Economic Adjustment Strategy for the Oregon Fishing Industry

Feasibility Review of Increasing Abundance and Harvest of Chinook Salmon In Oregon Offshore Fishery

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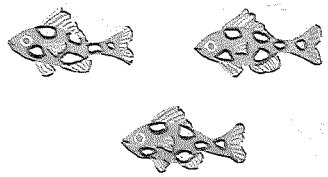
Thanks Hillary!

Carl



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FEASIBILITY REVIEW OF INCREASING THE ABUNDANCE AND HARVEST OF CHINOOK SALMON IN OREGON OFFSHORE FISHERY

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contributed financially to the
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A Preliminary Feasibility Review of Increasing The Abundance and Harvest of Chinook Salmon in The Oregon Offshore Fishery

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EXECUTIVE SUMMARY

The purpose of this study is to provide a literature review of available information pertaining to the feasibility of increasing the Oregon offshore harvest of chinook salmon. The status of the Oregon coastal chinook stocks is evaluated with respect to abundance, offshore contribution, migratory patterns, and disease problems. This information provides preliminary guidelines for determining which stocks are potential candidates for transfer or enhancement. After this initial screening, a final qualitative evaluation of the stocks is made with regard to the impacts of introductions on native fish and the genetic risks involved in a reprogramming or enhancement effort. Reprogramming refers to transferring hatchery fish and enhancement refers to increasing the number of hatchery fish released.

The Oregon coastal chinook stocks that tend to contribute heavily to the Oregon offshore fishery are the southern stocks: the Umpqua spring, the Rogue spring and fall, the Chetco fall, and the Elk fall chinook. The contribution of the Elk stocks to the Oregon fishery may be due in part to the extended troll fishery that operates off the Elk River. Fish from the southern stocks generally are not as highly migratory as the northern coastal chinook and are believed to remain in local waters (Oregon and California) for most of their ocean life history. The escapement of the southern coastal stocks has been depressed in the past few years; there is speculation that this was caused by the warm ocean currents of the El Nino. Historically, the size of the runs from the southern coastal streams probably was comparable to that of the northern streams. Recent catch and escapement data indicate that the southern stocks are recovering; however, limited information on the long term status of these stocks makes it difficult to assess the present health of the resource.

Oregon Department of Fish and Wildlife policy prohibits the transfer of two southern coastal stocks to other systems. The Chetco and Elk fall chinook have been quarantined due to the Infectious Hematopoietic Necrosis Virus (IHNV). Recently, this virus was isolated from upriver bright chinook in the Columbia River, resulting in the destruction of millions of eggs at the Bonneville hatchery. Chinook from the Columbia-Willamette Basin cannot be transferred to any Oregon coastal hatcheries. The development of an IHN-free stock is not expected in the near future and there is presently no treatment (e.g. vaccine) for the virus.

The life history strategies of the various coastal stocks provide information that is critical to the outcome of a reprogramming effort. The life history of introduced stocks should be compatible with the new environment to which they are transferred. Variations in tolerance levels to high temperatures, low river flows, and diseases as well as differences in the timing of migration to the ocean, freshwater and estuary residence time, and run timing could lead to failure of the transplanted fish to survive.

Interactions between hatchery and wild fish form the basis of concern about the genetic risks associated with transferring fish. The impact of hatchery strays (adults and juveniles) cannot be analyzed directly; however, there is evidence that negative interactions can result in the reduced production (i.e. survival and growth) of wild fish. Beneficial and neutral "impacts" are also possible, but in order to manage the resource conservatively, it is recommended that the possible negative impacts be avoided. Hatchery management practices, hatchery location (e.g. proximity to the coast), the density of wild fish (and their "fitness") in the streams, and fish behavior are some factors that might influence the extent of the negative impacts.

The carrying capacity of the ocean does not appear to limit the production of chinook. Fall chinook stocks have been increasing at a rate of about 3% per year since 1950. Although this trend has slowed in recent years, the overall health of the resource appears to be good. Density-dependent mechanisms might occur in streams where rearing, spawning, and overwintering habitats are limited. Methods exist for examining the carrying capacity of coastal streams (and optimum stocking rates); however, the efficacy of these methods is restricted by the limitations of the present information base. Because of these limitations, recommendations for a "safe level of increased releases" could not be made. The issue of allocation fell subject to a similar fate.

In conclusion, this report presents a review of important aspects of the coastal chinook resource that need to be considered in future feasibility studies. Further study is recommended before reprogramming or enhancement efforts are initiated. More emphasis should be placed on the design of contribution experiments and the analysis of data pertaining to abundance, ocean contribution, distribution, and life history strategies of Oregon coastal chinook salmon.

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List of Acronyms and Abbreviations

AK	Alaska
BGD	Bacterial Gill Disease
BC	British Columbia
BKD	Bacterial Kidney Disease
BY	Brood Year
CA	California
CPUE	Catch Per Unit Effort
CWD	Cold Water Disease
CWT	Coded Wire Tag
ICH	Ichthyophthirius
IHN	Infectious Hematopoietic Necrosis
IHNV	Infectious Hematopoietic Necrosis Virus
INPFC	International North Pacific Fisheries Commission
IPN	Infectious Pancreatic Necrosis
ODFW	Oregon Department of Fish and Wildlife
OPI	Oregon Production Index
OR	Oregon
OSU	Oregon State University
PMFC	Pacific Marine Fisheries Commission
STEP	Salmon and Trout Enhancement Program
VEN	Viral Erythrocytic Necrosis
WA	Washington

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ABSTRACT

The potential for increasing the Oregon harvest of chinook salmon is evaluated with respect to enhancement and reprogramming efforts which would use Oregon coastal chinook stocks. Several candidates for transfer were selected on the basis of their contribution to the Oregon offshore fishery, their abundance, and their disease status. These were the Rogue spring and fall and Umpqua spring stocks. However, genetic concerns (e.g. development of a "superstock"), life history strategies, and socio-institutional concerns precluded these stocks from being recommended for transfer at this time. Further study is required on various aspects of these stocks as well as on the other coastal stocks before reprogramming or enhancement efforts are initiated.

Introduction

Salmon have become a predominant element in the economy, politics and culture of the Pacific Northwest. The resource, once thought to inexhaustible, has become scarce and requires careful management to insure its perpetuation. This report addresses the perceived need to increase the abundance and harvest of chinook salmon in the Oregon offshore fishery to satisfy various user groups. The objectives of this study are to review the status of the Oregon coastal chinook stocks and to evaluate the impact of introductions of hatchery fish on native fish populations.

The status of Oregon coastal chinook stocks is reviewed with respect to the contribution of various stocks to the Oregon offshore fishery, their migratory behavior, their ocean distribution, and their abundance.

The evaluation of hatchery and native fish interactions includes genetic concerns of enhancement and reprogramming efforts, density dependence and carrying capacity considerations, and general ideas governing stocking policy in Oregon.

Scope of Study

1. The factors that are important in assessing the feasibility of increasing chinook production and/or contribution to the Oregon offshore fishery are analyzed in a qualitative manner. Available information on many of these subjects is limited or sporadic; hence, a quantitative analysis (unless rigorously executed) would be constrained by the inadequacy of the original data.

2. The Columbia River system was not reviewed in detail due to time limitations. Complications of evaluating the Columbia River arise from the complexity of the system and the intricate life history of chinook. Furthermore, Columbia chinook cannot be transplanted to coastal streams due to disease regulations. For information on Columbia River chinook, a recent report on their status by the Oregon Department of Fish and Wildlife (ODFW) is

recommended (Howell, et al., 1985).

3. An assessment of stocks from other states is not included in this evaluation; California or upriver Columbia River stocks may be suitable for subsequent study.

4. The potential for increasing harvest and abundance is presented in terms of reprogramming stocks that are released from existing hatcheries and increasing the number of fish released from existing hatcheries. "Enhancement" by improving the quality of the fish released is not considered in this report but should be addressed in later studies.

5. Fisheries management concerns in terms of stock/recruitment and escapement and allocation is briefly reviewed but is generally beyond the scope of this report.

6. Hatchery management practices (eg. time and size of release) are not evaluated.

7. Due to time limitations, the level of resolution of this study is such that areas of harvest within Oregon waters are not distinguished in the evaluation of contribution.

8. The determination of contribution of stocks with respect to age classes was considered beyond the scope of this study.

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The Status of Oregon Coastal Chinook Stocks

General

In order to evaluate the potential for reprogramming or enhancing Oregon chinook stocks in the future, it is important to gain an understanding of the health of the resource. Historical and recent studies were reviewed to provide a long term perspective on the status of Oregon coastal chinook stocks. The status of these stocks was assessed with respect to: contribution of Oregon coastal chinook to the Oregon Offshore fishery, migration and distribution of Oregon chinook salmon in the North Pacific Ocean, abundance of various coastal chinook stocks and disease problems of Oregon chinook salmon.

Contribution of Oregon coastal chinook to the Oregon Offshore fishery

Literature Review of Tagging and Marking Studies, Past to Present

Historical Tagging and Marking Studies

The earliest tagging studies that provided information on the migrations of chinook from Oregon coastal streams and the Columbia River were conducted in Canadian waters from 1925 to 1930 (Williamson, 1927 and 1929; Clemens, 1929; Williamson and Clemens, 1932; and Pritchard, 1934;) (Appendix A-1.2). Prior to 1925, tagging and marking experiments were not designed to study the ocean contribution or migration of chinook salmon. The tagging of chinook salmon off the Oregon coast in 1926 represented the first attempt to learn about the migratory behavior of chinook salmon found off the Oregon coast (Rich and Holmes, 1929). However, little effort was made to recover the tags and only two chinook recoveries were reported (Van Hyning, 1951). In 1948 and 1949, a more intensive research program was conducted to study the migration and abundance of troll-caught chinook salmon. The Oregon Fish Commission tagged 138 chinook in the general area of Coos Bay. There were 6 recoveries: 4 off the Oregon coast and 2 off the California coast. This tagging study was accompanied by increased efforts to report the recoveries of tagged fish.

Other early studies reported on tagged fish which later returned to Oregon streams: in California from 1939 to 1949 (Fry and Hughes, 1951), in Washington from 1948-1949 (Kauffman, 1951), in British Columbia in 1949 (Neave, 1951), and in Alaska from 1950 to 1955 (Parker and Kirkness, 1956).

Early marking experiments do not provide much information on the migration or contribution of Oregon chinook salmon to the Oregon offshore fishery. Rich and Holmes (1929) released 100,000 fin clipped fall chinook in 1923. All of the 18 troll recoveries were made off or north of the Columbia River; however, biases exist due to the variable effort expended in recovering marks.

Marked spring chinook were released from Oregon hatcheries from 1948 to 1962; the only coastal streams involved were the Trask (brood year 1949), the Rogue (brood years 1958-1962), and the Umpqua (brood years 1958 to 1962). Limited information is available on contribution to the offshore fisheries beginning with brood year 1958.

Limitations of the Early Marking and Tagging Studies

The limitations of the early tagging and marking experiments greatly restrict the use of this information. Some of the deficiencies of these early studies are:

1. There was no systematic recovery of marked chinook in the ocean, or of tagged chinook in the streams.

2. There were large variations in the opportunity to recover tagged fish, especially in streams. Examples: There were more facilities on the United States streams to capture tagged fish than there were on Canadian streams (Godfrey, 1968).
   Most of the recovery efforts were directed at the Columbia River and therefore, the information was biased because most of the recoveries were from that area.
   In 1947, the Fish Commission of Oregon emphasized the recovery of coho marks and not much effort was placed on the recovery of chinook marks.

3. Duplication of marks. For example, the same marks were used by the Sacramento and Columbia River hatcheries in 1948 so it was impossible to determine the natal streams of the troll-caught marked fish (Van Hyning, 1951).

4. Differential survival to catch of marked fish.

5. Fin mark regeneration and the appearance of "natural" fin clips.

6. Straying of tagged fish. It cannot be verified that the stream of recovery was the stream of origin of a tagged fish.

7. Hooking mortality of tagged fish was undetermined for many of the studies. Differential mortality of tagged fish is also a source of error.

8. Tagging experiments were inadequate in scope such that their results tended to exaggerate the importance of some stocks while underestimating the importance of others. This occurred when the experiments were limited to part of the fishing season and/or area (Informal Commission on Chinook and Coho, 1969).

9. No early cooperative efforts to report the recovery of marked and tagged fish. However, in 1948 and 1949 the cooperation between California, Oregon and Washington was enhanced because each state was involved in a marking or tagging experiment. Godfrey (1968) noted that the tagging programs in Canada and the United States were out-of-phase in terms of effort expended to tag fish and the times and locations of the experiments. Most of the chinook tagging experiments in Canada took place approximately 20 years before most of the U.S. chinook tagging experiments.

10. The actual numbers of chinook that had been tagged were not great. From 1925 to 1955, Canada tagged approximately 8000 chinook and the U.S. tagged approximately 7500 chinook (Godfrey, 1968).

Because of these limitations, information from these early studies will be used only as observations on where a particular fish was at the time of release and capture.

Fin Mark Experiments, 1962 to 1973.

In the early 1960's, the evaluation of the production of fall chinook in Oregon centered on fish from the Columbia River. Results from these marking experiments provided the basis for management of the resource for many years. Detailed reviews of these experiments are presented by Pulford (1964), Henry (1965), Van Hyning (1968), Cleaver (1969), and Lander (1970). Because the status of the resource has changed considerably in the 20 years since, more recent information on Columbia River chinook stock status (from coded wire tag studies) now provides the basis for management decisions.

Groups of fall chinook were marked from 1962 to 1973 and released in various coastal streams: Rogue (Lobster Creek stock), Umpqua, Sixes, Elk, Chetco, Trask, Coos, Coquille, and Alsea (Garrison, 1981). Marking experiments on Oregon coastal hatchery spring chinook were conducted on the Rogue and Umpqua Rivers from 1962 to 1973. Spring chinook from the Willamette Basin were also marked during this time period.

Limitations of Marking Experiments

Like the earlier marking experiments, the use of information from the later fin mark studies is restricted due to deficiencies in the techniques or sampling efforts. Although greater opportunities existed for recovering marked fish and the cooperation between Canada and the U.S. was enhanced, biases in the data prevented its use for accurately estimating contribution. Mark duplication and fin mark regeneration continued to be problems.

The effort to recover and report fin marked chinook declined starting in 1974 because of the change in emphasis to the coded wire tag program. After 1976, there was no recovery of fin marks except by individuals interested in the terminal fisheries or hatchery production (K. Johnson, pers. comm.). In turn, recoveries of fin marked fish after 1976 (from brood years 1971 to 1974) were sporadic and were not included in this report.

Information was not available for recoveries of marked chinook in catch years 1967 to 1969; however, the Pacific Marine Fishery Commission Regional Mark Processing Center has individual reports of fin mark recoveries from 1945 to 1973 (K. Johnson, pers. comm.).

Coded Wire Tag (CWT) Studies

The earliest releases of Oregon hatchery chinook with coded wire tags (standard length binary tags) were of fall chinook from brood year 1973. The earliest non-hatchery coded wire tag release of chinook was in 1977 (Wahle, draft 1985). Color coded tags were used previously to mark Big Creek and Trask stocks from brood year 1970. Since 1973, the use of CWTs to evaluate the contribution and distribution of various stocks has increased and has essentially replaced the earlier marking methods. However, until very recently, most hatchery fish with CWTs were not marked for the purpose of determining contribution or distribution (Wahle, draft 1985).

Most CWT fall chinook have been released from lower Columbia River Basin hatcheries and most CWT spring chinook have been released into the Rogue and Columbia Rivers. Non-hatchery (native) CWT chinook have been released in the John Day and Deschutes Rivers. According to Wahle (draft 1985), the Oregon Department of Fisheries and Wildlife (ODFW) marked 22.7 million hatchery chinook with CWTs and 285,000 non-hatchery chinook from 1976 to 1983. Private hatcheries have released CWT chinook but recovery information is available for only a few brood years.

A preliminary analysis of the contribution of hatchery produced chinook to the West Coast fisheries identified techniques that are required to better estimate stock contribution using CWT data (English, 1985). The analyses were based on tag recovery data from brood years 1971 to 1978. It was found that the contribution of U.S. hatchery chinook to the coastal fisheries remained fairly constant from 1974 to 1978 but has since declined. This pattern is reflected in the overall contribution of Oregon chinook stocks except for the northern coastal stocks (R. Garrison, pers. comm.).

The decline is closely correlated with the decrease of survival to catch for most U.S. hatchery stocks of chinook salmon (English, 1985). However, the survival to catch data for several Oregon areas (Appendix A-2) do not explain the differences in contribution observed for the northern and southern chinook stocks.

Some of the decrease is probably due to U.S. management strategies which reduced harvest rates on some U.S. chinook stocks. English (1985) suggests that drastic and unexpected declines in hatchery contribution can have serious implications for management, i.e. increased harvest rates on wild stocks may result, especially with those strategies that use "catch ceilings."

Unexpanded estimates (i.e. only marked fish are represented) of CWT recoveries of hatchery releases for brood years 1971 to 1977 reveal that "tule" fall chinook produced in the lower Columbia River area contributed 48.9% to the B.C. fishery, 19.1% to the Washington fishery, 16.5% to the Alaska fishery, 8.0% to the Columbia River fishery, 6.1% to the Oregon fishery and 1.1% to the California fishery. Of the 6.1% contribution to the Oregon fishery, 5.4% was caught in the troll fishery.

Unexpanded estimates of CWT recoveries of chinook produced along the Oregon coast (from brood years 1971 to 1977) show a different pattern of contribution. The contribution to the Oregon fishery was 35.8% ; of this, 34.6% went to the troll fishery. The coastal hatchery chinook contributed 32.4% to the California fishery, 18.1% to the B.C. fishery, 8.2% to the Alaska fishery and 5.3% to the Washington fishery.

Oregon catches only 5.2% (4.4% in the troll fishery) of the entire West Coast production of chinook. The mean survival to catch estimate for chinook released from the Oregon coastal hatcheries was substantially greater than that from the lower Columbia River hatcheries (English, 1985) (Appendix A-2).

The CWT data summarized in the Pacific Marine Fisheries Commission (PMFC) mark recovery reports contains observed (actual) recoveries of CWT fish and estimated recoveries. Estimated recoveries refer to the number of fish caught that are estimated to contain tags. Corrections for differences in sampling methods and an expansion factor from area of port of

recovery is included in the estimate. This is not to be confused with the expansion factor used by English (1985) to represent unmarked fish released with marked groups of fish.

To date there is no computer database for retrieving and analyzing CWT data for Oregon. The PMFC presently is reviewing several ways to establish a database but methods and location of the central office are under discussion (Garrison, pers. comm.). The streamlining of this information would greatly aid studies designed to estimate contribution and distribution of various Oregon chinook stocks. Frank de Libero (of Washington) has keypunched some of the CWT data for Oregon chinook releases and Ken Johnson (PMFC) has computer access to CWT data for Oregon chinook brood years 1977 to 1982 (Johnson, pers. comm.).

Limitations of Coded Wire Tag Studies and Estimates

The limitations of coded wire tagging non-hatchery stock (Wahle, draft, 1985) are:

1. The inaccessibility of many streams where chinook are produced.

2. The difficulty of collecting statistically significant numbers of representative non-hatchery samples.

3. The fragility of chinook smolts.

4. The need for repeated marking experiments (i.e. replicates).

Limitations of using an expansion model to represent unmarked fish with groups of marked fish. Accuracy of the estimates depends on satisfying the following assumptions (English, 1985) :

1. "Tagged fish are representative of the defined group in that they are representatively sampled and are treated the same as the untagged fish both before and after tagging;

2. "Tag shedding is non-existent or is estimated and corrected for;

3. "No differential mortality occurs between tagged and untagged members of the group from tagging to release, or from release to recovery. If differential mortality occurs it can be estimated and adjusted for;

4. "No differential growth exists between tagged and untagged fish affecting catch distribution in space or time;

5. "No differential susceptibility to the fishery exists between tagged and untagged fish;

6. "No error in identifying tagged and untagged fish exists."

Some of the limitations of the unexpanded estimates (those currently used in the CWT recovery summaries for each catch year) are:

1. Oregon uses different "expansion factors" than other states in the estimates of contribution. Oregon expands the observed catch by port rather than by area; the possibility of expanding by area presently is under discussion (Johnson, pers. comm.).

2. Differences in sampling methods, effort, and fishing regulations (e.g. harvest rates) exist between the various fisheries.

3. Recovery rates are related directly to catches; hence, changes in harvest rates should be accounted for in order to analyze trends over time. This, however, was considered beyond the scope of this report.

English (1985) notes that "the contribution estimates are relatively insensitive to the variety of strategies used to represent unmarked U.S. hatchery releases." However, he also states that "the assumption associated with the theoretical model used to estimate contribution have not been rigourously evaluated with respect to CWT mark recovery data." The development of a more complete database and of better analysis techniques will improve the accuracy in interpreting contribution estimates.

Other studies and methods that may be used in determining contribution

Other techniques that can be used to evaluate contribution are reviewed briefly. These methods are still in their developmental phase and not much information is available for Oregon coastal chinook stocks.

Scale Analysis: The scale pattern analysis method can be used as a method for estimating contribution of non-hatchery fish. Wahle (draft,1985) suggests that information obtained from this method must be coupled with CWT data to provide accurate estimates on the proportion of wild fish in the catch. Scale analysis has been used in the past to gather information on life

history characteristics of various stocks. For example, scale analysis was used to determine residence time in Sixes River estuary (Reimers, 1973 and Reimers and Downey, 1982); residence time subsequently was used to determine the time of ocean migration of chinook adults that returned to spawn.

Electrophoresis: The electrophoretic method of genetic stock identification has been used to determine the origin of fish caught in the ocean fisheries. Unless a unique allele is present, however, the stock of origin cannot be established definitively. While electrophoresis can be used to differentiate between stocks of Asian and North American origin, it rarely can be used to differentiate between stocks that originated from a common geographical area. This method cannot stand alone as a measure of contribution and needs to be complemented with data from CWT studies (Wahle, draft, 1985). Not much information is available from electrophoretic studies of Oregon coastal chinook stocks with respect to contribution or distribution. Some information is available on Columbia River chinook stocks (Utter, et al., 1980). A serious limitation of this method is that the genetic integrity of the coastal stocks as well as the Columbia River stocks is probably not intact. This is due primarily to the long history of transplants that has occurred in Oregon streams. This aspect is reviewed in greater detail in Part II.

Acoustic Tagging: Because of the expense and technical difficulties associated with this method, acoustic tagging of representative groups of Oregon coastal chinook salmon probably will not be used in the near future to evaluate contribution. Presently this method is used to study river migrations of salmon (Pearcy, pers. comm.) and to study the movements of salmon in the open ocean (see vertical distribution).

Evaluation of Long Term Patterns of Contribution

Constraints on combining earlier studies with later studies.

Due to the many limitations of the early and more recent tagging and marking studies, information cannot be combined to give a quantitative expression of contribution. Few of the experiments were designed to study contribution or distribution. In turn, information from the earlier tagging and marking studies (including the fin mark studies to 1973) is useful as an observation on the movement of a particular fish or group of fish, but not as a measure of contribution of a stock to the fishery. These studies can be used to support the findings of the more recent coded wire tag studies in order to provide a long term perspective on the movements of various chinook stocks from

Oregon.

Another major problem of combining these studies is that the stocks have undoubtedly changed throughout history. Some stocks have declined in numbers while others have increased. If there are genetic factors that influence migratory behaviors, then transfers of stocks that survived to reproduce may have ~~have~~ resulted in some genetic alterations. The intensity of the fishery has increased and there have been changes in the types of gear used. Consequently, the distribution of particular stocks of chinook salmon today most likely are different from what they were in the past.

Without the reinforcement of the earlier studies, the CWT data is restricted to evaluating contribution over the short term. Results from only a few brood years provide the basis for estimating contribution of Oregon coastal chinook stocks. Consequently, the results are subject to marked change with each new catch year. A longer term perspective on the movements of salmon from various Oregon coastal streams is useful in evaluating how long term cyclical changes in the environment may influence the movements of salmon.

For example, the last "big" El Nino (1982) is believed to have affected the health of Oregon chinook salmon (Garrison, pers. comm.; Pearcy, pers. comm.; Johnson, 1984). The southern Oregon coastal stocks were more adversely affected than the northern coastal stocks in terms of catch and escapement numbers (A. McGie, pers. comm.). El Nino might have also caused chinook stocks to have a slightly different migration pattern. Pearcy (pers. comm.) notes that with higher mean sea levels, the currents tend to flow more strongly to the north causing fish to disperse more widely.

From 1953 to 1957-- the three years after the previous "big" El Nino-- the number of fish spawning in standard spawning index streams declined (Appendix A-3). Whether this decline is attributable to the warm ocean current is undetermined. (The investigation of this point is clearly beyond the scope of this report but is worth investigating in future studies-- it may aid in managers abilities to adjust strategies during years when environmental disturbances can be predicted). However, with the synthesis of long term information on contribution, distribution and abundance, some repeating scenarios might be observable for such cyclical environmental occurrences such as the El Nino.

General Patterns of Contribution

In general, northern Oregon coastal chinook stocks tend to migrate north and southern stocks tend to stay in Oregon waters or move southward. This does not mean that all fish leaving a northern natal stream go north; rather, a larger portion of the group goes north than south. When we estimate contribution to the

various fisheries, we are trying to estimate the relative proportions of marked fish that are caught by the West Coast fisheries. Because estimated contribution is not expanded to represent unmarked fish, not much can be said about these fish at this time.

Summary of Findings on the Contribution of Various coastal chinook stocks to the offshore fishery

1. The chinook stocks that were found to contribute primarily to the northern fisheries (WA, BC, and AK) are: Alsea fall chinook, Nestucca spring and fall chinook, Trask spring and fall chinook, Salmon River native fall chinook, Yaquina native fall chinook, Oregon Aqua-Foods fall chinook (primarily Trask fall stock) released in Yaquina Bay.

2. The chinook stocks that were found to contribute primarily to the southern (CA and OR) are: Chetco hatchery fall chinook, Rogue hatchery spring chinook, Rogue native fall chinook, Anadromous hatchery spring (Rogue stock) and Umpqua hatchery spring chinook. Anadromous hatchery fall chinook (Alsea and Trask Stock) tend to contribute to the northern fisheries.

3. The chinook stocks whose contribution is still undetermined or spread between the various fisheries (i.e. contribute to the northern and southern fisheries) are: Elk hatchery fall chinook, Coos native fall chinook and Umpqua fall chinook. The widespread distribution of Elk fall chinook may be artifactual. This is believed to be the result of the delayed October and November fishery that operates off the mouth of the Elk River. Elk River chinook cannot enter the estuary because a sandbar blocks the entrance until it is removed by the first big fall freshet each year. Consequently, Elk River chinook are believed to follow a predominantly northward migration. 4. Not enough information was available to evaluate contribution of the following chinook stocks: Burnt Hill, Coquille, Bandon (on the Coquille), Nehalem, Siletz, Siuslaw, Sixes and Oregon Aquafoods spring chinook released in Yaquina Bay. However, the spring chinook (Trask stock) released by Oregon Aquafoods are believed to contribute to the northern fisheries (Ratti, pers. comm.).

Ocean Migrations of Chinook Salmon from Oregon Streams and Rivers

Information on the ocean movements of chinook salmon comes from various sources. The CWT studies provide evidence for the occurrence of chinook salmon in various fisheries, especially in

the coastal fisheries. Occasionally some of these CWT chinook salmon are caught on the high seas by foreign commercial vessels or research vessels. Historical tagging and marking studies provide limited information on the movements of Oregon coastal chinook salmon on the high seas because the opportunity to recover fish in distant areas was low.

Scale analysis and electrophoresis have also been used to determine the general area of origin of salmon caught on the high seas. In recent years, the primary focus of identifying the origin of salmon caught on the high seas has been to determine areas of intermingling between United States and foreign salmon and not to study distribution.

Acoustic tagging is another means for learning about the ocean migrations of chinook salmon. However, there has not been any acoustic tagging of chinook from Oregon for the purpose of studying ocean distribution.

In this report, release and recovery information for Oregon coastal chinook salmon is summarized with respect to ocean movements. Information on vertical distribution was obtained primarily from reports on bottom trawl bycatch. Additionally, the migratory behavior of salmon is discussed briefly as it is relevant to understanding the distribution of the resource in the North Pacific Ocean.

High Seas Release and Recovery Information

Most of the information on the migrations of Pacific salmon has come from studies conducted after 1955 by Canada, Japan and the United States, members of the International North Pacific Fisheries Commission (INPFC). In 1952, the Japanese developed the commercial high seas fishery for salmon in the North Pacific. This led to increased interest in studying marine habitat, distribution, migration and intermingling of Pacific salmon.

Comprehensive reports on the migration and distribution of Pacific salmon show that chinook salmon are more widely dispersed in the ocean, travel greater distances and move in deeper waters than other salmonids (Manzer, 1964; Kondo et al., 1965; Hartt, 1966; Fredin et al., 1977; Major et al., 1978; Burgner, 1980; Hartt, 1980; Pearcy, pers. comm.). Because of these factors as well as the logistical problems in targeting a research study on chinook, information on their distribution is limited. Also, for strategic and scientific reasons, tagging efforts have been concentrated in known areas where high seas stocks are captured (e.g. the Aleutians) (Hartt, 1962).

Some of the early tagging studies indicated that chinook migrate long distances in the ocean. A chinook tagged south of

Adak Island in 1956 was recovered 11 months later in the Salmon River, Idaho; the minimum distance travelled was 2400 miles (Hartt, 1962). Mason (1965) notes that most chinook are found across the Pacific Ocean from at least 41° latitude to the Aleutian chain in the months of June and August.

The extent of the ocean distribution of chinook still is not well understood for the various Oregon coastal stocks. There is evidence that chinook from the upper Columbia River have extensive migrations to northern waters while lower Columbia River chinook tend not to migrate as far north (Rich and Ball, 1933; PMFC, 1961; Lander, 1970; Van Hyning, 1973). Northern coastal Oregon chinook stocks are believed to migrate greater distances than the southern coastal stocks (PMFC, 1952 and 1959; Garrison, pers. comm.). Therefore, some stocks have more extensive migrations than other stocks.

According to the INPFC Annual Report of 1983, Oregon chinook salmon were not detected in the Bering Sea and North Pacific Ocean "except in three fine strata, suggesting low relative abundance in 1980." The incidental catch in 1982, as reported by foreign observers, was made up primarily of chinook salmon (INPFC Annual Report, 1982).

The Japanese mothership fishery and research vessels mostly took immature chinook (predominately ocean age two-year olds) in the Bering Sea from 1972 to 1980. An attempt was made to analyze the data for a yearly comparison of catch per unit effort (CPUE) of chinook salmon caught in the mothership fishery from late June to late July in the area of 56° to 60°N and 175°E to 175°W. High CPUE appears to be cyclical, occurring every five years. For example, high CPUE was noted for 1964, 1969, 1974 and 1979. Following these years (i.e. 1970, 1975 and 1980), CPUEs generally were high but in other years they were low (INPFC Annual Report, 1981). This information, although inconclusive, suggests that chinook stocks experience some short term cyclical variations. Consequently, information from only several years of CWT studies may not reflect these changes in terms of distribution or contribution.

Few recoveries on the high seas of CWT chinook from Oregon have been made. A fish released in Elk River in September, 1980 was recovered in May 1982. Two fish released from the Salmon River, Oregon in 1980 and 1981 were recovered in the same area off the Aleutians in November, 1982 (INPFC Annual Report, 1983).

Migratory Behavior of Chinook Salmon in The North Pacific Ocean

Although information on chinook salmon is limited, a brief overview of various factors that may influence salmon movements is presented in order to provide some insights into chinook migratory behaviors.

Strong migratory patterns are most likely genetically determined. However, environment (e.g. recognition of water masses and photoperiod cycles) plays a significant role in the migratory behavior of salmon. Changes in the environment (natural or man induced) may alter the environmental cues the salmon use in their migrations (Burgner, 1980).

Burgner (1980) notes that during most of the salmon's migration in the open ocean, they swim near the surface and away from landmasses. This generalization, however, may not be true for chinook behavior. Juvenile salmonids are believed to migrate rapidly and extensively during their first summer at sea (Hartt, 1980). Chinook that have just left their natal stream areas tend to stay close to the mainland, as is indicated by catch data (Major et al., 1978). Chinook in their second growing year are widely dispersed on the distant high seas although not to the extent of their maximum recorded distribution (Major et al., 1978).

Sonar observations and catch patterns from gillnet catches indicate that salmon disperse rather than form defined schools during feeding perios (Burgner, 1980). There is some evidence that the feeding areas in the north (e.g. off the Aleutians) are richer than the local areas, which, in turn, may account for the majority of salmon heading north after leaving their natal streams.

Salmon use ocean currents in their migrations but there is evidence that they also cross defined current boundaries (Burgner, 1980). Temperature, salinity and food supply also have been examined as factors that are important migratory cues but definitive conclusions have not yet been reached (Favorite and Hanavan, 1963; Major at al., 1978; Burgner, 1980). Pearcy (pers. comm.) notes that currents, temperature, salinity and food supply are related factors and that migration is probably influenced by the interplay of these variables. Temperature (both mean sea and air temperature), however, may be used to explain deviations in run timing (Burgner, 1980). Nishiyama (1977) concluded that runs are earlier in warmer years than in colder years.

Vertical Distribution of Chinook Salmon

The vertical distribution (movements within the water column) of chinook is not well understood. They are taken in surface gillnets and incidentally in bottom trawls. In North America, it is not unusual to find chinook at depths to 110 meters (Major, et al., 1978). Most chinook are caught in the upper 78 meters, although some are caught below 128 meters (Major, et al., 1978).

Echo-sounding experiments conducted on high-seas salmon fishing grounds in the Aleutian area revealed that salmon ascended after sunset and descended after daylight (Hashimoto and

Maniwa, 1959; and Manzer, 1964). In these studies, the strongest echos were observed to come from the deep-scattering layer that shifted with the thermocline.

The offshore trawl fishery from Bandon to Port Orford in 1982 took primarily small chinook (2 to 4 lbs.) at 80 to 220 fathoms (Neil Richmond, Charleston Lab, Memo, 11 May 1983; Pearcy, pers. comm.). In the winter of 1981, most chinook were caught from 50 to 80 fathoms between Coos Bay and Willapa Bay, WA (Pearcy, pers. comm.). Measurements of 75 chinook taken as bycatch to the sole, cod, rockfish and pink shrimp fisheries showed that the fish varied in size from 292 to 755 mm fork length and age groups one to four were represented. Of these fish, eleven had CWTs. The CWT fish were fall and spring chinook of BY 1977 and 1978 that had been released in CA, WA, and OR (Rogue River, Umpqua River, Columbia River and Coos Bay). The stocks represented in the salmon bycatch of commercial trawlers in winter were similiar to those caught by trollers during summer. Pearcy (pers. comm.) suggests that these stocks may not be highly migratory and may spend their entire ocean life in local waters.

Six chinook of BY 1982 were recovered in the bottom trawl fishery in the following areas: Westport, Depot Bay, Winchester, and Trinidad, CA. These fish were Rogue chinook which were released from the Big Creek Hatchery, Columbia River (Garrison, pers. comm.).

If catch provides the window for studying distribution and contribution, the possibility that chinook are not caught heavily in the troll fishery in some areas because they are travelling in deeper waters is an important point to consider. Another related point is that adult chinook may be on their homeward journey and are not feeding; hence, they are less available to the offshore fishery.

Abundance of chinook salmon in the Oregon Coastal Streams

Abundance of Natural Spawners

The number of natural spawners found in Oregon coastal streams is difficult to ascertain. Several sources of information are reviewed in the attempt to determine how many fish are produced in various coastal systems.

Punch Card Estimates

Punch card estimates provide information on the river sport catch. However, the use of this information in determining the abundance of natural spawners is limited.

