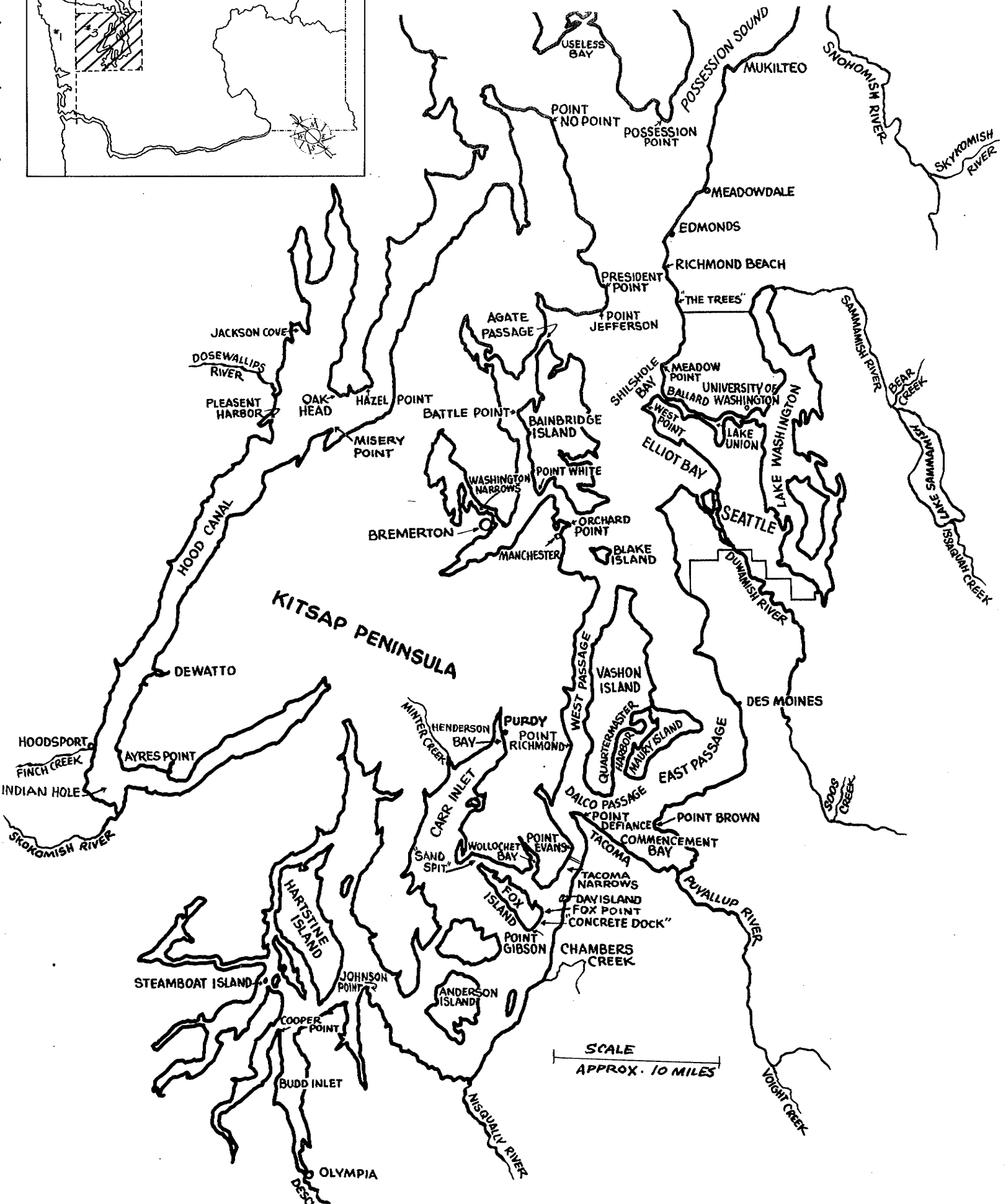
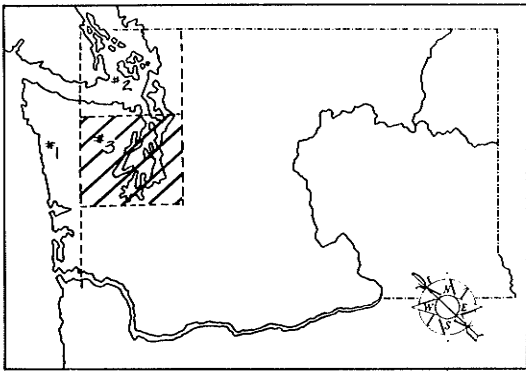


Figure 1. Locales pertinent to salmon angling on central and southern Puget Sound.

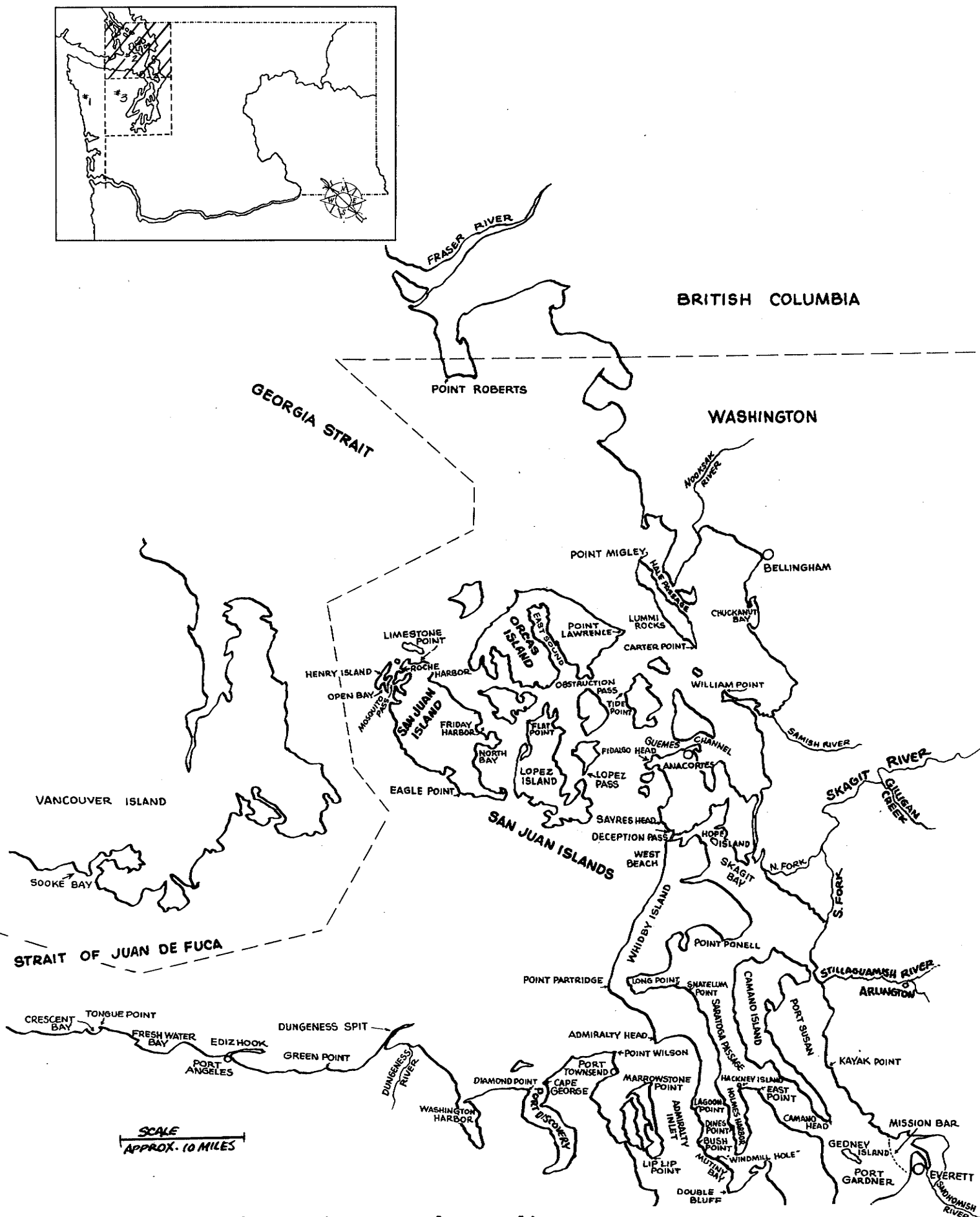


Figure 2. Locales pertinent to salmon angling on eastern Juan de Fuca Strait, the San Juan Islands and on northern Puget Sound.

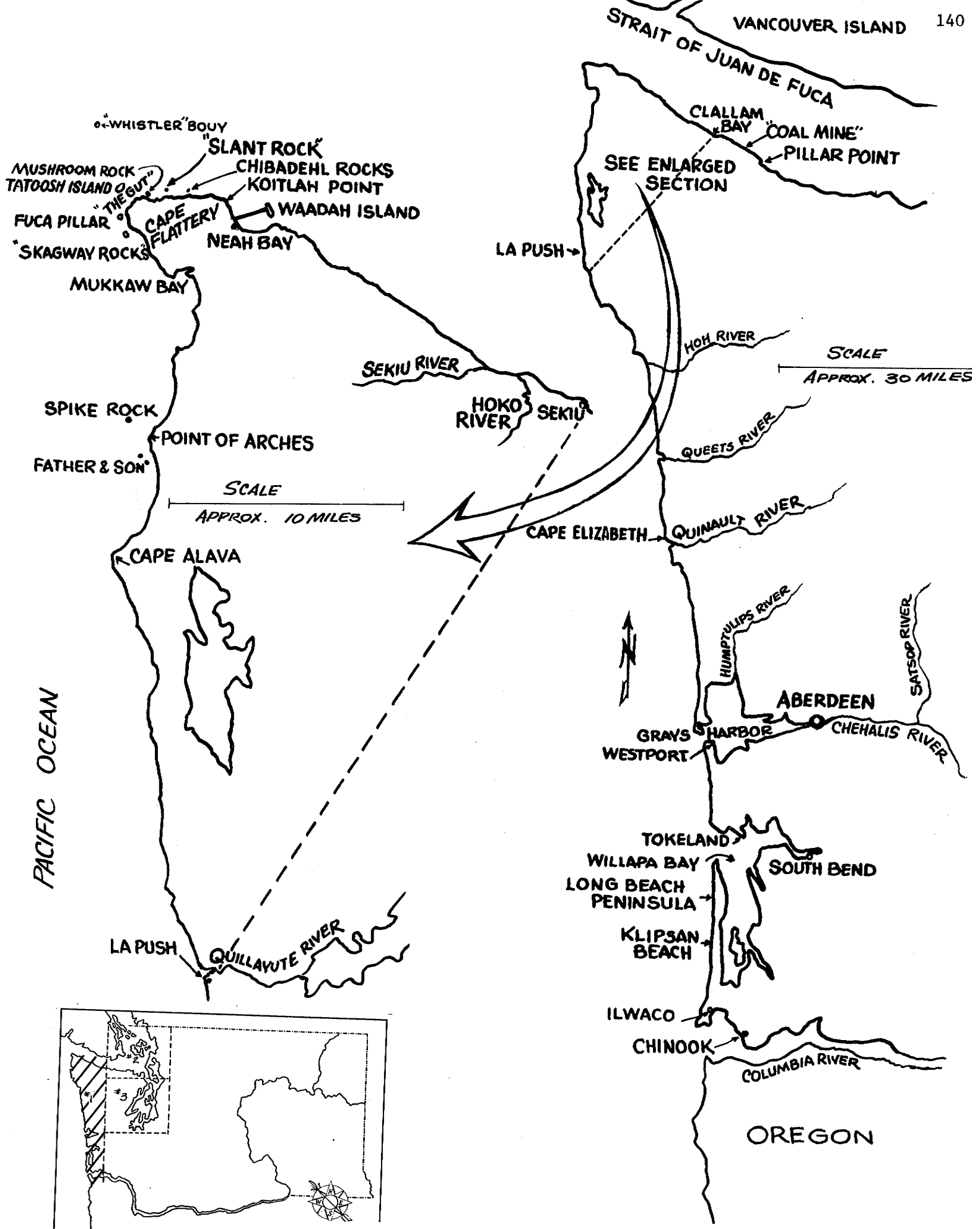


Figure 3. Salmon angling locales along the Pacific coast of Washington and western Juan de Fuca Strait.

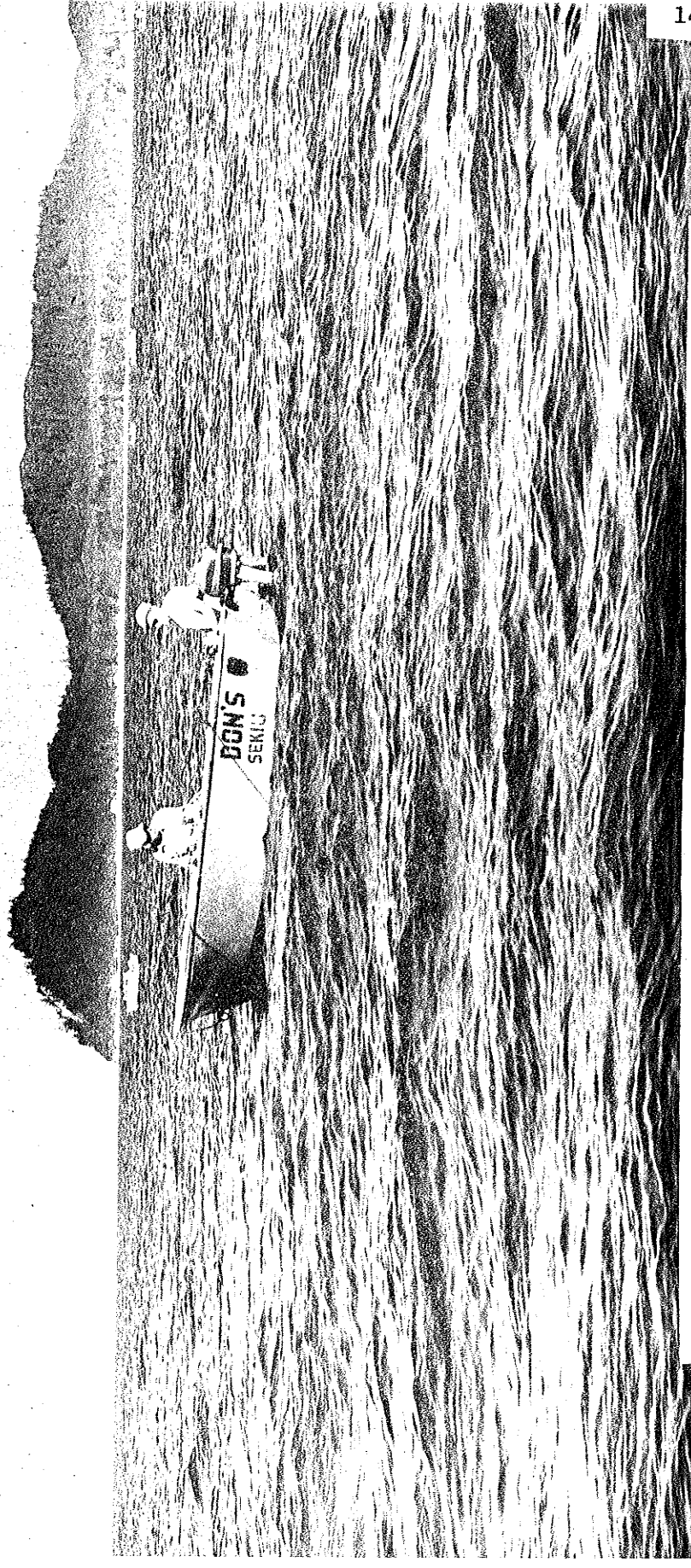


Figure 4. A rental boat at Sekiu (Courtesy of Washington Department of Commerce and Economic Development).



Figure 5. Private boat anglers netting a salmon at West Beach.

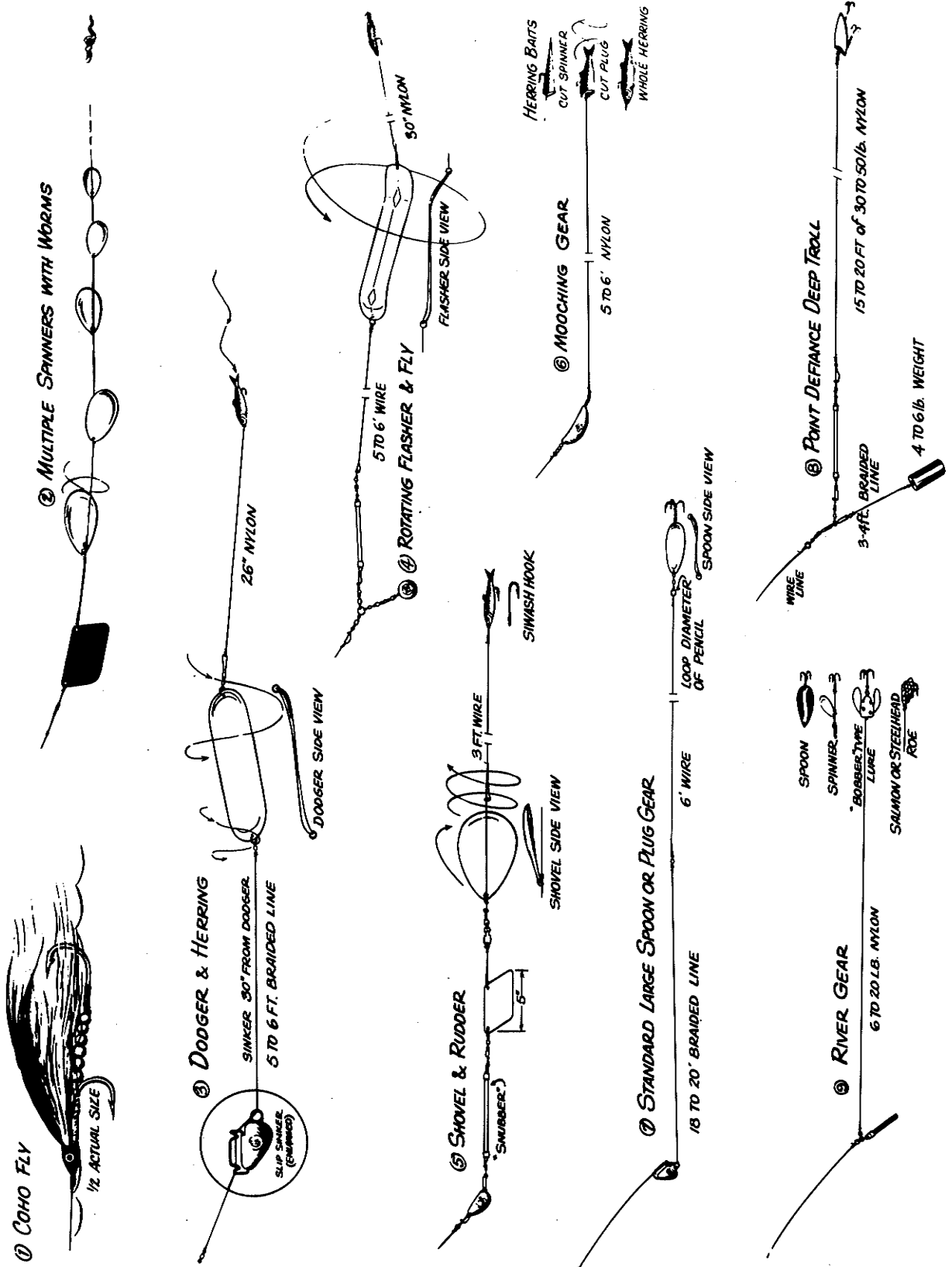


Figure 6. Terminal salmon angling gear used in Washington.