Early punch cards did not separate coho and chinook catches (i.e. they were grouped as "salmon"). In later punch card estimates, coho and chinook catches were differentiated post-facto on the basis of the perceived abundance of the two species in coastal streams. The punch card estimates tend to have a "positive response bias." People who catch fish are more likely to turn in their cards than people who do not catch fish. This has been substantiated by comparisons of statistical creel surveys with punch card estimates (Jay Nicholas, pers. comm.). Another problem with the punch card information is that the rate of exploitation is unknown for most streams, with the possible exception of the Elk River. For some streams (e.g. the Umpqua system), punch card data may provide relatively accurate information (McGie, pers. comm.).

Dam Counts

Winchester and Gold Ray dam counts provide data for estimating the numbers of chinook in the Umpqua and Rogue Rivers. Although the location of the dam may bias the results, this data is believed to provide an accurate indication of abundance (J. Nicholas, pers. comm.). A large percentage of the spring chinook runs from both rivers cross the dam while a low percentage of the fall chinook are represented in the dam counts. The spring chinook counts at the Gold Ray and Winchester Dams are presented in Table 1. The combined hatchery and wild counts at Gold Ray Dam from 1942 to 1980 averaged 28,855 fish per year (McPherson, pers. comm.); the combined average at the Winchester Dam from 1946 to 1980 was 8015 fish/year). The 1985 count (to June 15) at both dams already is exceptionally high; whereas the 1983 and 1984 counts were less than average. This may indicate that the Southern coastal stocks are beginning to recover from the slump of the last two years, which presumably was caused by the El Nino.

Historical Records from Canneries

Historical information on the commercial harvest of chinook, 1892 to 1961, can be used to evaluate the historical abundance of chinook from Oregon coastal streams (Appendix A-6). Early records came from canneries. Even though the canneries operated under a

Table 1. COUNTS OF WILD AND HATCHERY SPRING CHINOOK AT THE GOLD RAY DAM, ROGUE RIVER AND THE WINCHESTER DAM, UMPQUA RIVER

YEAR	GOLD RAY DAM	WINCHESTER DAM
1942	41,779	-
1943	36,136	-
1944	30,632	-
1945	31,996	-
1946	28,374	2,507
1947	33,637	3,811
1948	26,979	2,493
1949	18,810	2,593
1950	15,530	2,321
1951	19,443	3,617
1952	15,888	5,261
1953	31,465	4,831
1954	24,704	3,189
1955	15,714	7,644
1956	28,068	9,314
1957	17,710	5,228
1958	15,016	4,398
1959	13,972	3,787
1960	24,374	4,050
1961	31,775	5,253
1962	31,395	4,260
1963	40,567	11,020
1964	37,327	8,803
1965	47,644	11,730
1966	31,422	7,269
1967	14,693	9,036
1968	22,066	9,262
1969	59,043	20,077
1970	45,101	12,970
1971	29,473	9,930
1972	30,788	16,423
1973	35,276	19,674
1974	16,747	10,898
1975	21,483	10,590
1976	21,570	10,697
1977	16,403	12,263
1978	47,221	8,223
1979	38,207	9,507
1980	36,932	7,586
1981	17,213	8,702
1982	29,924	8,473
1983	12,511	5,849
1984	12,270	6,942

From: McPherson, pers. comm. and McGie, pers. comm.

state licensing system, the reports are not consistent or complete (Mullen, 1981). Other inconsistencies in the data resulted from:

1. Cannery records represented fish canned at a particultar location but not necessarily fish caught at that location. The price offered and the location of the cannery probably biased the records.
2. Not all salmon were canned. In the early years, most of the salmon were canned but with the development of transportation systems and processing techniques, not as many fish were canned.
3. Translation of cases into fish weight and translation to numbers.
4. Variations in fishing effort.

Spawning Fish Surveys

Spawning fish surveys on Oregon coastal fall chinook have been conducted since 1950. They originally were intended to provide indices of escapement for various coastal streams. There are twelve index areas where peak counts of spawning chinook are recorded (McGie, 1981). The spawning surveys provide more accurate information than the punch card data; however, the spawning surveys also contain limitations. Some of these are:

1. The density of spawners sampled in a stream is not random; peak counts of spawning fish per mile of stream are not representative of the entire stream. Consequently, by multiplying fish/mile by the number of miles in the stream, the estimated number tends to be inflated. Also, it is difficult to know how many miles of stream are used by native fish. Adjustments for these biases can improve the reliability of the estimates. Conversion factors currently are used by ODFW (Solazzi, 1984; J. Nicholas, pers. comm.; A. McGie, pers. comm.).

2. The overall level of effort devoted to these surveys has declined throughout the years (Cummings, 1979). McGie (1981) notes that the method of obtaining these indices has not changed with time but that the number and location of some survey units have changed. Consequently, it is difficult to analyze the information in terms of long term trends, although methods for doing this exist (Uremovich, 1977; Cummings, 1979; and McGie, 1981).

3. Limited spawning records are available on the southern coastal chinook stocks.

These surveys were used in this report as an indication of the relative abundance of various native coastal stocks of

chinook and as a rough qualitative estimate of the long term status of these stocks. Peak counts of fish per mile from selected spawning fall chinook surveys from 1950 to 1983 are presented in Figure 1; the data were adjusted to correct for differences in the lengths of the index streams.

Northern coastal fall chinook stocks are healthy and have increased at an average annual rate of 3% per year since 1950 (McGie, 1981). McGie notes that this increase has leveled off in recent years (pers. comm.). The stocks have been increasing but at a decreasing rate since the late 1970's (Appendix A-3).

In general, a greater number of spawners are observed in peak counts of Northern coastal index streams than of southern coastal streams; however, this may be a reflection of the surveys rather than of the status of the populations. The Nehalem, Tillamook, Nestucca, Siletz, Yaquina, Alsea and Siuslaw Rivers had higher peak counts of fish per mile from 1981 to 1983 than the Coos, Rogue, Pistol and Winchuck Rivers. The fish per mile counts on the Coquille River has been higher than the counts on other southern coastal streams (except for the counts on the Rogue River before 1979). However, McGie suggests that the apparent discrepancy between the northern and southern stocks is due to the inadequacy of the surveys conducted on the southern coastal streams (pers. comm.). Data from the Chetco, although not included in the index counts, show that the average fish per mile count was very similar to that of the northern streams from 1977 to 1981 (McGie, pers. comm.).

Some short term differences in the peak counts observed between southern and northern coastal streams may be attributed to the environmental disburbances caused by El Nino. Southern coastal stocks were more severely affected because they tend to remain in the local waters.

A graphical comparison of the historical spawning fish surveys for the various index streams is presented in Figure 1.

Other Sources of Information

A recent report by Wahle (draft, 1985) provides rough estimates on the number of natural spawners in Oregon coastal streams. This information is presented in Table 2.

Releases of chinook from coastal hatcheries

Estimated hatchery releases for 1985 to 1986 for coastal streams that release chinook are presented in Appendix A-7 (Wahle, draft, 1985). The estimated number of fall and spring

Figures 1a to j.

Peak counts of fish per mile on selected spawning survey index streams.[1]

from: Cummings, 1979 and McGie, pers. comm.

1/ Points represented on the graph (except those on the x-axis) are actual data points. Peak counts were adjusted for variations in river length between index streams and normalized to one mile.

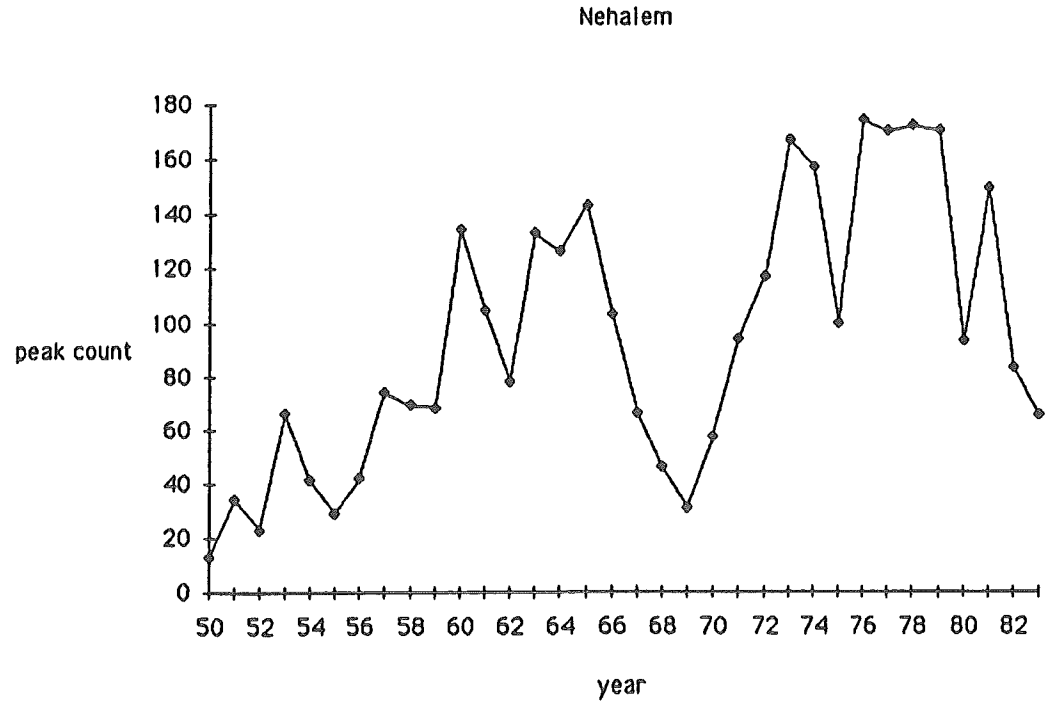

Nehalem
peak count
180
160
140
120
100
80
60
40
20
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1a.

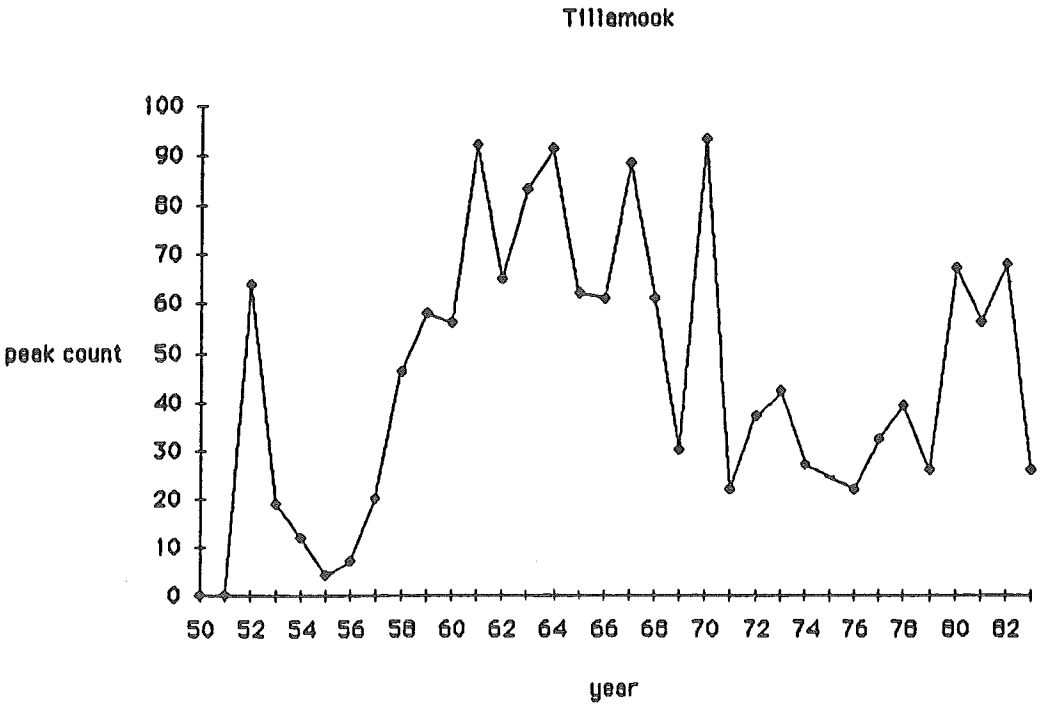

Tillamook
peak count
100
90
80
70
60
50
40
30
20
10
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1b

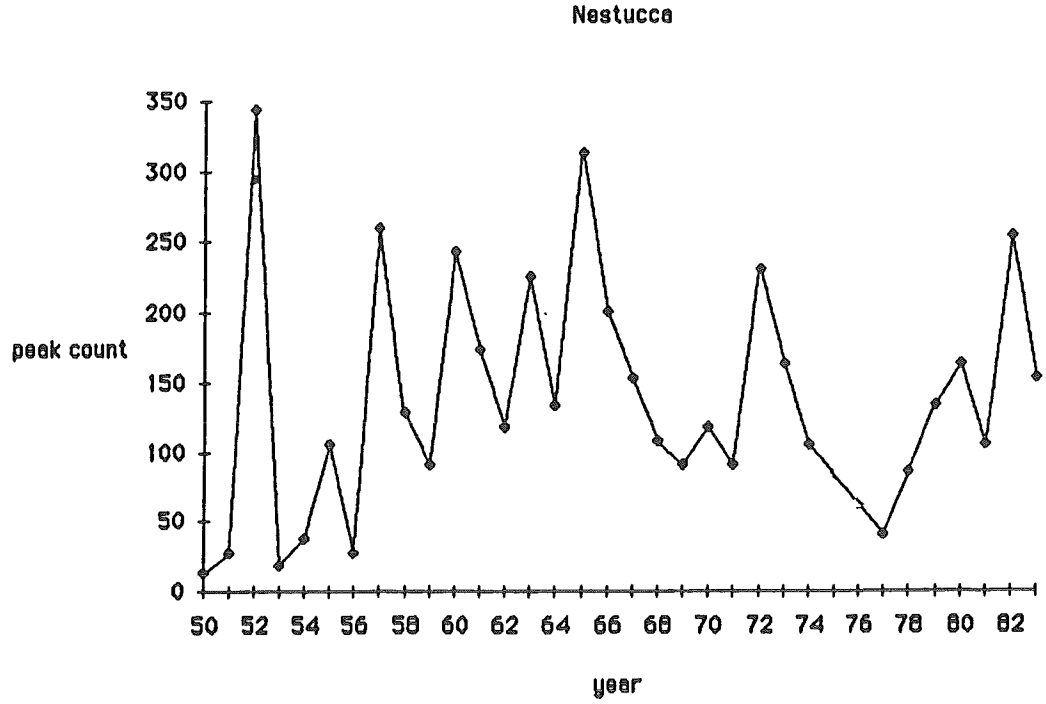

Nestucca
peak count
350
300
250
200
150
100
50
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1c.

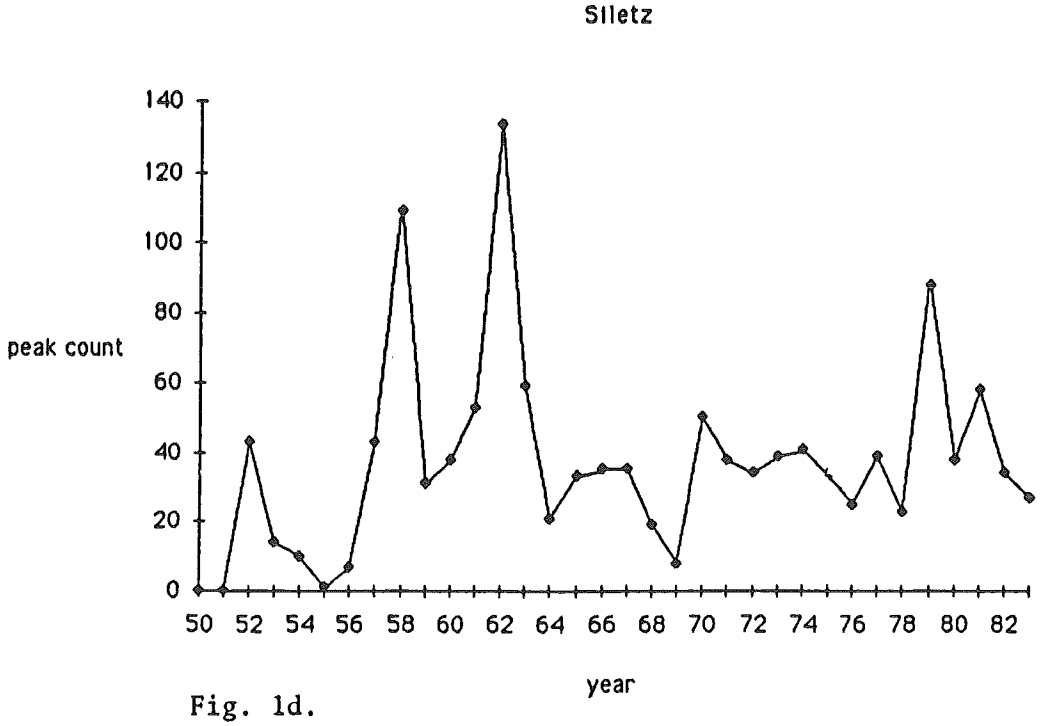

Siletz
peak count
140
120
100
80
60
40
20
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1d.

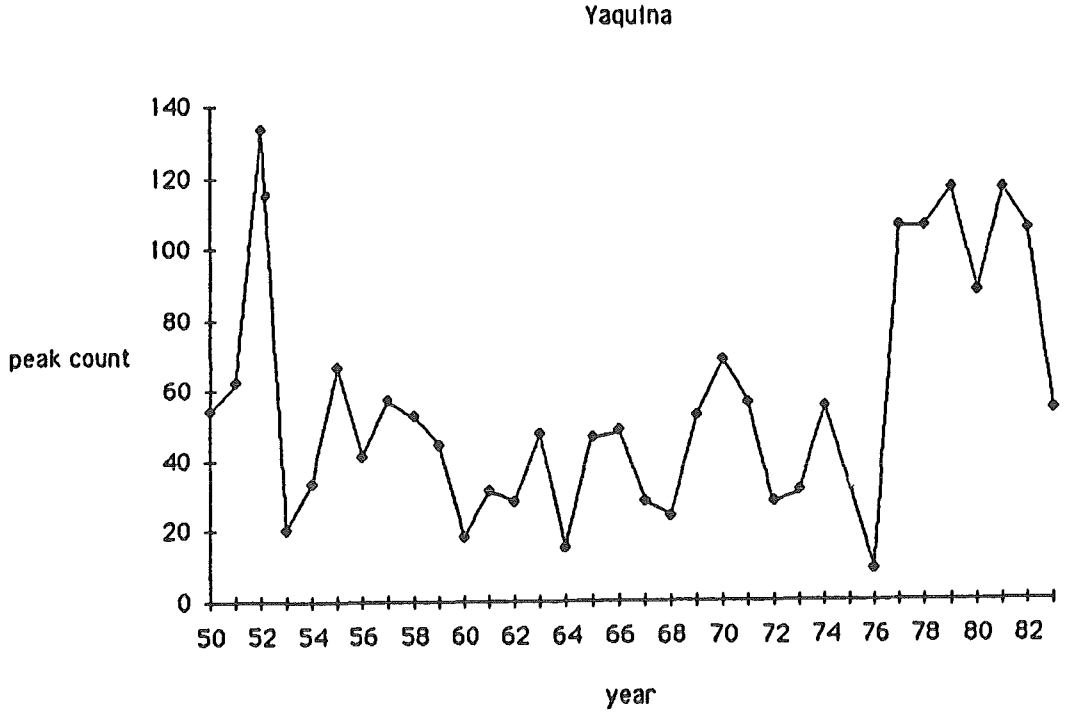

Yaquina
peak count
140
120
100
80
60
40
20
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1e.

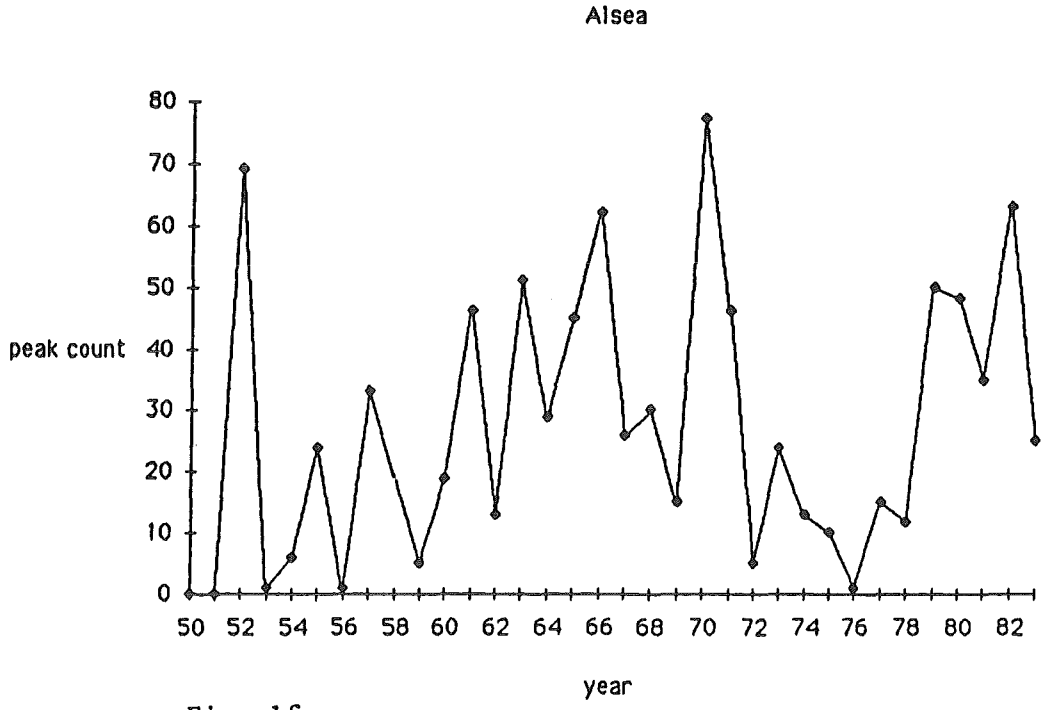

Alsea
peak count
80
70
60
50
40
30
20
10
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1f.

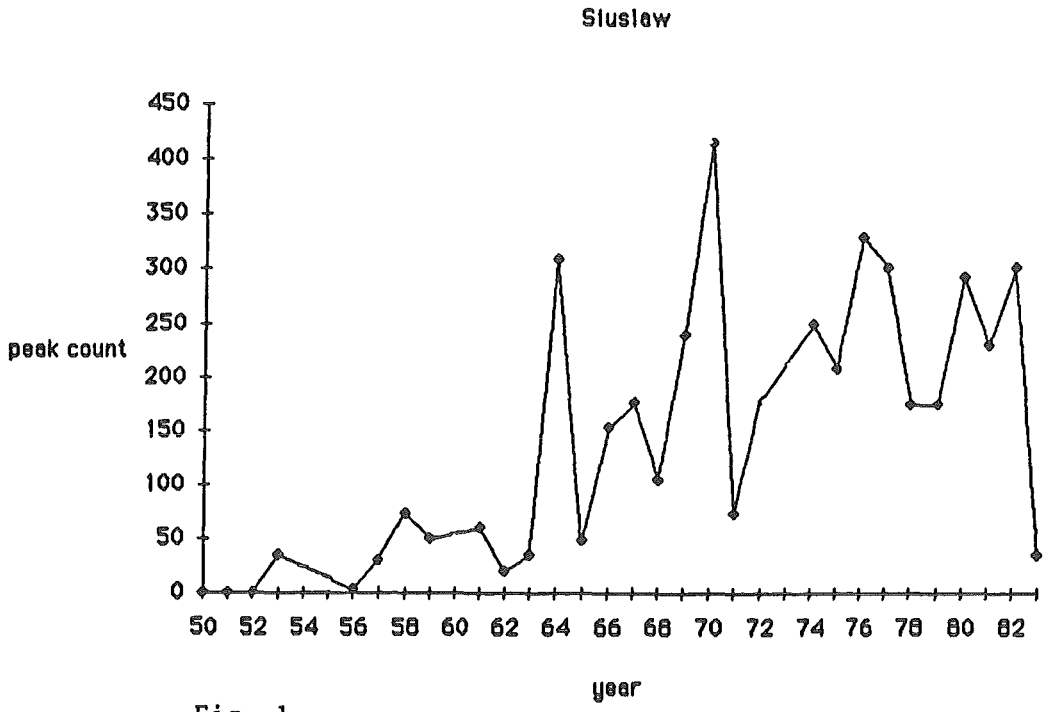

Siuslaw
peak count
450
400
350
300
250
200
150
100
50
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1g.

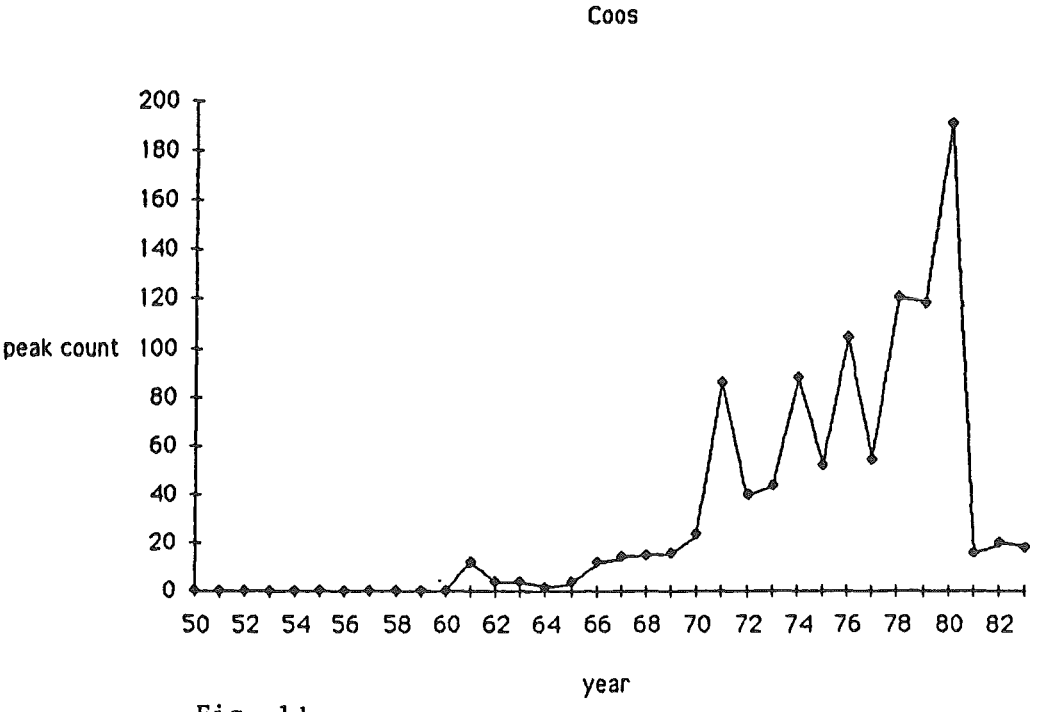

Coos
peak count
200
180
160
140
120
100
80
60
40
20
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1h.

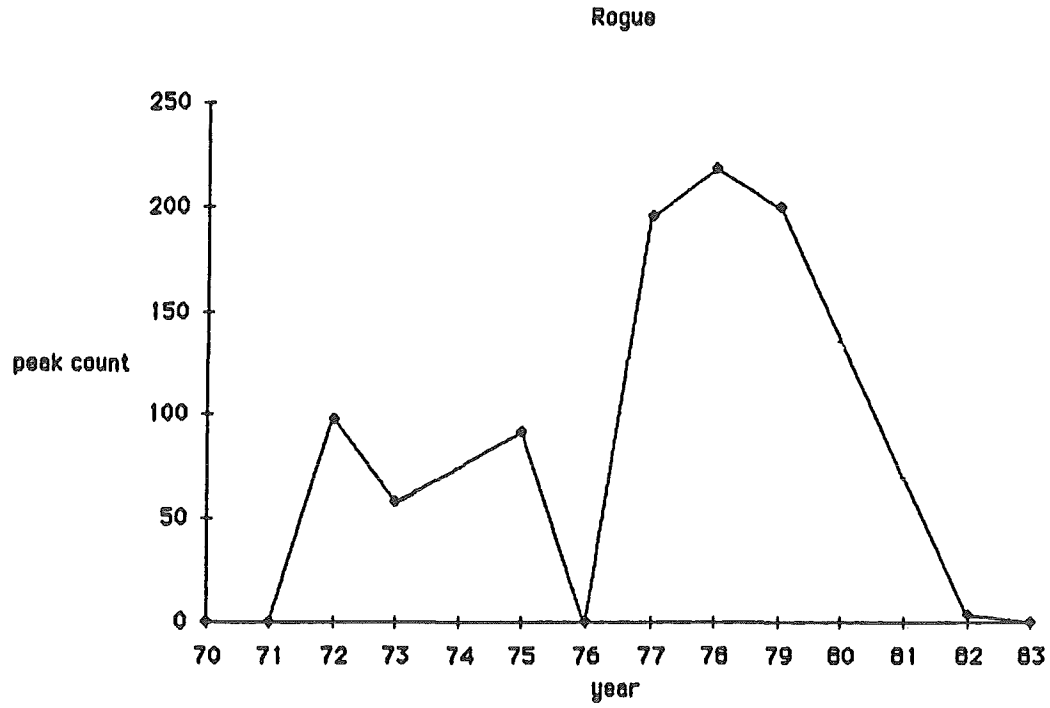

Rogue
250
200
150
peak count
100
50
0
70 71 72 73 74 75 76 77 78 79 80 81 82 83
year

Fig. 1i.

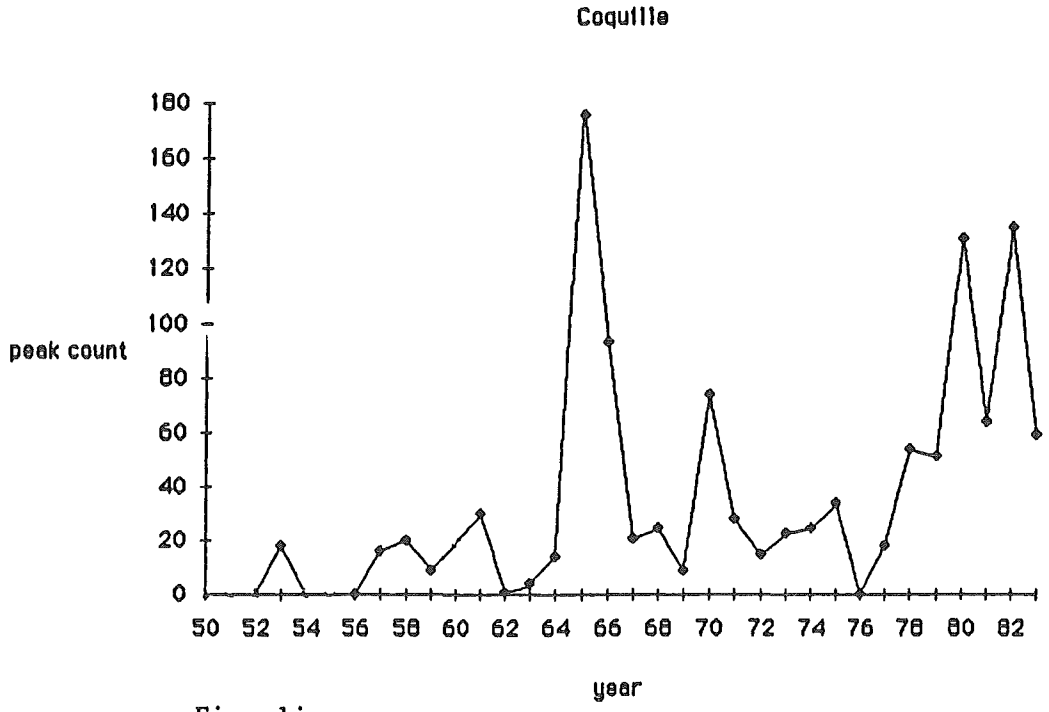

Coquille
180
160
140
120
100
peak count
80
60
40
20
0
50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82
year

Fig. 1j.

Table 2.

ROUGH ESTIMATE OF AVERAGE
NUMBER OF NATURAL SPAWNERS, 1975 TO 1984
(adapted from: R. Wahle, draft, 1985)

Stream	Number of Natural Spawners (Chinook) Fall	Spring
Alsea	1,300	300
Beaver Creek	100	
Brush Creek	10	
Burnt Hill Creek	0	
Chetco River	4,500	
Coos River	7,600	
Coquille River	11,600	300
Elk River	4,000	
Euchroe	25	
Floras Creek	900	
Hunter Creek	50	
Necanicum River	300	
Nehalem River	4,000	
Nestucca River	5,000	1,150
Little Nestucca River	1,500	50
Pistol River	300	
Rogue River	29,800	23,000
Salmon River	500	100
Siletz River	1,800	500
Siuslaw River	4,000	100
Sixes River	2,500	
Tillamook Bay		
Miami River	1,100	
Kilchis River	1,500	50
Wilson River	5,700	500

Trask River	4,400	1,800
Tillamook River	900	30
Winchester Bay		
Smith River	1,000	
Umpqua River	2,500	5,900
Winchuck	400	
Yachats River	50	
Yaquina	1,900	

chinook expected to be released from coastal hatcheries in 1985 to 1986 is 3.4 million and 3.1 million respectively (Wahle, draft, 1985). According to English (1985), the number of chinook released from Oregon's coastal hatcheries has remained fairly constant since 1964.

Disease Status of Oregon Coastal Chinook Hatchery Stocks

Non-Viral diseases

Information obtained from the ODFW Infectious Disease Program for Salmon and Steelhead Trout was used to evaluate the incidence of various non-viral diseases that have been diagnosed in chinook salmon in Oregon coastal hatcheries from 1977 to 1982 (Appendix A-8). Records of diseases that were detected prior to 1977 are available but have not been summarized (R. Holt, pers. comm.).

The most frequently diagnosed bacterial diseases of chinook salmon in coastal hatcheries are furunculosis and bacterial kidney disease (BKD). Columnaris is found infrequently in coastal hatcheries because the water temperature remains fairly cool throughout the year. Columnaris is a problem in the Columbia-Willamette and Rogue River drainages, where water temperature is higher. Although the Rogue River gets warm at the end of summer, the hatchery can control the temperature of the water (water is received from deep levels of the reservoir).

Other bacterial infections found in chinook from coastal hatcheries are cold water disease (CWD) and bacterial gill disease (BGD). There is a low incidence of CWD in the Elk River in the spring (Tony Amandi, pers. comm.). Costia, Ichthyophthirius (Ich) and gill amoeba are the most commonly found and troublesome ectoparasites. The incidence of the principal non-viral diseases of hatchery chinook from Oregon coastal stocks, based on data for BY 1977 to 1981, is presented in Table 3. Ceratomyxa shasta, a myxosporidian, is found in the Nehalem and Rogue River. The spore stage of ceratomyxa has been found in adults from the Trask and Klaskanine Rivers (Johnson, et al., 1979).

Viral diseases

Four fish viral disease agents have been isolated from Oregon salmonids: Infectious Hematopoietic Necrosis (IHN), Infectious Pancreatic Necrosis (IPN), Viral Erythrocytic Necrosis

Table 3.

PRINCIPAL NON-VIRAL DISEASES OF HATCHERY CHINOOK
OF OREGON COASTAL STOCKS
(based on data from 3 Fish Disease Reports, 1979-1982)

Furunculosis	Appears in all hatcheries; significant observations in: Elk River, North Nehalem, Salmon River, and Trask River.
Greytail	Appears in all hatcheries except Salmon River; signficant observation in: Rock Creek. Generally, not the most important in terms of occurrence.
Gill amoeba	Appears in all hatcheries except Cedar Creek and Rock Creek; significant observations in: Elk River, North Nehalem, and Trask River.
Enteric Red Mouth	Appears in Elk River, North Nehalem, Rock Creek, and Salmon River; significant observations in: Elk River.
Ichthyophthirius	Appears in all hatcheries, except Cedar Creek; signficant observations in: Elk River and Salmon River.
Cold Water Disease	Appears in Elk River, North Nehalem, Cedar Creek, Salmon River, and Trask River; significant observations in: Salmon River.
Bacterial Gill Disease	Appears in Cedar Creek and Salmon River; significant observations in: Cedar Creek (Hyamine 1622 toxicity noted in Cedar Creek).
Bacterial Kidney Disease	Appears in Trask River with significant observations. Fall and Spring chinook are equally affected but Fall chinook are more resistant to BKD.
Costia	Appears in Elk River, North Nehalem, Salmon River, and Trask River; significant observations in: Trask River and Salmon River. Several observations in Elk River.
Columnaris	Appears in North Nehalem, Rock Creek, and Trask River; significant observations in Trask River.
Trichodina	Appears in Cedar Creek, Salmon River, and Trask River. Incidental signficance (and observations).
Trichophrya	Appears in Bandon.
Fungus	Appears in Elk River, North Nehalem, and Salmon River.