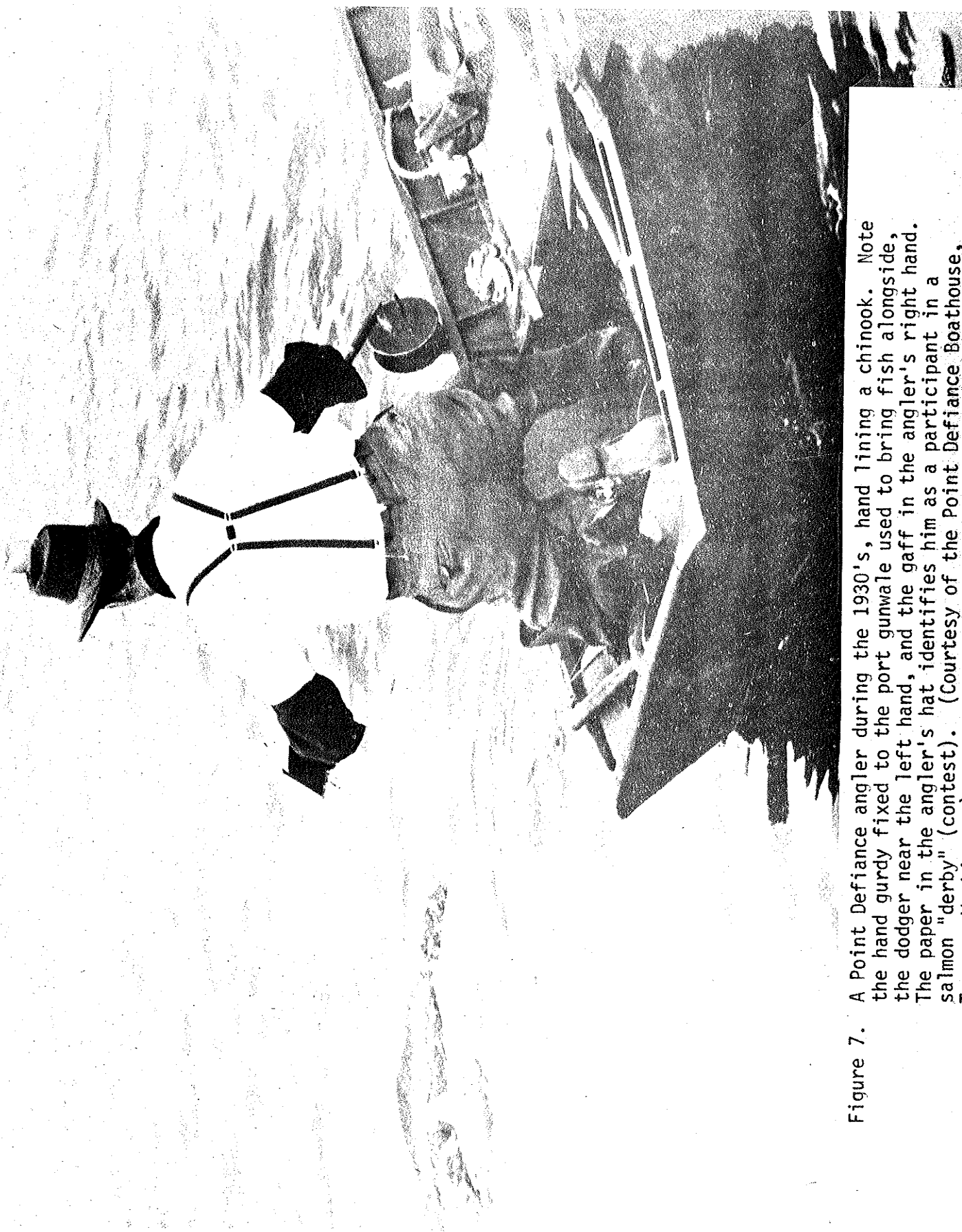


Figure 7. A Point Defiance angler during the 1930's, hand lining a chinook. Note the hand gurdy fixed to the port gunwale used to bring fish alongside, the dodger near the left hand, and the gaff in the angler's right hand. The paper in the angler's hat identifies him as a participant in a salmon "derby" (contest). (Courtesy of the Point Defiance Boathouse, Tacoma, Washington).

DETACH AND MAIL
ORIGINAL SHEET
EACH MONTH

Daily Boathouse Record

WASHINGTON DEPARTMENT OF FISHERIES

(Do Not Use This Space)

Name of boathouse or resort _____ For the month of _____, 19____

Address _____

Day of Month	1 No. of Rental Boats Out For Salmon	2 No. of Boats Checked	3 No. of King or Blackmouth Salmon	4 No. of Silver or Coho Salmon	5 No. of Humpy or Pink Salmon	6 No. of Dog or Chum Salmon	7 No. Miscellaneous Fish Marks or Species
1							
2							
3							
4							
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31							

Save duplicate sheet for your own records, mail original by 10th of following month to State Fisheries Department, Olympia, Washington.

Signed _____

Figure 8. Daily boathouse record used for estimating salmon sport catches from Puget Sound and Juan de Fuca Strait. The actual size of the report is 8.5 by 11.0 inches.



Figure 9. A rental rowboat on Elliott Bay (Seattle).

WASHINGTON STATE DEPARTMENT OF FISHERIES
Sport Salmon Catch Record

1964 NO. 279906

NAME JOHN DOE

HOME ADDRESS 1313 RICHARD ST.

CITY SEATTLE STATE WASH.

HOME TELEPHONE NO. NONE DATE OF ISSUE 1/2/64

SALMON CATCH RECORDS MUST BE ISSUED AT NO COST.

INSTRUCTIONS

Upon catching a legal salmon, in fresh or marine waters, remove a punch from the card and enter the month and day and the stream (or lake) name, or the marine area code number from the following list. For steelhead angling, a Department of Game punch card must be obtained.

MARINE AREA CODE NUMBERS

1. MOUTH OF COLUMBIA RIVER—From Klipsan Beach south.
 2. WESTPORT—From Klipsan Beach north to Cape Elizabeth.
 3. LAPUSH—From Cape Elizabeth north to Cape Alava.
 4. NEAH BAY—From Cape Alava north and inside Juan de Fuca Strait to the Sekiu River.
 5. SEKIU AND PILLAR POINT—From the mouth of the Sekiu River east to Tongue Point.
 6. EAST JUAN DE FUCA STRAIT—From Tongue Point east to Point Wilson, including waters off west Whidbey Island north of Point Partridge.
 7. SAN JUAN ISLANDS—Marine waters north of Deception Pass.
 8. DECEPTION PASS AND SKAGIT BAY.
- (Remove this stub before mailing) (continued on other side)

MARINE AREA CODE NUMBERS (Continued)

9. ADMIRALTY INLET, POSSESSION SOUND, SARATOGA PASSAGE AND PORT SUSAN.
10. SEATTLE AND BREMERTON AREA—Puget Sound waters south of a line between Richmond Beach and President Point, and north of a line true west from Des Moines.
11. SOUTH PUGET SOUND—Puget Sound waters south of Des Moines.
12. HOOD CANAL.

FAILURE TO RETURN CARD PRIOR TO FEB. 1, 1965 IS A MISDEMEANOR. NO POSTAGE NECESSARY. PLEASE RETURN CARDS WHETHER YOU HAVE CAUGHT SALMON OR NOT.

Upon filling a card, or at a time when less than 6 punches remain, a new card may be obtained at no cost from authorized agencies.

(Remove this stub before mailing) B.T.C. 495

WASHINGTON STATE DEPARTMENT OF FISHERIES
Sport Salmon Catch Record

1964 NO. 279906

NAME JOHN DOE

HOME ADDRESS 1313 RICHARD ST.

CITY SEATTLE STATE WASH.

	MONTH	DAY	AREA CODE NUMBER	MONTH	DAY	AREA CODE NUMBER	
●	6	30	5				○
●	9	5	SATSOP R.				○
○							○
○							○
○							○
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WASHINGTON STATE DEPT. OF FISHERIES
 115 General Administration Bldg.
 OLYMPIA, WASHINGTON, 98502

Figure 10. Front (left) and back (right) views of a salmon punch card indicating a catch of two salmon. The "stub" (top, left) is retained by the dealer and returned to the Department of Fisheries.

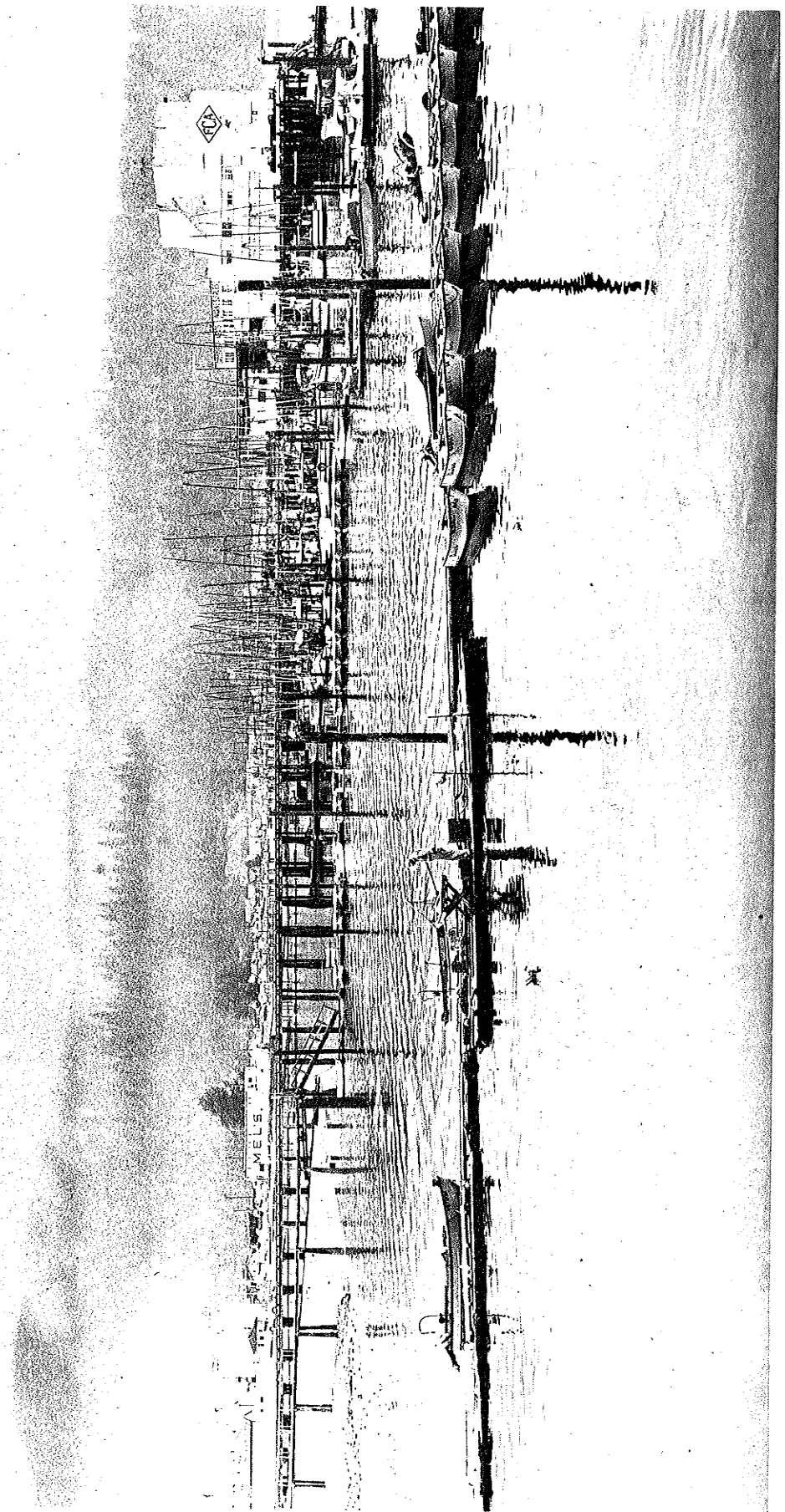


Figure 11. Sport fishing and commercial trolling boats moored at Nehalem Bay.

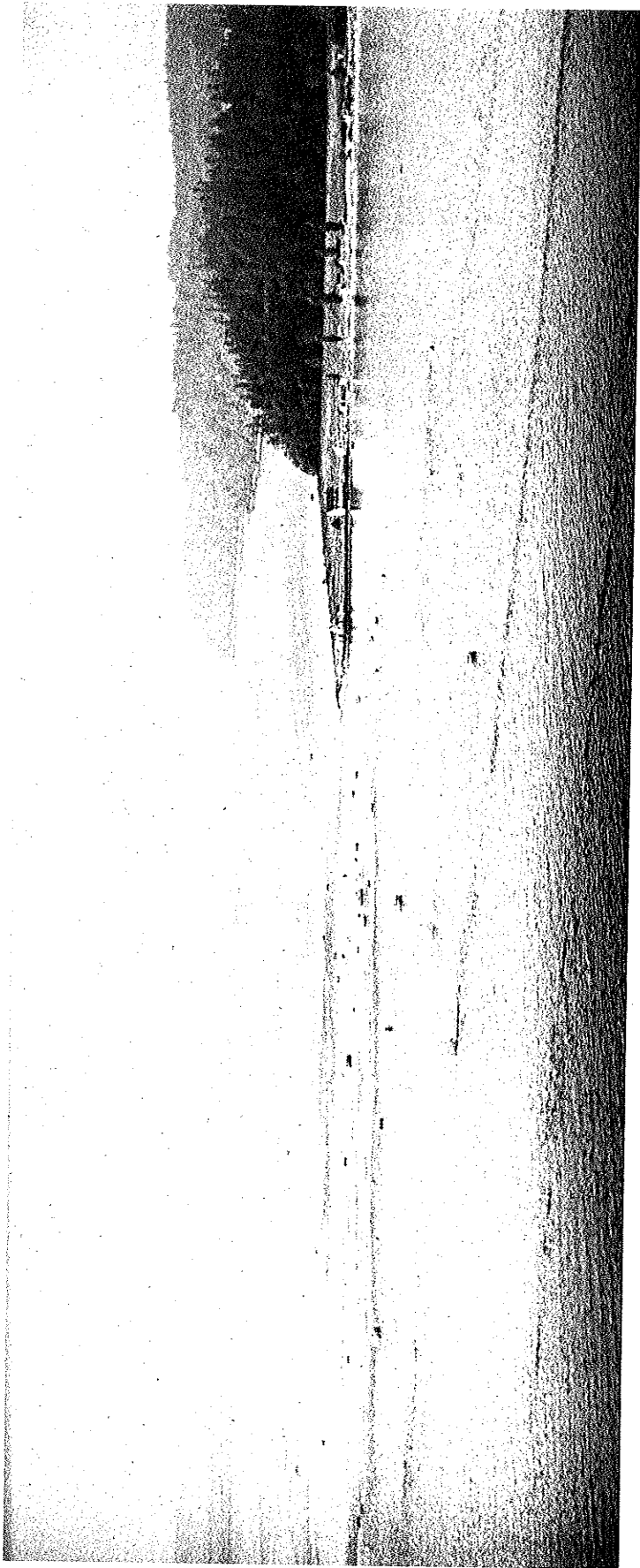


Figure 12. Sport fishing boats at Point No Point.

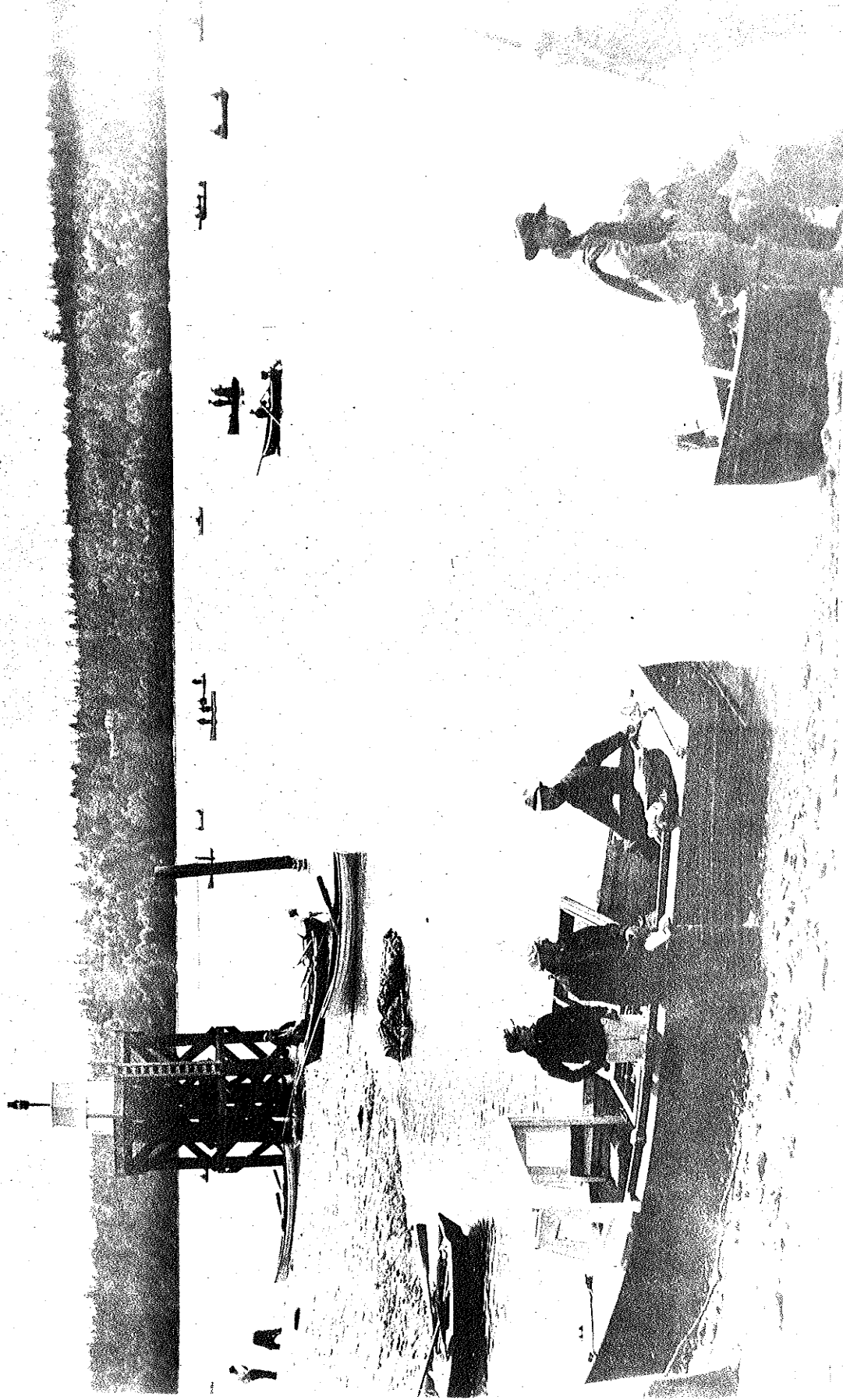


Figure 13. Salmon anglers at Point Defiance in the 1930's (Courtesy of the Point Defiance Boathouse, Tacoma, Washington).



Figure 14. Sport fishing boats concentrated along a tide-rip near Possession Point.