Sunburn	Appears in Elk River; of importance with spring stock.
Mycobacteria	Appears in Elk River; low incidence (1 observation from a granulomatous kidney lesion)
Hyamine 1622 toxicity	Appears in Cedar Creek when BGD incidence was high.
Clubbed gill dropout	Appears in Rock Creek, only 1 observation. Unknown etiology and serious disease.
Eye lesions	Appears in Salmon River (1 observation).
Stress	Appears in various forms (from various stresses) in North Nehalem (poor water quality), Cedar Creek (muddy water), and Trask River (handling).

DISEASE STUDY LIMITATIONS

Limitations of data and biases of study

Number of fish with disease is unknown.

Percentage of diseased/healthy fish is unknown.

Frequency of sampling is biased--not consistent within and between hatcheries.

Possible laboratory errors exist--must assume that diagnosis is correct.

(VEN), and a paramyxovirus. Of these, IHNV is the most serious.

Infectious Hematopoietic Necrosis is a disease that affects primarily young salmon, from alevins to fingerlings. INHV generally does not kill adults although it is believed that infected adults can be carriers (Warren Groberg, pers. comm.). The virus is found more often in late-returning than in early-returning spawners. There is evidence that the virus is horizontally transmitted; Mulcahy, et al. (1980) showed adult to adult transmission of IHNV occurs through the gills. Vertical transmission, where parent infects progeny, has not been proven in the laboratory but has not been ruled out as a mode of transmission.

Spring chinook appear to be more resistant to the virus than fall chinook (Groberg, pers. comm.). However, spring chinook are thought to be carriers and this causes serious problems when they are raised in the same hatcheries with other salmonids that are more susceptible (Appendix A-9).

The first isolation of IHNV from Oregon chinook occurred in 1973 in spring chinook from the Round Butte Hatchery. Presently, several public hatcheries have populations of chinook that are established carriers of IHNV. These are the Round Butte Hatchery and Elk River Hatchery (Elk and Chetco stocks). Last year IHNV was isolated from upriver bright chinook from the Columbia River (Bonneville Hatchery).

On the premise that IHNV can be vertically transmitted, eggs from spawners that test positive for the virus are destroyed. When eggs from different spawners have been pooled, the problem is amplified. In the case of Columbia River chinook, this has severe ramifications; several million eggs had to be destroyed last year and a continuing problem is anticipated. There is speculation that all Columbia River spring chinook stocks have IHNV (Warren Groberg, pers. comm.). Because of these disease problems, eggs cannot be transferred from the Columbia River system (including the Willamette System) to Oregon coastal systems. IHNV has not been isolated from private hatcheries. However, the virus has been found in wild fish from the Elk and Chetco Rivers (Groberg, pers. comm.).

Because of the IHN virus, Elk and Chetco fall chinook stocks are quarantined and cannot be tranferred to other systems. Groberg (pers. comm.) estimated the development of an IHN-free stock would take at least another 6 years. Also, there currently is no vaccine for IHNV.

The other fish viruses (IPN, VEN and a paramyxovirus) are not a serious problem in chinook reared in the coastal hatcheries.

II. Impacts of Introduced Stocks on Native Stocks

Introduction

The impacts of introduced stocks on native coastal chinook stocks are evaluated only insofar as they relate to the objectives of this study. The objectives are to examine the feasibility of increasing the abundance and harvest of chinook to the Oregon offshore fishery with respect to reprogramming releases or through enhancement.

Reprogramming refers to replacing stocks that do not contribute to the local offshore fishery with stocks that do contribute. Transfers would be made to existing Oregon hatcheries, not directly to streams. The supplementation of wild fish with hatchery fish was not considered in this study.

Enhancement refers to increasing the releases of chinook from existing Oregon hatcheries. It does not apply to other aspects of the term "enhancement," such as quality of fish released or stream rehabilitation.

Interactions between wild and hatchery fish

Genetic Considerations

A review of the interactions between wild and hatchery fish provides the basis for understanding some of the genetic concerns involved in reprogramming and enhancement. Limited information is available on chinook, especially on chinook from Oregon coastal streams. Therefore, studies conducted on other species of salmonids provide most of the available "evidence" of interactions between native and hatchery fish. The following is a review of the results of several genetics studies that have addressed this subject. It is important to note that the results of these experiments have considerable limitations. There is no consensus on how important genetic factors are in mediating hatchery and native fish interactions; therefore, it is impossible to apply the findings of these studies to Oregon coastal chinook stocks without reservation.

Adaptive differences of hatchery and wild fish.

Statement: Native fish are believed to be well adapted to the environmental characteristics of the stream in which they evolved. Hatcheries may select traits that are detrimental to survival in the wild.

Evidence: Reisenbichler and McIntyre (undated) state that "if brood fish are transferred from a different region and the (gene) structuring (of the native population) has resulted from adaptation, the hatchery population is initially adapted to the wrong environmental conditions, and adaptation to the new environmental conditions occurs at the cost of reduced survival." Studies on steelhead reveal that hatchery fish were genetically different from wild fish and fewer smolts result from hatchery X wild matings than from wild X wild matings. Hatchery X hatchery matings produced the lowest number of smolts (Reisenbichler and McIntyre, 1977; Chilcote et al., 1982). Chilcote et al.(1984) concluded that wild steelhead were 270% more capable than hatchery spawners of contributing to natural production of the subyearling steelhead in the Kalama River. Differences between the "reproductive success" of hatchery and wild spawners might be due to early, non-adaptive spawning of hatchery steelhead and to frequency-dependent competition between fry from wild and fry from hatchery parents. Miller (1954) suggested that the low survivability of hatchery fish is due to the absence of natural selection at early stages in their life history.

From these studies, it is apparent that there is a body of evidence that is consistent with the hypothesis that there are adaptations of natural stocks that make them more suitable than introduced stocks for particular environments. However, this hypothesis cannot be made into a general "natural law" based on present knowledge and evidence (Lannan and Kapuscinski, 1984). The nature of the inferences and initial assumptions of genetics studies restrict the universality of their results. While some of the results from genetics studies may be applied to a stock over the short term, they most likely cannot be used to predict long term changes in the structure of the population. If evolution is assumed to be a dynamic process, the issue of genetic purity even over the short term becomes nebulous.

Survival of hatchery and wild fish

Statement: Hatchery fish produced in hatcheries generally survive better than wild fish from egg to fry but wild fish survive better from smolt to adult. Survival from egg to fry (at emergence) of hatchery fish was lower than that of wild fish when both hatchery and wild fish were reared in gravel incubation boxes in streams.

Evidence: Not much evidence exists for comparing the survival of hatchery and wild fish in one controlled study. Several studies compared hatchbox and natural survival of pink salmon from egg to fry and concluded that hatchbox survival to the time of emergence was significantly higher than natural survival (Bams, 1972; Bams, 1974; Bailey et al., 1976). Reisenbichler and McIntyre (1977) planted summer steelhead in gravel incubation boxes (Vilbert boxes) in three tributaries of the Deschutes River. They found that survival was lowest for the hatchery stock (78.4%) and highest for the wild stock (86.1%). Survival from egg to fry of the hatchery and wild cross was 79.5%.

Results from various studies must be combined in order to compare the relative survival of juveniles and adults from hatchery and wild parents that spawned in streams (Junge and Phinney, 1963; Lister and Walker, 1966; Major and Mighell, 1969; Bjornn, 1978; Jonasson and Lindsay, 1983). However, due to differences in experimental design and assumptions, the reliability of combined results is questionable. Although there is some evidence to support the contention that hatchery fish (reared in hatcheries) survive better than wild fish from egg to fry, and that wild fish survive better from smolt to adult, the generalization of this information is not warranted on the basis of available scientific information.

The fitness of wild and hatchery fish

Statement: It is believed that the fitness of wild stocks can be reduced if hatchery fish interbreed with wild fish.

Evidence: Reisenbichler (1984) used a simple genetic model (one gene locus with two alleles) to show that "density-dependent mortality and gene flow constitute a potent force for eliminating advantageous alleles and, by inference, for effecting other potentially damaging genetic changes in wild fish populations."

Chilcote et al. (1984) concluded that the reproductive fitness of wild steelhead may exceed the reproductive fitness of hatchery steelhead by 600%.

The assumptions and conditions under which these studies were conducted prevents their results from being readily transferred to other systems and to other species. The interpretations of the results provide relatively specific information on the genetic components involved in hatchery and native fish interactions. Therefore, based on available information, it is exceedingly difficult to generalize about genetic impacts and to extend the information to predict future risks.

Some Genetic Concerns

The genetic concerns associated with reprogramming and enhancement efforts are outlined in a conceptual manner. Given the high degree of uncertainty inherent in a genetic impact analysis, predictions of stock performance at a future time might be misleading. Consequently, the information reviewed in the previous studies cannot be extended to predict the genetic risks of enhancement or reprogramming efforts.

A major problem with determining fitness is scientific uncertainty (Larkin, 1981). Because we cannot predict the environment, we cannot know how a stock will perform in the future. There is no hard evidence to indicate the existence of genetic risk associated with transfers (Lannan, pers. comm.) but to satisfy conservative management concerns some risk is assumed to occur.

The genetic risks to the indigenous stocks can be negative, neutral or beneficial (Lannan and Kapuscinski, 1984). Several studies indicate that the risks of introduced and hatchery stock matings would be negative (McIntyre, 1983; Reisenbichler and McIntyre, 1977; Bams, 1976). The problem with these studies is that many inferences must be made. Therefore, the pertinence of the information to Oregon coastal chinook stocks is questionable. Rigorous genetic experiments on salmonids are difficult to perform and at best, present an indication of the stocks performance at the time of the study.

Some studies rely on a genotypic model to predict the genetic fitness of various stocks (e.g. electrophoretic studies and simple genetic models). These models generally are based on the Hardy/Weinberg Equilibrium (a binomial expression), whose assumptions rarely are satisfied in the real world. The contribution of individual genes cannot be described as fitness. What is really important in determining fitness are the phenotypic characteristics. These include genetic factors and environmental factors; often the two cannot be partitioned and are represented as a continuous characteristic.

Migratory behavior generally is believed to have a strong genetic component. The risk of transplanting stocks that are not adapted to the new environment may be reduced survival (Ritter, 1975). Some stocks, however, survive the transfers well (eg. Chetco fall chinook transplant to the Klaskanine and the Rogue chinook transplant to the Big Creek Hatchery (Columbia River)). Therefore, it is difficult to predict the success of transfers.

The rationale behind the concept that if transfers are to occur, they should be confined to nearby localities is the following: native-hatchery crosses have reduced survival; this assumes that native stocks have been programmed to survive in

these areas. Two problems exist with regard to this line of reasoning: generalizations cannot be made on the basis of existing scientific evidence and the "genetic purity" of native coastal chinook stocks is not intact. The many transfers and strays during the past century probably have diluted the "original" stocks' integrity. Straying is not necessarily detrimental to wild populations if the population size is large; also, a small amount of straying is believed to invigorate some populations (e.g. heterosis) (Lannan, pers. comm.).

Since hatchery practices are beyond the scope of this report, inbreeding depression as it relates to hatchery fish will not be discussed. Native populations that have been isolated for many generations may experience an inbreeding depression if the population is small.

Development of a "superstock": concerns

The genetic risk of creating a "superstock" cannot be determined. However, it would be conservative to assume that the creation of a coastal superstock (e.g. Rogue chinook) would generally reduce the amount of genetic variation (diversity) in coastal chinook stocks over time. The resource should be managed to preserve some level of diversity in case of environmental changes. This assumes that by preserving the diversity we are making available a broader spectrum of genes to improve the fishes ability to adapt to alterations in the environment. While hard evidence does not exist that support this generalization, to categorically dismiss it would be unwise. The dilemma is that if the resource is managed so that some stocks become "extinct," the damage done would be irreversible.

Superstocks may not be what is needed because they might "load" a particular ocean area that may not be able to support the increase. For example, Rogue stocks tend to occupy local waters and their pattern of contribution apparently does not change much when they have been transplanted. However, there is no hard evidence that ocean carrying capacity has been reached or that transplanted fish necessarily continue to follow their former migratory patterns.

A socio-institutional consideration and a genetic concern is that introduced fish may breed with native fish and cause a change in the migratory behavior or distribution of stocks from a particular watershed. For example, if Rogue fish are released at the Trask Hatchery and a fair number of fish stray each year, over time some matings of introduced and native fish are bound to occur. Assuming that these matings produce offspring that return as spawners, then there is the slight possibility that repeated matings would alter the overall migratory patterns of the original stock. This would have political implications in that

the cross might contribute more to the Oregon offshore fishery, but the important sport fishery that operates off Tillamook Bay might decline. This scenario relies on many assumptions and possibilities that cannot be predicted by a genetic impact analysis. Furthermore, the impact of introductions on the genetic "integrity" of the native fish is lower when the population of natural spawners is high than when it is low, ceteris paribus.

Behavioral interactions of hatchery and native fish; interspecific competition among juveniles.

Statement: Juvenile interactions between hatchery and native fish indicate that hatchery fish are dominant.

Evidence: Because of their larger size upon release from the hatchery, hatchery fish tend to have a competitve advantage over wild fish (Solazzi et al., 1983). Releases of pre-smolt coho can decrease the density of wild juveniles by 40 to 50%. This is a concern of hatchery management practices.

Other studies show that hatchery fish tend to be dominant. Fenderson et al. (1968) found that when hatchery and wild Atlantic salmon parr of the same age and size competed in aquaria, twice as many hatchery fish than wild fish attained social dominance. Glova (1978) found that hatchery coho had severe impacts on native coho and cutthroat trout because they did not exhibit the "normal" behavioral display that hatchery fish use to settle territorial disputes.

Interactions between various salmonid species is only briefly reviewed; if supplementation of wild fish with hatchery fish were to occur, these would be important considerations (Nicholas, et al., 1979). These interactions might be significant if enhancement or reprogramming efforts lead to an increase in the number of hatchery strays.

When interactions occur between coho, chinook, steelhead and cutthroat, coho tend to prevail (Hartman, 1965; Stein et al., 1972; Nickelson, 1981) except in very warm water when chinook are dominant (Stein et al., 1972).

The results from studies conducted on the behavioral interactions of native and hatchery fish cannot be used to make generalizations about chinook in various situations. Like the genetics studies, changes in the environment over time as well as changes in the gene structure over time, prevent this information from being used as a predictive device. Moreover, it presently is unclear whether behavior is genetically controlled. The genetics

and behavior studies may be useful in providing limited information, but until a conceptual framework has been developed, the information should not be extended beyond its initial assumptions.

Life History Strategies

Information on the life history strategies of various Oregon coastal stocks is sporadic but can be used to develop some guidelines for stock transfer. The limiting factors of various coastal streams (e.g. high temperatures, low summer flows) might affect the success of introduced stocks in their new environments. Also, life history strategies may be important if density dependent relationships are demonstrated.

Juvenile chinook from Oregon Coastal streams

Estuarine Rearing

All of the coastal chinook populations are capable of being reared in the river or the estuary but some stocks spend less time in the river because the habitat is not suitable. The Nehalem stocks rear in both the estuary and the river even though the river is warm in the summer. The Rogue has a limited estuary; in turn, most juvenile rearing occurs in the river.

Within the estuaries there are variations in the size of fish and the abundance of fish. The abundance of fish is usually a reflection of stocking rates. High wild chinook stocking rates are found in the Siletz, Nestucca, Coquille, and Salmon Rivers. Low wild chinook stocking rates occur in the Yaquina, Coos, Umpqua, Siuslaw, and Nehalem Rivers (J. Nicholas, pers. comm.).

Migration to the Estuary

Migration to the estuary occurs rapidly in late May to early June, and then declines throughout the summer to early fall. In the Siuslaw, most chinook leave freashwater by mid-July and rear in the estuary. Juveniles remain in the Siletz and Nestucca Rivers through the summer (water temperatures are low). In the Tillamook system, Trask and Wilson chinook rear upriver to a greater extent than chinook from the Kilchis, Miami and Tillamook Rivers (J. Nicholas, pers. comm.).

Migration to the Ocean

The study conducted by Reimers and Downey (1982) on the Sixes River provides the "model" for studying migrations of juvenile chinook to the ocean. However, the applicability of this model to other coastal streams has not been demonstrated.

Reimers and Downey (1982) used scale studies to determine that wild fish that survive to become adults leave the estuary in the fall. In general, larger fish tend to migrate to the ocean before smaller fish resulting in a continuous departure to the ocean. However, there is no scientific evidence for a size thresh hold, which would trigger a movement of larger fish to the ocean. A previous study conducted on the Salmon River found that early releases survived better than later releases; however, the results were insensitive to the proportion of jacks in the total number of adults recovered (Nicholas, pers. comm.).

Variations in Tolerance levels of various stocks

Chinook stocks vary in their tolerance to high temperatures and low flows. For example, Nestucca or Siletz fish would survive poorly in the warmer waters of the Nehalem River (J. Nicholas, pers. comm.). Also, certain stocks are more resistant to disease than other stocks. The transfer of Trask fish to the Nehalem resulted in low survival; this was possibly due to their susceptibility to Ceratomyxa shasta. Chinook from the Nehalem are believed to be resistant to Ceratomyxa (McGie, pers. comm.). Tolerance limitations also apply to adult chinook.

Adult Chinook

Run Timing

Coastal chinook stocks exhibit variations in run timing. The Elk, Sixes and Chetco River stocks return late; most Elk and Sixes River chinook return from November to January while most of the Chetco River chinook return from October to November. The Coquille fall chinook are similiar to other coastal fall chinook in that the peak returns occur in October. Hatchery practices have influenced the timing of the run for some hatchery stocks; generally, hatchery runs are more compressed. Ocean and air temperature may also influence run timing (Burgner, 1980).

Maturation rates and external characteristics

Elk and Chetco fall chinook often are referred to as high quality bright fish (J. Nicholas, pers. comm.). The reasons for variations in brightness are not scientifically understood. The size of the tidal area and the rate of maturation may be important factors. For example, the Coquille River has a long tidal area. Dark fish ("tules") have been caught there that are immature adults (not ready to spawn). In the Elk River, where the estuary is negligible, the fall chinook spawn quickly after migration into freshwater--most fish spawn within the lower 13 miles.

Age at return

The age at return of various coastal stocks is not well documented. Variations exist between stocks and within stocks (e.g. fish from different brood years). Survival to catch and escapement data provide some indication of the age of return. However, the information base is extremely small and very little can be said about the general behavior of the coastal stocks (Garrison, pers. comm.). Escapement estimates depend on returns to the hatchery. In the Elk, returns to the hatchery have been found to vary from 30% (in low flow years) to 80%. Hatchery practices as well as the fisheries influence the catch to escapement ratio. Some hatcheries do not collect fish after they have taken a specific number of eggs. The size at and time of release also affect the number of fish that survive. For example, it is believed that with later releases, more 4- and 5-year olds return. Consequently, age at return might be genetically mediated but environmentally modified. Estimating the various catch to escapement (C/E) ratios of the coastal chinook stocks is considered beyond the scope of this report; however, some estimates have been determined by Garrison (1981 and 1984). The C/E ratio of fall chinook is believed to be higher than that of spring chinook (2/1 and 1/1 respectively) (Martin, pers. comm., and Garrison, pers. comm.).

Carrying capacity and density dependence considerations

Limited carrying capacity in the ocean as it pertains to the survival and abundance of chinook salmon has not been demonstrated. That the decline in coho poulations is due to limitations of the ocean environment currently is debated. The ecological relationships between survival of juvenile coho and nearshore upwelling phenomena are not well understood (McGie,

1981; Nickelson, 1985). In the case of chinook salmon, the scenario is different. Coastal fall chinook populations are not declining. McGie (1981) found that escapement of fall chinook has increased at approximately 3%/year since 1950. Therefore, it would be extremely difficult to support an argument that these stocks are limited due to the ocean environment.

Furthermore, because there is no OPI (Oregon Production Index) area for chinook, the effects of poor upwelling on chinook survival in local waters cannot be readily examined. Chinook salmon are thought to migrate farther distances and to be more widely distributed in the ocean than coho; in turn, the concentration of large nubers of chinook in poor ocean feeding grounds is not likely. However, studies need to be conducted to determine the migratory behavior of young chinook from Oregon coastal streams before any conclusions can be drawn.

It is not clear how density-dependent mechanisms regulate fish populations within the carrying capacity limits of a particular body of water. Factors such as increasing competitor populations (e.g. pink and chum salmon), increasing predator populations (e.g. marine mammals and birds) and disease problems probably influence the survival of chinook in the ocean (Peterman, 1980). However, it would be difficult to show that increasing the number of chinook smolts (e.g. through enhancement efforts) would drive the population down the right-side of the stock-recruitment curve because reliable stock-recruitment curves for the various coastal chinook stocks have not been developed. Few stock-recruitment curves exist for any chinook stocks or groups of stocks and it is uncertain whether these curves would be applicable to the Oregon coastal stocks (Worlund, et al. 1969; Reisenbichler and McIntyre, undated; Bjornn, 1978; McIntyre, 1983; J. Martin, pers. comm.).

Density dependent relationships within river systems may occur if hatchery fish do not leave the hatcheries to migrate directly to the estuaries (or ocean) or from stray hatchery adults. Density dependent and density independent relationships have been shown to occur between abundance and survival of salmon in the rivers. The Ricker curve, a density-dependent model, is based on the assumption that smolt production decreases after carrying capacity is reached and that high stocking rates can result in reduced production (Ricker, 1972). The Beaverton-Holt relationship is a density-independent model that assumes smolt production does not decrease after carrying capacity is reached. Increased stocking rates should result in the production of more fish. It is believed that egg-planting follows this type of model (Thomas, 1975).

If smolts released from the hatchery go directly to the ocean, there would be little concern over carrying capacity problems with juvenile fish in the rivers. Problems result when hatchery juveniles stray upriver or stay in the rivers for extended periods of time. This is directly related to hatchery management practices, genetic programming of the stocks, and the

location of the hatchery. Reduced interactions between native and hatchery fish would be expected from hatchery fish released from hatcheries situated close to the coast.

Density dependent relationships have been found to occur when pre-smolt coho are planted (Mason, 1974 and 1975; Martin, 1982). Mortality and migration regulate population density (Mortensen, 1977 ;and Martin, 1982). Density is also regulated through habitat and territorial interactions. Juvenile hatchery fish have been found to have a competitive advantage over wild fish (Solazzi, et al., 1983; Fenderson, et al., 1968; Glova, 1978). In Sixes estuary, smaller fish that enter the estuary early (possibly due to high population density in the river) generally do not survive to become adults (Rodgers, pers. comm.).

Density dependence mechanisms may also occur when adults return to spawn; for example, redd superimposition is believed to follow a Ricker-type model. Limited overwinter habitat, summer rearing space and spawning habitat may result in reduced production. However, this would depend on the limitations of the particular system. Some models exist for exploring carrying capacity limitations (Kelly, et al., 1982; McIntyre, 1983; and Anderson, 1984), but these are not reviewed in this report. McGie (pers. comm.) presently is investigating the optimum seeding of female fall chinook per mile of coastal stream for STEP (the Salmon and Trout Enhancement Program) stocking Guidelines.

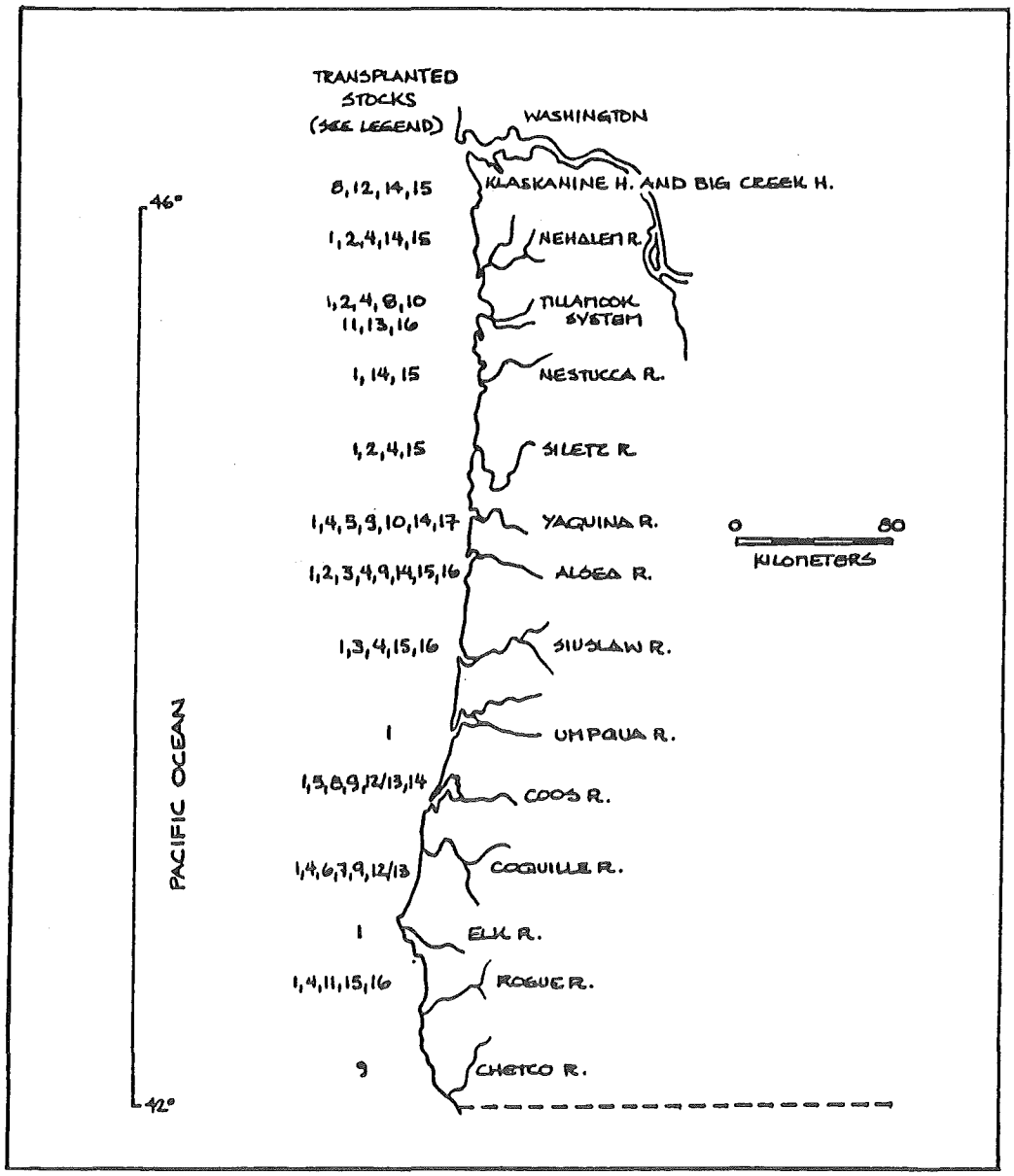
Preliminary review of chinook transplants to Oregon coastal streams

Chinook salmon have been transferred many times and to many streams and rivers in Oregon since the turn of the century (Appendix B-1.1). They have been transplanted as eggs, fry and fingerlings to coastal hatcheries and streams (figure 2; Appendix B-4 and B-5). How well these transplants survived is not well documented. Consequently, it is impossible to know whether the transplants lived to reproduce and whether the offspring from introduced and native matings survived.

Without information regarding the success of these transplants, in terms of the "reproductive fitness" of the crosses (see Genetic Considerations), there are problems in defining:

1. the "genetic purity" of wild stocks (Appendix B-1.2);

2. the contribution of wild stocks to the offshore fisheries. If offspring from crosses survived, some alterations in migratory behavior might have occurred. However, very little tagging or marking information is available on the contribution of non-hatchery fish, so this problem cannot be examined.



Legend:
1. Columbia River fall chinook
2. Columbia River spring chinook
3. Willamette River fall chinook
4. Willamette River spring chinook
5. Alsea River fall chinook
6. Coos River fall chinook
7. Coos River spring chinook
8. Chetco River fall chinook
9. Elk River fall chinook
10. Nestucca River fall chinook
11. Nestucca River spring chinook
12. Rogue River fall chinook
13. Rogue River spring chinook
12/13. Rogue River chinook
14. Trask River fall chinook
15. Trask River spring chinook
16. Umpqua River spring chinook
17. Univ. of Washington cross, fall chinook

from: Wallis, 1962, 1963, 1964; McGie, 1980; Garrison, 1981.

Figure 2. Schematic representation of transplants of chinook to Oregon coastal hatcheries and streams, 1906 to 1982.

location of the hatchery. Reduced interactions between native and hatchery fish would be expected from hatchery fish released from hatcheries situated close to the coast.

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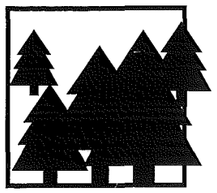
YOU CAN HELP SALMON

Oregon's coastal coho—and steelhead and cutthroat trout—can be saved! Land owners and managers play an important part in this effort. Whether your land covers hundreds of acres or a residential lot in town, you can help.

The first way is by simply being aware of your place in the watershed and of your local fish runs.

The second way is to help provide the habitat conditions the fish need. Here are a few helpful tips for different kinds of landowners.



FOREST OPERATIONS

- Protect streamside trees and other vegetation at least consistent with the Oregon Forest Practices Act requirements.
- Leave good natural features, such as a beaver pond or natural side channel, alone. These are important rearing areas for fish.
- Check areas where your roads cross streams. If your culverts have a drop or are above the stream channel, they could be barriers to fish passage. Consider redesigning problem culverts or replacing them completely with a bridge structure.

AGRICULTURAL BUSINESSES

- Create streamside (riparian) pastures that can be managed for grazing during times when livestock will prefer pasture grasses over riparian trees and shrubs. Provide a trough or watering tank away from the stream.
- Plant willows or other shrubs and trees along your waterways. They help stabilize the banks, filter out sediments from runoff, and provide cooling shade.
- If riparian pastures are not viable options for your operation, consider using fencing to keep animals away from the water's edge.
- Protect wetlands, rivers, and estuaries through careful animal waste management and from the effects of poor fertilizer or herbicide application.

LAND DEVELOPERS, HOMEOWNERS, BUSINESSES

- While state and federal law may allow filling wetlands or estuaries (with the proper review and permits), loss of such habitat can harm fish. Consider options that preserve these habitats.
- Construction can cause serious sediment problems, even well away from a waterway, if storm-water runoff is not properly contained. Although smaller operations may not need permits, they still can have significant impacts. Check with the state Department of Environmental Quality or local construction companies about responsible runoff management at your site.
- If possible, homeowners and businesses should connect to a sewage treatment and disposal facility. Poorly performing septic tanks can contaminate groundwater and nearby streams, lakes, and bays. If you must use a septic tank, be certain it is properly designed, located, and maintained.
- Dispose of household chemicals such as used motor oil, antifreeze, pesticides, and paints at approved collection facilities in your area.

For more information—other publications about coho and watersheds, contacts at organizations and agencies—see the insert page.

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Sea Grant combines basic research, education, and technology transfer to serve the public. This national network of universities works with others in the private and public sectors to meet the changing environmental, economic, and social needs of people in the coastal, ocean, and Great Lakes regions of the U.S.

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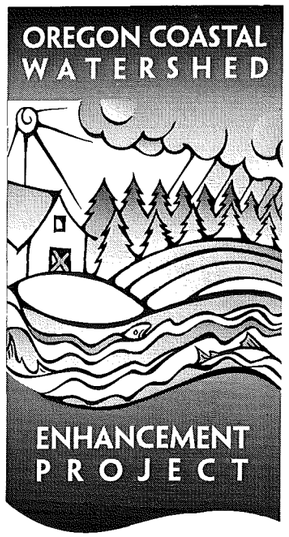


COHO SALMON: LIFE IN THE WATERSHED

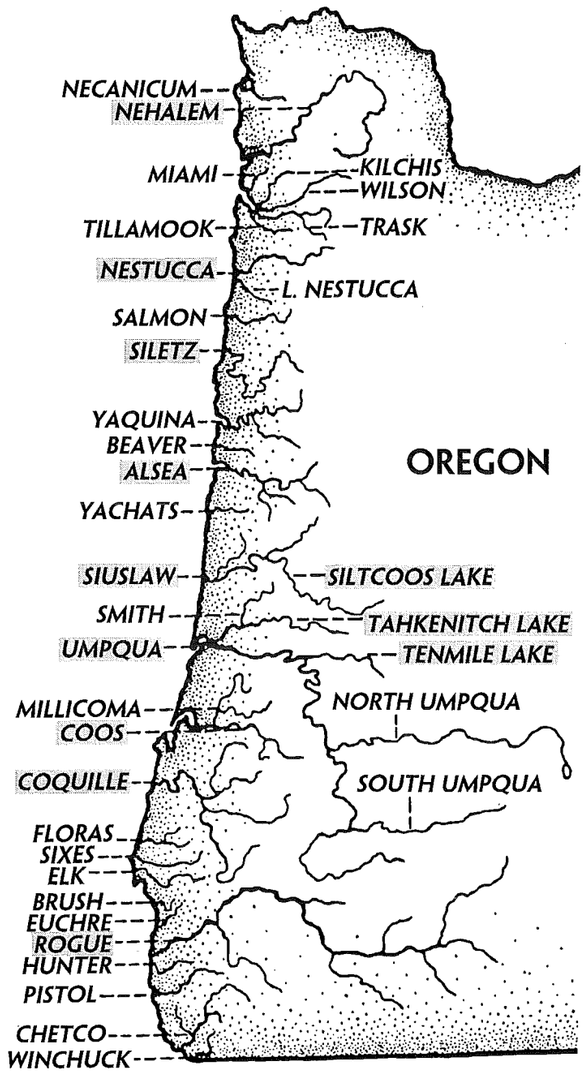
Coho salmon have been the most important variety of salmon caught commercially in Oregon. Until recently, coho were also the most common variety in most coastal streams. Based on records from salmon canneries, coho in Oregon north of Cape Blanco (near Port Orford) numbered about 1.25 million adults annually 100 years ago. During recent years, the annual production of native coastal coho in Oregon has been dramatically less, around 50,000 to 80,000 fish—a 90% decline.

Given this decline, the National Marine Fisheries Service (NMFS) considered listing two groups of coastal coho in Oregon as threatened under the Federal Endangered Species Act. In April 1997 the agency decided to list a population of coho that spans the Oregon-California border, from Cape Blanco south to Punta Gorda. Meanwhile NMFS placed the population north of Cape Blanco to the Columbia River on a "candidate list" and agreed to let Oregon attempt to recover Oregon coho according to a plan developed by state agencies, working with local groups. The goal of this Oregon plan is not merely to prevent the extinction of coho salmon in the coastal region, but to restore salmon populations.

Efforts to restore salmon must focus on improving the fish's habitat in the watersheds it lives in, along with addressing other factors of its decline, such as harvest and hatchery effects on the species.

Coastal residents have a critical role to play in improving fish habitat in watersheds. Improving watersheds can not only help prevent the extinction of species, but also provide benefits to individuals and communities in terms of enhanced water quality and quantity.