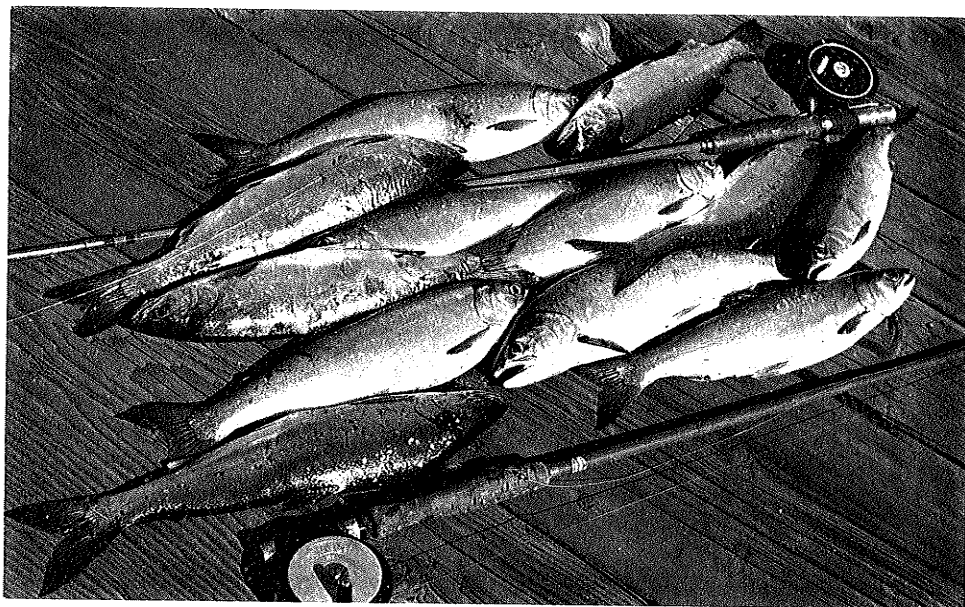


Figure 15. A catch of small coho from inner-Puget Sound.
The angling gear is atypical.

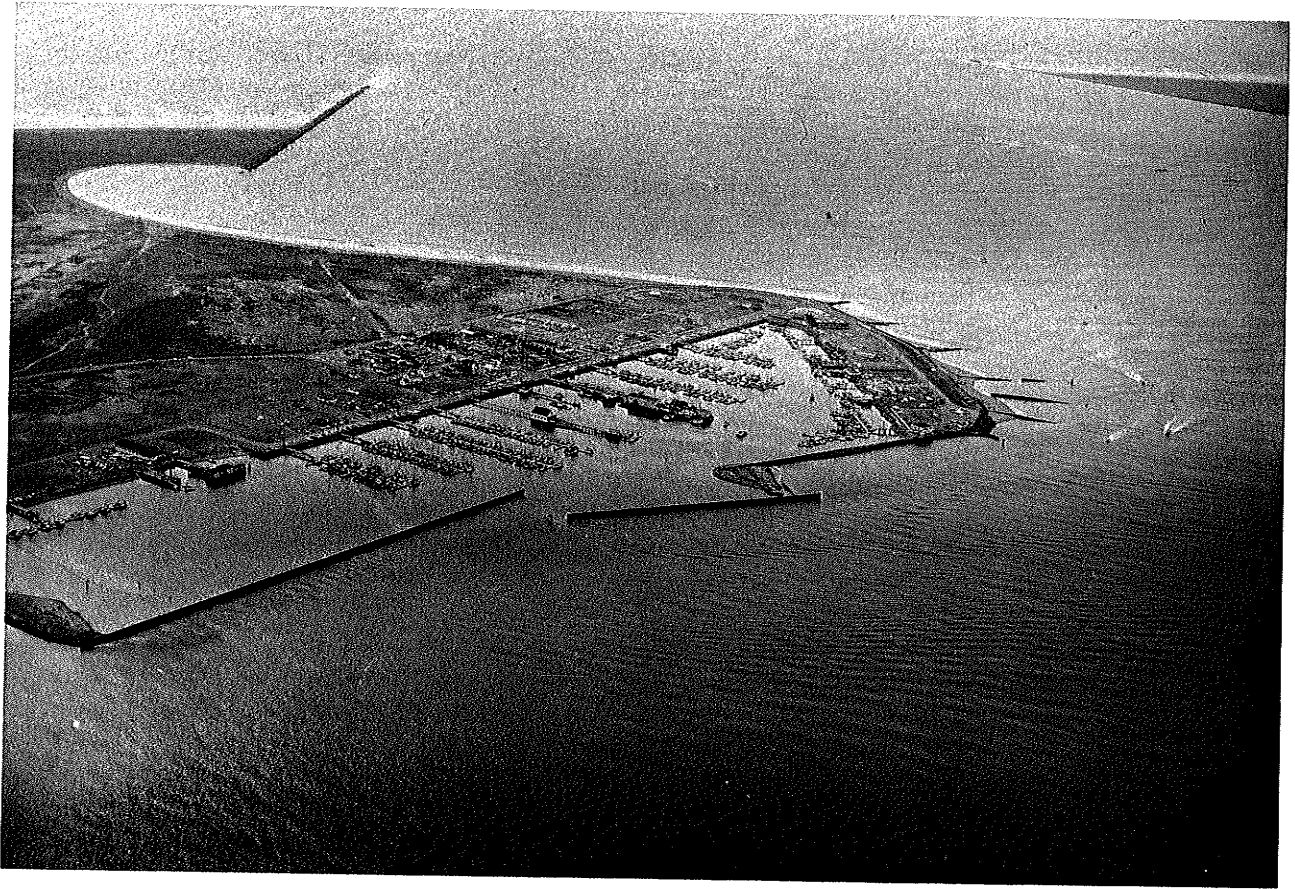


Figure 16. Westport, Washington looking seaward through the entrance of Grays Harbor (Courtesy of Jones Photo Co., Aberdeen, Washington).

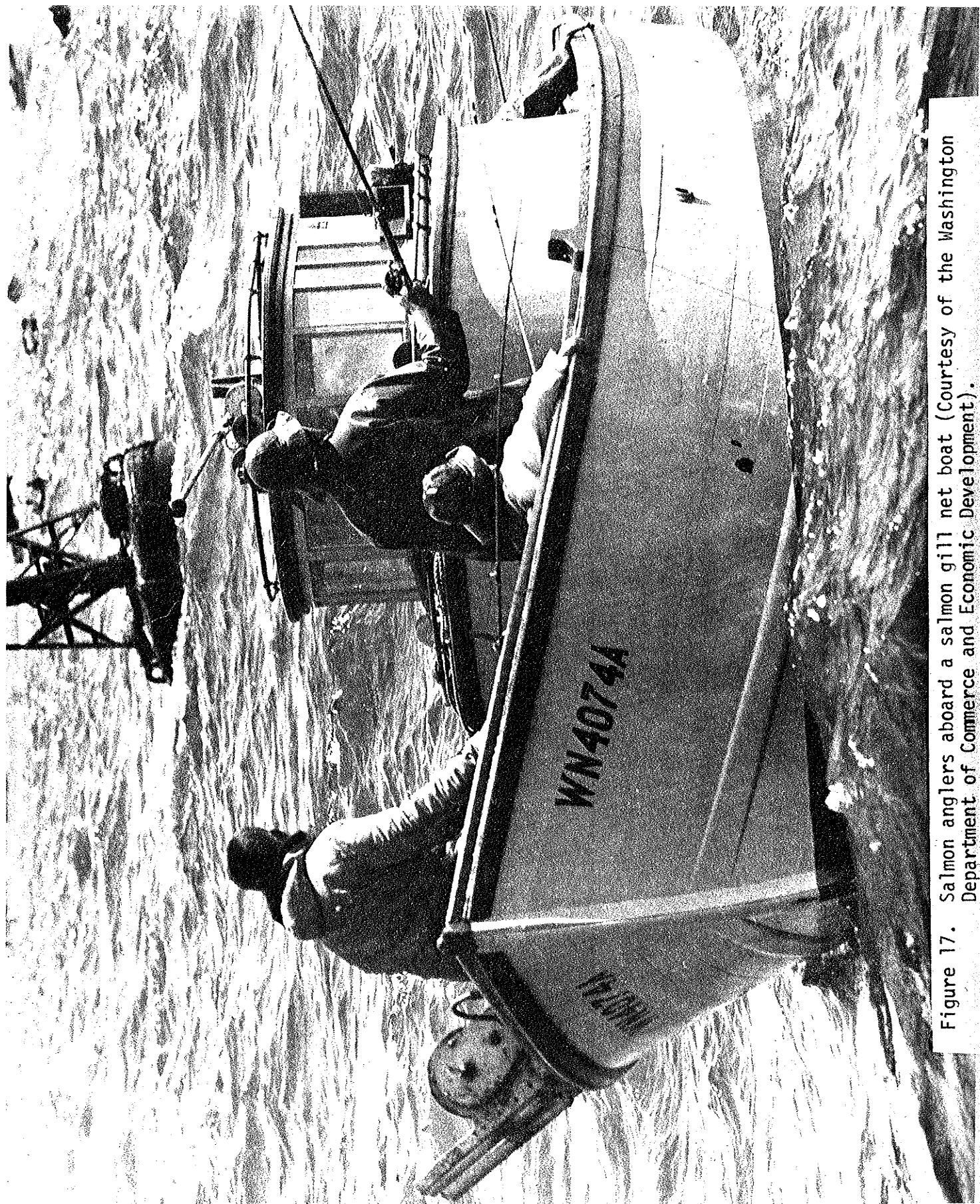


Figure 17. Salmon anglers aboard a salmon gill net boat (Courtesy of the Washington Department of Commerce and Economic Development).

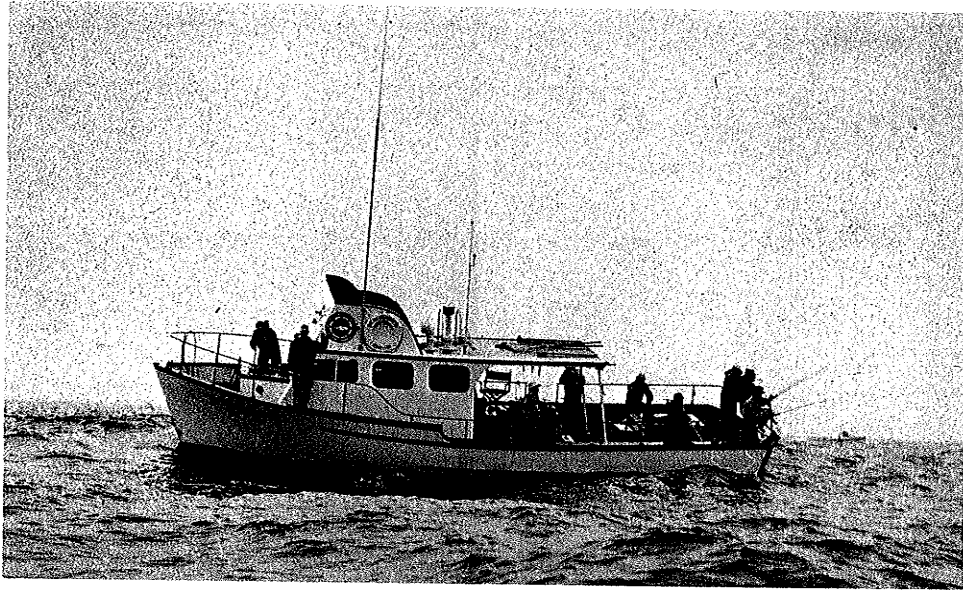


Figure 18. A typical Westport charter boat.

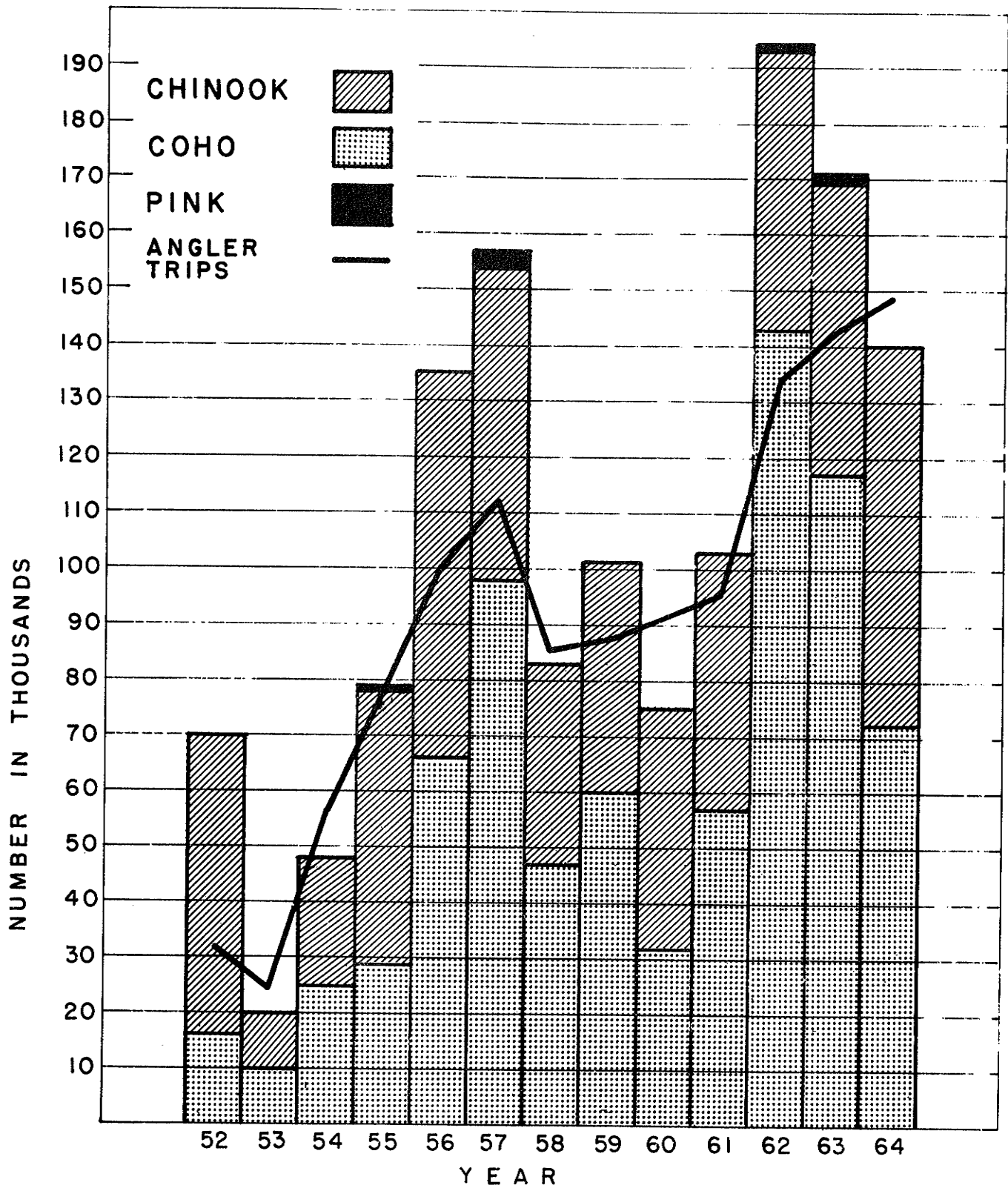


Figure 19. Estimated annual angler trips and salmon sport catches at Westport (1952 through 1964).

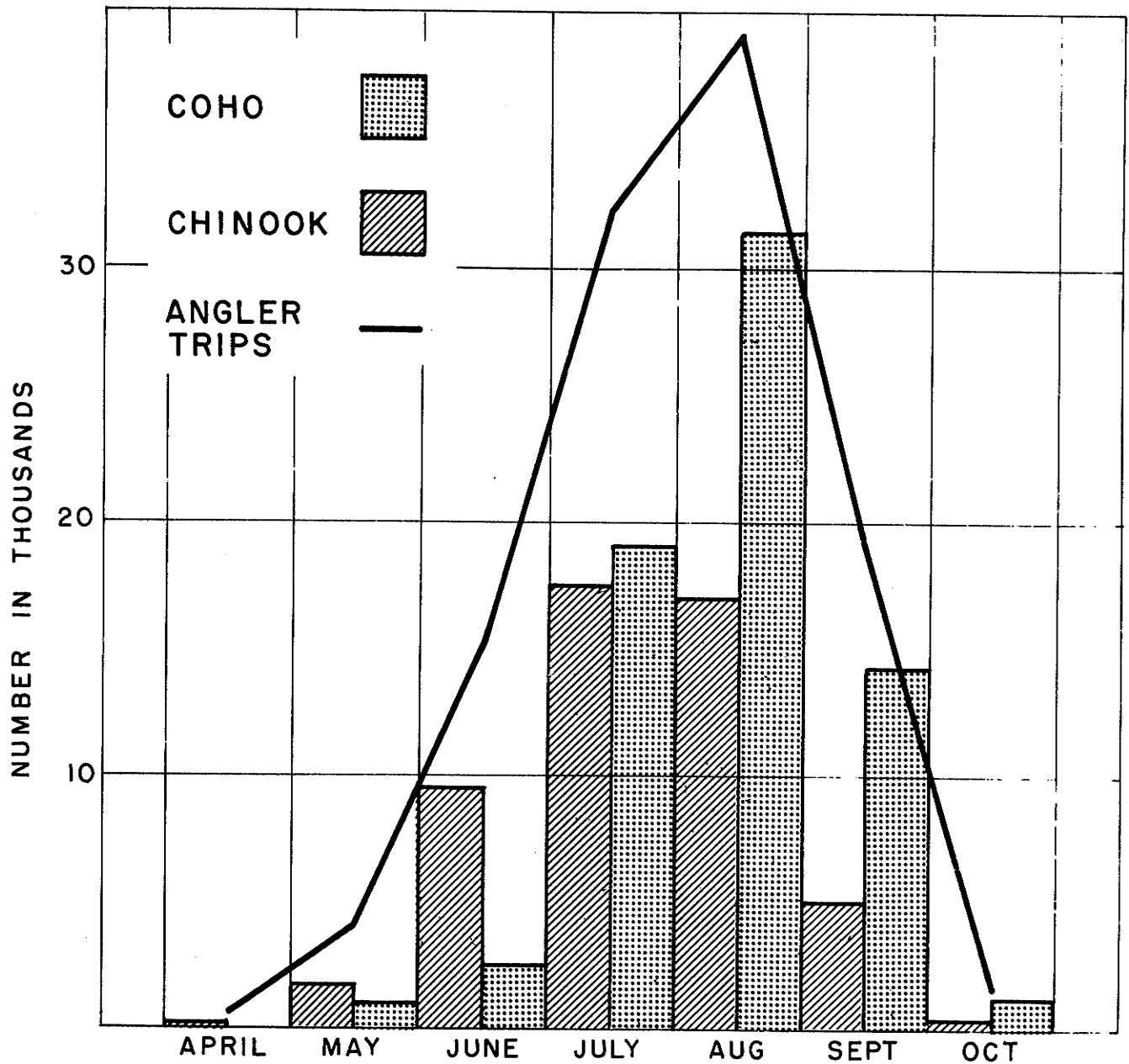


Figure 20. Mean monthly estimated salmon sport catches (1955 through 1964) and fishing effort (1957 through 1964) at Westport.

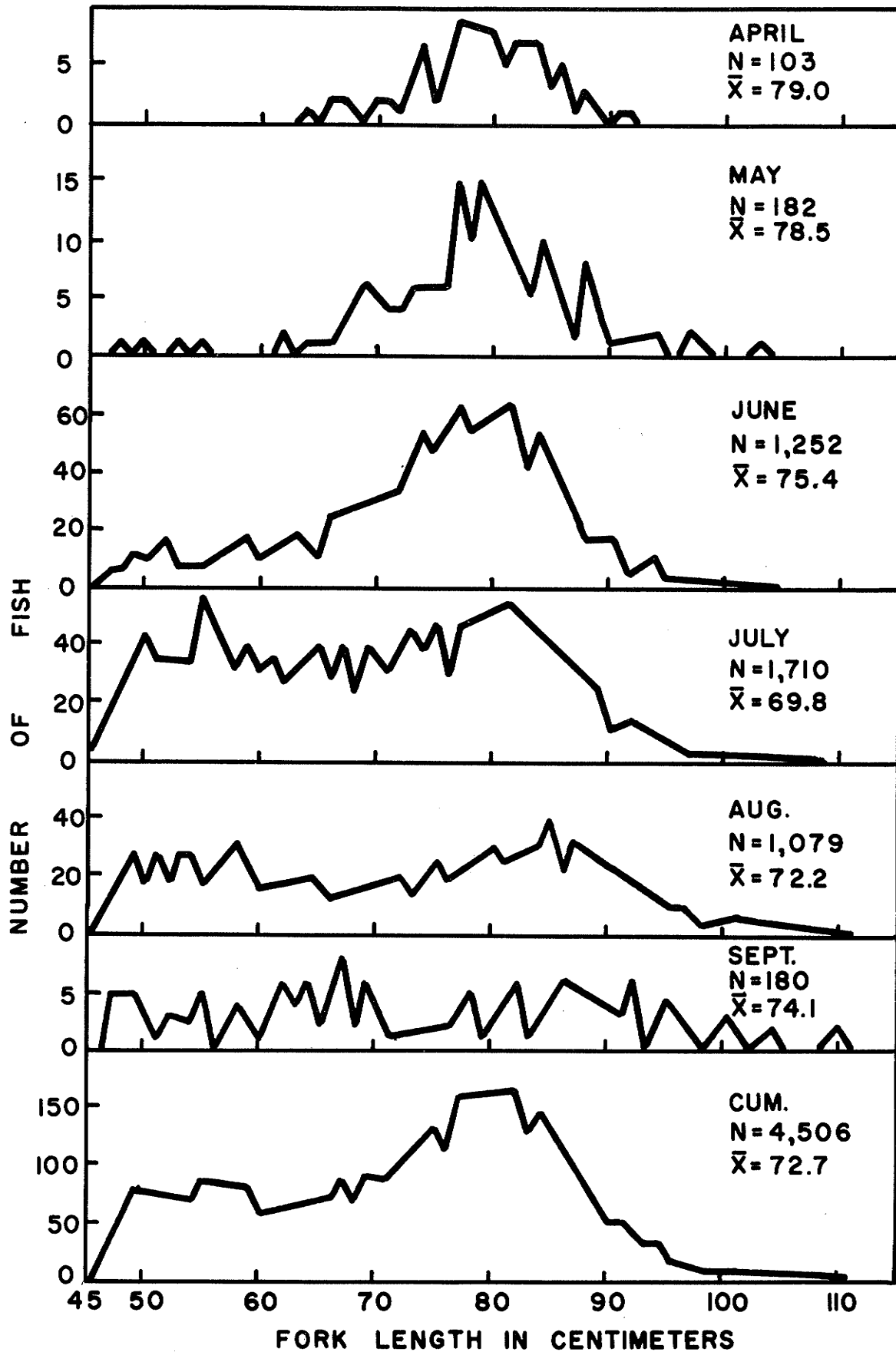


Figure 21. Length frequencies of chinook salmon sampled in the 1963 Westport sport fishery.

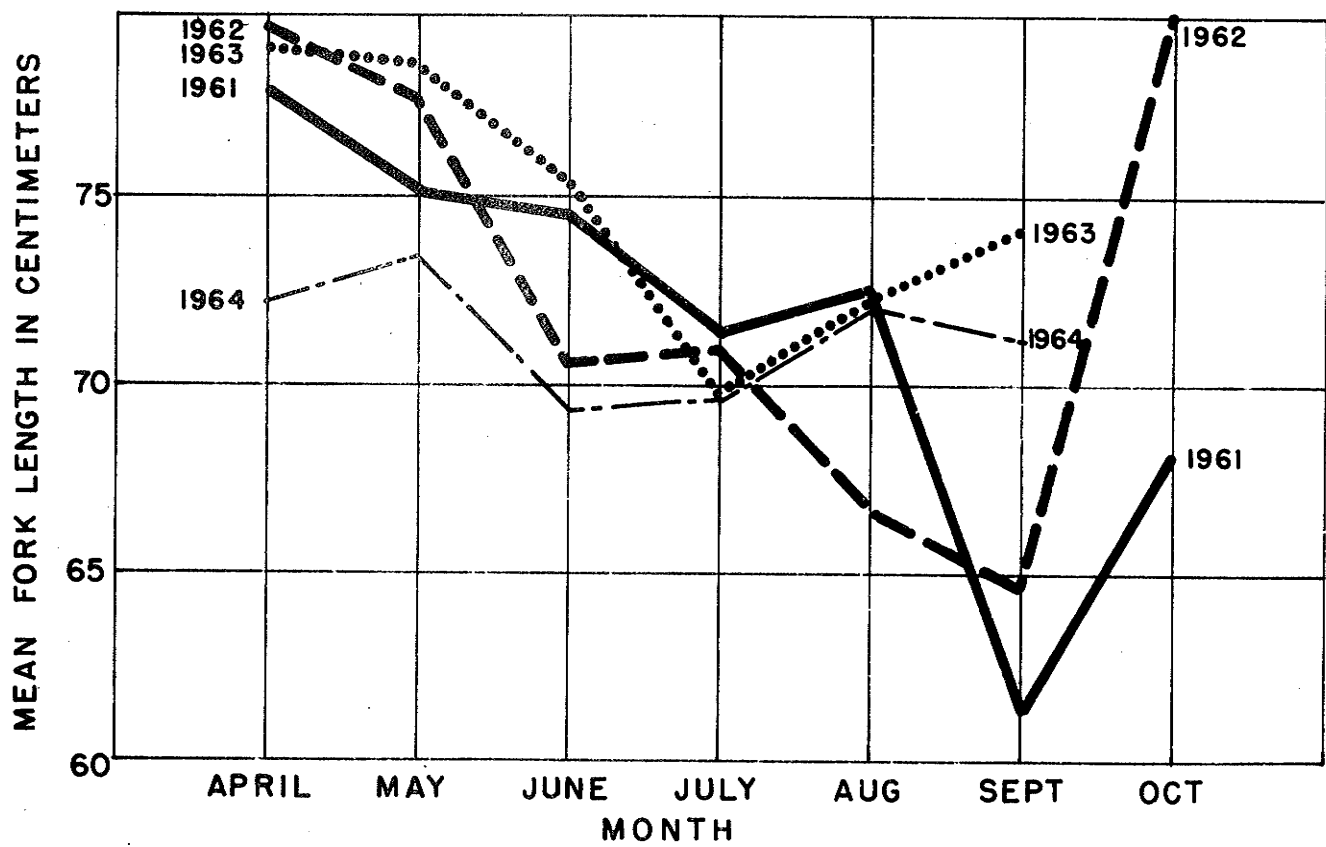


Figure 22. Monthly mean fork lengths of chinook from the Westport sport fishery (1961 through 1964).

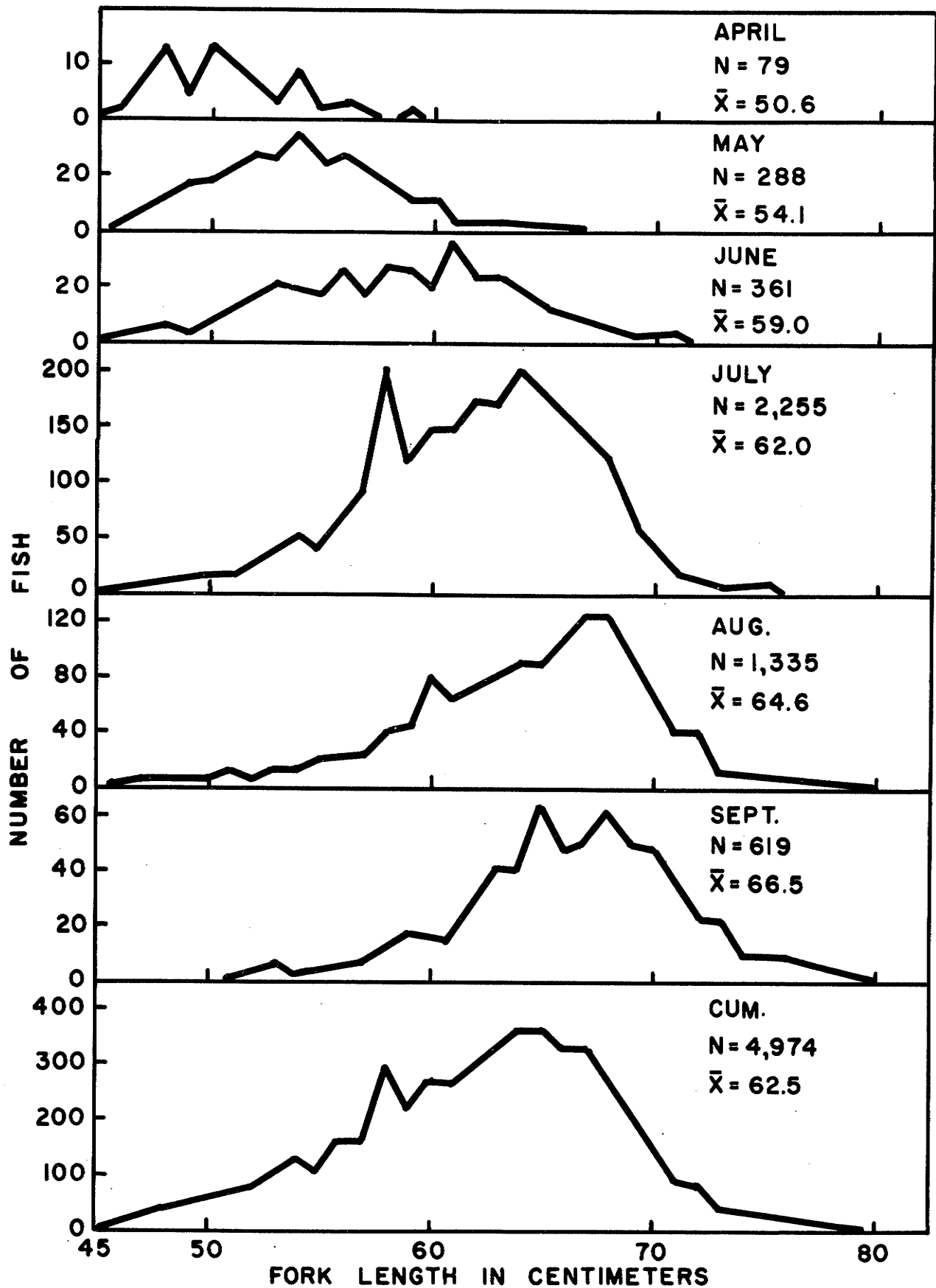


Figure 23. Monthly length-frequency distributions of coho salmon sampled in the 1963 Westport sport fishery.

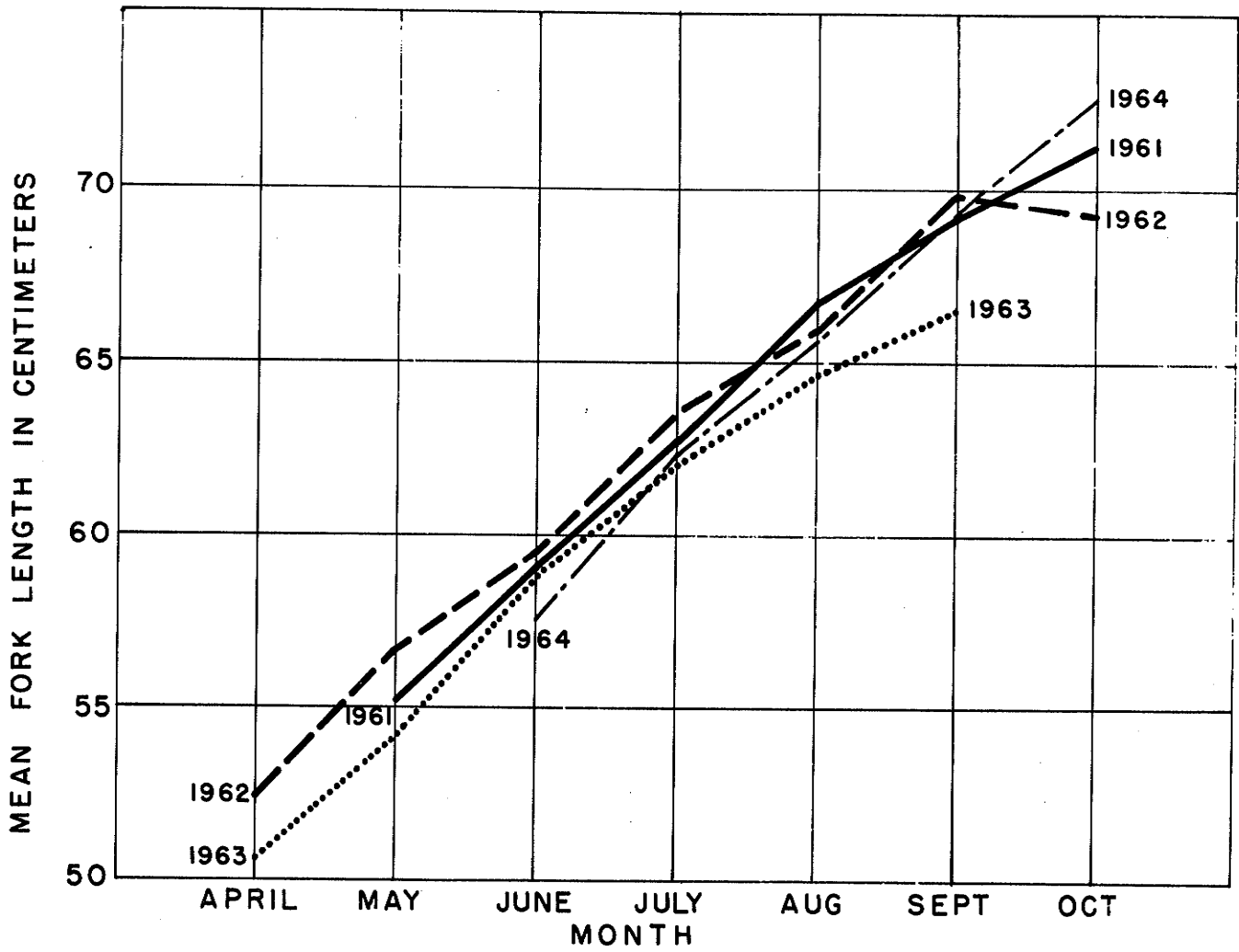


Figure 24. Monthly mean fork lengths of coho sampled from the Westport sport fishery (1961 through 1964).

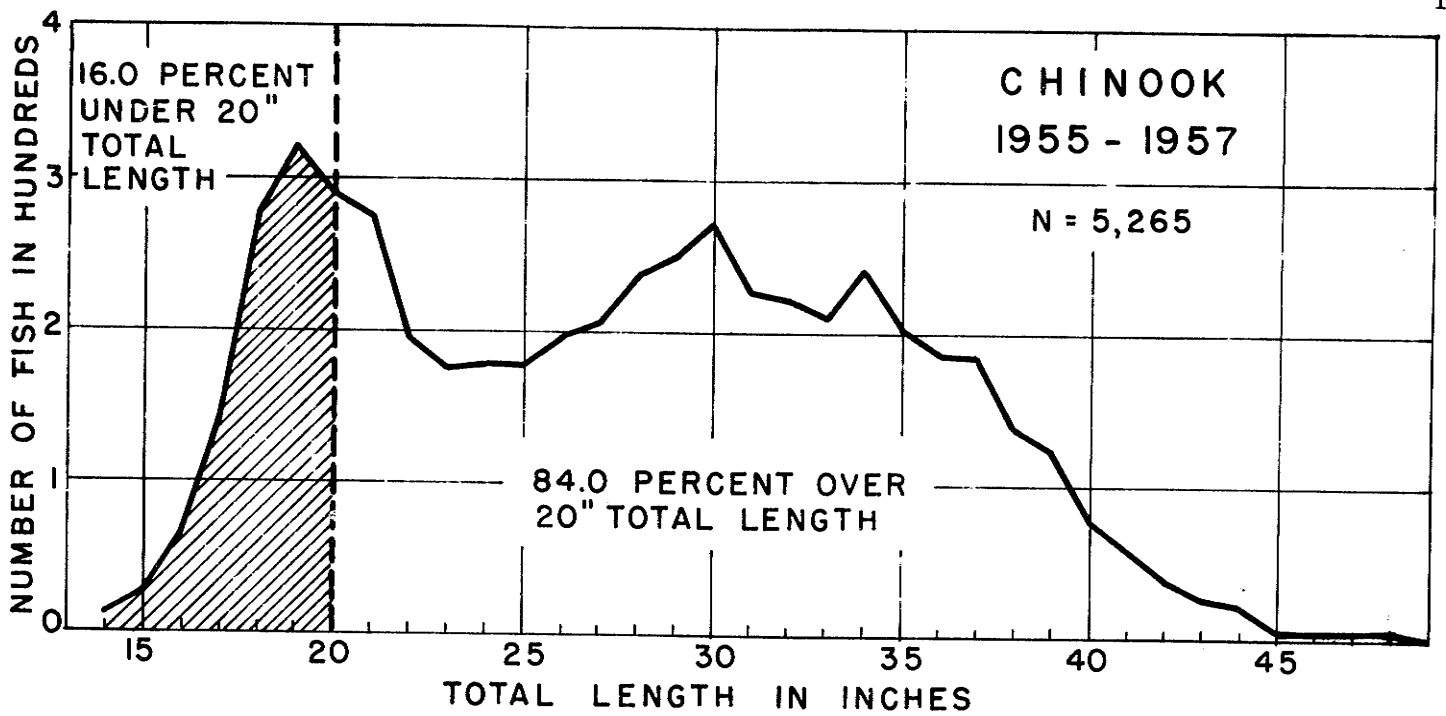


Figure 25. Length frequencies of chinook salmon sampled from the Westport sport fishery, showing the portion of the catch under 20-inches total length (1955 through 1957).