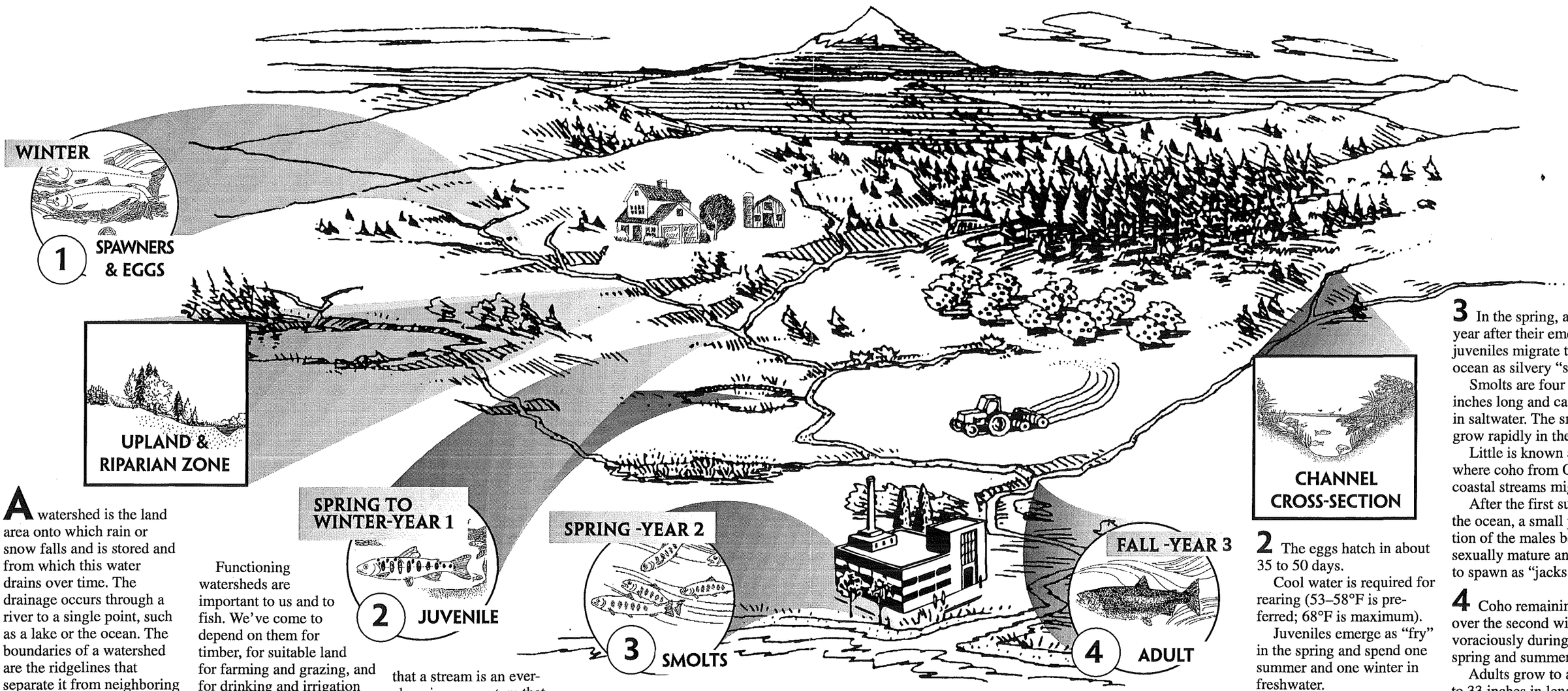
This publication is designed to help readers understand the fundamentally important *how, when,* and *where* coho salmon live in watersheds and *what* people can do to help.



The Oregon coast's most important producers of wild coho salmon are the Nehalem, Nestucca, Siletz, Alsea, Siuslaw, Umpqua, Coos, Coquille, and Rogue Rivers; Tillamook Bay tributaries; and Siltcoos, Tahkenitch, and Tenmile Lakes (on the central coast).

WE LIVE IN WATERSHEDS . . .

. . . AND *COHO* LIVE IN WATERSHEDS



A watershed is the land area onto which rain or snow falls and is stored and from which this water drains over time. The drainage occurs through a river to a single point, such as a lake or the ocean. The boundaries of a watershed are the ridgelines that separate it from neighboring watersheds.

From the ridgetops to the water body, the watershed drains all land areas. These areas are connected. We know that actions and consequences are connected in a watershed: what happens upslope and upstream eventually comes down.

Functioning watersheds are important to us and to fish. We've come to depend on them for timber, for suitable land for farming and grazing, and for drinking and irrigation water. The land areas that people manage provide large wood, boulders, gravel, shade, and food that build healthy stream habitats for coho salmon. It's a fact: *we all live in a watershed*—not only people, but the salmon and other animal and plant species, too.

No single picture can convey the understanding that a stream is an ever-changing ecosystem that reflects the condition of the watershed around it. The stream and "riparian" (streamside) areas are especially dynamic, shaped by such disturbances as fire and windthrow, channel erosion, peak flows, floods, and debris flows. Such natural disturbances are a normal part of a stream's existence and help create the conditions and habitats that salmon and other species have adapted to over evolutionary time. However, human activities that modify the watershed and stream channel can exaggerate the effects of natural disturbances, with detrimental results.

1 Adult coho migrate into freshwater in the fall to spawn, usually to the stream they themselves were born in.

Spawners are typically three years old and weigh 4 to 12 pounds.

Spawning usually occurs from mid-November through February.

Females create nests in the gravel called "redds" where they deposit their eggs. The gravel needs to be clean and range in size from a pea to an orange.

Coho prefer to spawn and rear in small, relatively flat streams.

2 The eggs hatch in about 35 to 50 days.

Cool water is required for rearing (53–58°F is preferred; 68°F is maximum).

Juveniles emerge as "fry" in the spring and spend one summer and one winter in freshwater.

Because they are small, they seek wetlands, off-channel ponds, and slackwater areas in pools to survive swift currents during the winter.

Habitat complexity, primarily in the form of large and small wood, is an important element of productive coho salmon streams.

3 In the spring, about a year after their emergence, juveniles migrate to the ocean as silvery "smolts."

Smolts are four to five inches long and can survive in saltwater. The smolts grow rapidly in the ocean.

Little is known about where coho from Oregon coastal streams migrate.

After the first summer in the ocean, a small proportion of the males become sexually mature and return to spawn as "jacks."

4 Coho remaining at sea over the second winter feed voraciously during the next spring and summer.

Adults grow to about 23 to 33 inches in length.

In the fall, coho that escape predators, fishers, and natural calamities return to their home streams or neighboring streams.

After spawning, coho die and, if left to decay in the rivers, contribute nutrients to support the next generation of coho.

MORE ABOUT COHO SALMON

Coho Salmon Briefing Package. National Marine Fisheries Service. 1997. Packet of materials relating to NMFS decisions about Oregon coho in April 1997. See NMFS listing under *Organizations*.

Field Guide to the Pacific Salmon. Robert Steelquist. Seattle: Sasquatch Books, 1992. 64 pages. Partial proceeds from the guide's sale ($5.95) go to the Adopt-A-Stream Foundation.

Pacific Salmon Life Histories. C. Groot and L. Margolis, editors. Vancouver, B.C.: University of British Columbia Press, 1991. 608 pages. The standard reference work, available in larger libraries.

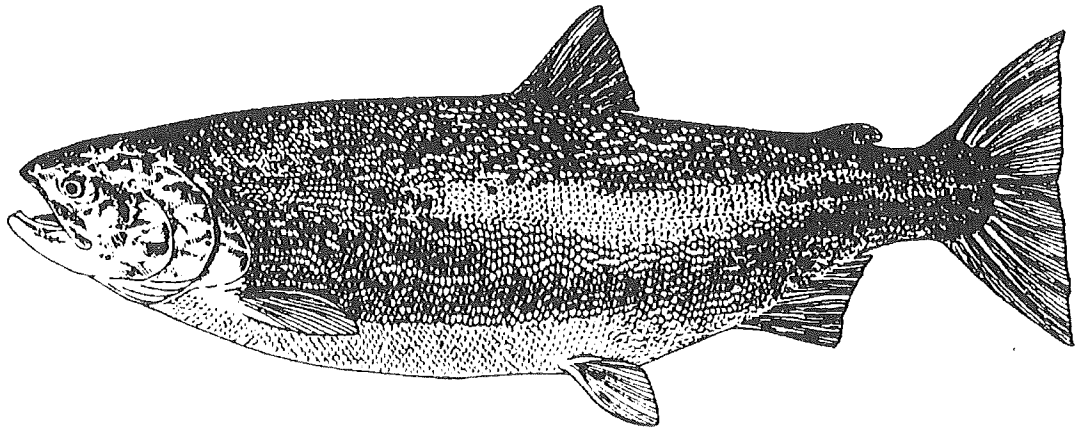
Oregon Department of Fish & Wildlife publications are available from the department's Information Services office: 2501 SW First Ave., Portland, OR 97207; 503-872-5264, ext. 5356. All listed below, except *Stream Scene* curriculum, are free:

Oregon's Migratory Fish Species. Leaflet.

Oregon's Threatened and Endangered Species. Leaflet.

Stream Care. A Salmon/Trout Enhancement Program (STEP) publication.

Fish Restoration and Enhancement and STEP Newsletter. About ODFW programs.



Adult coho (scientific name, Oncorhynchus kisutch*) are distinguished from other Pacific salmon by the presence of small black spots on their backs and the upper lobe of their tails.*

ODFW "Backgrounders":

- *What You Can Do to Help Salmon Restoration Where You Live and Work*
- *Coho Salmon*
- *Oregon's Coastal Salmon and Trout*
- *Oregon's Wild Fish Management Policy*
- *Instream Water Rights*
- *Fish Screening*
- *The Stream Scene: Watersheds, Wildlife and People.* 300 pages, $15. A curriculum package for watershed awareness.

MORE ABOUT WATERSHEDS

A Watershed Assessment Primer. F. D. Euphrat and B. P. Warkentin. U.S. Environmental Protection Agency, 1994. 270 pages. Available from USEPA, Region 10, 1200 Sixth Avenue, WD-139, Seattle, WA 98101, or call 1-800-490-9198 (Document EPA 910/B-94-005). Free (if in stock).

Healing the Watershed workbook series. Includes *A Guide to the Restoration of Watersheds and Native Fish in the Pacific Northwest,* and *A Citizen's Guide to Funding Watershed and Wild Salmon Recovery Programs.* The Pacific Rivers Council, Inc. Available from Pacific Rivers Council, P.O. Box 10798, Eugene OR 97440. $15 per book. To order, call 541-345-0119.

A Guide to Placing Large Wood in Streams and *Forest Practices Notes Series.* Available from Oregon Department of Forestry, Forest Practices Section, 2600 State Street, Salem, OR 97310. Free. To order, call 503-945-7470.

The Return of the Salmon—Restoring the Fish to Rivers and Watersheds. Thirty-minute video produced by Oregon Sea Grant. Sea Grant Communications, A402 Kerr Administration, Oregon State University, Corvallis, OR 97331. $30. To order, call 1-800-375-9360.

The Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods. Thomas Murdoch, Martha Cheo and Kate O'Laughlin. Adopt-A-Stream Foundation, 600 128th St. SE, Everett, WA 98208. 310 pages. $29.95 + shipping. To order, call 206-316-8592.

ORGANIZATIONS, INSTITUTIONS, AND PROGRAMS

Note: A large amount of additional information is available about salmon and watersheds on the World Wide Web. A sampling of sites is presented below along with other organization information, but users should recognize that the content of sites and their addresses often change.

Adopt-A-Stream Foundation
600 128th St. SE
Everett, WA 98208
206-316-8592

Fish Restoration and Enhancement Program
Oregon Department of Fish & Wildlife
PO Box 59
Portland, OR 97207
503-872-5252 ext. 5429

For the Sake of the Salmon
45 SE 82nd Dr. Suite 100
Gladstone, OR 97027
503-650-5447
Fax 503-650-5410
www.4sos.org/

Oregon Sea Grant:
Extension Sea Grant Program
Hatfield Marine Science Center
2030 S. Marine Science Dr.
Newport, OR 97365
541-867-0368
seagrant.orst.edu

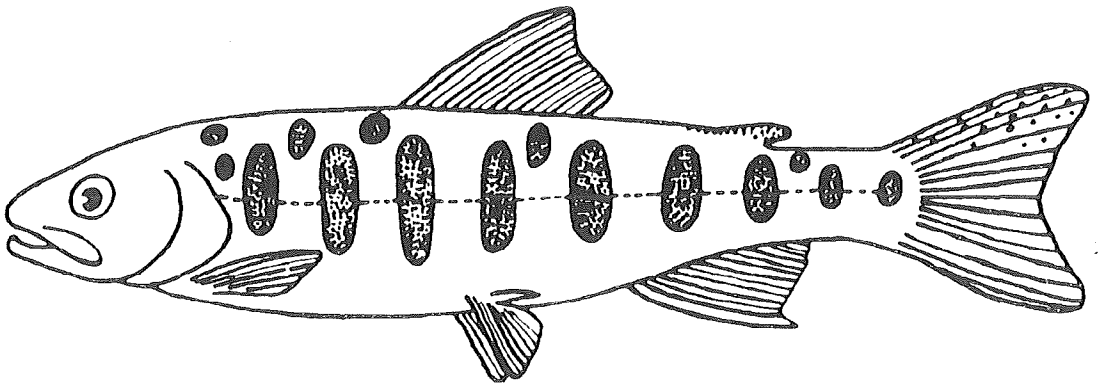
Oregon State University Extension Service
Publication Orders
Extension & Station Communications
OSU
422 Kerr Administration
Corvallis, OR 97331-2119
541-737-2513
www.agcomm.ads.orst.edu/

Partners for Wildlife Program
Pat Wright or Maureen Smith
US Fish & Wildlife Service
2600 SE 98th Avenue
Suite 100
Portland, OR 97266
503-231-6179

RELATED MANAGEMENT AGENCIES

Governor's Watershed Enhancement Board
255 Capitol St. NE
Salem, OR 97310
503-378-3589, Ext. 831
Fax: (503) 378-3225

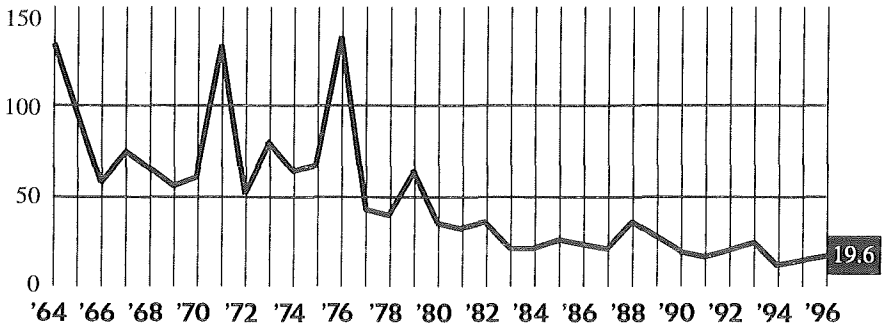
National Marine Fisheries Service
Enviro. & Tech. Services
525 NE Oregon St.
#500
Portland, OR 97232
503-230-5400
kingfish.ssp.nmfs.gov/



Juvenile coho are identified by long, narrow, widely spaced "parr" marks and the long leading edge of the anal fin (on the fish's rear underside).

COHO IN DECLINE

The number of spawning salmon per stream mile has fallen dramatically since the 1960s.



Source: Oregon Department of Fish and Wildlife.
Figures are adjusted to pre-harvest levels.

Oregon Department of Agriculture
635 Capitol St. NE
Salem, OR 97310
www.oda.state.or.us

Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204
1-800-452-4011
www.deq.state.or.us

Oregon Department of Fish & Wildlife
2501 SW First Avenue
PO Box 59
Portland, OR 97207
503-872-5310
www.dfw.state.or.us

Oregon Department of Forestry, Forest Practices Program
503-945-7470 or contact local Forestry offices
www.odf.state.or.us

US Environmental Protection Agency
Watershed Branch
200 SW 35th
Corvallis, OR 97331
541-754-4389

For more information and for details on your local site, contact your local soil and water conservation district or watershed council, or a listed organization.

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3. "stocks" as they are referred to in electrophoretic studies. Ricker (1972) defines stocks as "the fish spawning in a particular lake or stream (or portion of it) at a particular season, which...to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season." Because of the great number of transplants throughout history, it is reasonable to assume that some of the offspring from introduced and native crosses did survive to reproduce. Therefore, the assumption that the Oregon coastal chinook stocks are discrete is difficult to justify and in turn, the stocks cannot be so neatly delineated on the basis of electrophoretic analysis.

Two aspects of stock transfers are examined: 1. How well do stocks that are transplanted survive in other areas and, 2. when a stock is transferred, does its pattern of contribution change.

Few studies have been conducted in Oregon that provide information on survival and contribution of transplanted coastal chinook stocks.

The Oregon Department of Fish and Wildlife transplanted Trask, Elk and Chetco fall chinook of BY 1973 and 1974 to other coastal streams (table 4). McGie (1980) reports that all of the control groups (e.g. Elk stock released in the Elk River) producer larger catches than cohorts released in other streams. The Chetco fish survived well in other streams, especially those transferred to the Klaskanine Hatchery, although their survival was lower than the control group. The Chetco chinook continued to contribute heavily to the Oregon offshore fishery but McGie (1980) notes that "there was a tendency for transplanted fish to contribute more fish to the northern fisheries than [did] the control group at Chetco River." The changes in the pattern of contribution of Elk fish could not be analyzed because of the low survival of the tranplanted fish.

An objective of the transfer of Trask and Chetco fish to the Klaskanine was to see if these stocks would contribute to the lower Columbia River and Young's Bay gill net fisheries (McGie, 1980). Chetco fish were not caught while Trask fish were. Differences in the run timing between the two stocks might account for this distinction. For example, Chetco fall chinook migrated upstream to spawn in late fall, after the gill net fishery had closed while Trask fish returned during the gill net season.

This study was discontinued because of the outbreak of IHNV in the Elk and Chetco chinook (they could no longer be transferred). Some of the results (e.g. survival) may have been influenced by the disease. Furthermore, the opportunity to recover fish with fin marks was low after 1973 when recovery efforts focused on coded wire tags.

Rogue chinook of BY 1982 and 1983 were transferred to the Big Creek Hatchery on the Columbia River. Preliminary

Table 4. Transplants of Elk, Chetco, and Trask River chinook of brood years 1973 and 1974.

Stock	Release site	Date released	Size (g)	Mark	Number released
		1973 brood year (liberated in 1974)			
Trask	Trask R.	11/01	54	07-10/10[a]	36,519
Trask	Alsea R.	10/31	39	07-10/11	38,883
Elk	Alsea R.	10/31	46	07-10/12	38,030
Elk	Elk R.	11/01	45	07-10/13	39,660
Elk	Coos Bay	10/23-28	43	Ad-RV[b]	109,985
Chetco	Coos Bay	10/23-28	43	Ad-LV	99,609
Total					362,686
		1974 brood year (liberated in 1975)			
Elk	Coos Bay	10/20-21	41	07-11/09	26,307
Chetco	Coos Bay	10/21	42	07-11/10	23,616
Trask	Klaskanine R.	11/21	48	07-11/11	30,550
Chetco	Klaskanine R.	11/21	48	07-11/12	34,620
Trask	Trask R.	10/22	45	07-11/13	38,233
Trask	Alsea R.	10/21	46	07-11/14	25,578
Elk	Alsea R.	10/21	45	07-11/15	32,538
Elk	Elk R.	10/20	41	07-12/09	35,825
Chetco	Chetco R.	11/18-20	46	07-12/10	39,150
Total					286,417

[a] *Coded wire tag*
[b] *Fin mark*

From: McGie, 1980, p. 4.

information, based on the catch of one and two-year olds indicates that Rogue fish have survived well. Returns of jacks in 1984 of BY 1982 were high; however, this cannot necessarily be used as an indicator of how well other year classes will survive. Recent information (May 20 to June 2, 1985) from the troll catch, shows that chinook from the Rogue-Big Creek release are being caught in relatively great numbers off the Oregon Coast. Information from other fisheries has not yet been tabulated; therefore, an estimate of contribution to the offshore fisheries cannot be made at this time.

Concerns regarding Reprogramming Efforts

1. The genetic risks associated with transferring stocks cannot be predicted with accuracy or reliability (refer to Genetic Considerations). However, conservative management dictates that to minimize genetic problems transplanted stocks should have similar genetic "backgrounds" as native stocks. The genetic problems that may result from the developemt of a "superstock" have been reviewed previously.
2. The life history strategies of coastal chinook stocks as well as the environmental limitations of some coastal systems will influence the outcome of a reprogramming effort (refer to Life History Strategies). For example, if Rogue spring stocks are transplanted, the chances that they will successfully mate with the wild fish from most coastal streams is low; in general, native spring stocks enter the system later and spawn later. Rogue fall chinook have a higher probability of breeding with native chinook. If it were not for the higher contribution to the offshore fishery of fall chinook than of spring chinook, spring chinook would be the stock of choice (J. Martin, pers. comm.). This illustrates some of the trade-offs that must be considered if stocks are to be transferred.

3. Finally, ODFW stocking policy for the Oregon coastal streams may prevent some of these stocks from being transferred to areas that are managed primarily for wild stocks or other species (Appendix B-2).

Concerns regarding enhancement efforts

Increasing the number of fish released can be viewed in two ways: 1. Increasing the number of fish released from hatcheries with stocks that do not contribute heavily to the Oregon offshore fishery; and 2. Increasing the number of fish released from hatcheries that have stocks that do contribute to the local offshore fishery.

Increasing the releases of stocks that do not contribute heavily to the Oregon offshore fishery

This would involve primarily the Northern coastal stocks. These stocks contribute relatively little to the Oregon offshore fishery and would mostly be caught by the northern fisheries. By increasing the number of fish released it is reasonable to assume that the numbers of fish caught will increase although the proportion of catch in the various coastal fisheries would remain the same, ceteris paribus. The trade off between numbers released and numbers caught ultimately is an economic question. An economic feasibilty analysis would provide an indication of the cost effectiveness of increasing the releases of northern coastal stocks. For the purpose of illustration, if 100 fish are released of a stock that contributes 50% to the Oregon fishery, one fish would be caught in the oregon offshore fishery. If 1000 fish of a stock that contributes 10% are released, two fish would be caught in the Oregon offshore fishery. In both cases, suvival to catch is assumed to be 2%. Therefore, the numbers released as well as contribution must be weighed in order to determine the benefits and costs of enhancement efforts. Before an economic analysis is done, however, the following biological and fisheries management concerns of the northern coastal stocks need to be evaluated.

1. Northern stocks migrate north and utilize the richer feeding grounds of the northern waters. There presently is controversy regarding the productivity of the ocean off Oregon. That carrying capacity has been reached for chinook is not established; however, density dependence mechanisms may act at a level of increased releases (as yet undetermined) that would reduce survival (and/or growth). Conservative management strategies would guard against the creation of another coho scenario with chinook.

2. Northern stocks are abundant and escapement is fairly high.

3. The following northern stocks have had surplus eggs (to 1982): Trask spring and fall; Nestucca spring and fall; and the Salmon River fall chinook. The egg status of these stocks after 1982 was not evaluated (Appendix B-3).

4. Northern stocks are not affected by the IHN virus.

5. The Canadian Treaty is expected to improve the contribution of Northern stocks to the Oregon fishery; however, it will not greatly alter the contribution of the southern stocks (Martin, pers. comm.).

Increasing the release of stocks that do contribute to the Oregon offshore fishery

If the trends of contribution do not change as a result of enhancement efforts, more fish would be available to the Oregon offshore fishery if more fish are released from the southern hatcheries. However, some points to consider about the southern stocks are:

1. Few southern stocks are known to contribute to the Oregon offshore fishery and of these, one is affected by IHNV (the Chetco fall stock). The Elk is also quarantined due to IHN but the Elk generally does not contribute as heavily to the Oregon fishery as the Chetco. Furthermore, the development of an IHN-free stock is not expected to occur in the near future (Groberg, pers. comm.).

2. Southern stocks have been depressed in past few years but recent information on 1985 catch and escapement indicates that these stocks are recuperating.

3. Very little information is available on the native southern stocks; hence, it would be extremely difficult to recommend a "safe level of increased releases."

4. Eggs have been available in the past (up to 1982) from the following stocks: Umpqua spring; Rogue spring; and Chetco fall. Recent information on the egg status of these stocks has not been reviewed. The STEP program takes eggs from many of these southern stocks (Appendix B-3).

5. Rogue chinook are already released from various coastal hatcheries. Increasing the release of Rogue stocks might generate concerns about genetic risks as well as carrying capacity.

Summary of General Concerns Governing Enhancement

Before a "safe level of increased releases" can be determined, information on the following topics needs to be gathered and analyzed:

1. The status of the native chinook stocks found in Oregon coastal streams. The management of a mixed fishery (i.e. harvesting native and hatchery fish) depends on accurate and reliable information on the catch and escapement of wild fish. A mixed stock harvest scenario might have long term genetic implications. Martin (pers. comm.) suggests that hatchery stocks from the Sacramento Basin can withstand a harvest rate of 80-90% while wild stocks can support a rate of 60% (or lower). Also,

limited knowledge is available on the stock recruitment relationships for the coastal stocks, making short term management decisions (e.g. setting harvest rates and release levels) difficult.

2. Carrying capacity and density dependence. Presently, these are rhetorical qusetions that cannot be supported by empirical evidence. However, these are concerns that, if verifiable, would impose severe limitations on enhancement efforts.

3. Life history strategies of coastal chinook. The natural production of wild fish and their life history strategies may influence the extent of the negative effect hatchery strays would have on native fish stocks. Increasing the number of hatchery fish released generally results in higher numbers of strays. It is believed that hatchery fish stray more than wild fish; and in some rivers there is a high percentage of strays. For example, strays from the Elk River to the Sixes River can be as high as 30% (Nicholas and Downey, 1983; Uremovich, 1977). This is a genetic concern and should be considered as a potential risk.

Conclusions

1. Knowledge on the contribution of Oregon coastal chinook to the Oregon offshore fishery is founded primarily on recent coded wire tag studies. Historical studies contain many discrepancies which limit their use in evaluating contribution. The Oregon stocks that tend to contribute heavily to the Oregon offshore fishery are the Umpqua spring chinook, the Rogue spring and fall chinook, and the Chetco fall chinook. The Elk fall chinook also contribute to the Oregon fishery. This may be because of the extended troll season off the Elk River.

2. The distribution of the coastal chinook stocks on the high seas is not well understood. Migratory patterns are believed to be genetically determined but are also influenced by environmental factors. Chinook are widely dispersed in the ocean--more so than other salmonids because of their complex life histories. They have also been caught in deeper waters than other salmonids. Chinook from both the northern and southern Oregon coastal streams have been caught off the Aleutians Islands, which are rich feeding grounds.

3. The abundance of the coastal chinook stocks was difficult to ascertain due to the limitations of the information base and the time restrictions of this study. Apparently, the escapement of native fall chinook from Oregon coastal streams has increased at approximately 3% per year since 1950. This trend, however, appears to be slowing down. Both the northern and the southern coastal stocks have been increasing, although in the past two years, the southern stocks experienced a decline. This was presumably caused by the warm ocean currents of the El Niño. Recent data indicate that the southern stocks may be improving; 1985 dam counts on the Rogue and Umpqua rivers are exceptionally high.

4. Two southern stocks, the Elk and the Chetco, are quarantined due to IHN virus (they cannot be transferred to other systems). An IHN-free stock is not expected to be developed in the near future. Recently, IHN was isolated from Columbia River chinook and millions of eggs had to be destroyed at the Bonneville Hatchery. This has severe implications for management. ODFW policy prohibits the transfer of chinook from the Columbia-Willamette Basin to any of the Oregon coastal systems. Non-viral diseases are found in all of the coastal hatcheries but treatment is available for most of these diseases and the stocks are not quarantined.

5. The genetic risks associated with reprogramming or enhancement efforts are not predictable because of the scientific uncertainity of predicting the environment. However, conservative management dictates that it is wise to preserve some degree of genetic diversity in case of future disturbances. Furthermore, fewer negative impacts are believed to occur if stocks are transferred to nearby localities.

6. Interactions between native and hatchery juveniles are thought to favor hatchery fish. This might disturb the normal population mechanisms of the native stocks in streams where hatcheries are located. However, generalizations cannot be drawn from the scientific evidence on various behavioral interactions.

7. The life history strategies of the coastal chinook stocks are varied. Some important factors to consider for juveniles are the timing of migration to the estuary and to the ocean, time spent rearing in freshwater and in the estuary, and tolerance to environmental pressures (e.g. high water temperatures and low stream flows). For adults, tolerance levels and the timing of the run must be considered. It is believed that Nehalem chinook have a greater tolerance for high temperatures than chinook from the Nestucca or the Siletz Rivers. In general, the southern coastal stocks return later than the northern stocks (partially related to flows and temperature). The limitations of the system (e.g. a small estuary) will also influence the success of enhancement and reprogramming efforts.

8. Limited carrying capacity in the ocean as it pertains to the survival of chinook has not been demonstrated, especially since chinook stocks are apparently healthy. Density dependent relationships within river systems, however, may occur if hatchery juveniles and adults stray. This depends on the location of the hatchery, the hatchery management practices, the amount of strays, and the density of wild fish in the river. Competition for rearing habitat, overwintering habitat, and spawning habitat (to name a few) would generally result in reduced production if density dependent mechanisms are present.

9. Chinook salmon have been transplanted many times and to many coastal hatcheries since the turn of the century. From 1909 to 1960, Bonneville Hatchery tranferred chinook (of Columbia and Willamette stock) directly to the Alsea, Coos, Coquille, Siuslaw, Yaquina, Trask, Nestucca, Nehalem, Rogue, Siletz and Umpqua Rivers or to hatcheries on these rivers. This represents only one of many hatcheries that transferred chinook to Oregon coastal streams. Many coastal chinook stocks have also been transferred to the Columbia River. However, limited information is available on the survival of these transfers. Two recent studies provide some indication of the survival and contribution of a few Oregon coastal stocks. According to a study conducted with Elk, Chetco and Trask stocks (brood years 1973 and 1974), the Elk survived the transfer worst and the Chetco survived the best. None of the transferred group survived as well as their cohorts that had been released in their natal streams. The pattern of contribution of Chetco fish released from the Klaskanine did not change substantially, although a slight northern shift was noted. Very recent information suggests that the Rogue chinook release (brood year 1982) at the Big Creek Hatchery, Columbia River, is successful; survival seems to be high. No information on the contribution to the offshore fishery is available yet.

In conclusion, further study is recommended before reprogramming or enhancements efforts are initiated with Oregon coastal chinook stocks. More information is required on various aspects of the southern coastal hatchery and wild stocks. Once this information is available, a biologically oriented feasibility study would be able to recommend stocks that would be suitable candidates for transfer or enhancement. However, it is doubtful that definitive answers regarding the issues of genetic risks and carrying capacity could be provided.

Recommendations for Further Study

1. The feasibility of enhancement in terms of releasing fish of better quality rather than more fish needs to be investigated as an alternative enhancement strategy.

2. Triploidy and sterilization programs should be evaluated for their potential as a tool for management (e.g. a different way to approach the mixed stock harvest problem).

3. A review of hatchery management practices might provide insights into such questions as what size of smolt should be released to reduce time of instream residence before migrating to sea. Practices that rely on time spent in fresh water increase the chance of interactions between hatchery and wild fish.

4. The possibility of transferring California chinook or enhancing the Columbia River spring chinook runs needs to be investigated. Cowlitz and Carson Hatchery spring chinook are thought to contribute to the local fisheries.

5. A review of the releases of hatchery fish by area and the contribution of these fish to the various Oregon offshore fishing areas needs to be examined. This may provide some information on where enhancement efforts should be concentrated. However, this type of study would be restricted due to the limitations of the current data base.

6. More research needs to be conducted in order to better assess the natural production of wild stocks in Oregon coastal streams. This information would provide the basis for management decisions (such as setting the harvest rates in a mixed fishery). Presently, there is limited information on the southern coastal stocks. More stream surveys, creel censuses, and life history studies would provide a broader information base for developing a

management model for coastal streams. Reliable information on catch to escapement ratios and abundance of stocks is not available for most of the coastal streams.

7. The methods currently used to estimate contribution need to be improved. However, these improvements will come about when more data from recent CWT tag studies are available; it is useless to expand the older data due to deficiencies in the original studies. Better information on contribution is expected with time. We should adopt a "wait and see" attitude, especially with respect to the Rogue--Big Creek release.

8. The possibility of building a new hatchery or expanding an existing hatchery in an area on the coast that has stocks that contribute heavily to the Oregon fishery should be evaluated. This would be an enhancement and not a reprogramming effort.

9. Hatchery management practices should be reconsidered with respect to managing populations that have IHNV. Practices can be altered to reduce the loss of eggs by using separate egg trays; however, this might not be cost effective. Alternately, the resource can be managed and the losses to IHN accepted; in this case IHN would greatly reduce the survival of juveniles, but ultimately this could be considered as an economic trade-off. Finally, we can continue to wait for the development of an IHN-free stock.

LITERATURE CITED

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Bailey, J.E., J.J. Pella, and S.G. Taylor (1976). Production of fry and adults of the 1972 brood of pink salmon, Oncorhynchus gorbuscha, from gravel incubators and natural spawning at Auke Creek, Alaska. Fishery Bulletin 74: 961-971.

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APPENDIXES

Appendix A Index

Appendix A-1.1

RECORD OF RECAPTURED SALMON TAGGED ON THE WEST COAST OF VANCOUVER ISLAND IN 1925
(Only Oregon Coastal Recoveries are reported)

Return of Spring Salmon tagged off Barkley Sound, Vancouver Island, 1925.

Tag No.	Date Tagged	Date Recaptured	Days Free	Place of Recapture
923	6 Jun	12 Nov	159	Alsea River
754	14 Aug	no date	---	Oregon Coast
2105	19 Jun	24 Jul	35	Tillamook Bay
2110	19 Jun	29 Oct	132	Nestucca River
2013	20 Jun	27 Sep	99	Siletz River
2202	20 Jun	21 Sep	93	Coos Bay (Marshfield)
2239	6 Jul	23 Sep	79	Nehalem River
2179	15 Jul	17 Oct	94	Coos Bay (Marshfield)
2197	16 Jul	21 Sep	67	Coos Bay (Marshfield)
2045	19 Jul	22 Sep	65	In ocean off OR coast (troll)
2050	19 Jul	19 Oct	92	Umpqua River
2073	19 Jul	10 Oct	83	Umpqua River
2098	23 Jul	21 Sep	60	Coos Bay (Marshfield)
2251	23 Jul	9 Oct	78	Alsea River

Return of Spring Salmon tagged off Ucluelet in 1925: no coastal recoveries.

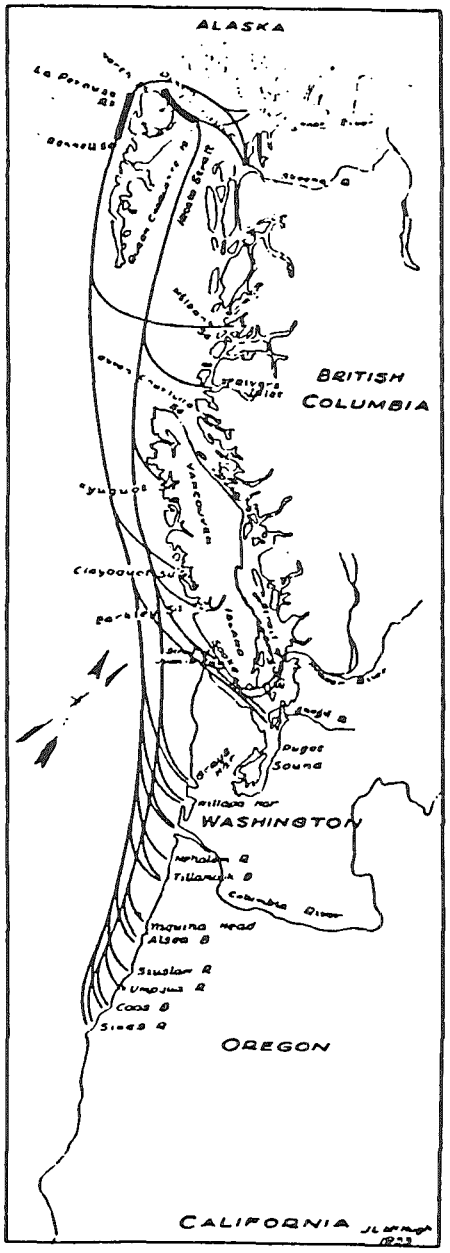
Return of Spring Salmon tagged off the west coast of Vancouver Island, 1925: no coastal recoveries.

adapted from: Report of the Commissioner of Fisheries for the Year ended December 31st, 1926, Victoria, British Columbia.

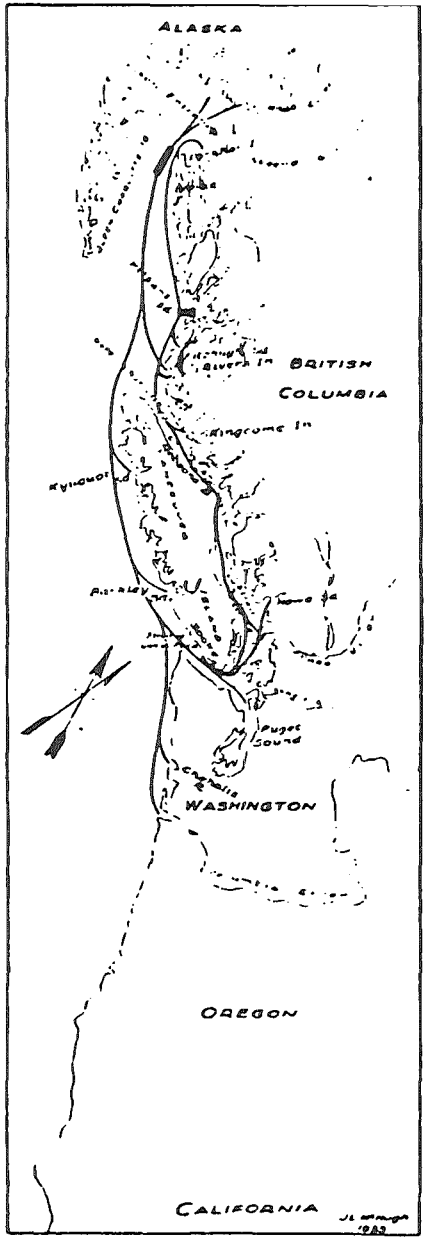
APPENDIX A-1.2a to 1.2k

SCHEMATIC REPRESENTATIONS OF EARLY TAGGING AND MARKING STUDIES

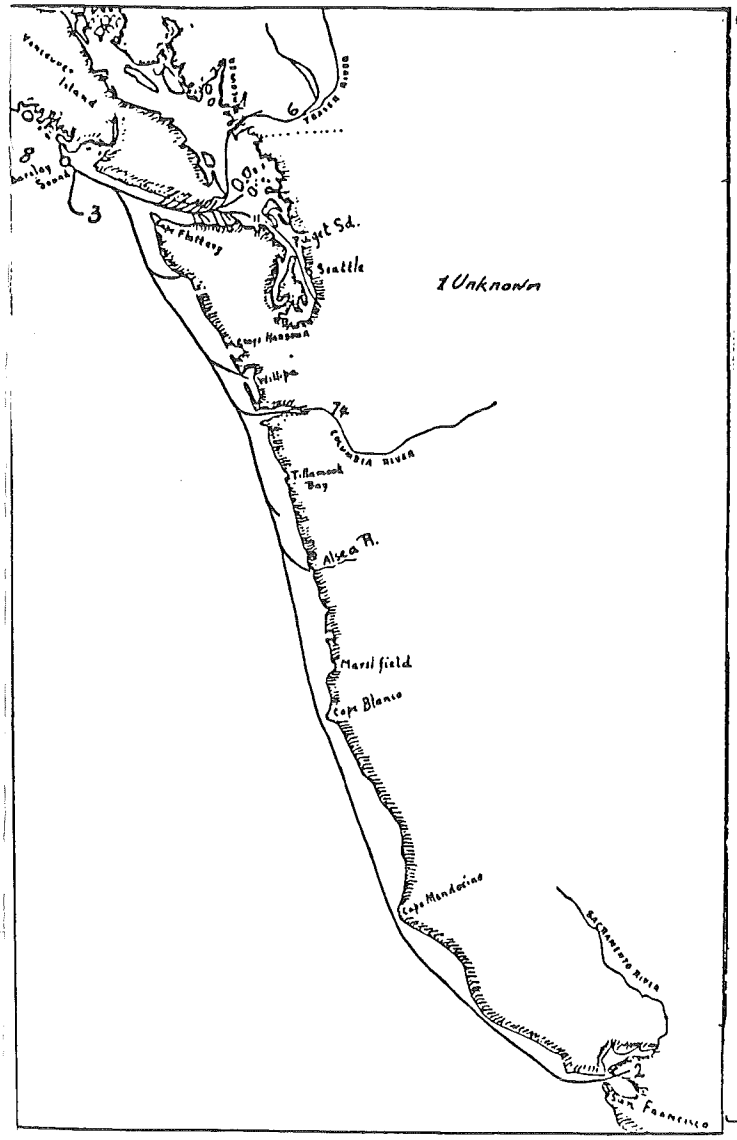
From: Godfrey, H., 1968. Review of Information obtained from the tagging and marking of Chinook and Coho salmon in the coastal waters of Canada and the United States: Fish. Res. Bd. Canada, m.s. Rep. Ser. No. 953, Nanaimo, B.C.



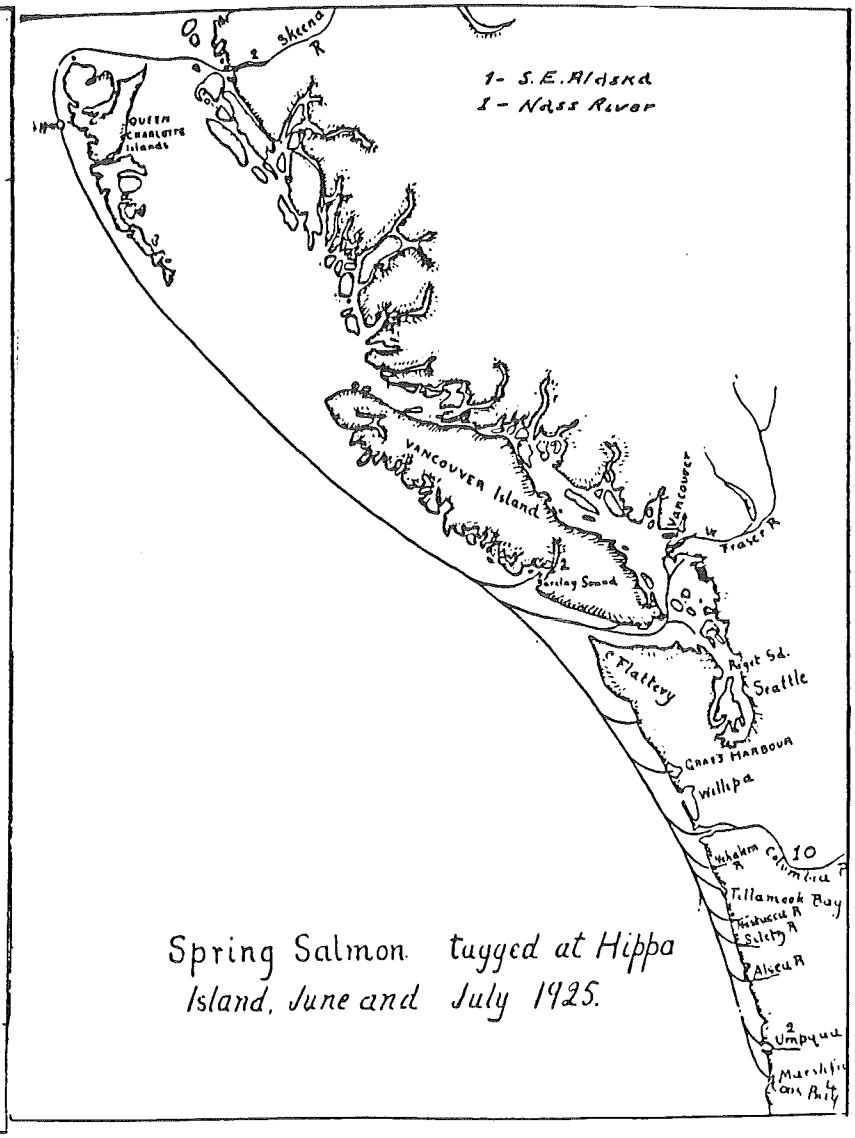
Recoveries of chinook salmon tagged by Canada off the north and northwest coasts of the Queen Charlotte Islands in 1929 and 1930. Reproduced from Pritchard, 1934a.



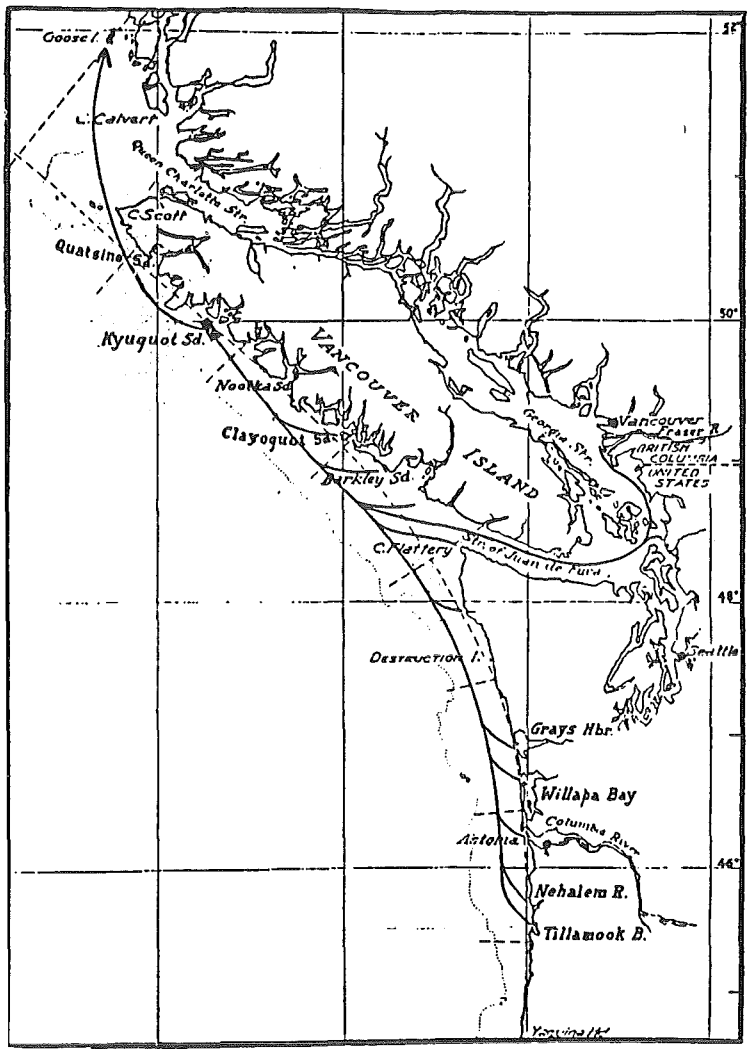
Recoveries of chinook salmon tagged by Canada in north and central Hecate Strait in 1930. Reproduced from Pritchard, 1934a.



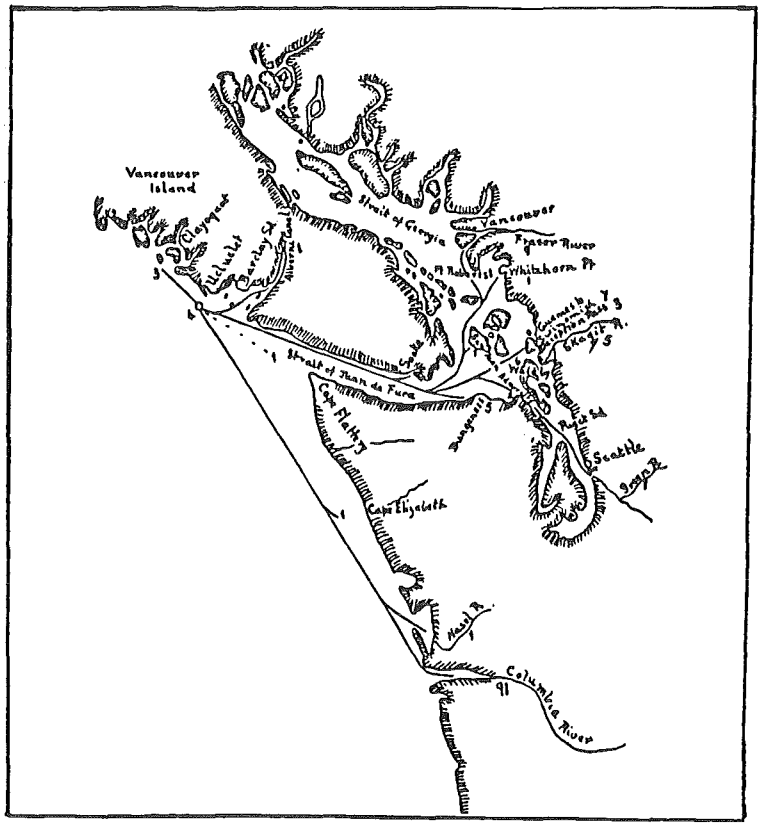
Recoveries of chinook salmon tagged by Canada off Barkley Sound in 1925. Reproduced from Williamson, 1927, with later recoveries added (Williamson, 1929, and Clemens, 1932).



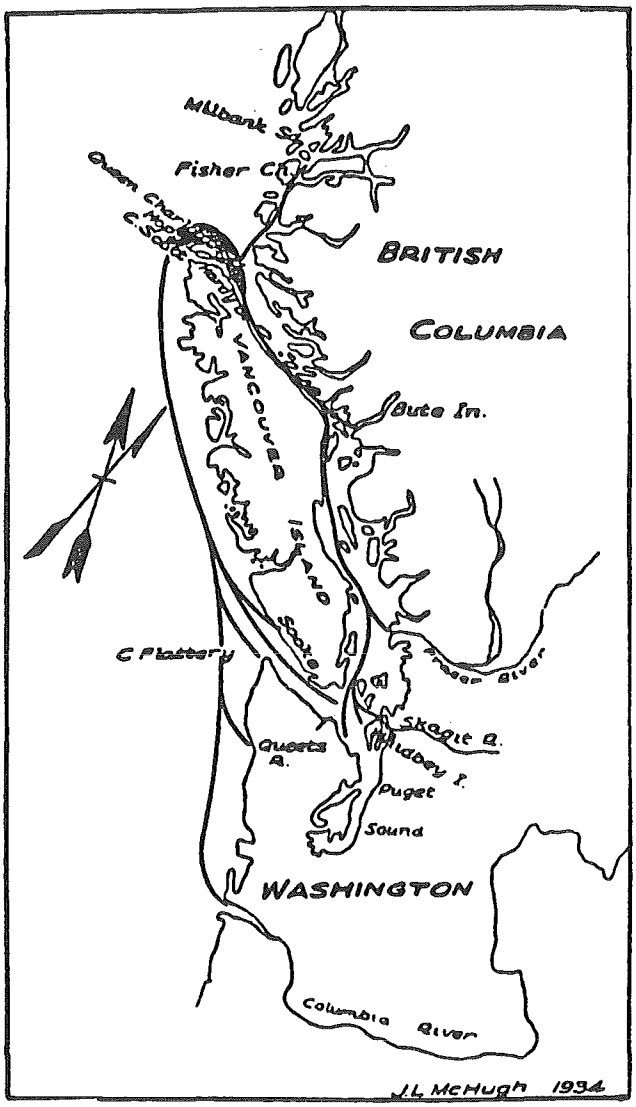
Recoveries of chinook salmon tagged by Canada off Hippa Island, Queen Charlotte Islands, in 1925. Reproduced from Williamson, 1927, with later recoveries added (Williamson, 1929, and Clemens, 1932).



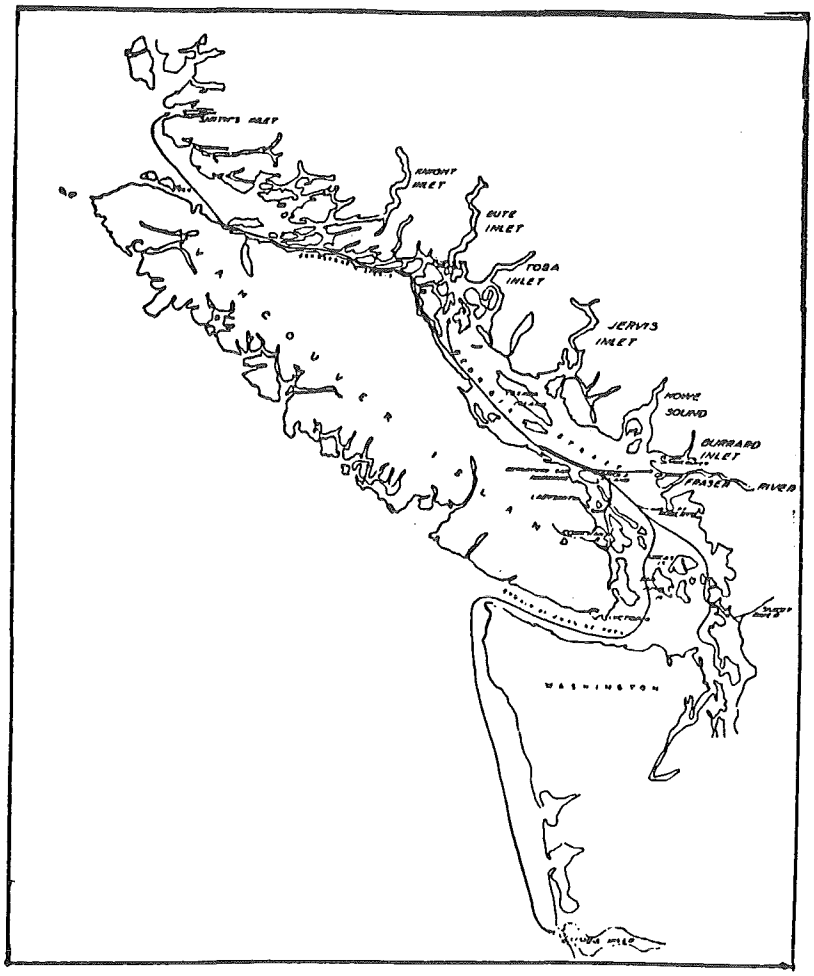
Recoveries of chinook salmon tagged by Canada off Kyuquot Sound in 1927. Reproduced from Williamson and Clemens, 1932.



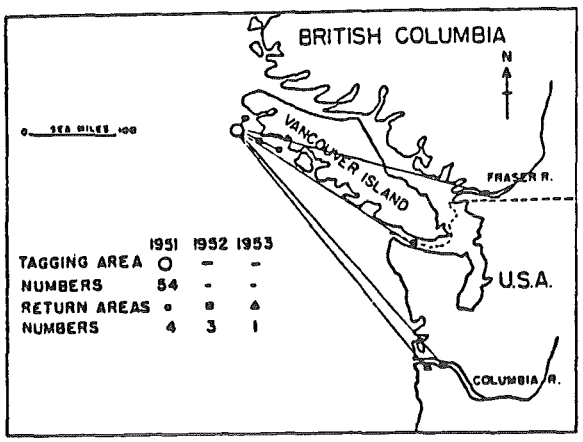
Recoveries of chinook salmon tagged by Canada off Barkley Sound in 1926. Reproduced from Williamson, 1929, with later recoveries added (Williamson and Clemens, 1932).



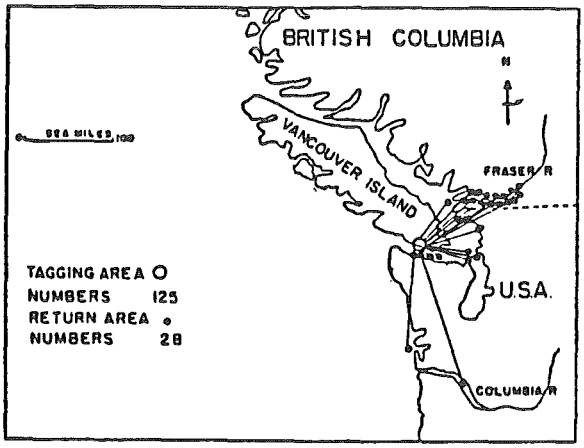
Recoveries of chinook salmon tagged by Canada off the north and northeast coasts of Vancouver Island in 1930. Reproduced from Pritchard, 1934a.



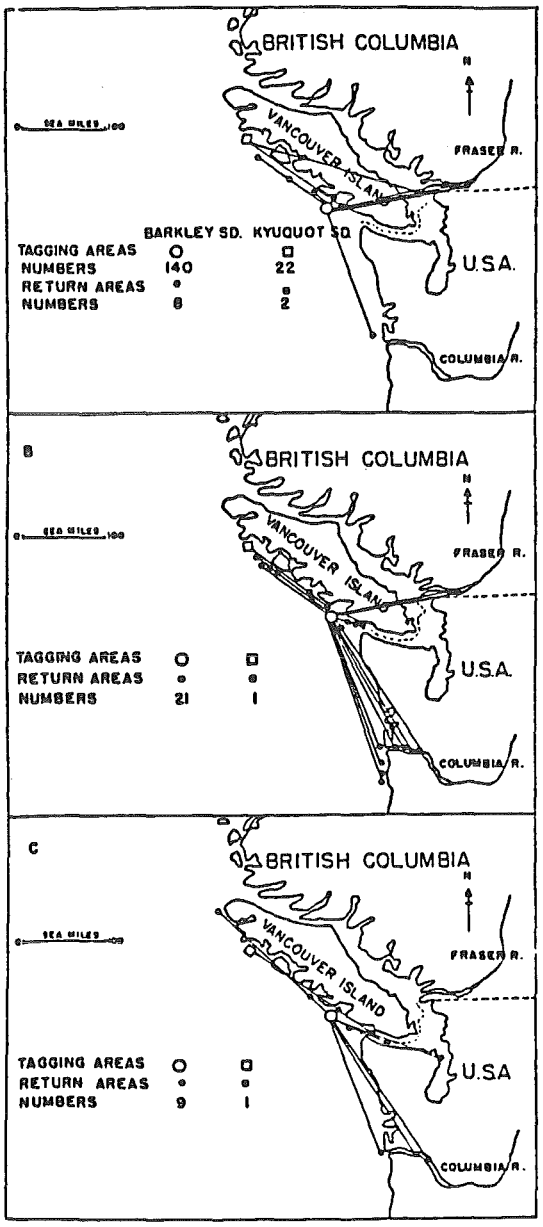
Recoveries of chinook salmon tagged by Canada in the Nanaimo area in 1928. Reproduced from Clemens, 1932.



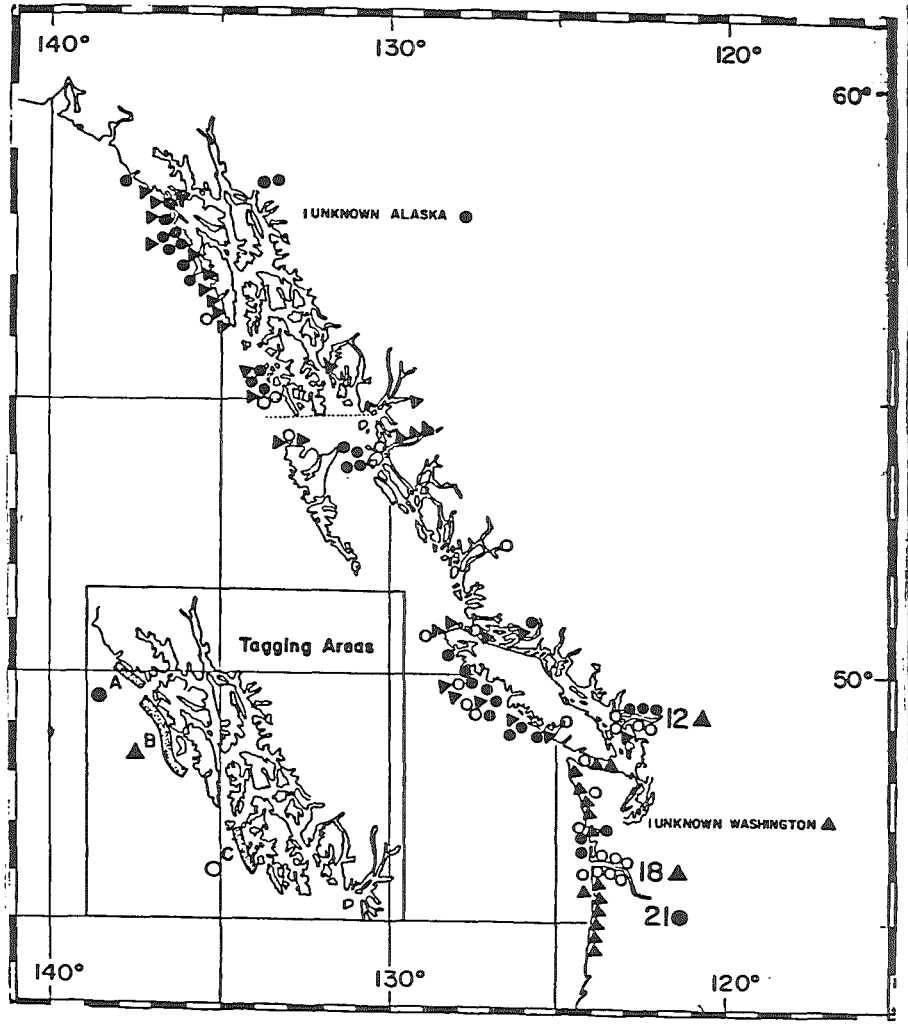
Recoveries of chinook salmon tagged by Canada off Quatsino Sound in 1951. Reproduced from Milne, 1957.



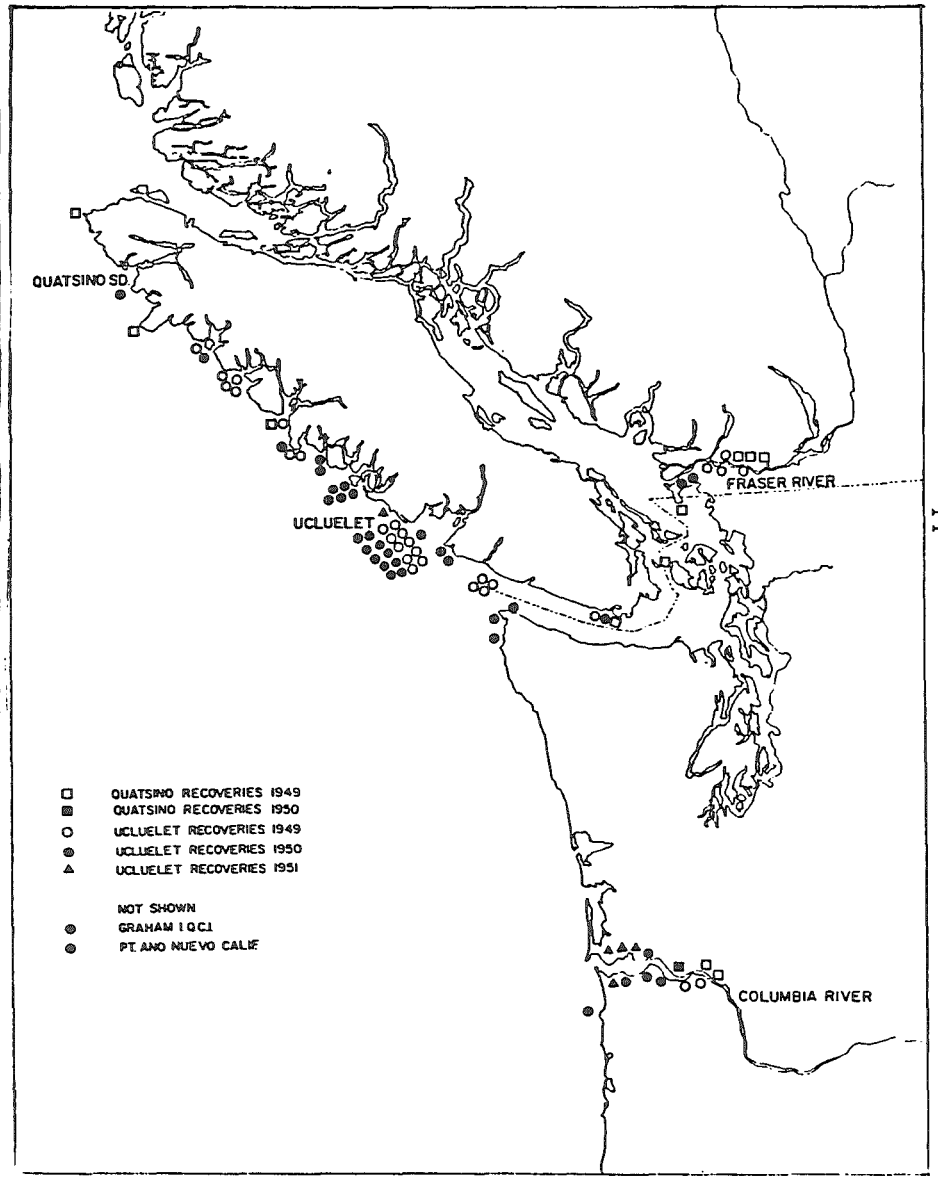
Recoveries of chinook salmon tagged by Canada from the traps at Sooke in 1952. Reproduced from Milne, 1957.



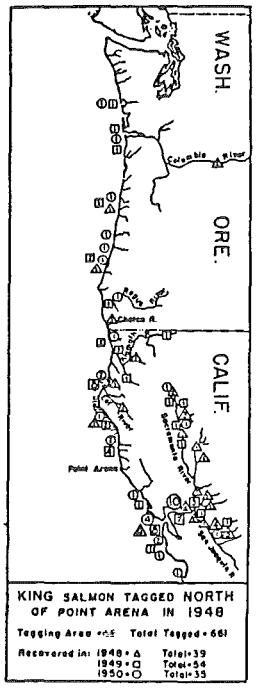
Recoveries of chinook salmon tagged by Canada off Kyuquot and Barkley Sounds in 1950. Reproduced from Milne, 1957.



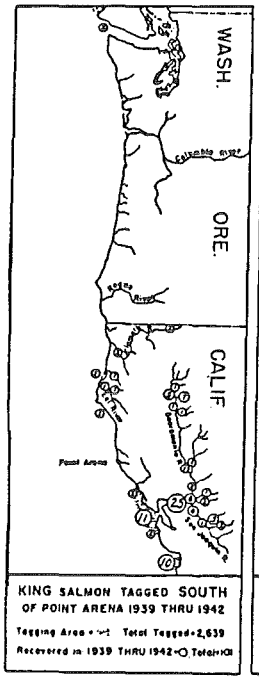
Recoveries of chinook salmon tagged by the United States off the west coast of Southeast Alaska in 1950-1952. Redrawn from Parker and Kirkness, 1956.

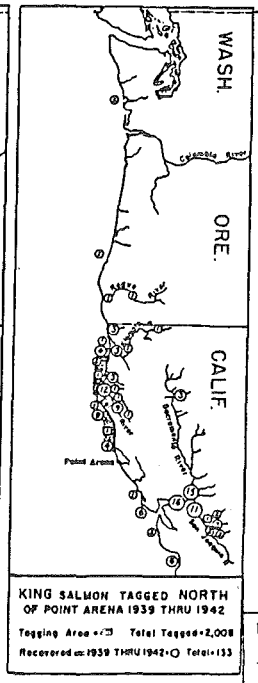


Recoveries of chinook salmon tagged by Canada off Quatsino and Barkley Sounds in 1949. Redrawn from Neave, 1951, with later recoveries added (Milne, 1957)

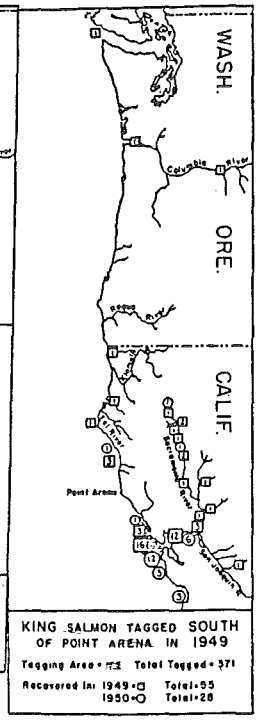


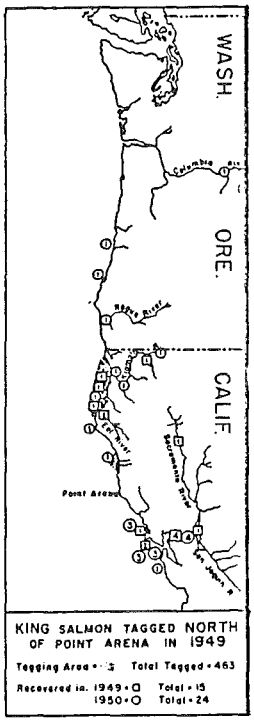
Recoveries of chinook salmon tagged by the United States off the coast of California north of Point Arena in 1948. Reproduced from Fry and Hughes, 1951.



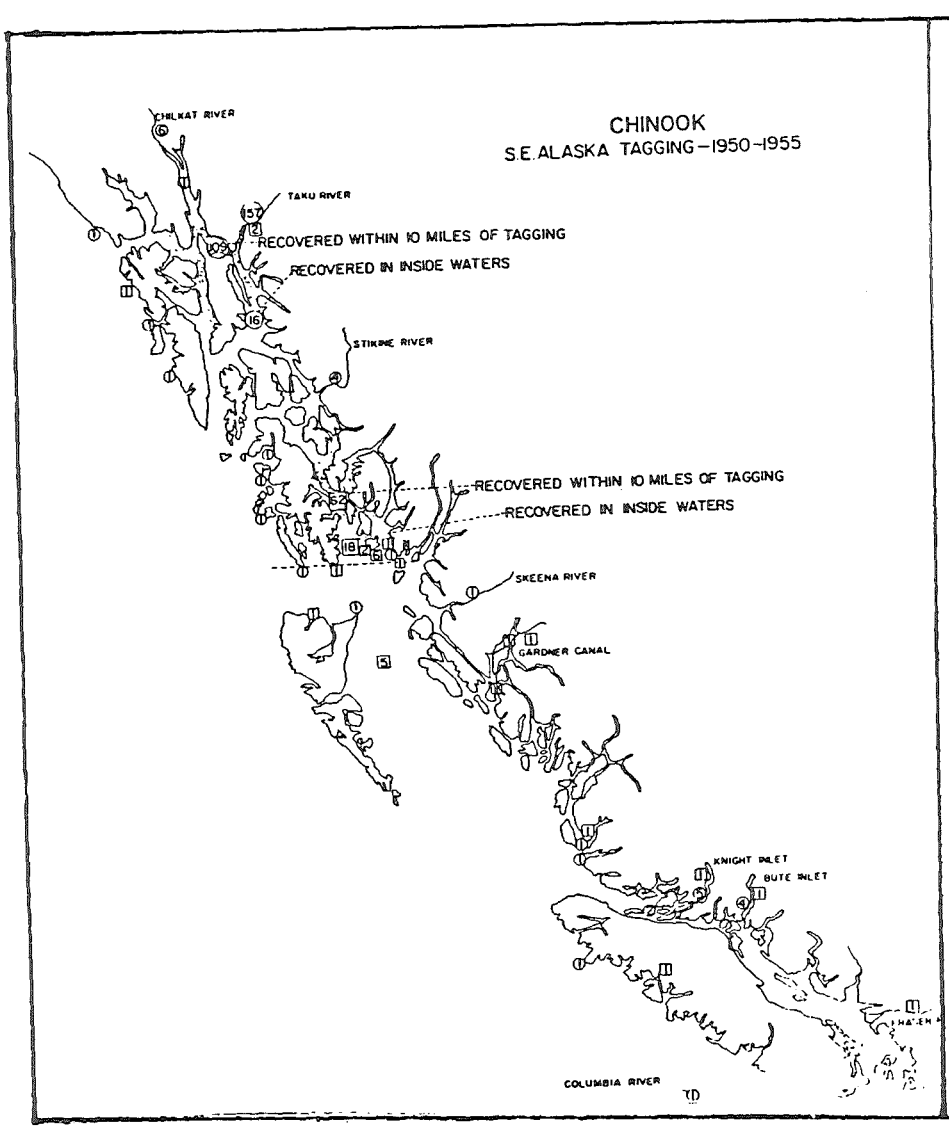


Recoveries of chinook salmon tagged by the United States off the coast of California north and south of Point Arena in 1939-1942. Reproduced from Fry and Hughes, 1951.