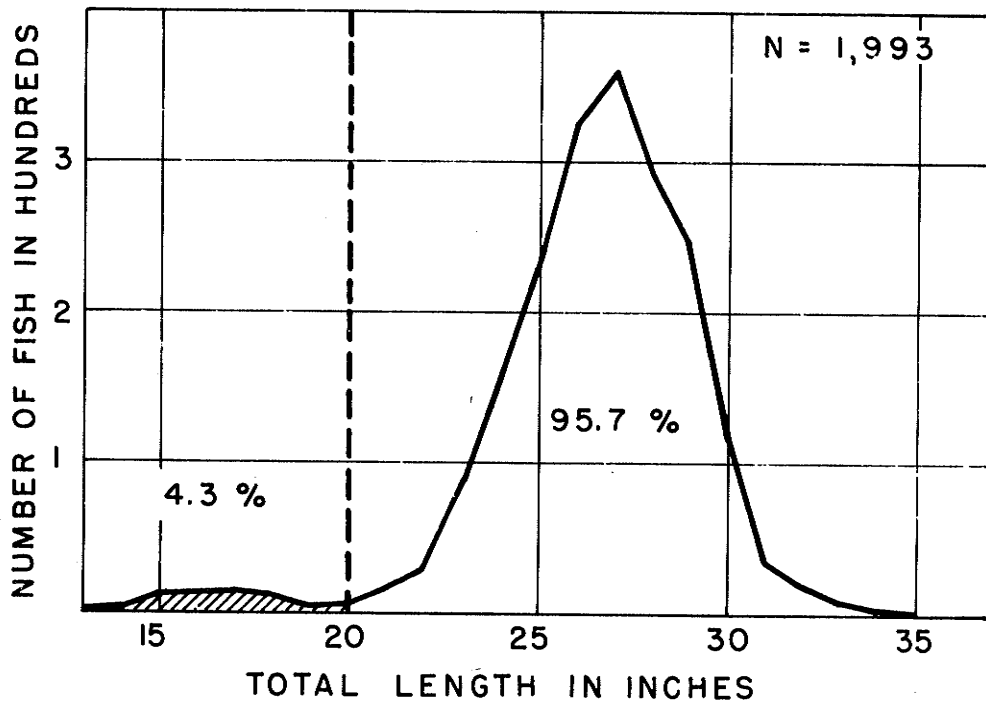


Figure 26. Length frequencies of coho salmon sampled from the Westport sport fishery, showing the portion of the catch under 20-inches total length (1955 through 1957).

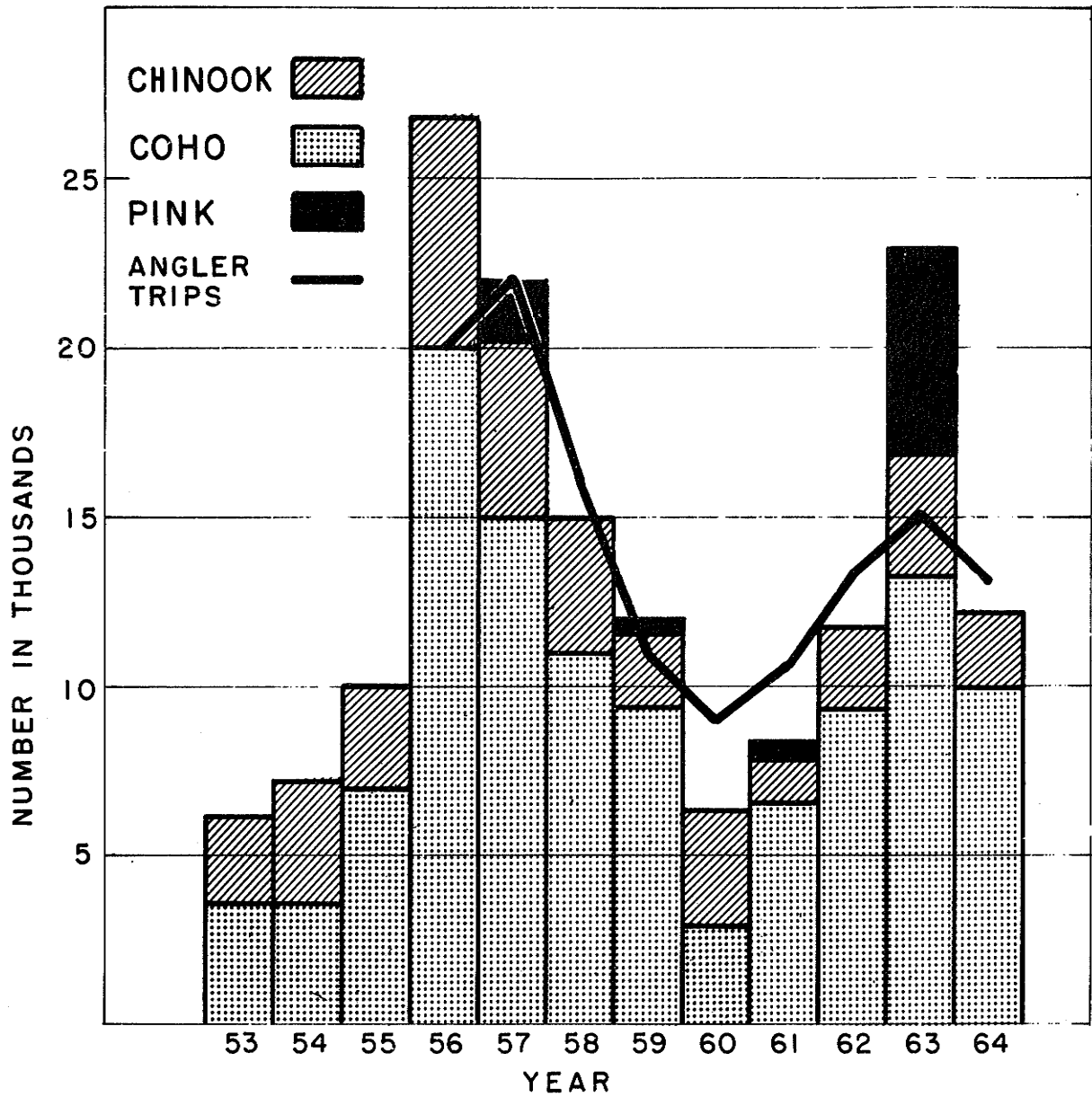


Figure 27. Estimated annual angler trips and salmon sport catches at La Push (1953 through 1964).

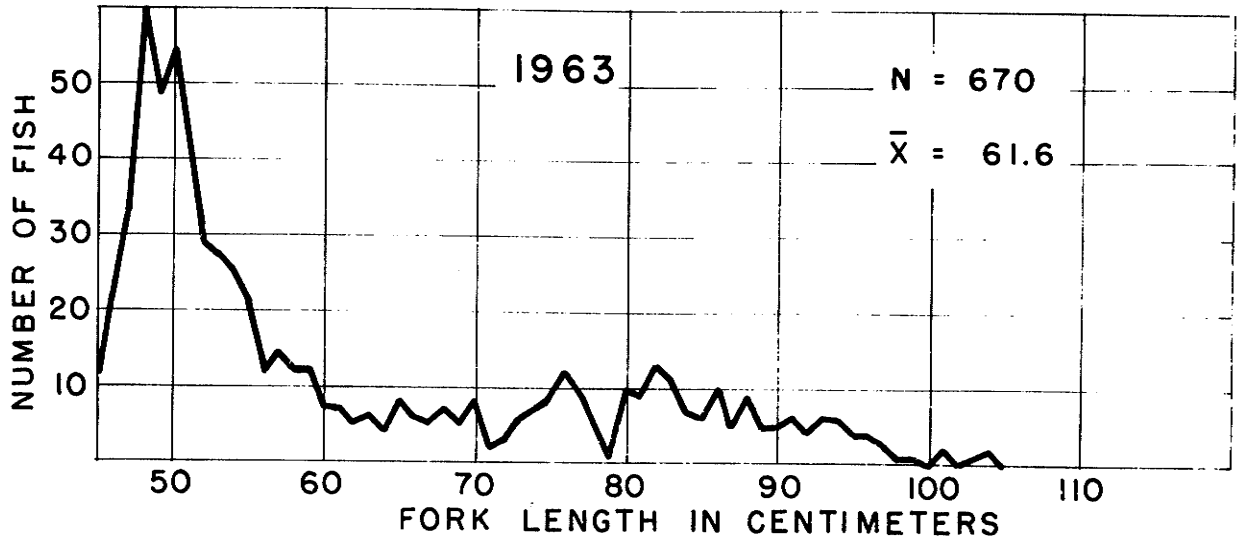


Figure 28. Length frequencies of chinook salmon sampled from the La Push sport fishery in 1963.

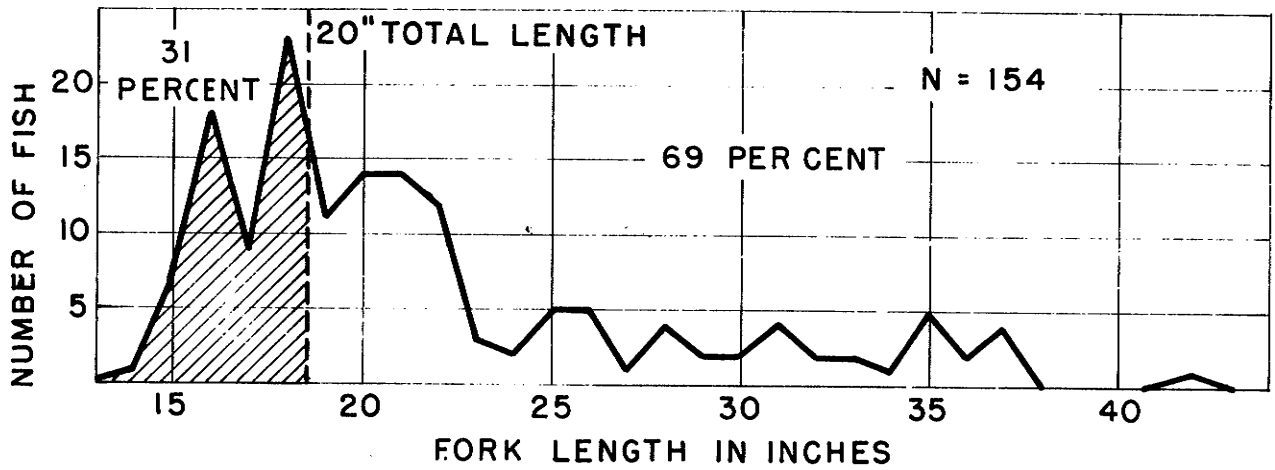


Figure 29. Length frequencies of chinook salmon, showing the portion of the sampled catch less than 20-inches total length. La Push sport fishery, 1957.

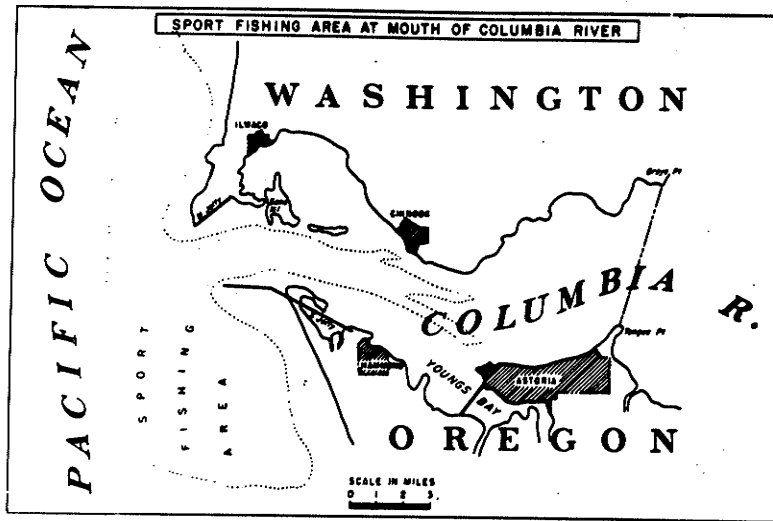


Figure 30. The sport fishing area at the mouth of the Columbia River.

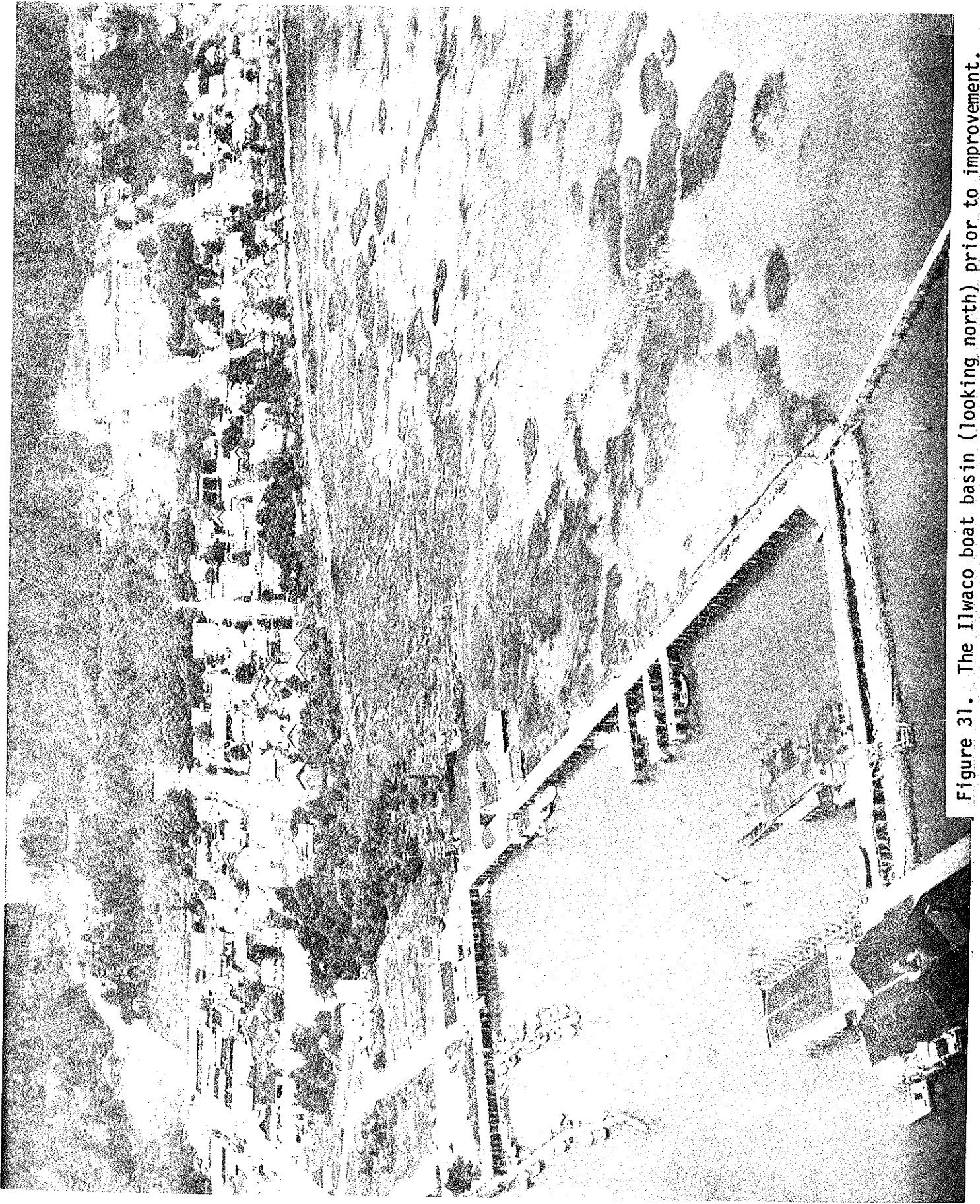


Figure 31. The Ilwaco boat basin (looking north) prior to improvement.

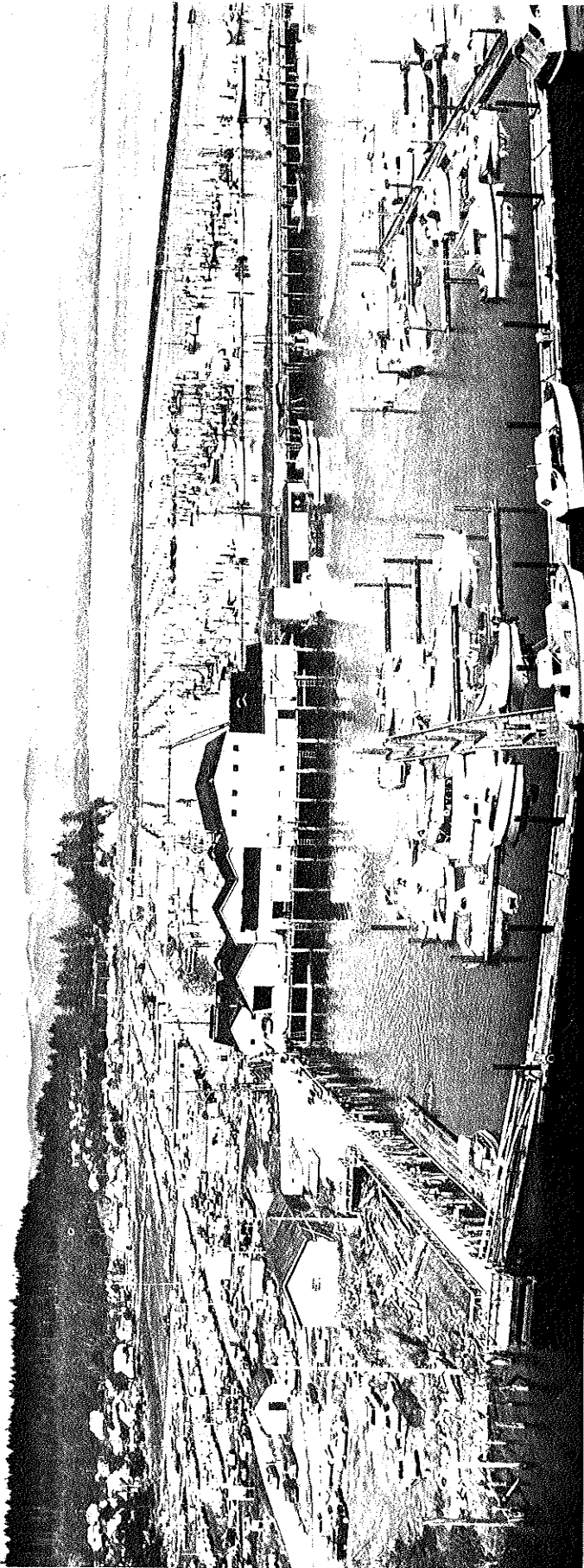


Figure 32. The Ilwaco boat basin (looking east) after improvement and enlargement. The large building on pilings in the center of the photograph is the same structure shown in the left center of Figure 31.

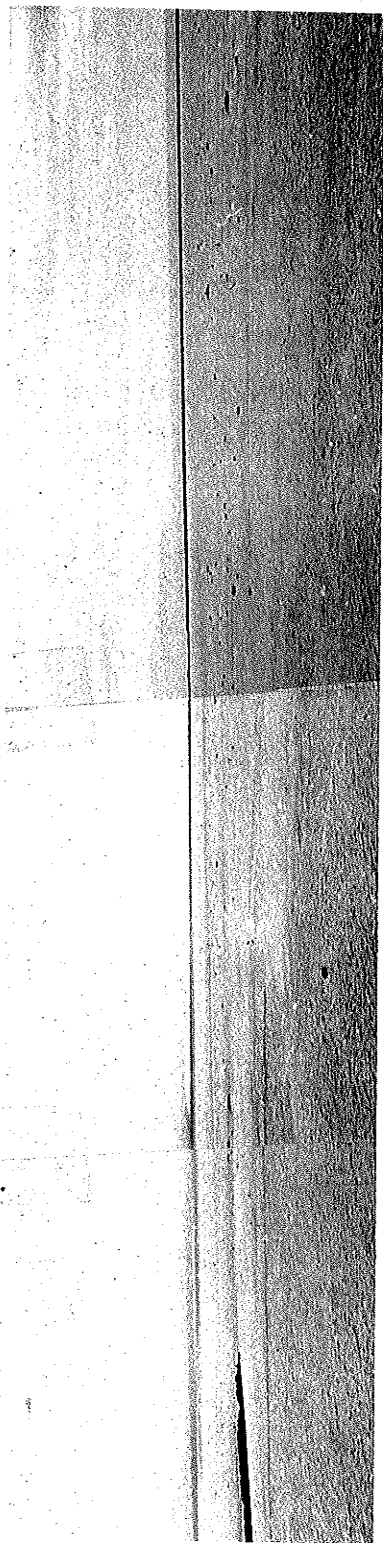


Figure 33. A combination of several photographs taken from the Cape Disappointment U. S. Coast Guard tower, showing the south jetty (Oregon shore) and sport fishing boats off the mouth of the Columbia River.