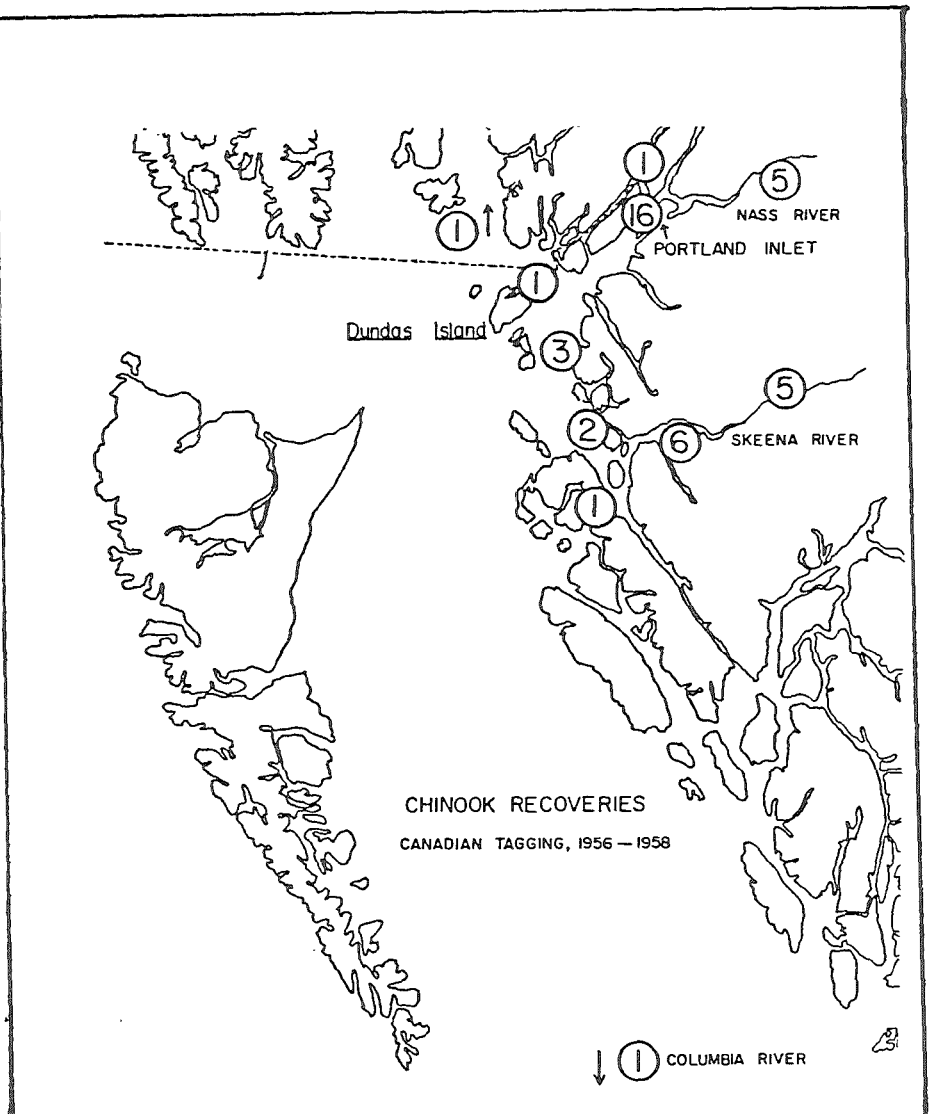




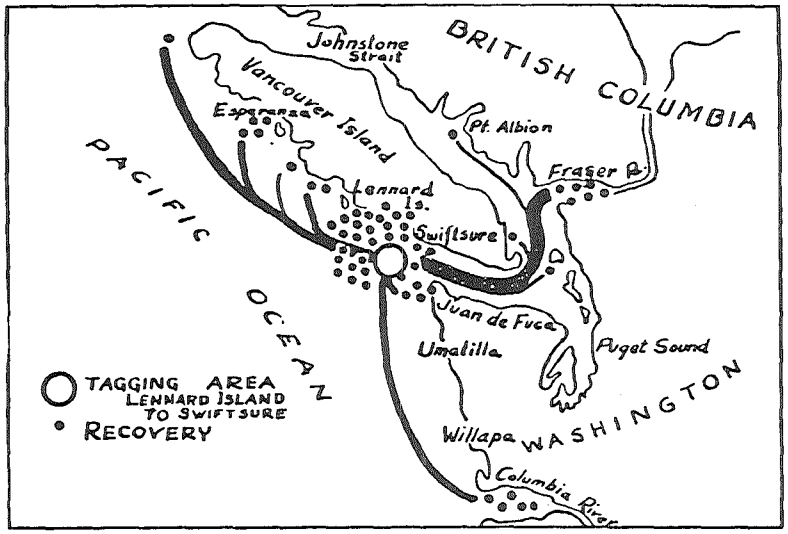
Recoveries of chinook salmon tagged by the United States off the coast of California north and south of Point Arena in 1949. Reproduced from Fry and Hughes, 1951.



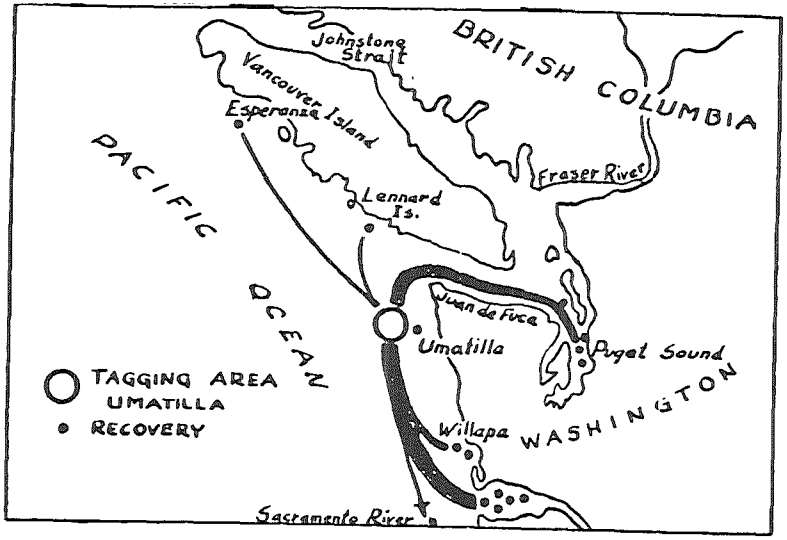
Recoveries of chinook salmon tagged by the United States in inside waters of Southeast Alaska in 1950-1955. Drawn from data provided by the Alaska Department of Fish and Game.



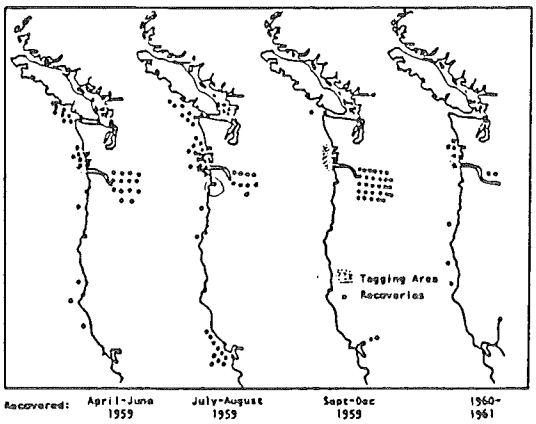
Recoveries of chinook salmon tagged by Canada in the vicinity of Dundas Isl 1956, 1957 and 1958.



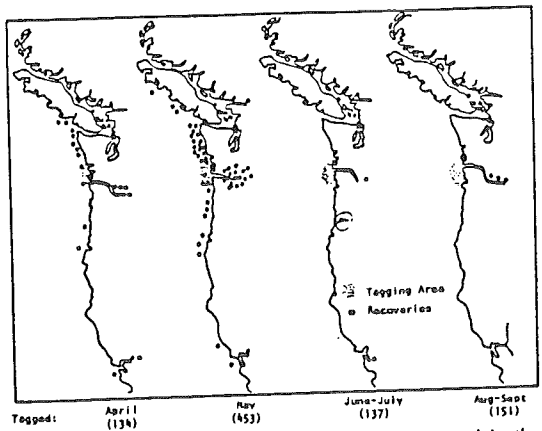
Recoveries of chinook salmon tagged by the United States in the Swiftsure-Lennard Island area in 1949. Reproduced from Kauffman, 1951.



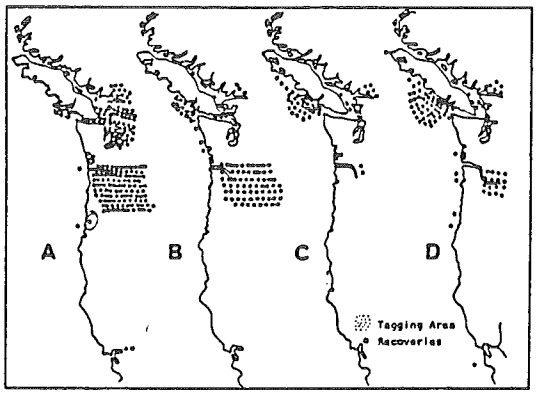
Recoveries of chinook salmon tagged by the United States in the Umatilla Reef area in 1949. Reproduced from Kauffman, 1951.



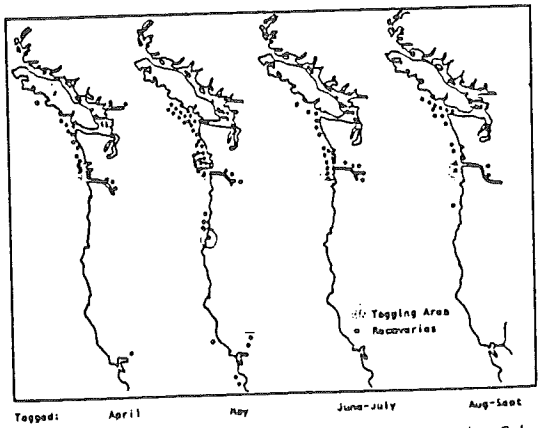
Recoveries from 422 chinook salmon tagged in the Columbia-Grays Harbor areas, march-April 1959.



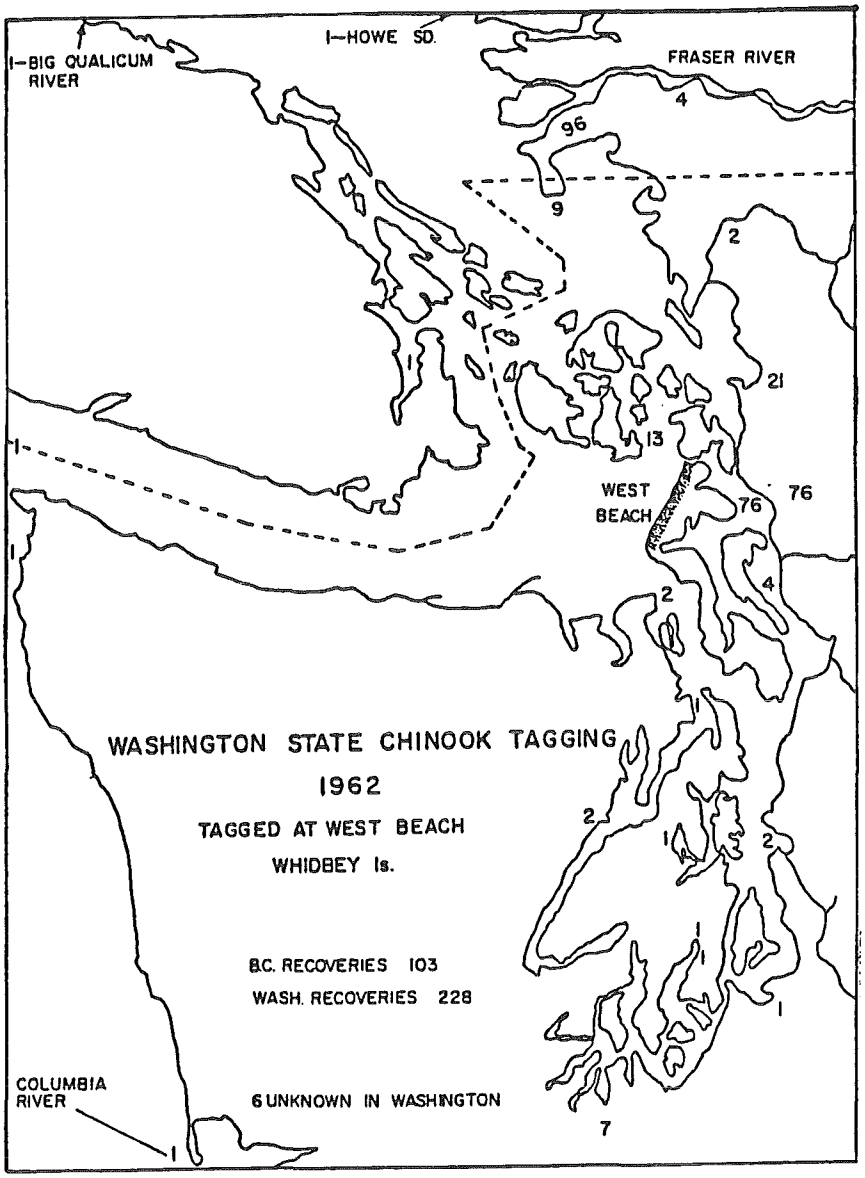
Recoveries, by month of tagging, from chinook salmon tagged in the Columbia area, 1948-52 and 1955, recovered same year as tagged. (Month of tagging and number tagged each period indicated.)



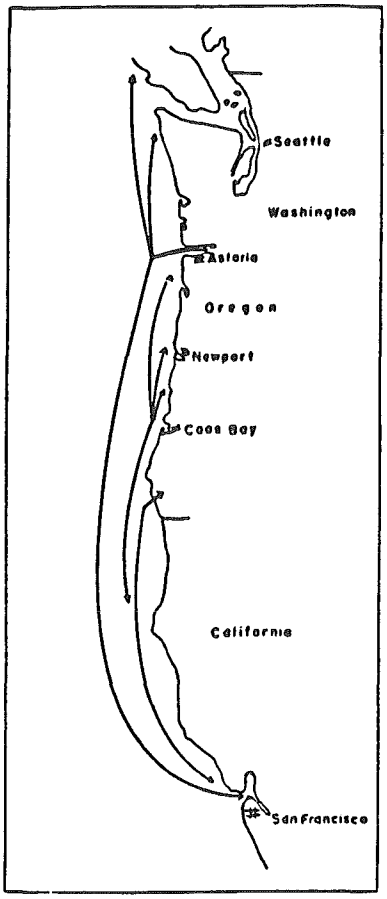
. Recoveries from chinook tagged off Barkely Sound, Vancouver Island: 1925-30 (2,478 tagged), A — recovered same year as tagged, B — recovered in subsequent years; and 1949-50 (912 tagged), C — recovered same year as tagged, D — recovered in subsequent years.



Recoveries, by month of tagging, from chinook tagged in the Columbia area, 1948-52 and 1955, recovered in years following tagging. (Month of tagging indicated.)



Recoveries of chinook salmon tagged by the United States off West Beach, Whidbey Island, in 1962. Drawn from data provided by Washington State Department of Fisheries.



Recoveries of chinook salmon tagged by the United States off the Columbia River and the coast of Oregon in 1948-1949. Reproduced from Van Hyning, 1951.

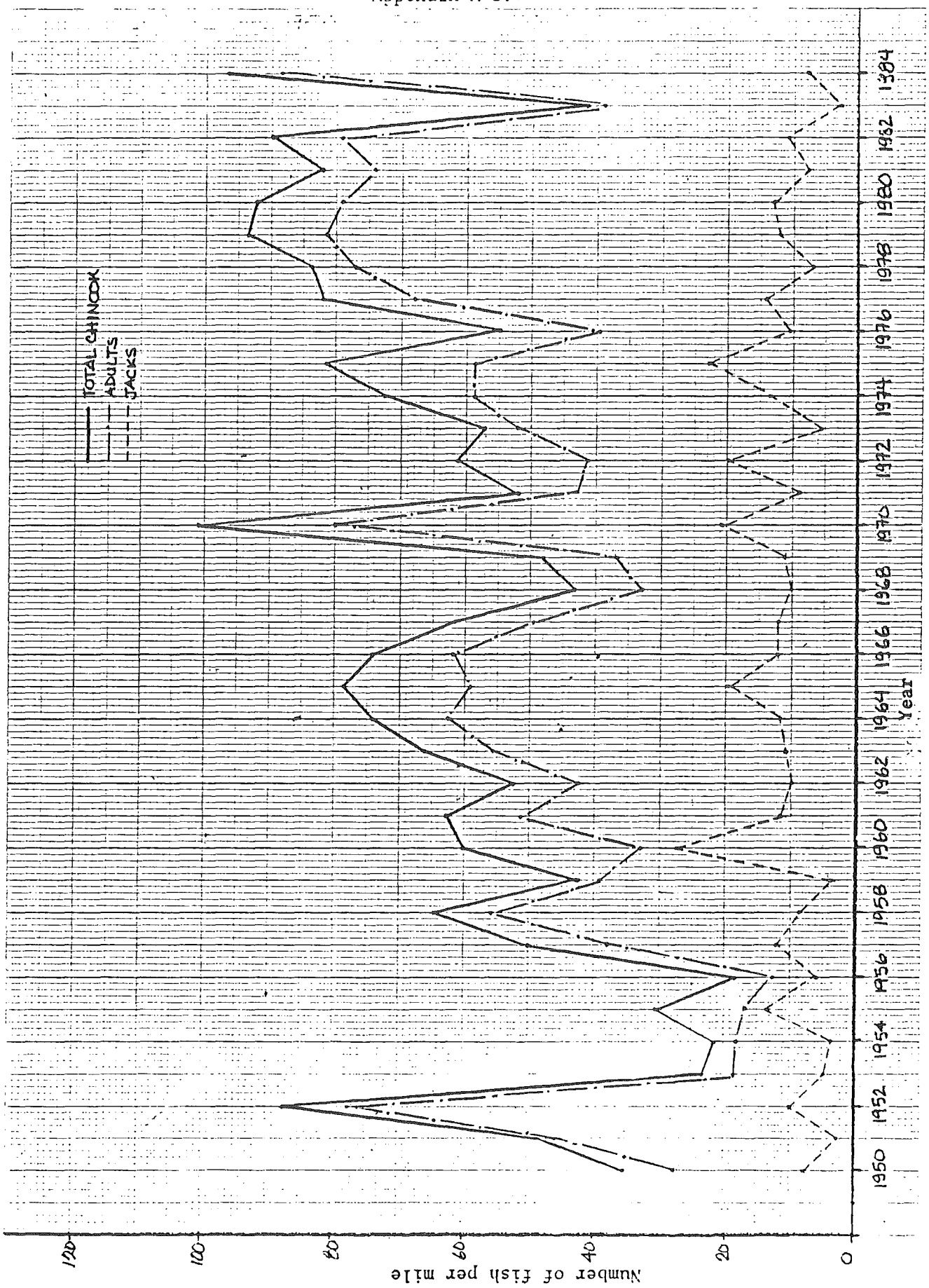
Appendix A-2.

ESTIMATED MEAN SURVIVAL TO CATCH FOR
OREGON PRODUCTION AREAS

Area	Mean survival to catch (%) for chinook
WILL	0.30
DESC	0.03
UPOR	1.22
LWOR	1.63
ORLC	1.11
ORLCO	0.33
OROTH	1.71

adapted from: English, 1985, p. 41.

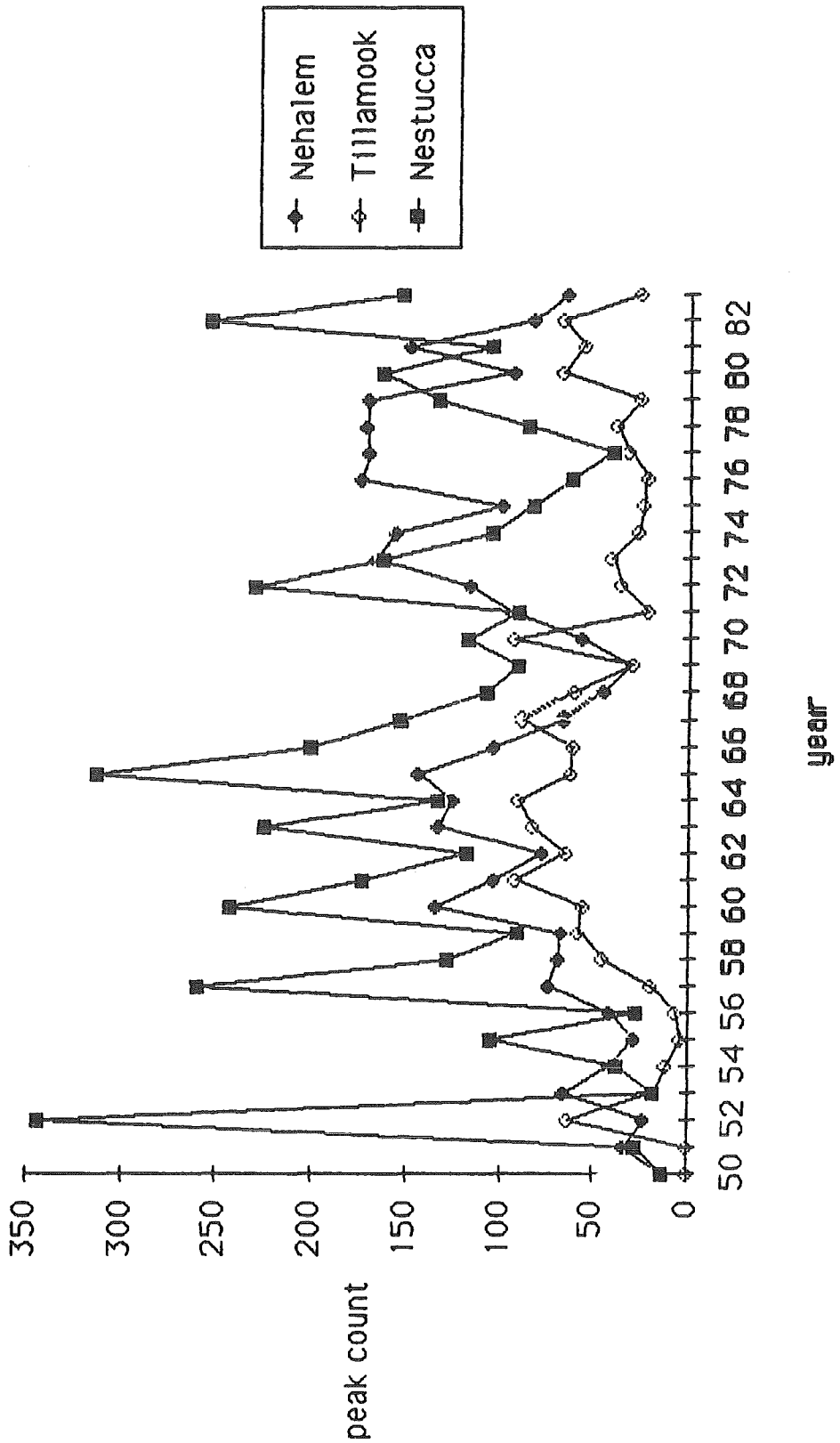
WILL: Willamette River System
DESC: Deschutes River System
UPOR: Upper Oregon Coastal
LWOR: Lower Oregon Coastal
ORLC: Oregon Lower Columbia River
ORLCO: Oregon Lower Columbia River including Lower Columbia, WILL, DESC
OROTH: Oregon State Other: UPOR, LWOR, UNKN
UNKN: Unknown



Average number of fish per mile observed in standard spawning index streams, 1950 to 1984. From: Cummings, 1979 and McGie, pers. comm.

Appendix A-3.2

from: Cummings, 1979; McGie, pers. comm.



Comparison of peak counts of spawning fall chinook (in fish per mile) on three northern coastal streams.

Appendix A-4.

ESTIMATED CONTRIBUTION OF SOME COASTAL CHINOOK STOCKS (1)

STOCK	RACE	CONTRIBUTION TO THE OREGON OFFSHORE FISHERY (2)
Umpqua	spring	A
Rogue	spring	B
Rogue	fall	B
Chetco	fall	A
Coos	fall	C

from: Garrison, pers. comm.; based on data from CWT studies

(1) These estimates are subject to marked change as subsequent recoveries are analyzed

(2) Contribution is reported as: A: greater than or equal to 60%.
B: between 30 and 60%
C: less than 30%

Appendix A-5.1

Preliminary evaluation of long term trends in contribution to the Oregon offshore fishery of Oregon coastal chinook stocks, by watershed or locality. (In alphabetical order).

The information reported in this preliminary evaluation represents an attempt to synthesize pertinent information on Oregon coastal chinook stocks. A qualitative review of the available information is presented for most of the coastal watersheds where chinook stocks are found. The contribution of private hatchery chinook as well as native chinook is included in this summary; however, information on these sources is limited. For each watershed, CWT data is summarized with respect to contribution to the Oregon offshore fishery. These data are supported by fin mark studies and historical marking and tagging studies. Raw data and details of information from the historical studies are presented in Appendix A-1 and Appendix C.

No attempt was made to assign a percentage to the contribution of various stocks to the Oregon offshore fishery; however, information of this nature is available and is included in Appendix A-4. Recent CWT releases are reported to BY 1982.

Alsea

CWT data: Brood year (BY) 1978 and BY 1979 releases of native fall chinook tended to contribute to the British Columbia (BC) and Alaskan (AK) fisheries, but contribution varied between year classes. For example, BY 1979 three-year olds contributed heavily to the California fishery.

Fin Mark Studies: Supports results of the CWT studies but shows that major contribution was to the Washington (WA) fishery rather than the BC and AK fishery. Restricted fishing seasons off Washington in recent years may account for this change.

BY 1966 and BY 1967 releases of Columbia River tule stock at Lint Slough showed no concentration of contribution; chinook contributed relatively equally to California (CA), Oregon (OR) and WA fisheries. However, because AK and BC data were not included, it is undetermined if contribution was primarily to the northern fisheries.

BY 1969 to BY 1972 releases of immunized groups and control groups (vibriosis experiment) in the Alsea contributed heavily to the WA fishery.

BY 1971 and BY 1972 immunized groups of Columbia River tule chinook released in Lint Slough did not contribute heavily to the WA fishery but were more equally divided among OR, WA and BC (BC only from BY 1972)

Historical Studies: Supports results of the CWT studies.

From 1925 tagging studies off Vancouver Island and Queen Charlotte's Islands, there were two recoveries of tagged fish in the Alsea. From the 1948 to 1962 tagging study from Cape Lookout to Willapa Bay, there was one recovery in the Alsea (Van Hyning, PhD thesis, 1973). Henry (1964) noted the straying of Tillamook tagged fish to the Alsea; therefore, some of these early recoveries were not necessarily Alsea stock chinook.

Recent Releases of Alsea fall chinook with coded wire tags were from BY 1980 to BY 1982.

General: From the various marking and tagging studies, Alsea fall chinook tend to contribute more to the northern than to the southern (includes OR and CA) fisheries. More information is required to determine whether most of the contribution is to the BC, AK or WA fisheries. Factors that influence contribution are the fishing seasons and the fishing quotas for the different fisheries.

Burnt Hill Creek, Burnt Hill Hatchery

CWT data: Fall (Rogue, Lobster Creek stock) and spring (Rogue stock) chinook of BY 1979 were released in Burnt Hill Creek. There is not enough information available at this time to note any trends in contribution; however, there is a preliminary indication that contribution is primarily to the OR and WA fisheries.

No Fin Mark or Historical information exists.

Recent Releases: Fall chinook of BY 1981 and spring chinook of BY 1980, 1981, 1982 were released in Burnt Hill Creek. All of these are imported stocks.

General: There are too few data on the contribution to the offshore fisheries of Burnt Hill chinook salmon to indicate a trend. To evaluate the performance of the Rogue stocks released

at Burnt Hill, the recoveries should be compared with the Rogue River releases of Rogue River stocks.

Chetco

CWT data: BY 1977 to 1979 releases of hatchery fall chinook contributed heavily to the CA and OR fisheries. Limited data is available for the recovery of 4- and 5-year olds. OR contribution ranged from 54.8 to 91.5%. Based only on age 3 fish, which are thought to contribute most heavily to the fisheries, the average contribution of Chetco chinook to the OR fishery is about 72% (this estimate is high and should include differences in survival, and number of marked fish released).

Fin Mark Studies: BY 1969 to 1971 released from the Chetco support the trends observed in contribution from the CWT data. OR contribution, however, is slightly lower at about 55% while CA contribution is about 41%. 1% or less of these Chetco fish were recovered in British Columbia and Alaska fisheries.

Historical Studies: A fish tagged north of Point Arena, CA in 1948 was recovered in the Chetco River in 1948 (Fry and Hughes, 1951).

Recent Releases: Fall chinook of BY's 80 to 83 were released from Chetco River.

General: The Chetco fall chinook tend to contribute heavily to the local fisheries. This is supported by the early tagging and fin mark studies.

Coos Bay

CWT data: No easily discernible trends are apparent; generally, Coos Bay chinook are caught in CA, OR, and WA fisheries.

Native coastal fall chinook from BY 78 contributed heavily to the CA fishery (100%), but the number of observations is limited and there is no information for age 5 returns. BY 80 showed a slightly more northern contribution (OR and WA), but data are sporadic (only half of the information for age 3 exists).

Anadromous-hatchery fall chinook (Alsea and Trask stock) tended to contribute to the OR fishery, but some go north to Alaska--no CA contribution was recorded (catch pre-83).

Anadromous-hatchery spring chinook (Rogue stock) contribute heavily to the OR fishery.

No fin mark information exists except for transplants.

Historical observations: 1925 tagging study of Hippa Island (Queen Charlotte Group) tagged 4 fish which were recovered 60-94 days later in Coos Bay. 1 Coos Bay fish was tagged off Coos Bay and

returned to the Coos River 10 days later. Nothing much can be said about this observation.

Recent releases: BY 81 and BY 83 were released.

General: Limited information prevents the emergence of any readily apparent trends. Native fall chinook seem to contribute to the local fisheries but this cannot be substantiated by the present information base. Anadromous spring chinook (Rogue stock) contribute heavily to the Oregon offshore fishery. Anadromous fall chinook contribute primarily to the northern fisheries.

Coquille River

No CWT data are available for Coquille stock contribution.

No fin mark data are available except for transplants.

No historical observations exist.

Recent releases: BY 83 fall and spring chinook were released (need returns before speculations about contribution can be made).

General: No information is available on the offshore contribution of Coquille chinook.

Elk River

CWT data: In general, Elk River fish go to OR and BC, but large variations exist in contribution between broods and year classes.

Coastal hatchery fall chinook released from the Elk River tended to contribute more to the OR fishery than to any other fishery, although British Columbia takes a significant portion of the catch. This is based on estimated recoveries of age 3 and 4 fish from BY 77-79. Only three BY 79 releases have data for 3 year olds; these data are in accord with the trend previously noted. Elk River fish are also caught by the CA, WA, and Alaska fisheries but to a lesser extent (except for several instances were WA catch was high).

BY 73 releases were caught mostly by the OR fishery, but WA and BC were also very important.

BY 74 releases (2) also supported the OR contribution trend, but BC, AK, and WA contributions were also important; some contribution to the CA fishery was made by 4 year olds.

Fin mark information: Fall chinook data indicated a wide dispersal, but contribution was predominantly to OR fishery.

BY 67 had very few recoveries (4 fish).

BY 68-69 contributed heavily to the OR fishery. Some went to WA and CA fishery.

BY 70-72 contributed primarily to OR fishery, but less so than in previous years. OR took about 42-56% of the catch, WA took about 25%, while BC (14%), AK (5%), and CA (10%) also took fish from the Elk River.

No historical observations were found.

Recent releases: BY 80-83 hatchery fall chinook were released from the Elk River.

General: Elk fall chinook are caught in both the Northern and local fisheries. However, it is believed that this stock is predominantly northward migrating and that the contribution estimates contain a bias due to the extended fishery that operates off the Elk River. This is supported by the observation that most of the Elk fish that contribute to the local fishery are caught late in the season when the extended fishery is operating (J. Nicholas, pers. comm.).

Nehalem River

No CWT data were found.

No fin mark data were found.

Historical observations: 1925 tagging study off Hippa Island, Queen Charlotte's Group tagged a fish which was recovered in the Nehalem River 79 days later (Williamson, 1927; Williamson, 1929). Henry (1964) noted the straying of Tillamook tagged fish to Nehalem.

No recent releases were made.

General: No information on contribution is available except for one historical observation from Queen Charlotte Islands.

Nestucca River (Cedar Creek Hatchery)

CWT data: Fall BY 77 to 80 (Trask stock) indicated that contribution of this stock is to the northern fisheries (predominantly BC and AK). Some fish recovered in CA but none in OR and WA. Data for 1983-4 are missing.

Spring BY 77 to 80 (Trask stock) showed widespread contribution (large standard deviations between release information exists). Contribution is more or less even between OR, WA, BC, AK fisheries (less so to CA fishery). OR

contribution is about 30%, but varies widely.

Fin mark information: Spring chinook have a different contribution pattern than fall chinook.

BY 67 and 68 contributed to CA, WA, and OR fisheries with OR contribution at about 30%.

Historical observations: 1925 tagging study off Hippa Island, Queen Charlotte Group, tagged a fish which was recovered in the Nestucca River 132 days later.

Recent releases: BY 81 hatchery fall and spring chinook were released.

General: Nestucca fall chinook tend to contribute heavily to the northern fisheries whereas the spring chinook show a more scattered distribution in the fisheries, although their contribution is still primarily northern.

Rogue River (and Applegate)

CWT data: Hatchery spring chinook were released in the Rogue with BY 77 to 80 contributing heavily to the OR and CA fisheries (about 50% each). Mostly age 4 fish were caught. Although data are incomplete (missing 83 and 84), no recoveries were made in BC or AK fisheries.

Fall native chinook released in the Rogue with BY 78 to 80 showing a similar contribution pattern as spring (about 50% each to CA and OR fisheries). Data are incomplete for 83 and 84.

Fall native chinook released in Applegate--only BY 77--contributed to CA and OR, but not enough information was gathered to discern a trend.

Hatchery spring chinook from Cole Rivers Hatchery of BY 75 also showed a southern contribution (OR and CA heavily favored). A few fish went to WA. Study was for Vibrio, but control groups indicated that contribution was primarily OR and CA.

Fin mark information: Data indicate primarily a CA contribution, but some shift in this trend is noted after BY 65. OR and northern contribution increased at this time.

Spring chinook of BY 58 to 65 contributed very heavily to the CA fishery (about 85%). Contribution to the OR fishery was generally less than 10%. Relatively few fish were also caught in WA and BC. However, there was no sampling in northern areas in early years and the estimates are highly dependent on fishing seasons and sampling rates.

Spring chinook of BY 66 to 72 contributed very heavily to the CA fishery but to a lesser extent than the earlier years (about 48%). OR contribution increased substantially (to 45%) at this time. BY 69 had no recoveries, and generally there were few recoveries in WA and BC.

Fall chinook (Lobster Creek) of BY 62, 64, and 65 contributed very heavily to the CA fishery (about 75%). Contribution to the OR

fishery was greater than spring chinook during this time (about 20%).

Fall chinook (Lobster Creek) of BY 66 to 70 contributed heavily to the CA fishery, but to a lesser extent than the previous years. During years of poor survival (e.g. BY 67 and 68), contribution to OR fishery was generally higher (38%). Also, there was an increased contribution to the northern fisheries.

Historical observations: In the CA tagging study from 1942 to 1950, 5 fish were tagged north of Point Arena and later returned to the Rogue River.

Recent Releases (including Applegate): Hatchery spring of BY 81 and native fall of BY 81, 82, and 83 were released.