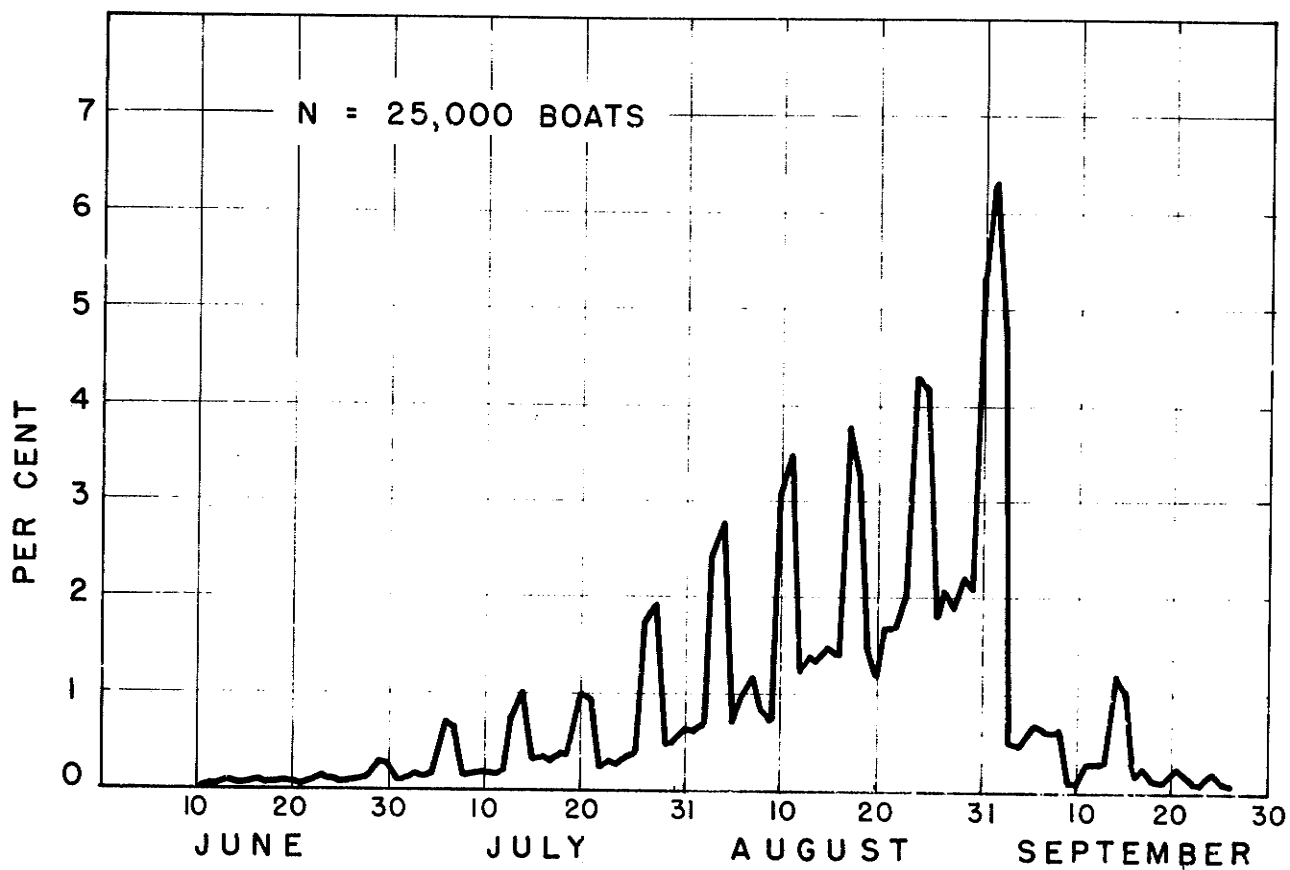


Figure 34. Average configuration of daily sport fishing effort derived from Cape Disappointment U. S. Coast Guard tower boat counts (1959 through 1964). Weekend angling effort is depicted in cyclic peaks.

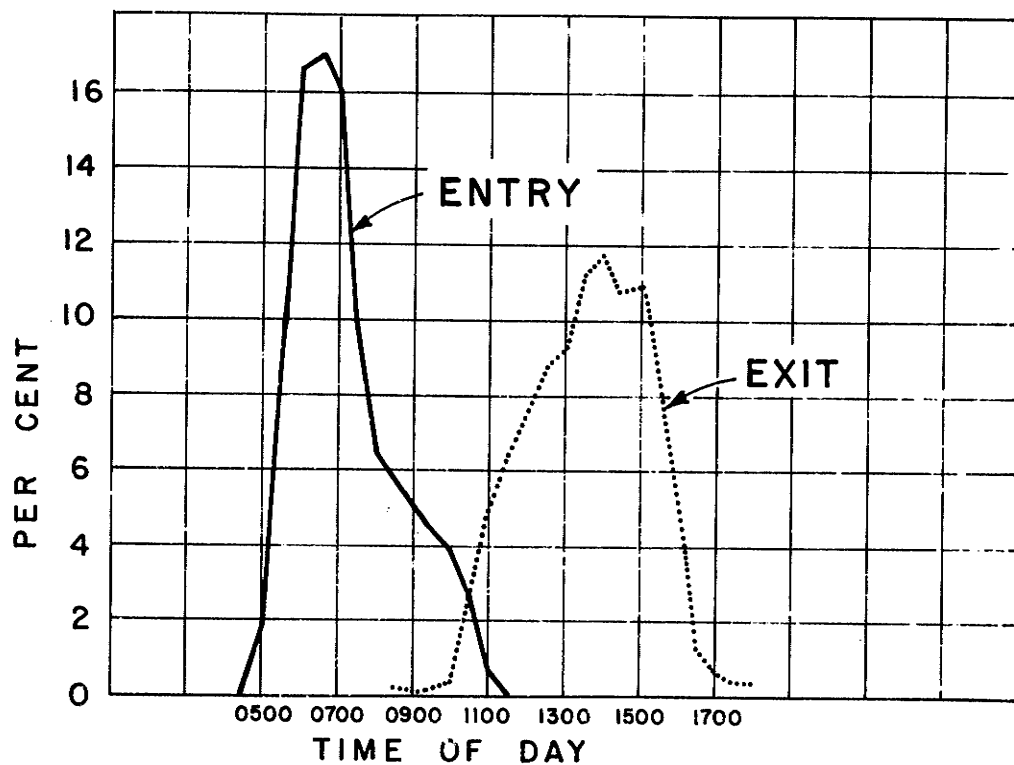


Figure 35. Average daily entry - exit pattern for boats sport fishing at the mouth of the Columbia River (1959 through 1964).

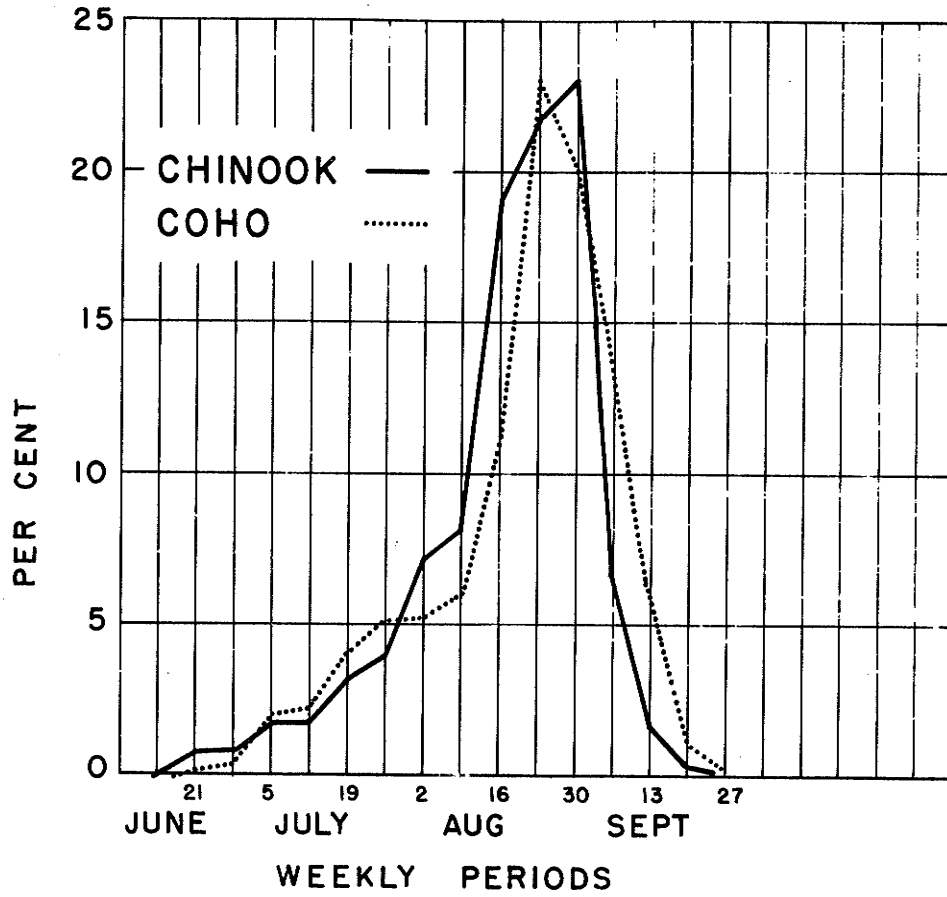


Figure 36. Composite configuration of timing of sport catch at the mouth of the Columbia River.

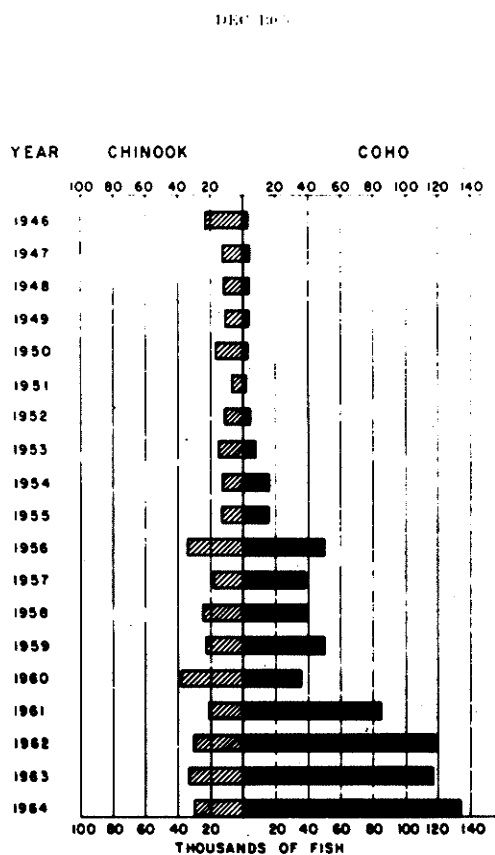


Figure 37. Annual estimated sport catches of chinook and coho. Columbia River (ocean) sport fishery - Washington and Oregon combined.

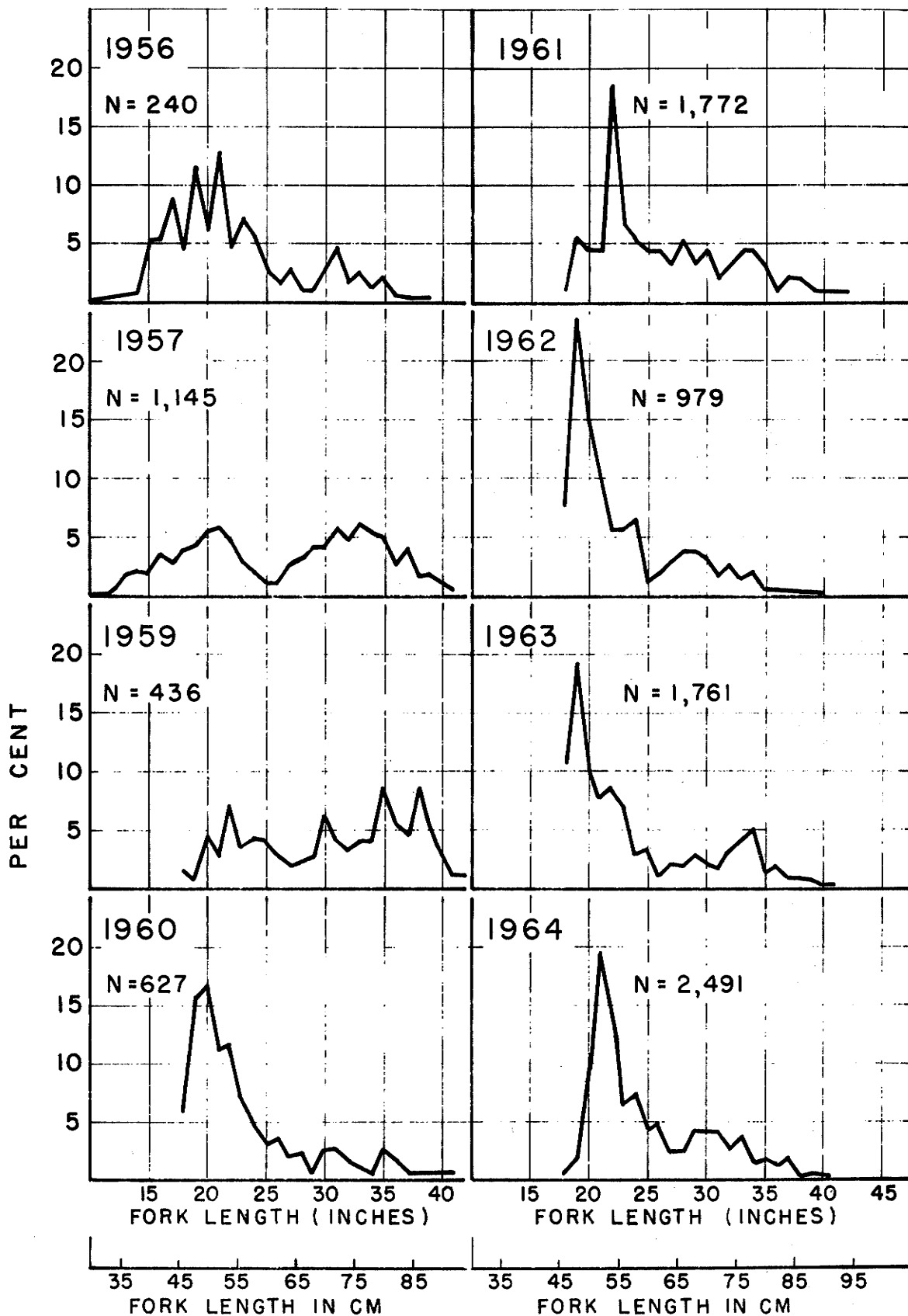


Figure 38. Length frequencies of chinook salmon in the Columbia River (ocean) sport fishery (1956 through 1964).

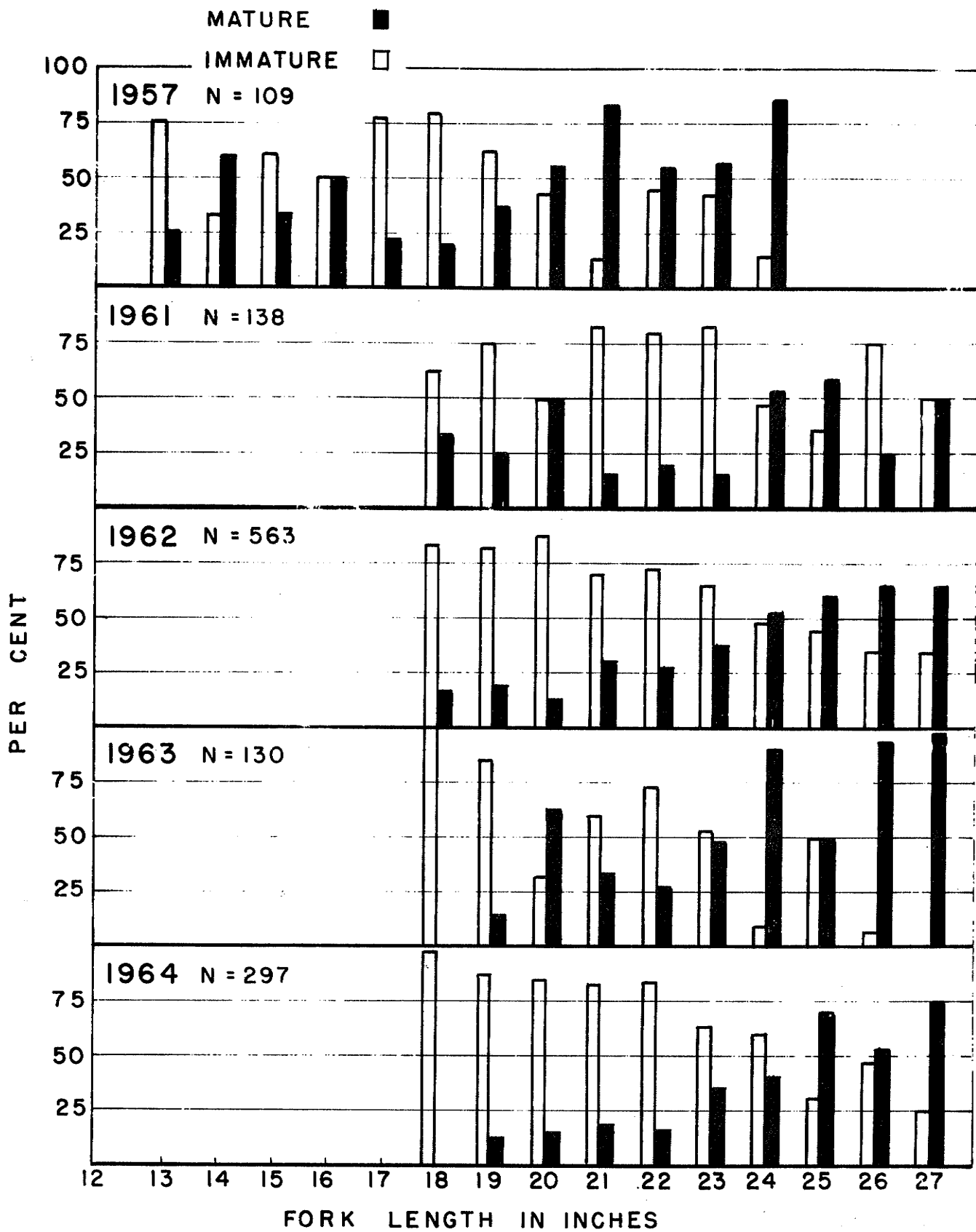


Figure 39. Sexual maturity of chinook salmon less than 28 inches (total length) in the Columbia River (ocean) sport fishery.