General: Rogue spring and fall chinook appear to contribute heavily to the local and southern fisheries. This is supported by early tagging and marking studies.

Salmon River

CWT data: Native fall chinook releases of BY 76 to 79 (2 releases per year) contributed primarily to the northern fisheries (BC and AK). Some fish from all age classes were caught in the CA, OR, and WA fisheries but in relatively few numbers.

No fin mark information exists.

No historical observations were found.

Recent releases: Two releases of BY 80 hatchery fall chinook were made. Hatchery fall chinook of BY 82 and 83 (1 release each) were also released.

General: Data are limited but there is an indication that the native fall chinook contribute to the northern fisheries.

Siletz River

No CWT data were found.

No fin mark information was found.

Historical observations: Tagging study off of Hippa Island, Queen Charlotte Group in 1925 tagged a fish that was recovered 99 days later in the Siletz River.

No recent releases were found.

General: Insufficient information to evaluate Siletz chinook contribution to the offshore fisheries. One historical observation was made off Hippa Island, Queen Charlotte Islands.

Siuslaw Bay

CWT data: Native fall chinook of BY 78, 79, and 80 were released but too little data exist to indicate a trend. BY 78 contributed primarily to the northern fisheries (BC and AK). Age 3 information for BY 79 and 80 showed a more widespread contribution (including OR and WA, but no CA fish).

DOMSEA fall chinook of BY 78 and 79 had few returns--OR and AK recoveries were greatest.

No fin mark information was found.

No historical observations were found.

Recent releases: BY 81 was released.

General: Insufficient data to analyze for a trend. Native fall chinook appear to be caught in the nothern fisheries (BC and AK).

Sixes River

No CWT data were found.

Fin mark information: Wild fall chinook of BY 66 and 67 contributed primarily to northern fisheries (WA and BC), but in one release with good survival some (19%) were caught in the CA fishery.

Historical observations: A non-definitive recovery off Port Orford was recorded by Van Hyning (1951) of a fish tagged July 27, 1948 and recovered October 24, 1948 in the sport fishery.

No recent releases were found.

General: Insufficient information to analze for trends.

Tillamook Bay (including Trask and Wilson Rivers)

CWT data: Spring chinook (Trask stock released in Trask River) of

BY 77 to 79 contributed primarily to northern fisheries with most fish caught in BC. Relatively few CA and OR recoveries (less than 6%) were made. Both age 3 and 4 fish contributed heavily, while escapement was mostly comprised of age 4 and 5 fish (data not yet available for 83 and 84).

BY 74 contributed heavily to AK fishery, although some went to WA (few to the Columbia River). 4 year old fish were the heavy contributors.

Fin mark information: BY 67 released at Cape Meares Lake (Columbia River stock) contributed primarily to the WA fishery (BC and AK contributions not reported). Some fish were caught in CA and OR fisheries (CA sport and OR troll).

Fall chinook of BY 69 released at Cape Meares Lake (Columbia River stock) contributed mostly to WA fishery and moderately to the OR fishery (about 23%).

Fall chinook of BY 70 released in Trask River contributed heavily to AK fishery and some to WA fishery (no recoveries were made in CA or OR).

Fall chinook of By 73 released in Trask River contributed only to Northern fisheries (especially 4 year olds).

Historical observations: From 1925 tagging study off Hippa Island, Queen Charlotte Group, 1 fish was recovered in Tillamook Bay (Williamson 1927, Williamson 1929).
Bergman (1963) noted the Tillamook recovery of a fish tagged in 1959-60 study off Gray's Harbor.
Bergman (1963) also noted a Wilson River recovery of a fish tagged in 1961 between the Columbia River and Tillamook Bay.
Henry (1964) noted the straying of Tillamook tagged fish to Alsea and Nehalem.

Recent releases: Four releases each of BY 82 and 83 Trask Hatchery Fall chinook were made. One release each of BY 80 and 81 Trask Hatchery Spring chinook were made. Spring chinook of BY 82 and 83 were released in Trask River and McGuire Reservior.

General: Both the spring and fall chinook from the Tillamook system (Trask stock) tend to contribute heavily to the northern fisheries.

Umpqua River

CWT data: Hatchery spring chinook of BY 77 to 80 contributed substantially to all fisheries except AK. Most of the fish were caught in the OR fishery (39-89%), but variations between year classes, and within years (e.g. 2 releases of BY 78 differed) exist. The 3 year old fish contributed most heavily to the fisheries; four-year old spring chinook enter the river before the fishery begins.

Fin mark information: BY 65, 66, 68, 70, and 71 contributed between 34 and 60% to the OR fishery. Recoveries were spread from CA to BC (no AK) and varied according to year. Only in BY 69 were recoveries from CA (50%) greater than those from the OR (9%) fishery. Survival was moderate for all years except BY 65 (when BC catch was high--about 34%--and CA catch was zero).

Spring chinook of BY 58 to 72 were fin clipped and returns indicate that the spring chinook tended to contribute evenly to the CA, OR, and WA fisheries. The contribution to the OR fisheries was greater than to CA and WA overall but varied considerably from year to year (17 to 70%). Also, the percentage contribution of spring chinook to the OR fishery was less than that of fall chinook. BC and AK reported only a few recoveries. Survival to catch and escapement for most years was exceptionally high (0.65 to 14.03%). BY 72 and 73 control groups from Vibrio study contributed most heavily to the OR fishery, especially 3 year olds. Some fish (but not many) were caught up north. BY 74, 75 and 76 catch are incomplete and fin mark recovery was being phased out.

Historical observations do not support trends observed from recent studies. Because the race (e.g. spring or fall) of the recoveries was not reported, it is possible that the northern migrating fish were fall chinook. From 1925 tagging study off Hippa Island, Queen Charlotte's Group, 2 fish were recovered in the Umpqua (Williamson 1927, Williamson 1929). From 1959-60 tagging off Gray's Harbor, 1 fish was recovered in Umpqua (PMFC 13 and 15th annual reports).

Recent releases: Two releases each of BY 81 and BY 82 hatchery spring chinook were made. Hatchery spring chinook of BY 83 (1 release) were released.

General: Umpqua spring chinook tend to contribute heavily to the local and southern offshore fisheries. The fin mark studies support this statement but the historical studies do not. However, the early studies may have caught Umpqua fall chinook, which are believed to be more northerly migrating than the spring chinook.

Yaquina Bay

CWT data: Native Yaquina fall chinook from BY 77 and 78 contributed heavily to the northern fisheries (few to OR, none to CA and WA). Age 3 fish contributed heavily to the fishery.

OreAqua fall chinook of BY 77 to 80 released in Yaquina contributed primarily to the AK fishery, but some were caught in OR and WA (none in CA).

OreAqua spring chinook of BY 77, 78, and 80 released in Yaquina contributed to the OR and WA fisheries; however, returns were so low in most cases that trends were not easily discerned. The spring chinook were Trask stock that generally migrate north.

No fin mark information was found.

No historical observations were found.

No recent releases were found.

General: Yaquina fall chinook tend to contribute to the northern fisheries (Native and OAF stocks). Because of poor survival, limited information is available on OAF Yaquina spring stocks. From 1982 to 1985, the production stock has been OAF fall chinook. In 1980 and 1981, Trask and OAF stock were released; the 1980 release was a cross. Yaquina native fall chinook were released in 1979 and a University of Washington stock was released in 1978. According to Ratti (pers. comm.), the performance of the Yaquina stock was superior to the other stocks; the OAF brood stock partially is comprised of the native stock.

APPENDIX A-6.

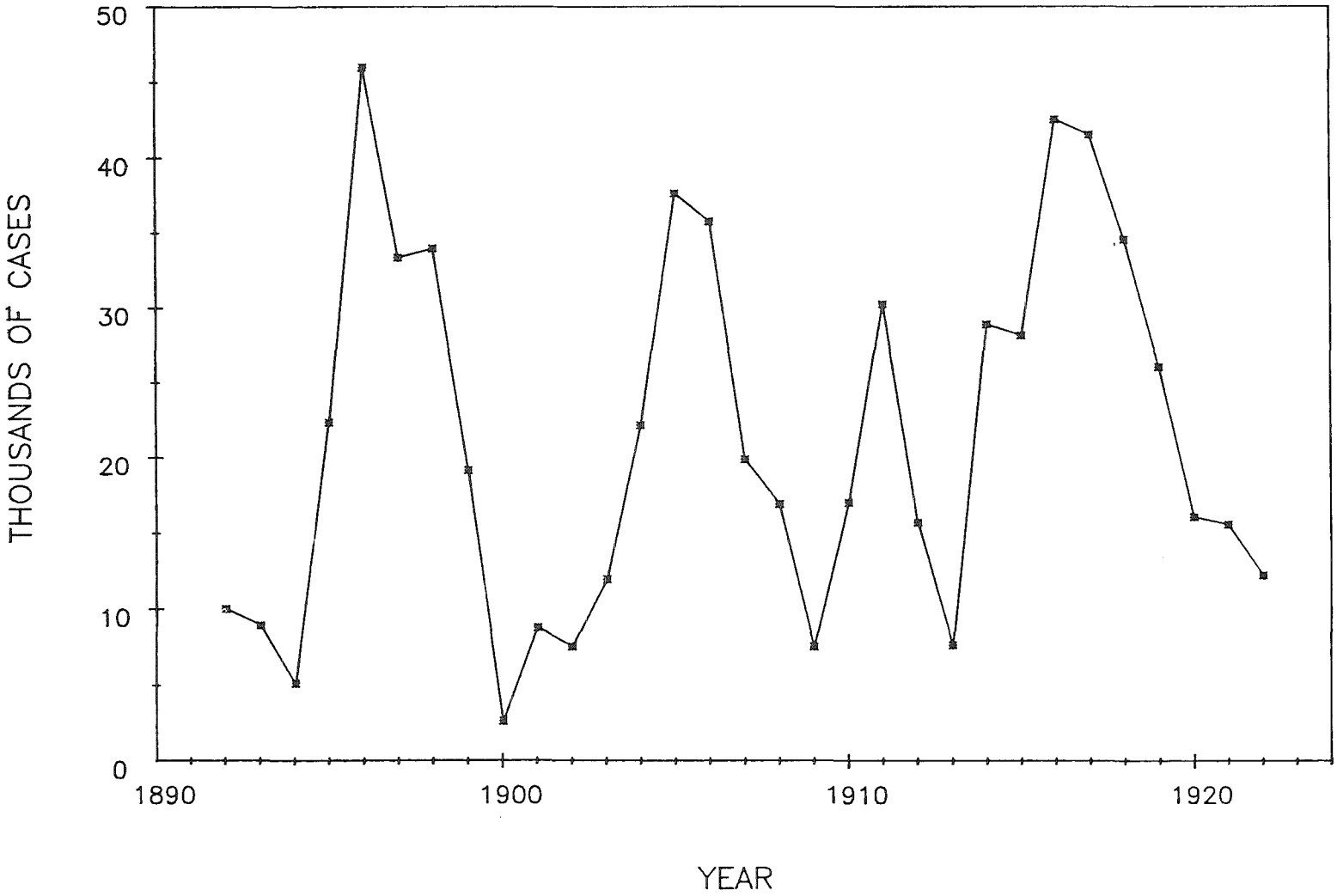
Historical estimates of the commercial harvest of chinook salmon in Oregon. [1]

From: Mullen, R. , unpublished.

1/ The following figures and tables are based on preliminary estimates and are subject to change.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON OREGON COASTAL RIVERS, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	10,000	680	30
1893	8,929	607	27
1894	5,036	342	15
1895	22,328	1,518	67
1896	45,967	3,126	138
1897	33,349	2,268	100
1898	33,971	2,310	102
1899	19,130	1,301	58
1900	2,636	179	8
1901	8,826	600	27
1902	7,572	515	23
1903	12,008	817	36
1904	22,183	1,508	67
1905	37,700	2,564	113
1906	35,823	2,436	108
1907	19,910	1,354	60
1908	16,954	1,153	51
1909	7,562	514	23
1910	17,108	1,163	51
1911	30,326	2,062	91
1912	15,773	1,073	47
1913	7,668	521	23
1914	28,957	1,969	87
1915	28,216	1,919	85
1916	42,573	2,895	128
1917	41,533	2,824	125
1918	34,586	2,352	104
1919	26,069	1,773	78
1920	16,115	1,096	48
1921	15,632	1,063	47
1922	12,270	834	37



CASES OF CHINOOK SALMON CANNED ON OREGON COASTAL RIVERS, 1892–1922.

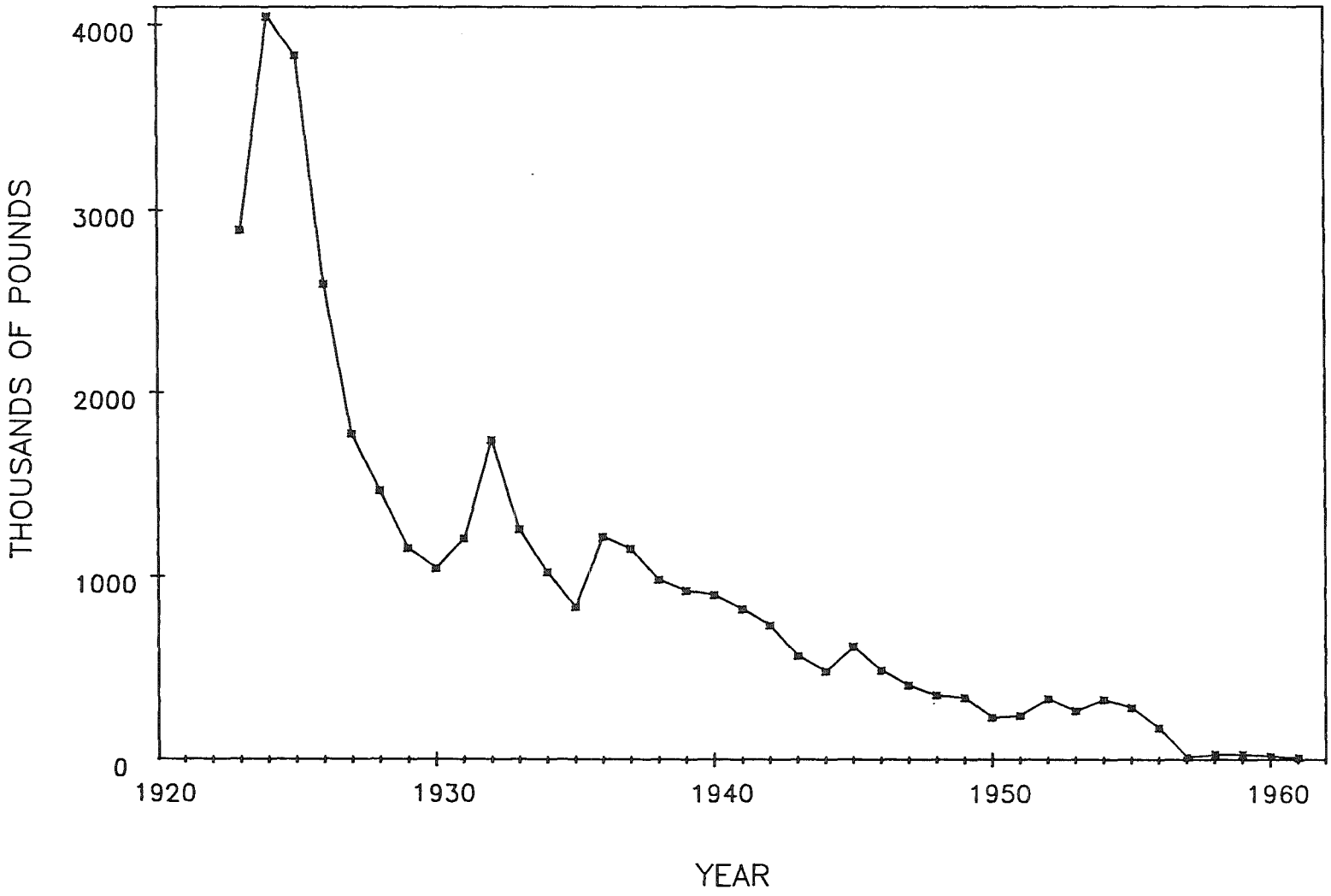
POUNDS (ROUND) OF CHINOOK SALMON LANDED ON OREGON COASTAL RIVERS, SOUTH OF THE COLUMBIA RIVER, BY MONTH, 1923-1961.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	204,486	544,190	246,027	402,073	818,636	326,939	65,582	345	2,889,893
1924	63	---	---	---	103,557	266,819	337,265	1067,748	1100,959	631,660	113,654	1,107	4,044,421
1925	217	1,093	14,988	35,260	57,328	243,441	416,596	1126,299	1227,592	621,736	83,091	7,926	3,835,567
1926	5,876	921	18,748	36,659	66,433	220,756	356,609	626,942	732,729	462,985	63,462	2,073	2,594,193
1927	1,424	648	6,286	16,536	71,600	219,641	285,169	274,322	624,065	244,995	25,103	418	1,770,207
1928	333	---	140	26,800	129,439	126,479	120,434	258,637	386,390	334,097	76,857	3,385	1,462,991
1929	1,100	3,007	10,419	18,915	95,432	142,107	81,521	185,793	402,129	180,184	28,468	2,221	1,151,296
1930	---	7,077	---	13,776	115,331	134,227	65,797	157,022	305,395	225,773	17,147	390	1,041,935
1931	1,213	5,002	---	4,527	70,832	101,125	94,073	197,046	374,987	302,078	46,483	5,992	1,203,358
1932	6,976	7,968	9,007	20,831	169,836	260,451	226,476	322,267	397,608	294,190	23,417	959	1,739,986
1933	41	6,328	3,737	13,415	185,753	229,720	254,826	125,242	251,028	161,576	15,827	6,619	1,254,112
1934	4,577	2,433	5,429	268	99,875	184,363	173,513	203,495	211,965	123,684	8,067	3,323	1,020,992
1935	6,657	1,479	2,475	10,345	77,200	92,053	111,307	128,572	246,035	136,732	15,616	1,599	830,070
1936	2,317	3,400	2,053	14,569	39,836	46,904	90,586	153,221	468,271	359,479	30,069	1,947	1,212,652
1937	699	381	2,180	30,540	35,082	59,395	66,502	139,026	359,785	433,956	19,380	341	1,148,593
1938	497	1,741	1,114	10,971	5,381	46,414	51,231	146,634	375,814	299,403	36,653	1,323	981,564
1939	481	2,234	1,553	8,996	33,912	69,175	57,309	83,370	271,661	337,521	48,893	1,561	920,391
1940	640	1,894	225	4,229	41,573	72,638	92,876	139,478	285,719	231,938	16,310	944	898,012
1941	840	1,256	451	7,024	49,639	57,355	72,103	137,036	264,468	199,084	19,687	1,187	822,066
1942	558	944	---	7,229	36,512	25,820	18,168	66,860	204,567	315,299	39,817	1,433	733,221
1943	561	2,945	350	4,783	20,157	20,033	7,038	29,855	184,870	263,810	23,785	2,709	568,906
1944	1,751	4,694	668	5,271	13,220	9,817	8,090	15,341	172,258	224,310	23,328	1,401	484,347
1945	62	2,337	---	136	5,956	3,549	4,897	13,839	226,288	315,630	42,759	1,263	619,312
1946	5,072	1,337	673	788	4,194	2,333	3,474	12,496	142,489	270,303	37,279	1,774	487,925
1947	---	---	---	---	3,103	1,936	1,768	15,700	159,436	199,069	23,568	1,136	405,716
1948	---	---	---	---	55	13	---	3,653	165,385	153,927	27,461	1,065	351,559
1949	---	---	---	---	25	---	---	4,025	127,465	178,381	27,344	756	337,996
1950	---	---	---	---	---	---	---	1,225	96,612	98,750	27,732	4,886	229,205
1951	---	---	---	---	---	---	---	2,183	90,827	113,324	31,560	3,476	241,370
1952	---	---	---	---	---	---	---	6,404	104,211	145,653	73,497	3,491	333,256
1953	---	---	---	---	---	---	---	9,634	114,258	109,912	31,694	758	266,256

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	14,638	156,730	129,137	27,907	1,544	329,956
1955	---	---	---	---	---	---	---	9,991	133,669	114,088	23,915	1,434	283,097
1956	---	---	---	---	---	---	---	8,884	93,437	56,556	13,305	1,679	173,861
1957	---	---	---	---	---	---	---	---	---	---	13,021	---	13,021
1958	---	---	---	---	---	---	---	---	---	---	29,003	---	29,003
1959	---	---	---	---	---	---	---	---	---	---	28,542	---	28,542
1960	---	---	---	---	---	---	---	---	---	---	16,940	---	16,940
1961	---	---	---	---	---	---	---	---	---	---	9,814	---	9,814

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON OREGON COASTAL RIVERS, SOUTH OF THE COLUMBIA RIVER, 1923-1961.

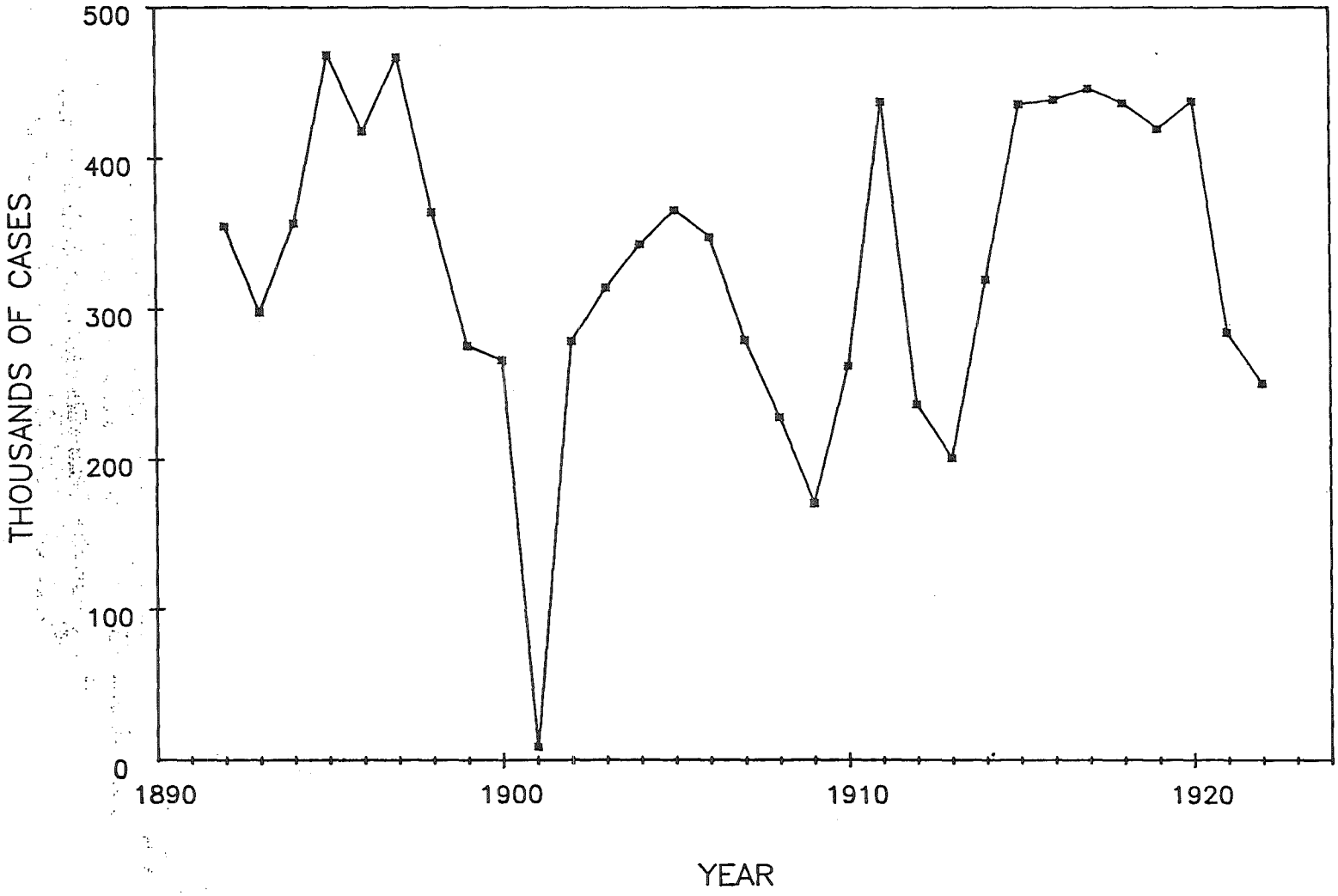
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	2,889,893	128
1924	4,044,421	179
1925	3.835,567	170
1926	2,594,193	115
1927	1,770,207	78
1928	1,462,991	65
1929	1,151,296	51
1930	1,041,935	46
1931	1,203,358	53
1932	1,739,986	77
1933	1,254,112	55
1934	1,020,992	45
1935	830,070	37
1936	1,212,652	54
1937	1,148,593	51
1938	981,564	43
1939	920,391	41
1940	898,012	40
1941	822,066	36
1942	733,221	32
1943	568,906	25
1944	484,347	21
1945	619,312	27
1946	487,925	22
1947	405,716	18
1948	351,559	16
1949	337,996	15
1950	229,205	10
1951	241,370	11
1952	333,256	15
1953	266,256	12
1954	329,956	15
1955	283,097	13
1956	173,861	8
1957	13,021	1
1958	29,003	1
1959	28,542	1
1960	16,940	1
1961	9,814	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON OREGON COASTAL RIVERS, 1923–1961.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED IN OREGON, 1892-1922.

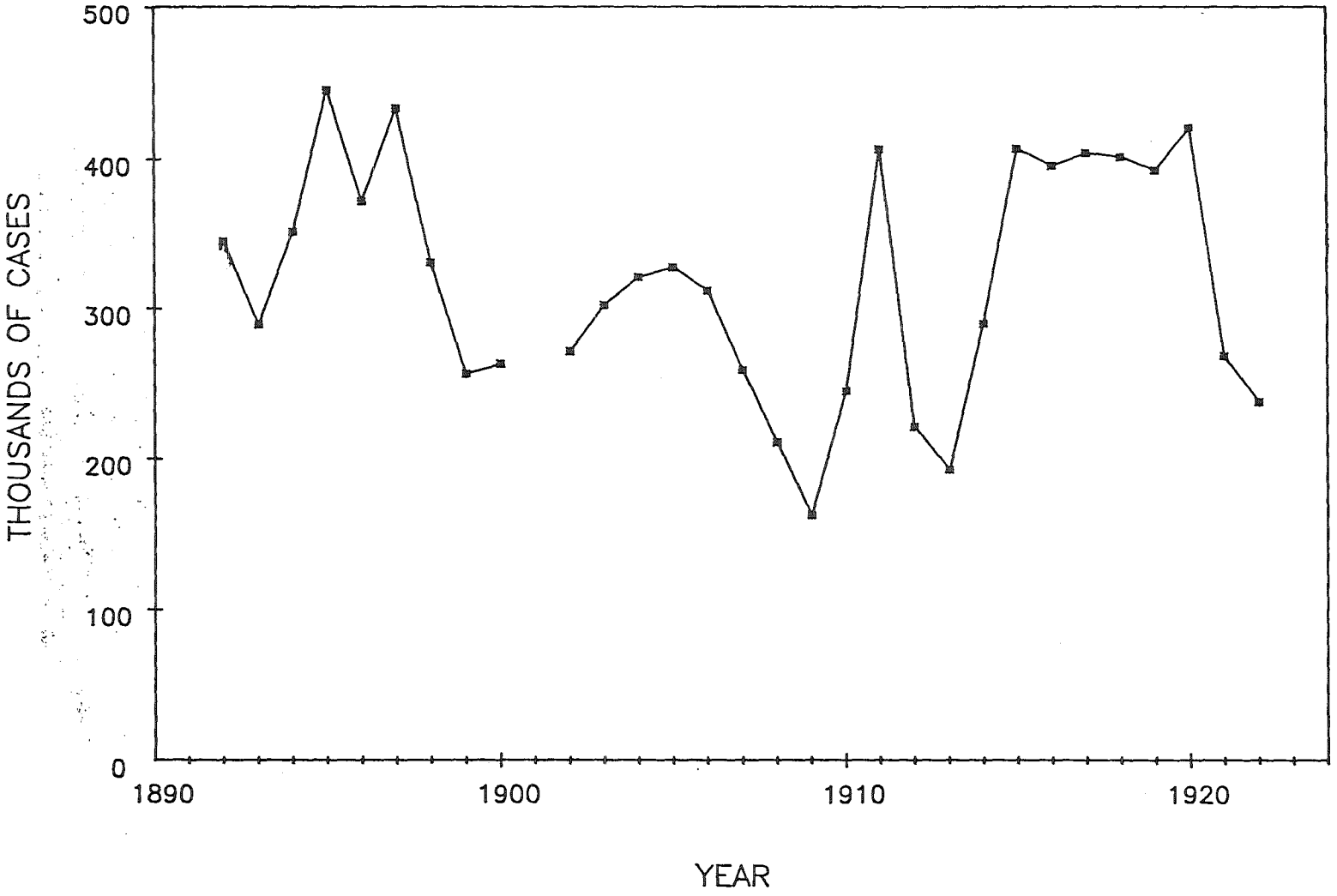
YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	354,267	24,090	1,292
1893	297,702	20,244	1,086
1894	356,142	24,217	1,302
1895	467,237	31,771	1,698
1896	416,910	28,350	1,498
1897	466,102	32,135	1,710
1898	363,537	25,490	1,352
1899	274,954	20,072	1,070
1900	265,028	19,424	1,045
1901	8,826	600	27
1902	278,152	23,549	1,265
1903	313,770	28,734	1,541
1904	342,561	33,291	1,780
1905	364,806	35,593	1,894
1906	347,157	32,406	1,724
1907	278,343	25,604	1,367
1908	227,050	20,896	1,115
1909	169,693	17,633	946
1910	261,393	26,489	1,416
1911	436,188	38,664	2,064
1912	236,090	22,461	1,200
1913	199,784	19,905	1,068
1914	318,421	27,378	1,457
1915	434,702	34,046	1,817
1916	437,739	34,888	1,853
1917	445,170	32,346	1,716
1918	435,538	31,601	1,681
1919	418,194	32,098	1,713
1920	436,582	32,190	1,724
1921	283,484	22,615	1,209
1922	249,500	18,749	1,003



CASES OF CHINOOK SALMON CANNED ON OREGON RIVERS, 1892–1922.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE COLUMBIA RIVER, 1892-1922.

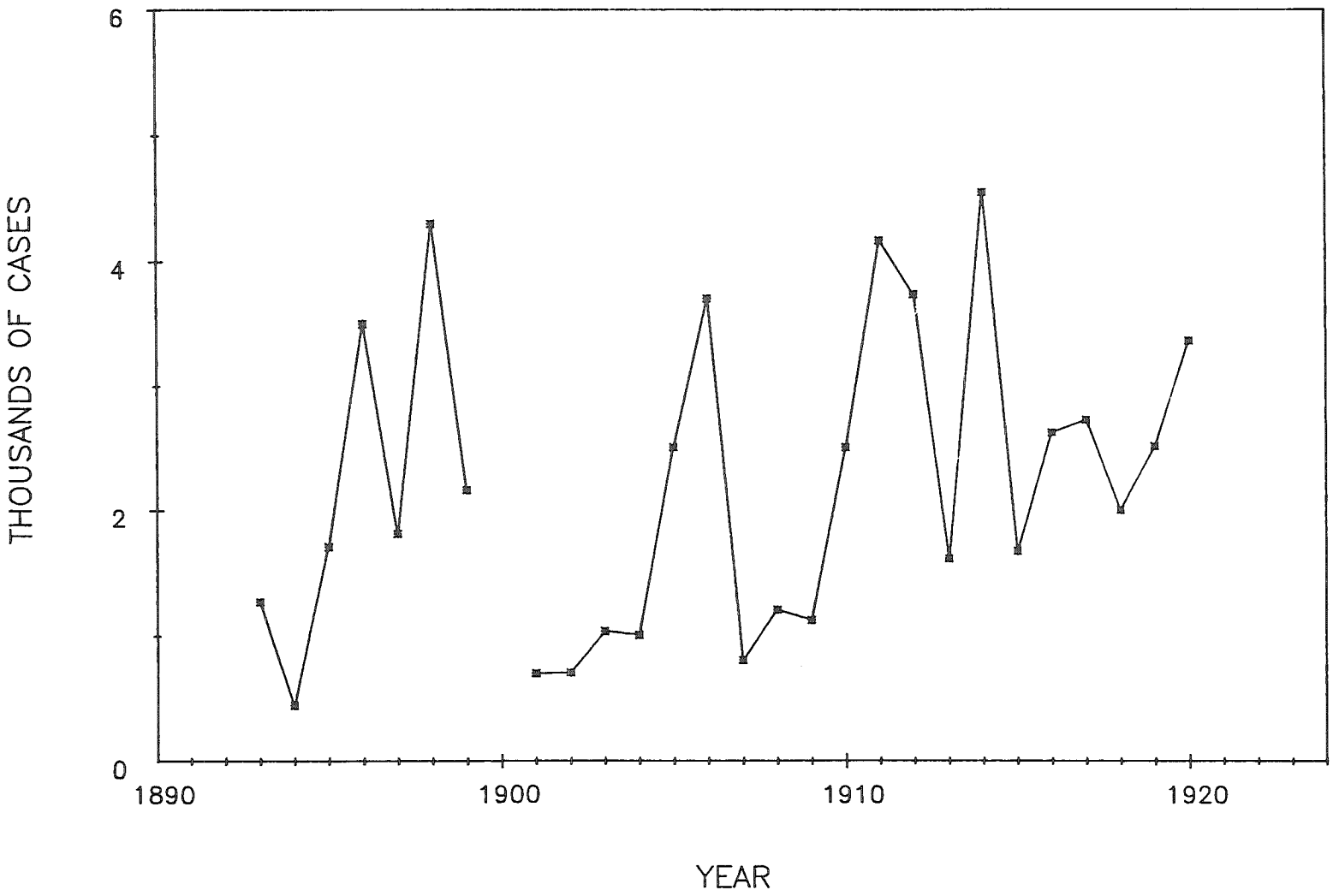
YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	344,267	23,410	1,262
1893	288,773	19,637	1,059
1894	351,106	23,875	1,287
1895	444,909	30,253	1,631
1896	370,943	25,224	1,360
1897	432,753	29,867	1,610
1898	329,566	23,180	1,250
1899	255,824	18,771	1,012
1900	262,392	19,245	1,037
1901	---	---	---
1902	270,580	23,034	1,242
1903	301,762	27,917	1,505
1904	320,378	31,783	1,713
1905	327,106	33,029	1,781
1906	311,334	29,970	1,616
1907	258,433	24,250	1,307
1908	210,096	19,743	1,064
1909	162,131	17,119	923
1910	244,285	25,326	1,365
1911	405,862	36,602	1,973
1912	220,317	21,388	1,153
1913	192,116	19,384	1,045
1914	289,464	25,409	1,370
1915	406,486	32,127	1,732
1916	395,166	31,993	1,725
1917	403,637	29,522	1,591
1918	400,952	29,249	1,577
1919	392,125	30,325	1,635
1920	420,467	31,094	1,676
1921	267,852	21,552	1,162
1922	237,230	17,915	966



CASES OF CHINOOK SALMON CANNED ON THE COLUMBIA RIVER, 1892–1922.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE ALSEA RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	1,260	86	4
1894	440	30	1
1895	1,700	116	5
1896	3,500	238	11
1897	1,800	122	5
1898	4,296	292	13
1899	2,150	146	6
1900	---	---	---
1901	695	47	2
1902	701	48	2
1903	1,031	70	3
1904	1,000	68	3
1905	2,500	170	8
1906	3,702	252	11
1907	800	54	2
1908	1,200	82	4
1909	1,119	76	3
1910	2,500	170	8
1911	4,161	283	13
1912	3,731	254	11
1913	1,607	109	5
1914	4,546	309	14
1915	1,668	113	5
1916	2,624	178	8
1917	2,727	185	8
1918	2,000	136	6
1919	2,512	171	8
1920	3,367	229	10
1921	---	---	---
1922	---	---	---



CASES OF CHINOOK SALMON CANNED ON THE ALSEA RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE ALSEA RIVER, BY MONTH, 1923-1956.