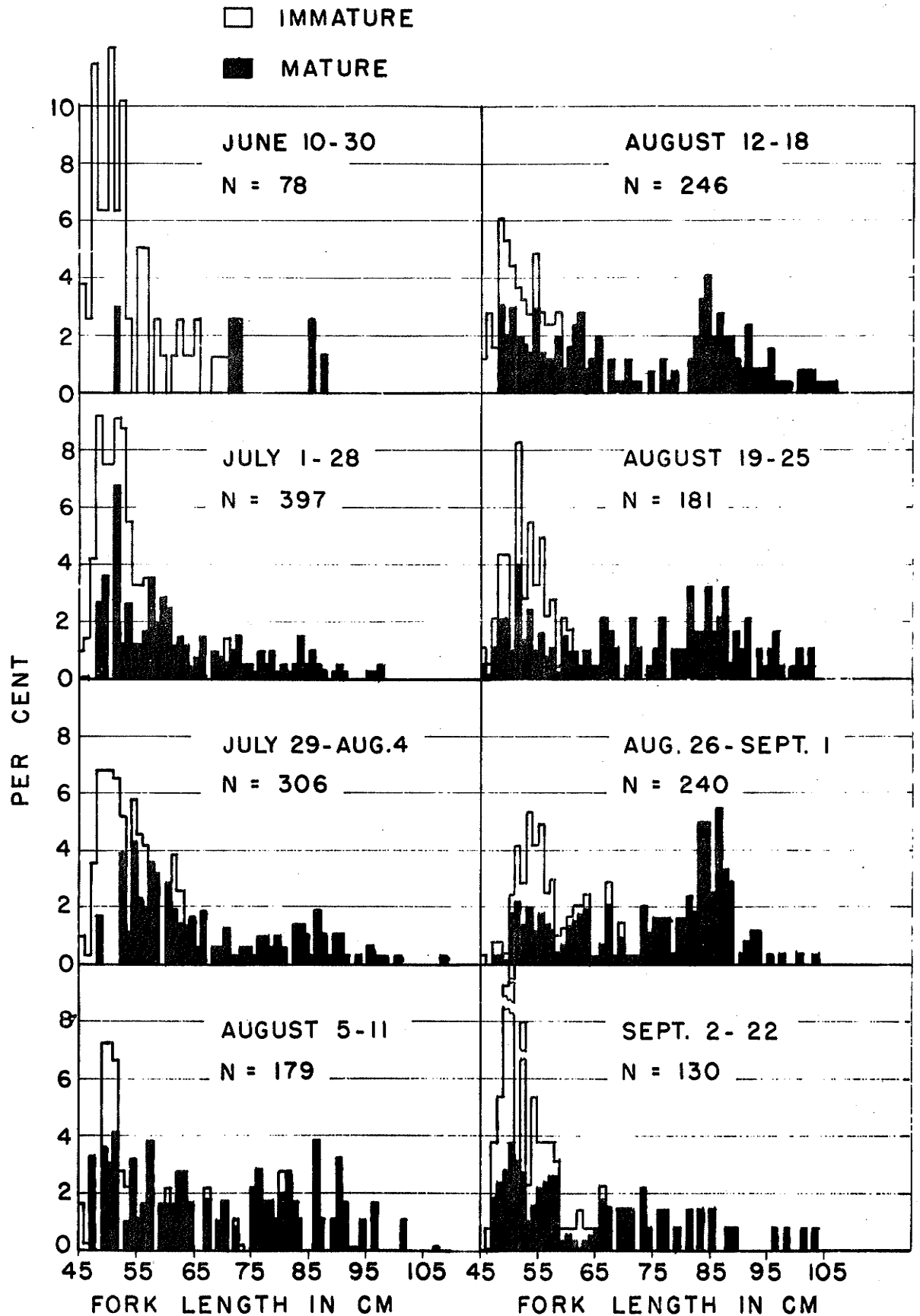


Figure 40. Maturity of chinook salmon by weekly periods. Columbia River (ocean) sport fishery, June through September, 1963.

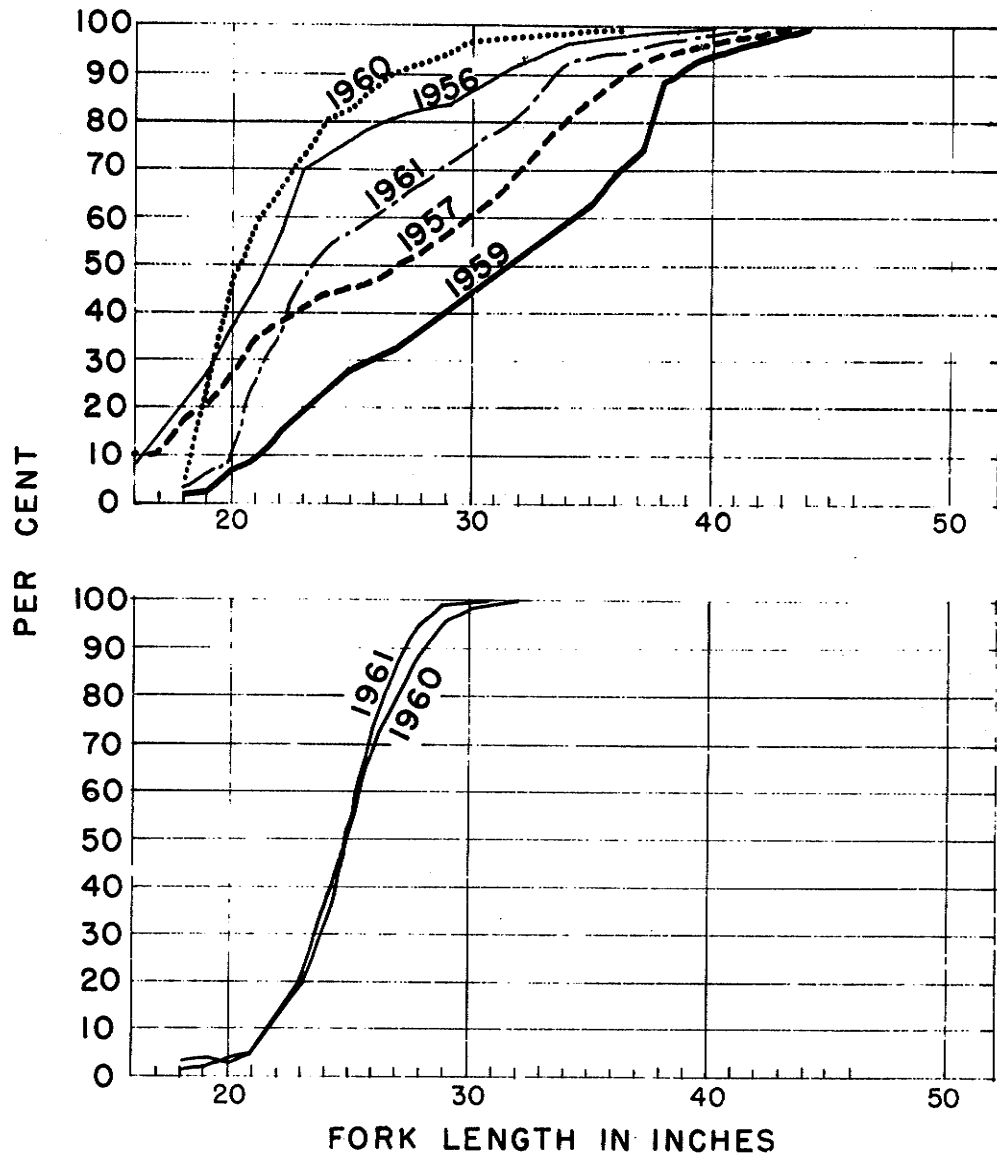


Figure 41. Cumulative length-frequencies of chinook (above) and coho (below) salmon in the Columbia River (ocean) sport fishery.

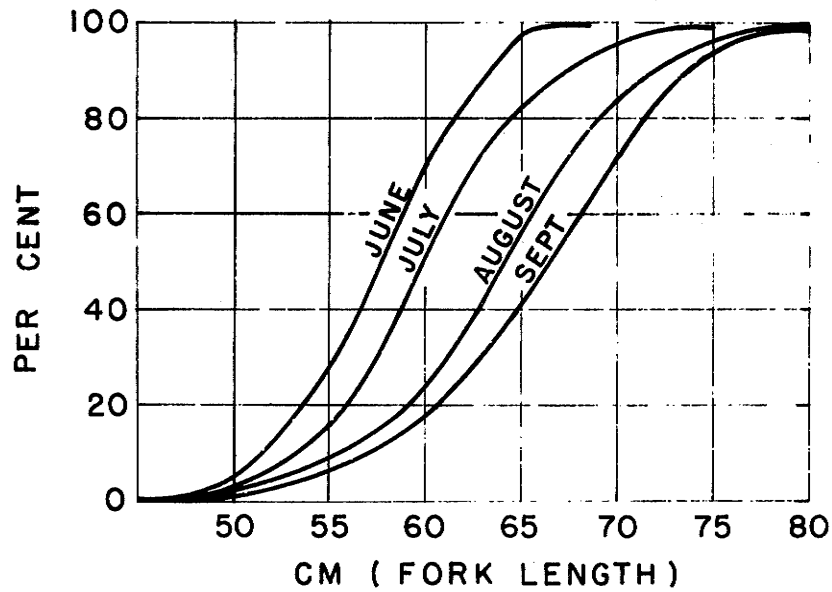
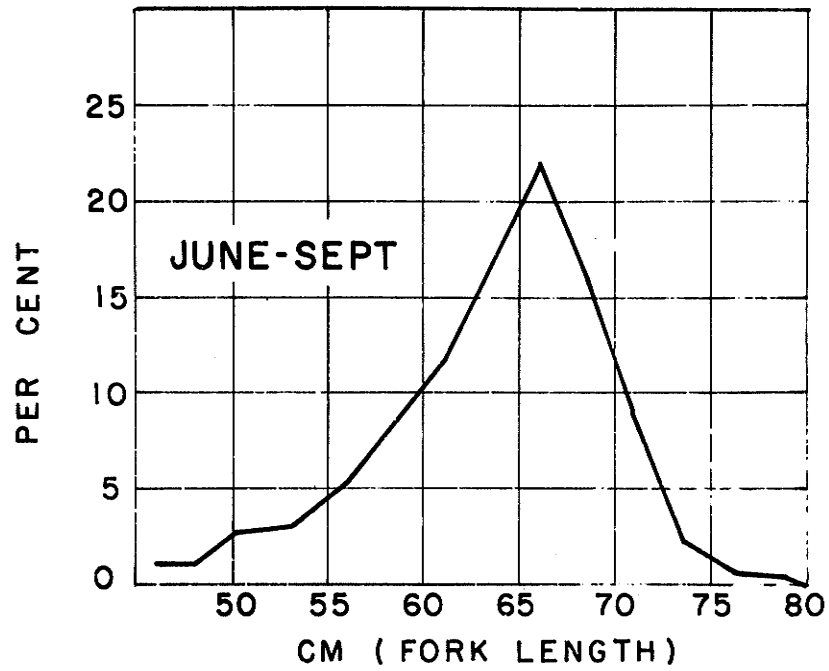


Figure 42. Length frequency (top) and cumulative monthly length frequencies (bottom) of coho. Columbia River (ocean) sport fishery.

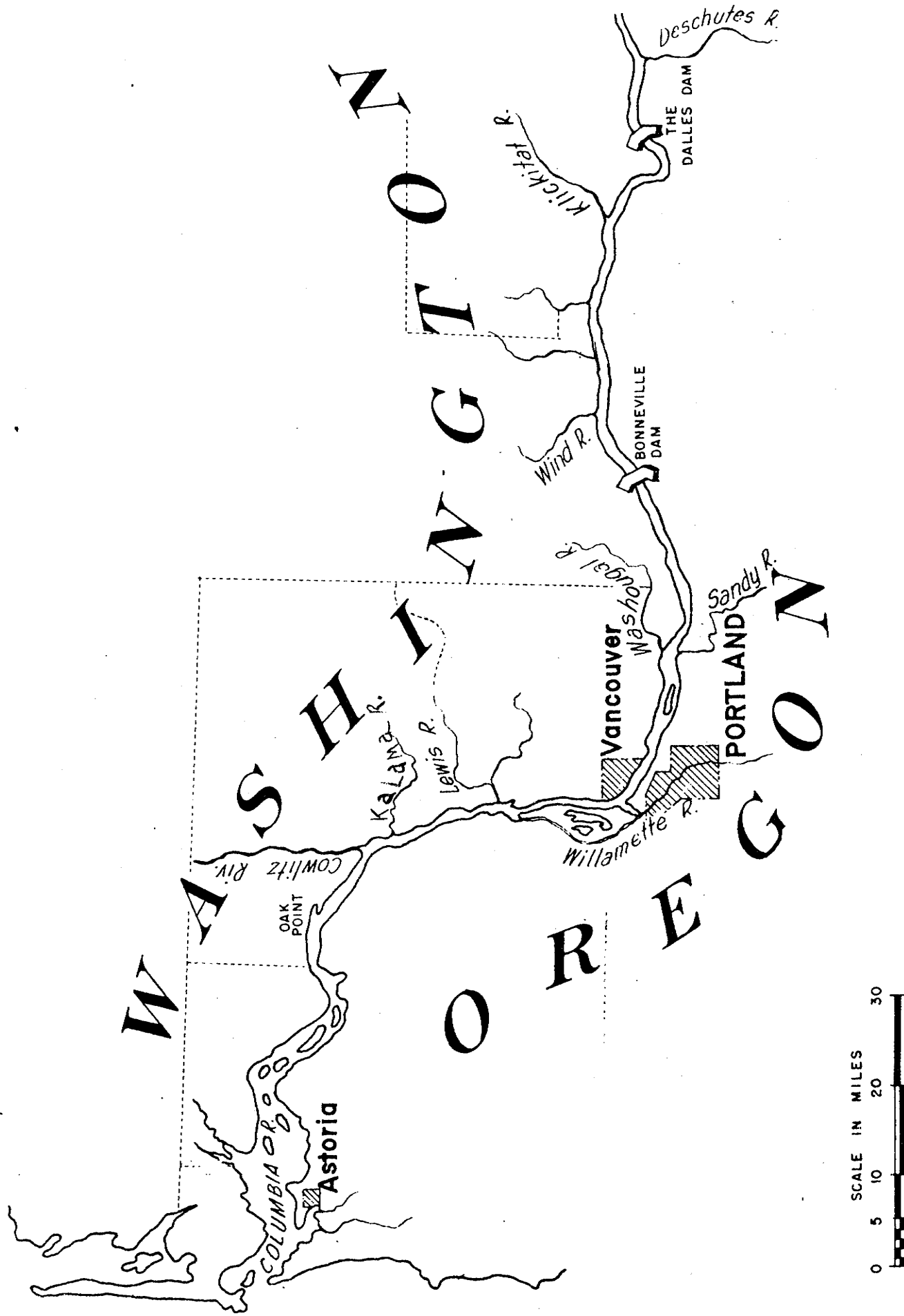


Figure 43. The lower Columbia River and tributaries.



Figure 44. "Hogline" fishing on the Columbia River near the mouth of the Sandy River, Oregon.

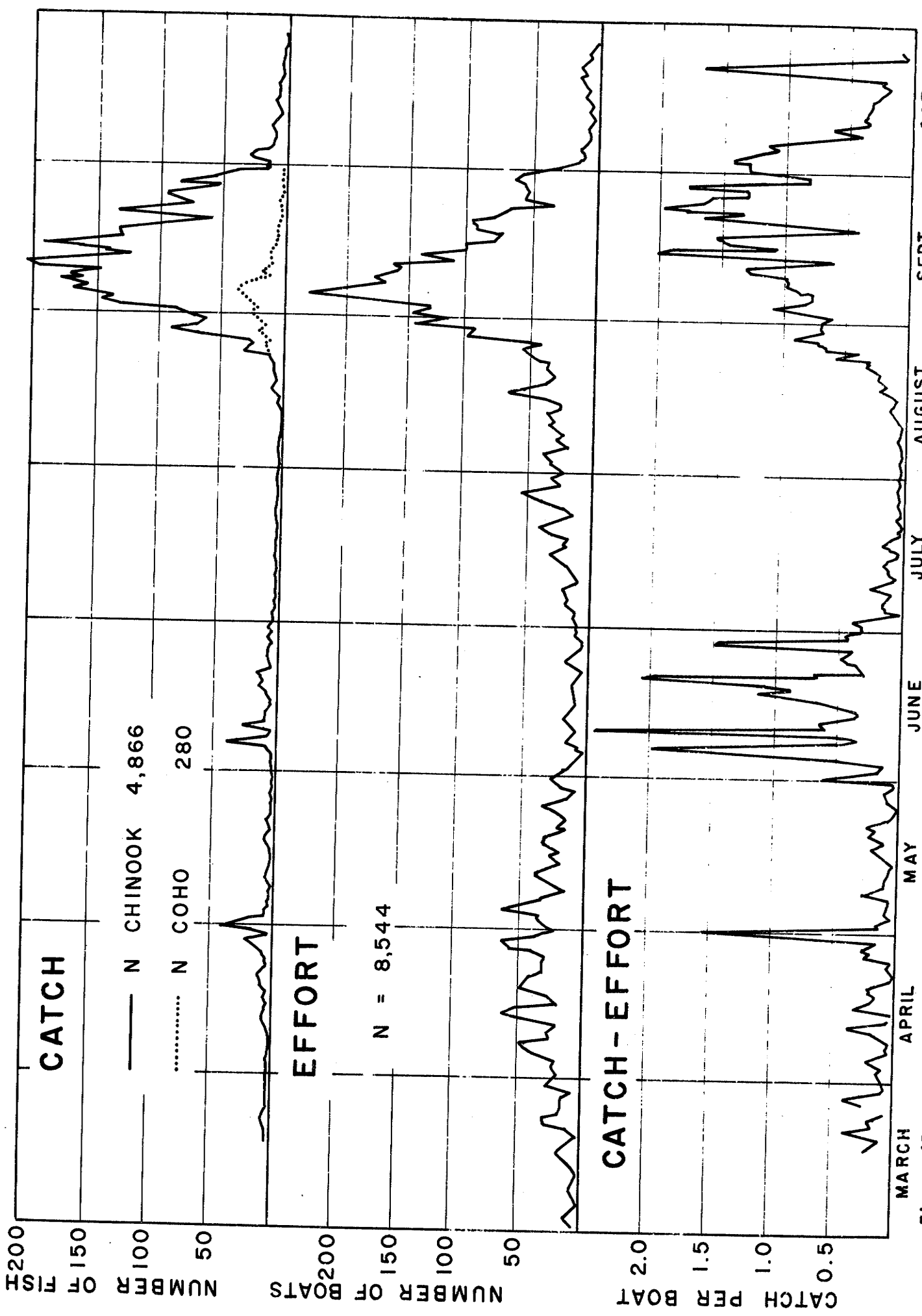


Figure 45. Composite configuration of chinook and coho catch, effort, and chinook catch per effort - Columbia River (fresh water) sport fishery.

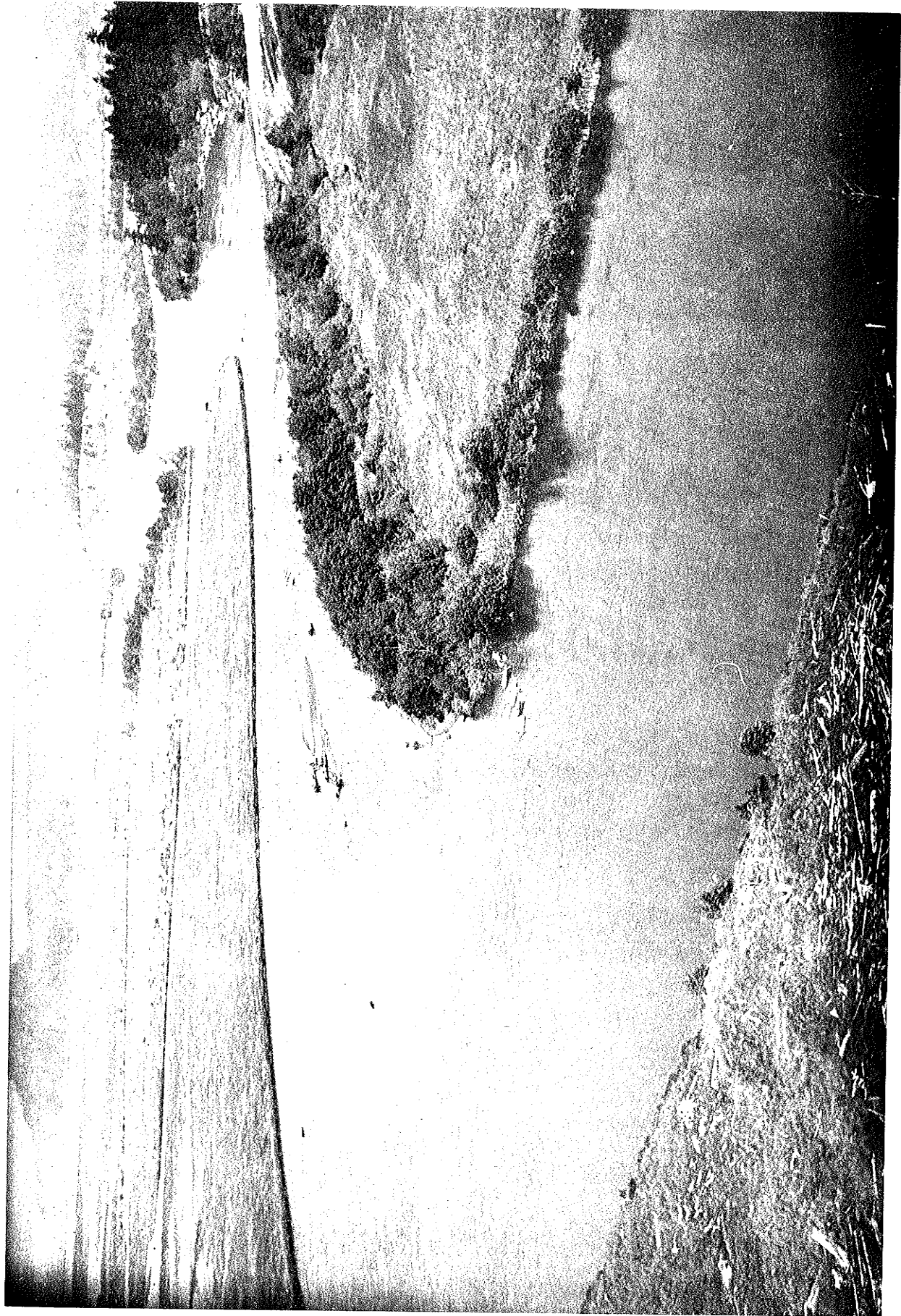


Figure 46. An aerial view of the North Fork of the Skagit River, showing boats anchored in fishing position and Skagit Bay in the background.

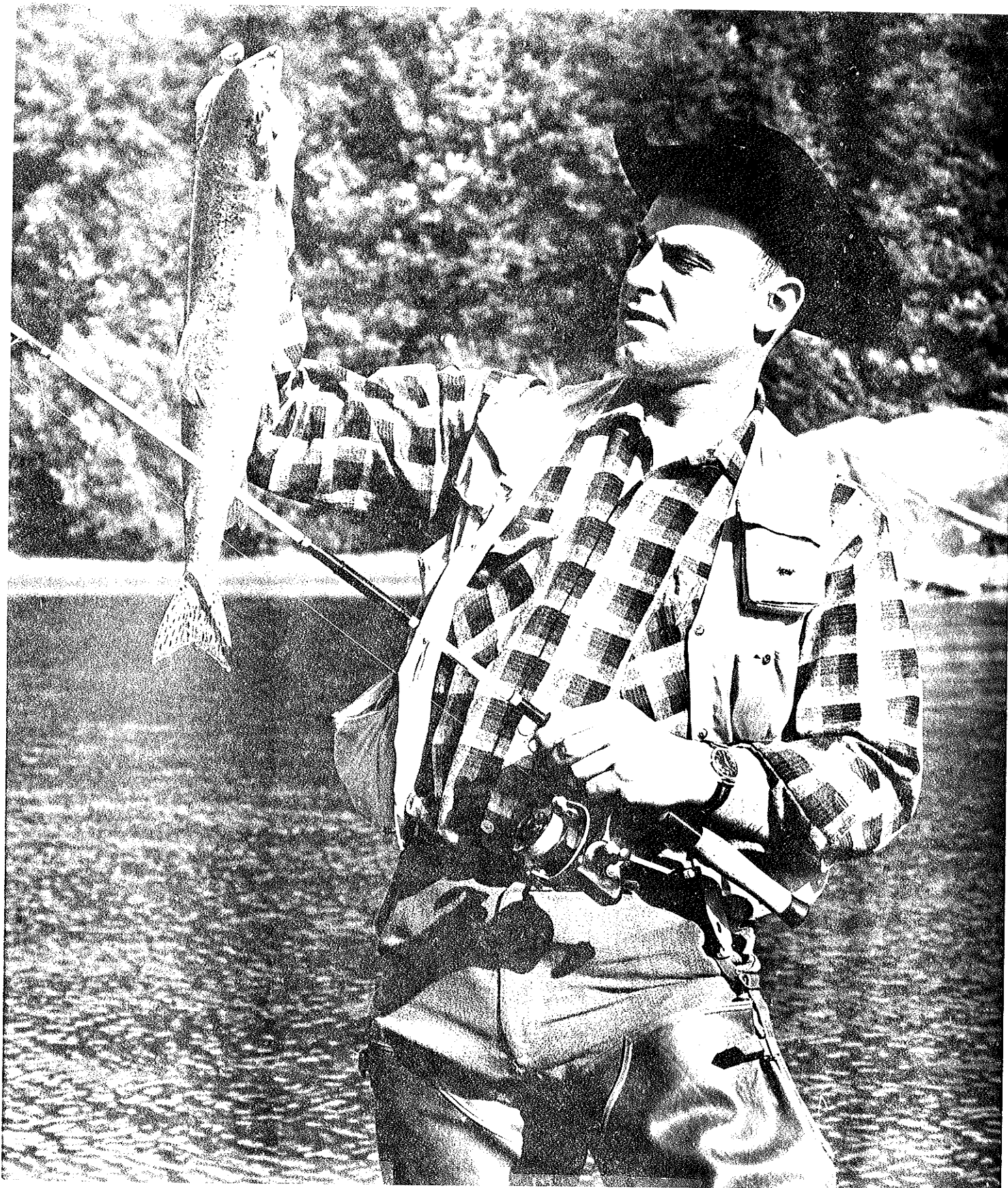


Figure 47. A Stillaguamish River angler with a pink salmon (Courtesy of Ted Wilcox, Seattle, Washington).

A P P E N D I X III

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Appendix 3. Percentage of sampled inner-Puget Sound sport-caught chinook bearing fin marks of specific Puget Sound basin releases 1/ by age at harvest 2/, brood year, and catch sampling areas. The numbers of chinook marked and the numbers of harvested chinook sampled for marks are shown under the appropriate headings.

Area of release: Deschutes River (Capitol Lake)

Sampling area	Brood year Number marked in millions	Percentage marked by age (and numbers examined for marks)		
		1+	2+	3+
Tacoma Narrows & south	1949	0.6 (331)	4.8 (351)	3.6 (338)
Seattle	(0.20)	4.2 (240)	3.5 (113)	0 (2)
Point No Point		0 (45)	2.0 (51)	14.3 (7)
Possession Point		0 (113)	8.3 (36)	5.9 (17)
Tacoma Narrows & south	1952	5.6 (951)	4.2 (1032)	0 (65)
Seattle	(0.23)	1.5 (712)	0.5 (369)	0 (13)
Point No Point		3.4 (58)	5.9 (17)	0 (13)
Possession Point		0.4 (890)	2.2 (182)	0 (10)
Tacoma Narrows & south	1954	15.4 (122)	39.0 (461)	22.2 (81)
Seattle	(1.02)	12.3 (619)	17.6 (68)	12.5 (8)
Point No Point		8.8 (159)	12.7 (71)	33.3 (6)
Possession Point		0.3 (618)	5.8 (69)	0 (8)
Tacoma Narrows & south	1955	5.1 (914)	14.2 (211)	10.2 (98)
Seattle	(0.76)	5.3 (512)	13.1 (99)	1.8 (56)
Point No Point		3.3 (120)	11.1 (18)	16.7 (6)
Possession Point		1.5 (482)	8.5 (117)	5.9 (17)

(continued next page)

Area of release: Deschutes River (Capitol Lake) (Continued)

Sampling area	Brood year	Percentage marked by age (and numbers examined for marks)		
	Number marked in millions	1+	2+	3+
Tacoma Narrows & south	1956	4.8 (168)	11.9 (236)	
Seattle	(1.41)	4.8 (228)	4.4 (180)	
Point No Point		0 (19)	0 (6)	
Possession Point		0 (241)	5.3 (75)	
Tacoma Narrows & south	1958		0.9 (218)	0 (122)
Seattle	(0.07)		0 (477)	0 (21)
Point No Point			0 (38)	0 (33)
Possession Point			0.4 (302)	0 (6)
<u>Area of Release: Soos Creek (Duwamish River)</u>				
Tacoma Narrows & south	1949	0.6 (331)	1.4 (351)	0.9 (338)
Seattle	(0.20)	0.4 (240)	0.9 (113)	0 (2)
Point No Point		0 (45)	0 (51)	0 (7)
Possession Point		0 (113)	0 (36)	0 (17)
Tacoma Narrows & south	1951	0.8 (510)	0.6 (326)	0.3 (299)
Seattle	(0.34)	0 (63)	0 (150)	0 (22)
Point No Point		0 (385)	0 (9)	0 (1)
Possession Point		0 (366)	1.0 (104)	0 (10)
Tacoma Narrows & south	1953	0.8 (1001)	0.7 (288)	2.4 (125)
Seattle	(0.14)	1.1 (801)	1.6 (122)	0 (9)
Point No Point		0 (21)	0 (15)	0 (18)
Possession Point		0.2 (1215)	7.4 (27)	0 (1)

(continued next page)

Area of Release: Issaquah Creek (Lake Washington System)

Sampling area	Brood year	Percentage marked by age (and numbers examined for marks)		
	Number marked in millions	1+	2+	3+
Tacoma Narrows & south	1953	0.5 (1008)	0.7 (288)	0.8 (125)
Seattle	(0.20)	0.7 (801)	0.8 (122)	0 (9)
Point No Point		0 (21)	0 (15)	11.1 (18)
Possession Point		0.3 (1215)	14.8 (27)	100.0 (1)
Tacoma Narrows & South	1955 ^{3/}	0.1 (914)	0.5 (211)	1.0 (98)
Seattle	(0.21)	0 (512)	0 (99)	0 (56)
Point No Point		0 (11)	0 (18)	0 (6)
Possession Point		0 (422)	117 (0)	0 (15)

Area of Release: Lake Union
(Lake Washington System - University of Washington)

Tacoma Narrows & south	1949	0 (331)	0.3 (351)	0 (338)
Seattle		0.4 (240)	0 (113)	0 (2)
Point No Point		0 (45)	2.0 (51)	0 (7)
Possession Point		0 (113)	0 (36)	0 (17)
Tacoma Narrows & south	1950	0.7 (583)	1.2 (576)	0.5 (190)
Seattle		0 (133)	0 (11)	0 (1)
Point No Point		0 (266)	0.5 (186)	0 (5)
Possession Point		0.5 (437)	0.9 (117)	0 (19)
Tacoma Narrows & south	1952	0.5 (951)	0.8 (1032)	0 (65)
Seattle		0.3 (1048)	0.8 (369)	0 (13)
Point No Point		0 (58)	0 (17)	0 (13)
Possession Point		0.2 (890)	0.5 (182)	0 (13)

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Area of Release: Lake Union
(Lake Washington System - University of Washington) (Continued)

Sampling area	Brood year	Percentage marked by age (and numbers examined for marks)		
	Number marked in millions	1+	2+	3+
Tacoma Narrows & south	1954	0.5 (790)	0.7 (461)	1.2 (81)
Seattle		0.6 (619)	0 (68)	0 (8)
Point No Point		0 (159)	2.8 (71)	0 (6)
Possession Point		0 (618)	1.4 (69)	0 (8)
Tacoma Narrows & south	1958		0.9 (218)	0.9 (112)
Seattle			0.8 (477)	0 (21)
Point No Point			2.6 (38)	0 (33)
Possession Point			0.7 (302)	0 (12)
Tacoma Narrows & south	1959	2.3 (43)	3.9 (152)	0 (52)
Seattle	(0.04)	1.2 (165)	1.7 (118)	0 (29)
Point No Point		5.3 (19)	4.9 (41)	0 (14)
Possession Point		0.7 (272)	0.9 (116)	0 (34)
Tacoma Narrows & south	1960	0 (190)	1.0 (301)	0 (111)
Seattle		0.5 (433)	0.3 (322)	0 (51)
Point No Point		0.7 (146)	2.0 (148)	0 (52)
Possession Point		0 (304)	0.3 (369)	0 (77)
<u>Area of Release: Samish River</u>				
Tacoma Narrows & south	1955	0 (914)	0 (461)	1.0 (98)
Seattle	(0.03)	0.6 (512)	3.0 (99)	0 (56)
Point No Point		0 (11)	0 (18)	0 (6)
Possession Point		0 (422)	0 (117)	0 (15)

(continued next page)

Area of Release: Stillaguamish River

Sampling area	Brood year	Percentage marked by age (and numbers examined for marks)		
	Number marked in millions	1+	2+	3+
Tacoma Narrows & south	1953	0.1 (1008)	0.7 (288)	0 (125)
Seattle	(0.11)	0 (801)	1.6 (122)	0 (9)
Point No Point		0 (21)	0 (15)	0 (18)
Possession Point		0 (1215)	0 (27)	0 (1)

1/ Most Puget Sound tributary fin marks, of a given brood year, were duplicated elsewhere along the Pacific Coast. Due to the rarity of marks recovered in the sound, before 1963, that are unassignable to Puget Sound basin releases, it is felt that this duplication has a minimal affect on inner-Puget Sound recoveries. When serious mark duplication within the Puget Sound basin occurred, these experiments have been omitted as are marked releases that failed to make a significant showing in catch samples.

2/ Ages were usually determined in the manner described by Lasater and Haw (1964), but 4.1% of these agings of marked fish were altered a year to correspond to marked releases into the Puget Sound basin. In addition, 51.5% of the lengths of marked chinook sampled from 1950 through 1954 are unavailable and these fish were aged on the basis of the mark alone.

3/ Released into the Lake Washington Ship Canal.

A P P E N D I X I V

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Appendix 4. Percentages of sampled inner-Puget Sound sport-caught coho bearing fin marks of specific local liberations $\frac{1}{}$, by catch sampling area and sampling year. The numbers of coho sampled for marks are shown in parentheses to the right of the percentages marked. The numbers of marked coho liberated are shown, in millions, in parentheses to the right of the sampling year.

Area of release: Minter Creek				
Sampling area	1950 (0.20)	1951 (0.22)	1952 (0.43)	
Tacoma Narrows	0.36 (3582)	0.31 (3181)	0.30 (2983)	
Seattle	0.08 (1196)	0.68 (1610)	0.08 (2478)	
Point No Point	0 (400)	0.16 (632)	0 (933)	
Admiralty Inlet	0.08 (1319)	0.22 (890)	0.26 (390)	
Possession	0.08 (3565)	0.12 (4089)	0.06 (3190)	
	<u>1953 (0.45)</u>	<u>1954 (0.29)</u>	<u>1955 (0.60)</u>	
Tacoma Narrows	1.91 (2252)	1.00 (2601)	0.77 (1819)	
Seattle	0.92 (1951)	0.17 (3484)	0.30 (1994)	
Point No Point	0.13 (770)	0 (100)	0 (62)	
Admiralty Inlet	0 (34)	0 (41)	0 (0)	
Possession	0.32 (2222)	0.10 (2968)	0.08 (3566)	
	<u>1956 (0.43)</u>	<u>1957 (0.30)</u>	<u>1958 (0.38)</u>	<u>1959 (0.52)</u>
Tacoma Narrows	1.40 (1505)	1.90 (1212)	1.61 (62)	1.95 (256)
Seattle	0.51 (1578)	0.47 (1072)	1.23 (244)	0 (80)
Point No Point	0.58 (520)	0.32 (312)	0 (31)	0 (14)
Admiralty Inlet	0.75 (268)	0.54 (184)	0 (33)	1.05 (95)
Possession	0.15 (1326)	0.20 (1481)	0.14 (699)	0.36 (1123)
Area of release: May Creek (Snohomish System)				
	1956 (0.20)			
Tacoma Narrows	0 (1505)			
Seattle	0.19 (1578)			

(continued next page)

Area of release: May Creek (Snohomish System) (Continued)

Sampling area	1956 (0.20)			
Point No Point	0 (520)			
Admiralty Inlet	0 (268)			
Possession	0 (1326)			

Area of release: University of Washington (Lake Washington System)

	<u>1952 (0.03)</u>	<u>1953 (0.07)</u>	<u>1954 (0.07)</u>	
Tacoma Narrows	0 (2983)	0 (2252)	0.23 (2601)	
Seattle	0.04 (2478)	0.21 (1951)	0.11 (3484)	
Point No Point	0 (993)	0 (770)	0 (100)	
Admiralty Inlet	0 (390)	0 (42)	0 (41)	
Possession	(3190)	0 (2222)	0.07 (2968)	
	<u>1955 (0.06)</u>	<u>1956 (0.05)</u>	<u>1957 (0.02)</u>	
Tacoma Narrows	0.22 (1819)	0 (1505)	0.08 (1212)	
Seattle	0.05 (1994)	0 (1578)	0 (1072)	
Point No Point	0 (62)	0 (520)	0 (312)	
Admiralty Inlet	0 (0)	0 (268)	0 (184)	
Possession	0.03 (3566)	0.15 (1326)	0 (1418)	
	<u>1952 (0.04)</u>	<u>1953 (0.04)</u>		
Tacoma Narrows	0 (2983)	0.04 (2252)		
Seattle	0.04 (2478)	0.21 (1951)		
Point No Point	0 (933)	0 (770)		
Admiralty Inlet	0 (390)	0 (42)		
Possession	0 (3190)	0.09 (2222)		

(continued next page)

Area of release: Baker Lake (wild stock)

Sampling area	1951 (0.02)	1952 (0.05)	1953 (0.03)	1962 (0.06)
Tacoma Narrows	0 (3181)	0.03 (2983)	0.09 (2252)	0 (125)
Seattle	0 (1610)	0 (2478)	0 (1951)	0
Point No Point	0 (632)	0.21 (933)	0 (770)	0
Admiralty Inlet	0 (890)	0.26 (390)	0 (34)	0
Possession	0.02 (4089)	0.09 (3190)	0 (2222)	0.07 (1351)

Area of release: Skagit River Hatchery (Clark Creek)

Tacoma Narrows	0.03 (3181)	0 (2983)	0 (256)
Seattle	0 (1610)	0 (2478)	0 (80)
Point No Point	0 (632)	0 (933)	0 (14)
Admiralty Inlet	0 (890)	0.26 (390)	0 (95)
Possession	0 (4089)	0.06 (3190)	0.09 (1123)

^{1/} Before 1958, two year classes of coho (1+ and 2+) were important in sport catches during a calendar year and are included in catch samples. Sub-16 inch marked coho occurring in catch samples from August through November were assumed to be 1+ (see Tables 3 and 4). The numbers of marked fish indicated as being available during a sampling year prior to 1958 included those which would result in catches of 1+ and 2+ coho. Only releases resulting in catches of 2+ coho are considered beginning with 1958.