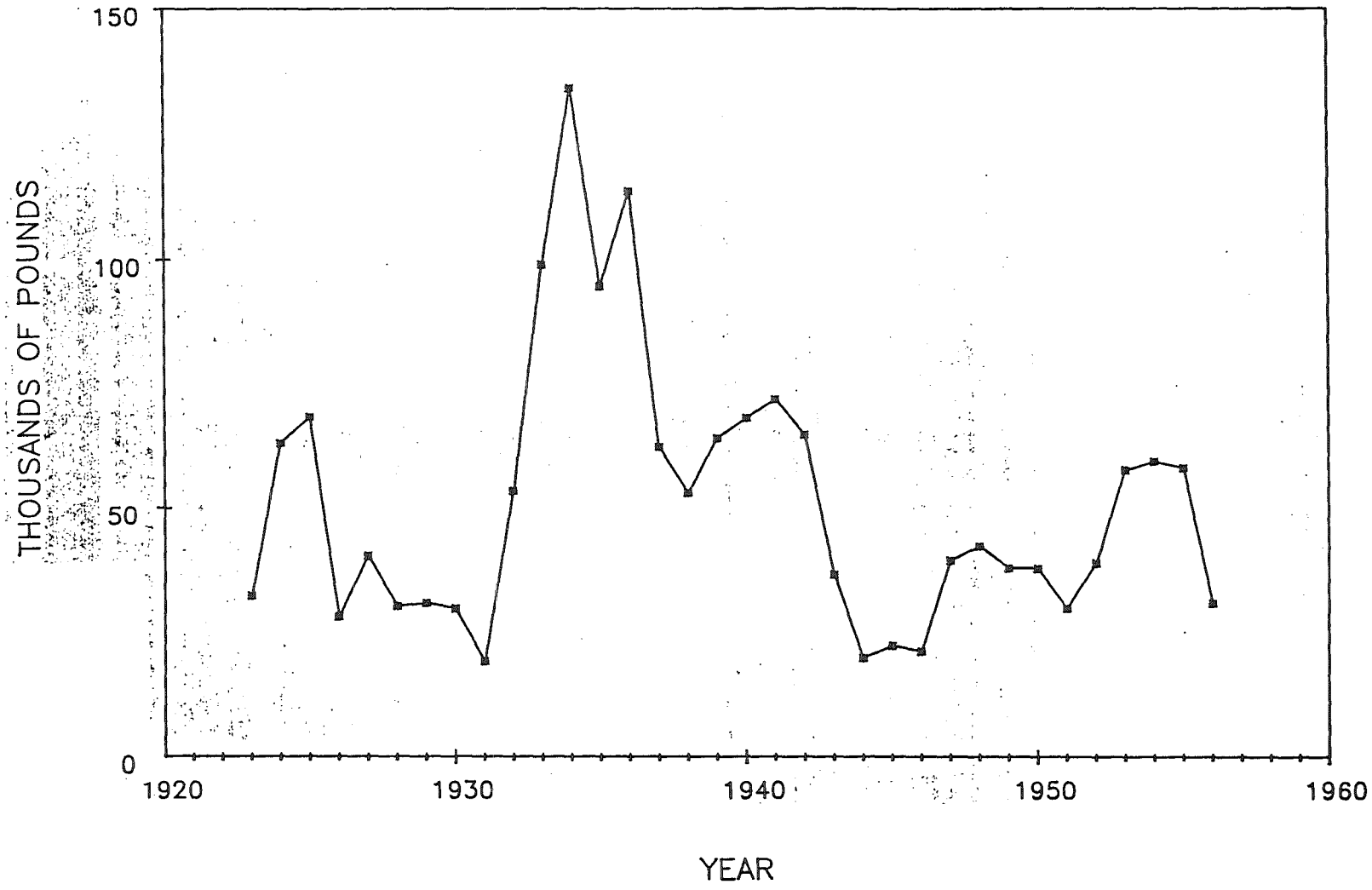
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	25,706	---	---	2,901	3,015	603	---	32,225
1924	---	---	---	---	6,116	29,053	---	---	13,616	13,747	584	---	63,116
1925	---	---	---	---	7,381	18,651	11,000	---	12,222	16,438	2,782	20	68,494
1926	---	---	---	---	1,158	8,651	8,012	---	2,090	6,527	1,481	94	28,013
1927	---	---	---	---	198	11,928	18,787	---	4,918	4,014	499	---	40,344
1928	60	---	---	---	403	9,385	13,032	---	1,551	3,247	2,500	27	30,205
1929	---	1,426	---	---	1,119	10,912	7,686	---	4,616	4,893	167	---	30,819
1930	---	6,924	---	---	2,362	6,587	4,037	---	3,142	6,488	168	---	29,708
1931	---	2,161	---	---	---	2,407	5,149	---	4,183	5,139	54	---	19,093
1932	---	2,134	---	---	2,622	16,740	21,115	132	3,979	5,872	1,035	---	53,629
1933	---	2,581	---	---	3,742	18,859	52,665	1,728	6,454	10,829	2,222	52	99,132
1934	979	---	---	---	12,440	23,425	52,769	29,101	6,160	8,780	374	93	134,121
1935	4,162	---	---	---	1,681	10,808	32,691	27,954	8,802	7,359	1,049	176	94,682
1936	1,735	---	---	---	1,358	7,933	32,839	27,771	17,679	20,191	4,143	---	113,649
1937	297	---	---	---	33	3,128	12,632	12,001	8,139	25,231	1,032	---	62,493
1938	65	---	---	---	382	4,819	11,033	18,103	10,329	7,031	1,270	111	53,143
1939	178	---	---	---	1,347	4,697	13,420	19,476	14,194	10,415	579	---	64,306
1940	28	---	---	---	756	4,761	15,804	27,590	11,793	6,956	340	399	68,427
1941	471	---	---	---	805	6,558	15,576	21,329	12,844	13,238	640	795	72,256
1942	200	---	---	---	172	256	8,010	13,400	14,654	18,436	9,907	---	65,035
1943	243	---	---	---	---	274	2,290	7,351	16,332	9,827	359	---	36,672
1944	1,586	---	---	---	---	---	561	1,848	10,142	5,013	704	---	19,854
1945	---	---	---	---	---	---	634	1,243	10,089	8,317	2,131	---	22,414
1946	---	---	---	---	---	---	16	735	9,506	10,683	293	---	21,233
1947	---	---	---	---	---	---	430	6,719	16,653	15,193	505	---	39,500
1948	---	---	---	---	---	---	---	---	29,750	12,121	624	---	42,495
1949	---	---	---	---	---	---	---	---	24,294	12,802	906	---	38,002
1950	---	---	---	---	---	---	---	---	25,656	12,130	176	---	37,962
1951	---	---	---	---	---	---	---	---	24,696	5,157	---	---	29,853
1952	---	---	---	---	---	---	---	---	26,003	9,453	3,564	---	39,020
1953	---	---	---	---	---	---	---	---	33,556	20,679	3,680	---	57,915

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	---	38,402	17,436	3,750	---	59,588
1955	---	---	---	---	---	---	---	---	35,342	18,734	4,206	---	58,282
1956	---	---	---	---	---	---	---	---	24,284	5,276	1,348	---	30,908

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE ALSEA RIVER, 1923-1956.

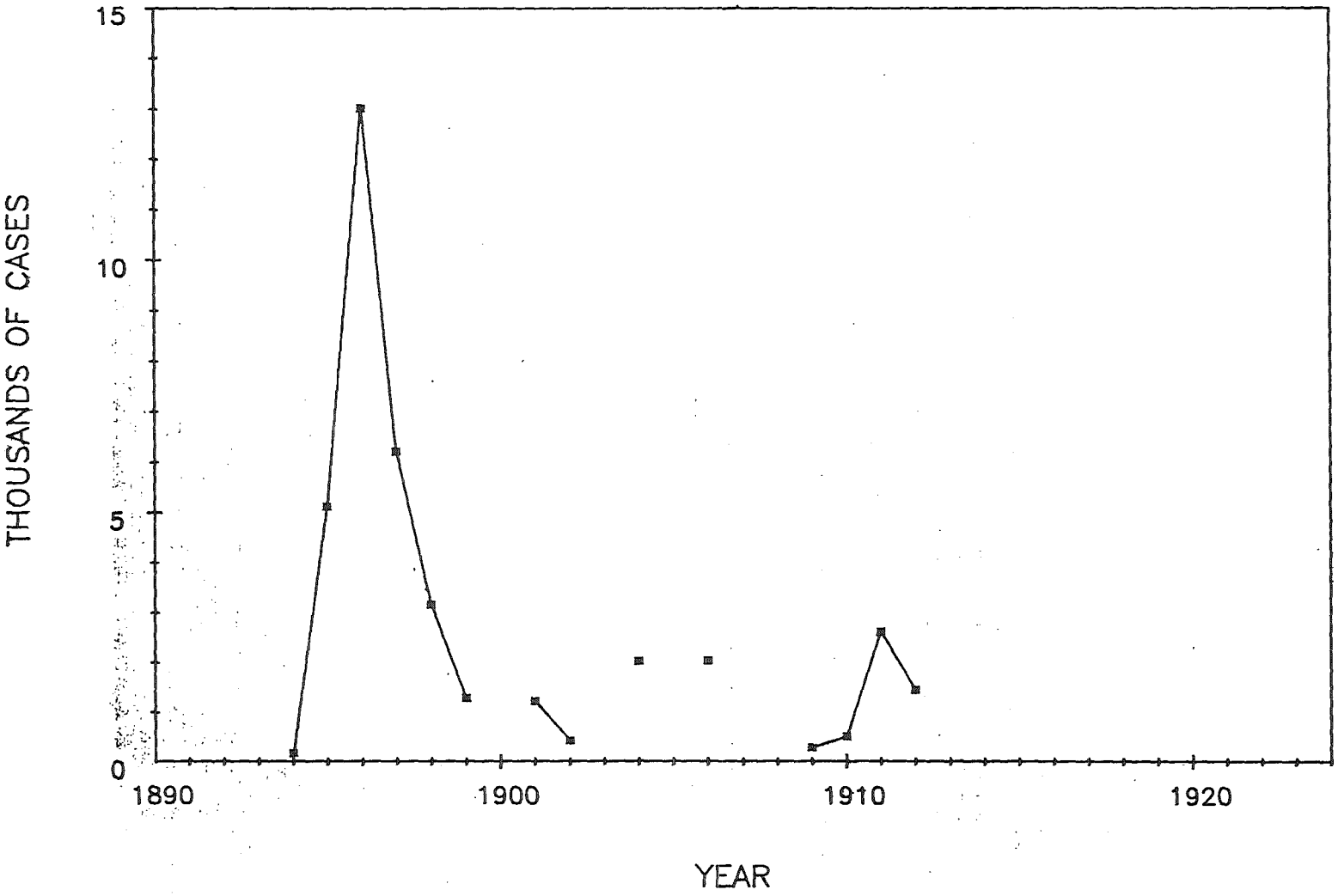
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	32,225	1
1924	63,116	3
1925	68,494	3
1926	28,013	1
1927	40,344	2
1928	30,205	1
1929	30,819	1
1930	29,708	1
1931	19,093	1
1932	53,629	2
1933	99,132	4
1934	134,121	6
1935	94,682	4
1936	113,649	5
1937	62,493	3
1938	53,143	2
1939	64,306	3
1940	68,427	3
1941	72,256	3
1942	65,035	3
1943	36,672	2
1944	19,854	1
1945	22,414	1
1946	21,233	1
1947	39,500	2
1948	42,495	2
1949	38,002	2
1950	37,962	2
1951	29,853	1
1952	39,020	2
1953	57,915	3
1954	59,588	3
1955	58,282	3
1956	30,908	1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE ALSEA RIVER, 1923–1956.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE COOS RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	---	---	---
1894	163	11	<1
1895	5,110	347	15
1896	13,000	884	39
1897	6,200	422	19
1898	3,142	214	9
1899	1,273	87	4
1900	---	---	---
1901	1,215	83	4
1902	412	28	1
1903	---	---	---
1904	2,033	138	6
1905	---	---	---
1906	2,043	139	6
1907	---	---	---
1908	---	---	---
1909	275	19	1
1910	500	34	2
1911	2,630	179	8
1912	1,457	99	4
1913	---	---	---
1914	---	---	---
1915	---	---	---
1916	---	---	---
1917	---	---	---
1918	---	---	---
1919	---	---	---
1920	---	---	---
1921	---	---	---
1922	---	---	---



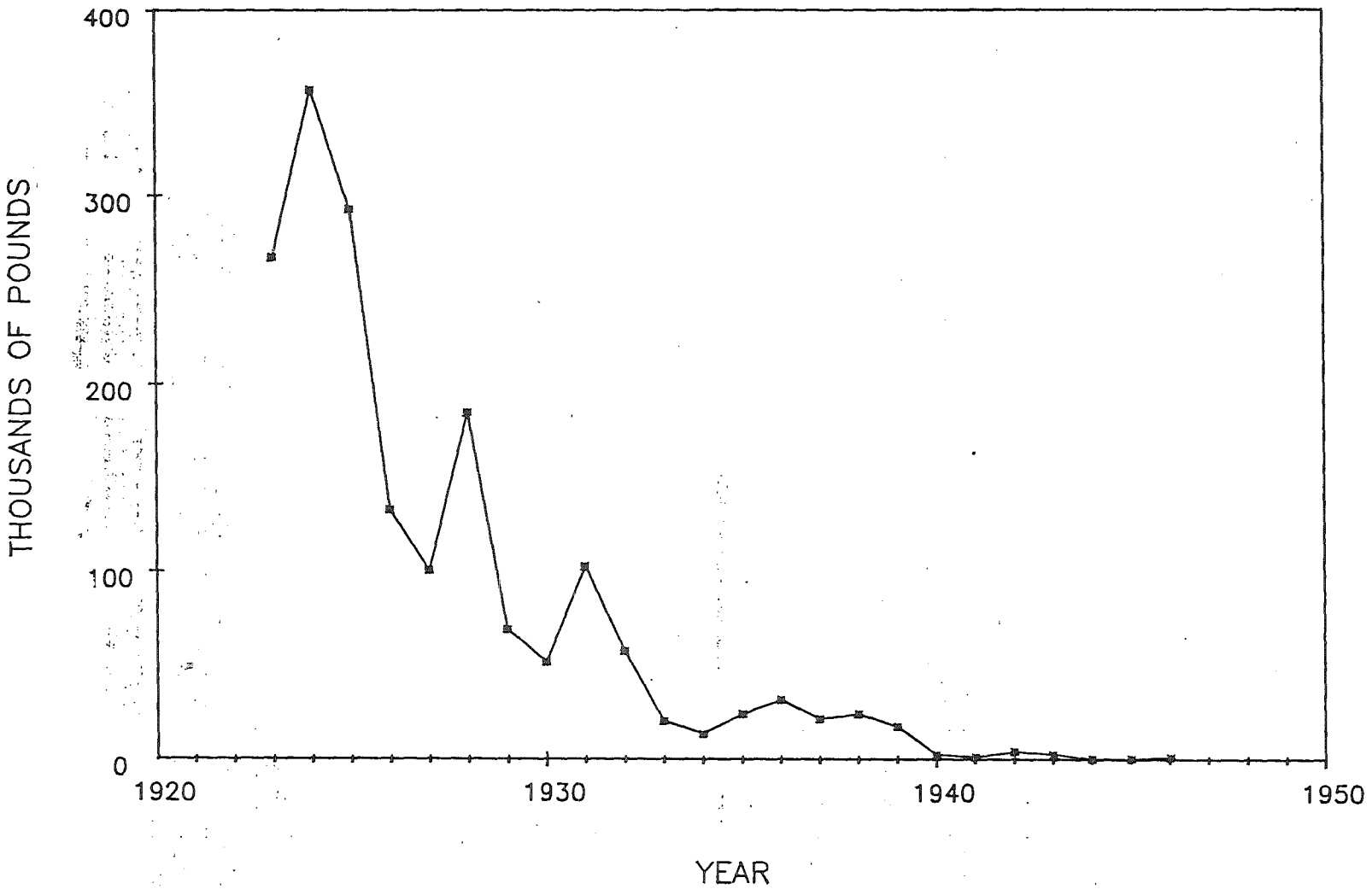
CASES OF CHINOOK SALMON CANNED ON THE COOS RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE COOS RIVER, BY MONTH, 1923-1946.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	85,058	174,365	6,533	843	---	266,799
1924	---	---	---	---	---	---	16,091	46,499	165,872	92,045	36,033	---	356,540
1925	25	---	---	---	---	177	10,847	103,711	113,613	56,992	6,330	423	292,118
1926	90	---	---	---	---	509	2,365	14,348	57,269	54,554	3,036	75	132,246
1927	1,037	---	---	---	---	68	2,670	13,408	52,642	24,581	5,710	68	100,184
1928	---	---	---	---	11,046	689	5,201	40,269	49,653	32,632	44,349	821	184,660
1929	18	---	---	---	59	330	705	6,981	37,017	21,807	642	1,114	68,673
1930	---	---	---	52	671	130	---	4,653	11,031	31,751	3,467	20	51,775
1931	---	---	---	---	116	---	1,341	6,843	8,561	56,287	29,091	50	102,289
1932	799	621	1,778	---	1,411	288	994	5,308	13,782	31,649	743	59	57,432
1933	---	---	10	---	2,447	156	2,640	2,714	4,708	5,786	1,761	---	20,222
1934	---	1,283	---	---	31	47	1,933	4,151	3,810	1,730	151	---	13,136
1935	---	---	1,689	---	1,444	1,259	1,246	6,349	10,038	1,815	213	55	24,108
1936	---	---	1,862	---	32	16	198	3,987	16,362	8,898	301	---	31,656
1937	48	---	1,664	---	61	51	135	2,117	6,814	7,451	3,101	5	21,447
1938	---	---	1,038	8	180	169	150	5,184	10,853	4,988	1,424	52	24,046
1939	---	780	1,159	224	78	81	---	2,975	5,309	4,426	2,175	---	17,207
1940	---	12	---	29	23	---	160	107	815	1,109	132	---	2,387
1941	---	---	451	---	---	---	211	---	51	455	28	---	1,196
1942	---	---	---	---	---	---	---	---	331	3,759	132	---	4,222
1943	---	---	150	---	18	---	---	1,002	368	982	136	---	2,656
1944	---	---	150	---	---	---	---	---	---	---	---	---	150
1945	28	---	---	51	---	---	---	25	---	20	---	---	124
1946	---	---	---	---	38	---	---	---	855	---	---	---	893

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE COOS RIVER, 1923-1946.

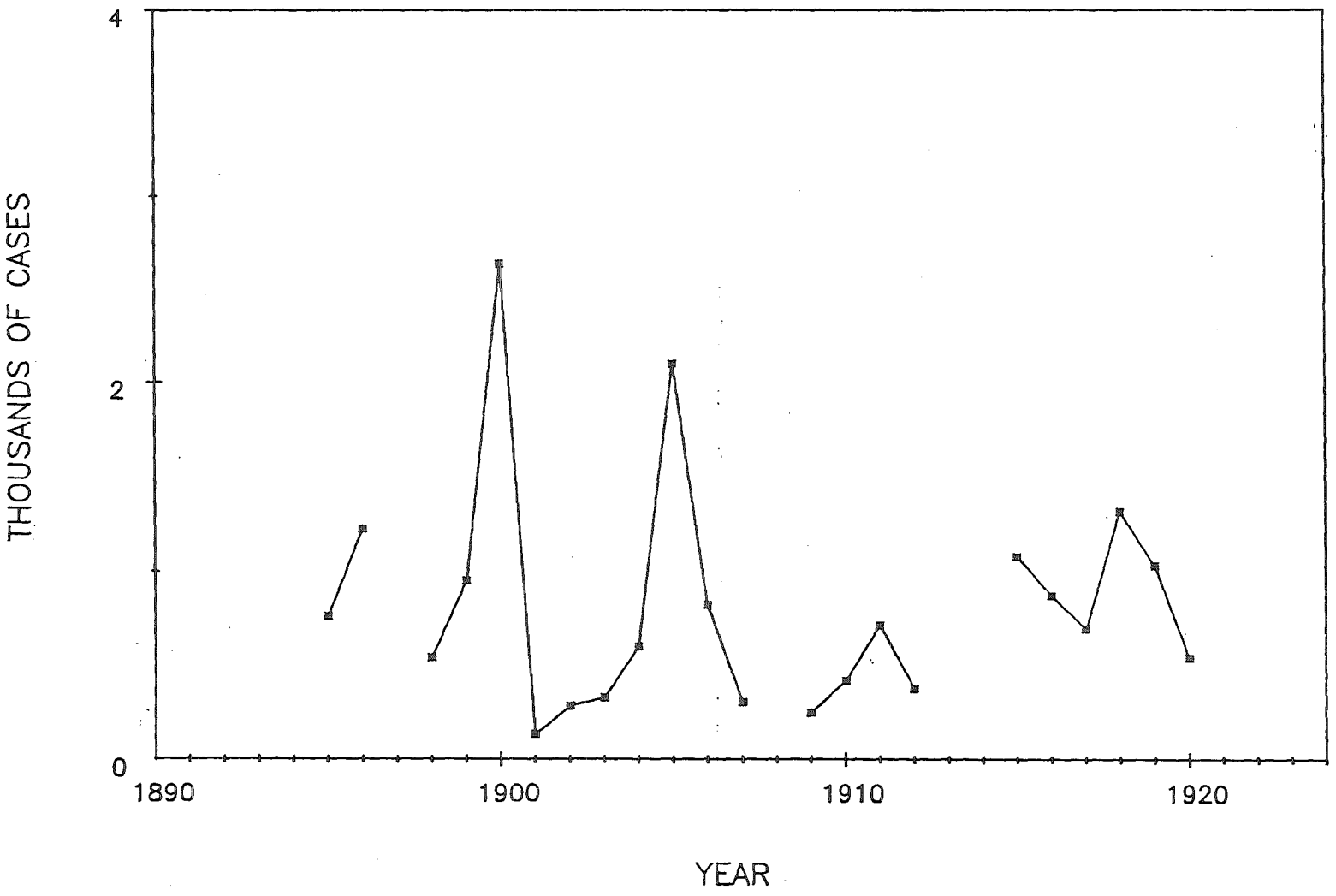
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	266,799	12
1924	356,540	16
1925	292,118	13
1926	132,246	6
1927	100,184	4
1928	184,660	8
1929	68,673	3
1930	51,775	2
1931	102,289	5
1932	57,432	3
1933	20,222	1
1934	13,136	1
1935	24,108	1
1936	31,656	1
1937	21,447	1
1938	24,046	1
1939	17,207	1
1940	2,387	<1
1941	1,196	<1
1942	4,222	<1
1943	2,656	<1
1944	150	<1
1945	124	<1
1946	893	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON COOS RIVER, 1923–1946.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE COQUILLE RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	---	---	---
1894	---	---	---
1895	760	52	2
1896	1,225	83	4
1897	---	---	---
1898	541	37	2
1899	950	65	3
1900	2,636	179	8
1901	133	9	<1
1902	286	19	1
1903	331	23	1
1904	600	41	2
1905	2,100	143	6
1906	821	56	2
1907	306	21	1
1908	---	---	---
1909	250	17	1
1910	420	29	1
1911	715	49	2
1912	377	26	1
1913	---	---	---
1914	---	---	---
1915	1,079	73	3
1916	869	59	3
1917	694	47	2
1918	1,318	90	4
1919	1,027	70	3
1920	541	37	2
1921	---	---	---
1922	---	---	---



CASES OF CHINOOK SALMON CANNED ON THE COQUILLE RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE COQUILLE RIVER, BY MONTH, 1923-1956.

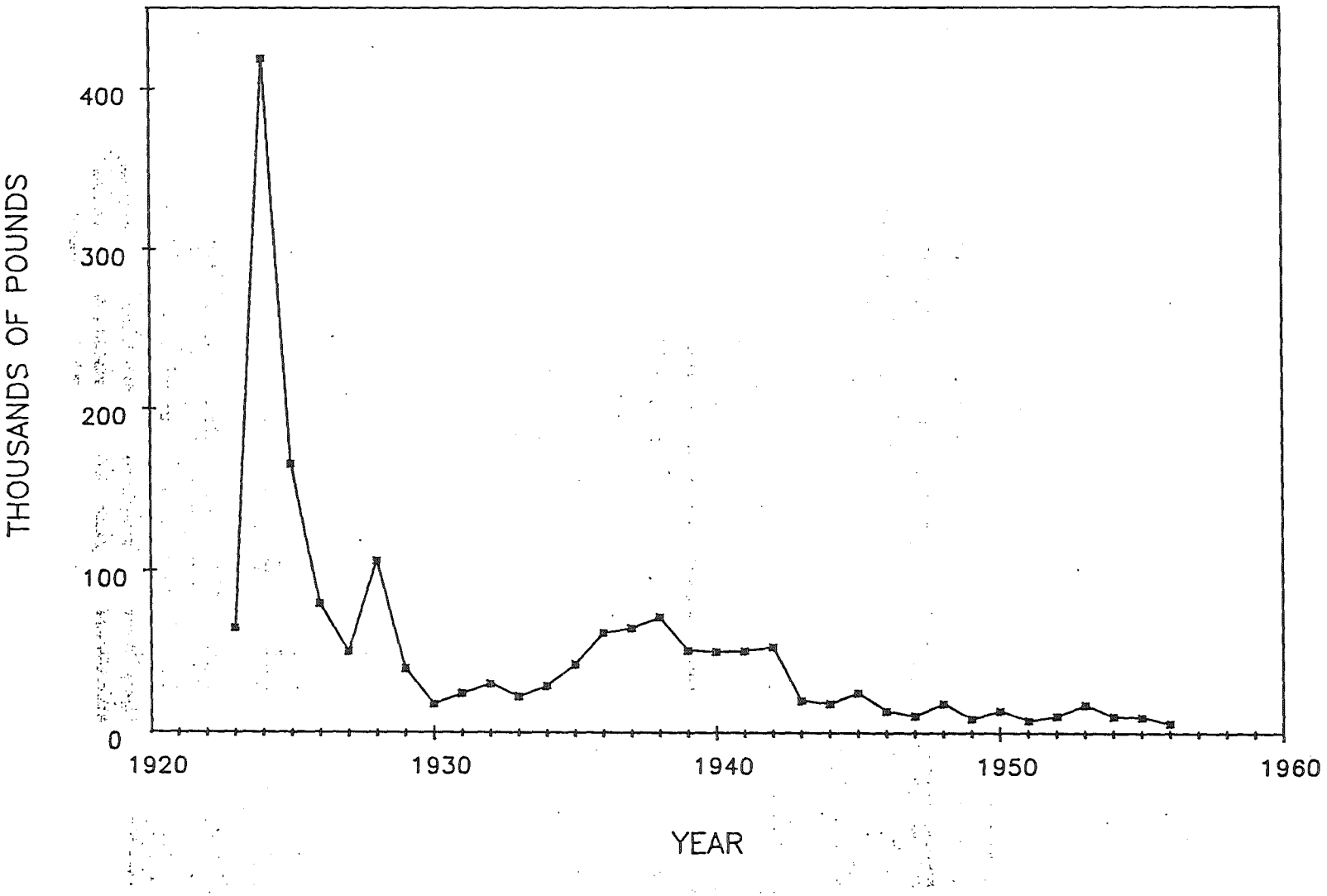
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	4,950	13,000	12,000	29,886	4,950	---	64,786
1924	---	---	---	---	---	---	39,342	118,307	60,748	161,693	37,993	217	418,300
1925	83	191	308	---	---	1,010	20,587	20,602	73,274	39,264	4,835	5,151	165,305
1926	5,751	---	54	---	---	---	6,576	7,451	24,532	25,765	9,176	223	79,528
1927	251	---	---	---	---	---	4,597	6,691	14,449	23,298	933	8	50,227
1928	245	---	140	---	---	226	2,584	12,276	13,453	70,158	5,185	1,994	106,261
1929	590	---	---	---	---	---	---	3,308	17,638	9,630	8,517	---	39,683
1930	---	---	---	---	---	---	---	2,490	6,017	5,283	4,031	---	17,821
1931	---	---	---	---	---	420	---	2,884	12,550	5,438	987	2,127	24,406
1932	1,930	1,868	---	---	---	250	2,629	---	10,444	10,665	2,549	---	30,335
1933	41	560	---	---	---	---	791	4,033	9,686	6,289	128	931	22,459
1934	200	---	---	---	---	143	225	1,629	11,658	12,197	2,709	137	28,898
1935	318	---	---	---	48	134	1,559	4,030	24,861	9,099	2,073	63	42,185
1936	546	---	---	---	15	550	1,922	11,002	23,334	20,607	3,626	143	61,745
1937	354	---	---	---	---	---	431	6,453	23,986	31,744	1,669	6	64,643
1938	400	---	---	---	39	43	1,138	8,584	36,868	21,071	2,767	496	71,406
1939	87	---	---	---	66	472	729	4,786	17,965	20,186	5,841	576	50,708
1940	372	---	---	17	17	3,842	5,374	7,376	17,045	13,718	2,179	---	49,940
1941	221	---	---	---	49	2,383	4,329	8,829	16,302	15,112	3,040	228	50,493
1942	81	---	---	---	62	90	1,264	9,087	24,087	14,242	3,262	780	52,955
1943	295	---	---	---	---	25	21	3,052	9,914	5,509	1,107	61	19,984
1944	165	---	---	---	18	20	85	1,910	8,400	6,265	1,198	---	18,061
1945	---	---	---	---	---	---	---	1,456	12,318	7,690	3,321	39	24,824
1946	---	---	---	---	---	7	---	348	8,424	4,726	16	92	13,613
1947	---	---	---	---	6	---	667	369	7,586	1,780	242	---	10,650
1948	---	---	---	---	23	13	---	---	13,790	4,377	131	---	18,334
1949	---	---	---	---	---	---	---	---	4,749	4,170	---	---	8,919
1950	---	---	---	---	---	---	---	---	7,164	6,693	---	---	13,857
1951	---	---	---	---	---	---	---	---	4,931	2,862	---	---	7,793
1952	---	---	---	---	---	---	---	---	6,468	3,501	600	---	10,569
1953	---	---	---	---	---	---	---	---	10,379	5,593	1,757	---	17,729

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	---	5,615	3,801	978	---	10,394
1955	---	---	---	---	---	---	---	---	3,897	4,938	1,031	---	9,866
1956	---	---	---	---	---	---	---	---	3,032	2,991	33	---	6,056

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE COQUILLE RIVER, 1923-1956.

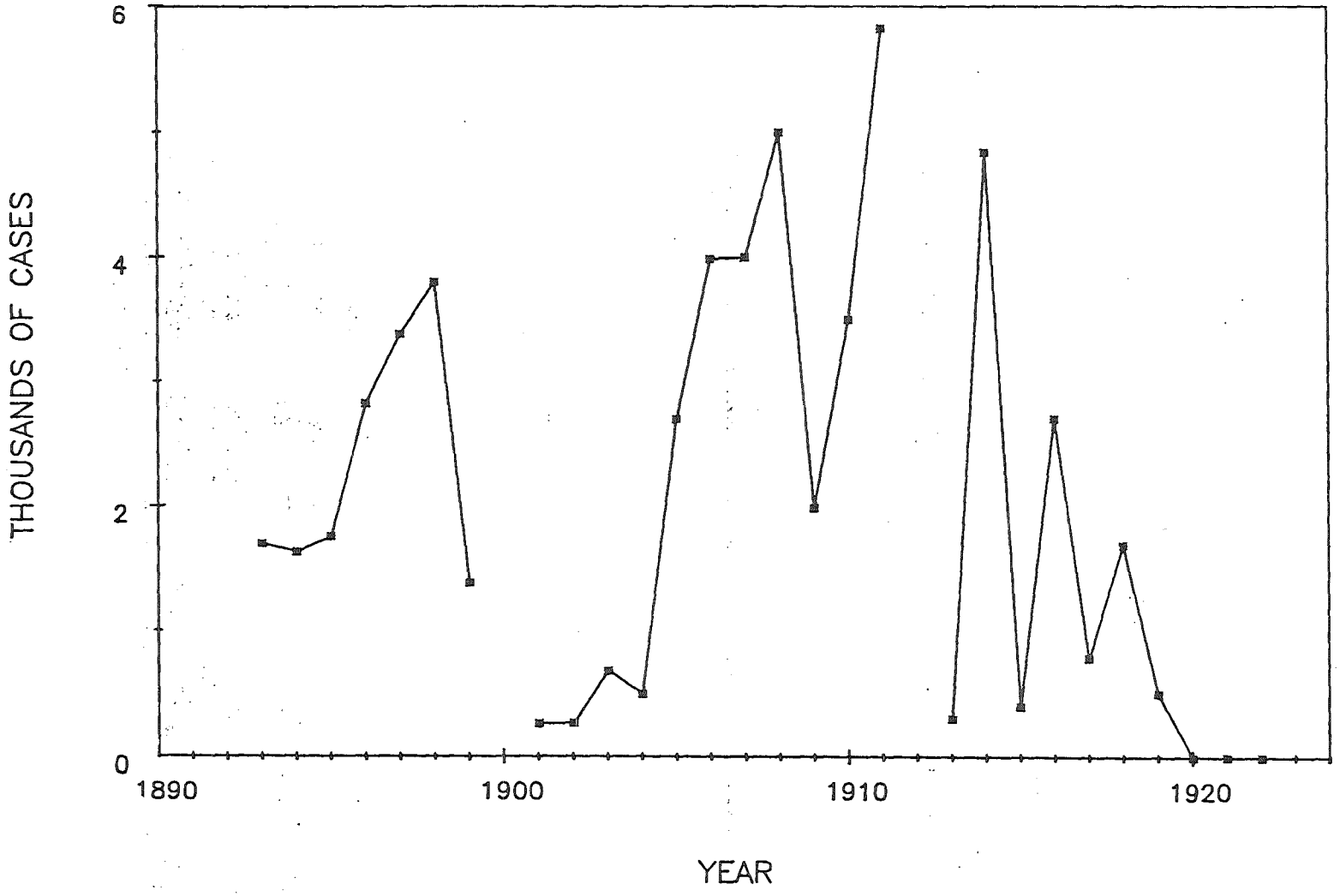
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	64,786	3
1924	418,300	19
1925	165,305	7
1926	79,528	4
1927	50,227	2
1928	106,261	5
1929	39,683	2
1930	17,821	1
1931	24,406	1
1932	30,335	1
1933	22,459	1
1934	28,898	1
1935	42,185	2
1936	61,745	3
1937	64,643	3
1938	71,406	3
1939	50,708	2
1940	49,940	2
1941	50,493	2
1942	52,955	2
1943	19,984	1
1944	18,061	1
1945	24,824	1
1946	13,613	1
1947	10,650	<1
1948	18,334	1
1949	8,919	<1
1950	13,857	1
1951	7,793	<1
1952	10,569	<1
1953	17,729	1
1954	10,394	<1
1955	9,866	<1
1956	6,056	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE COQUILLE RIVER, 1923–1956.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE NEHALEM RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	1,692	115	5
1894	1,627	111	5
1895	1,752	119	5
1896	2,828	192	9
1897	3,384	230	10
1898	3,808	259	11
1899	1,384	94	4
1900	---	---	---
1901	268	18	1
1902	271	18	1
1903	686	47	2
1904	500	34	2
1905	2,700	184	8
1906	3,987	271	12
1907	4,000	272	12
1908	5,000	340	15
1909	1,985	135	6
1910	3,500	238	11
1911	5,821	396	18
1912	---	---	---
1913	300	20	1
1914	4,841	329	15
1915	400	27	1
1916	2,700	184	8
1917	783	53	2
1918	1,685	115	5
1919	500	34	2
1920	0	0	0
1921	0	0	0
1922	0	0	0



CASES OF CHINOOK SALMON CANNED ON THE NEHALEM RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE NEHALEM RIVER, BY MONTH, 1923-1956.

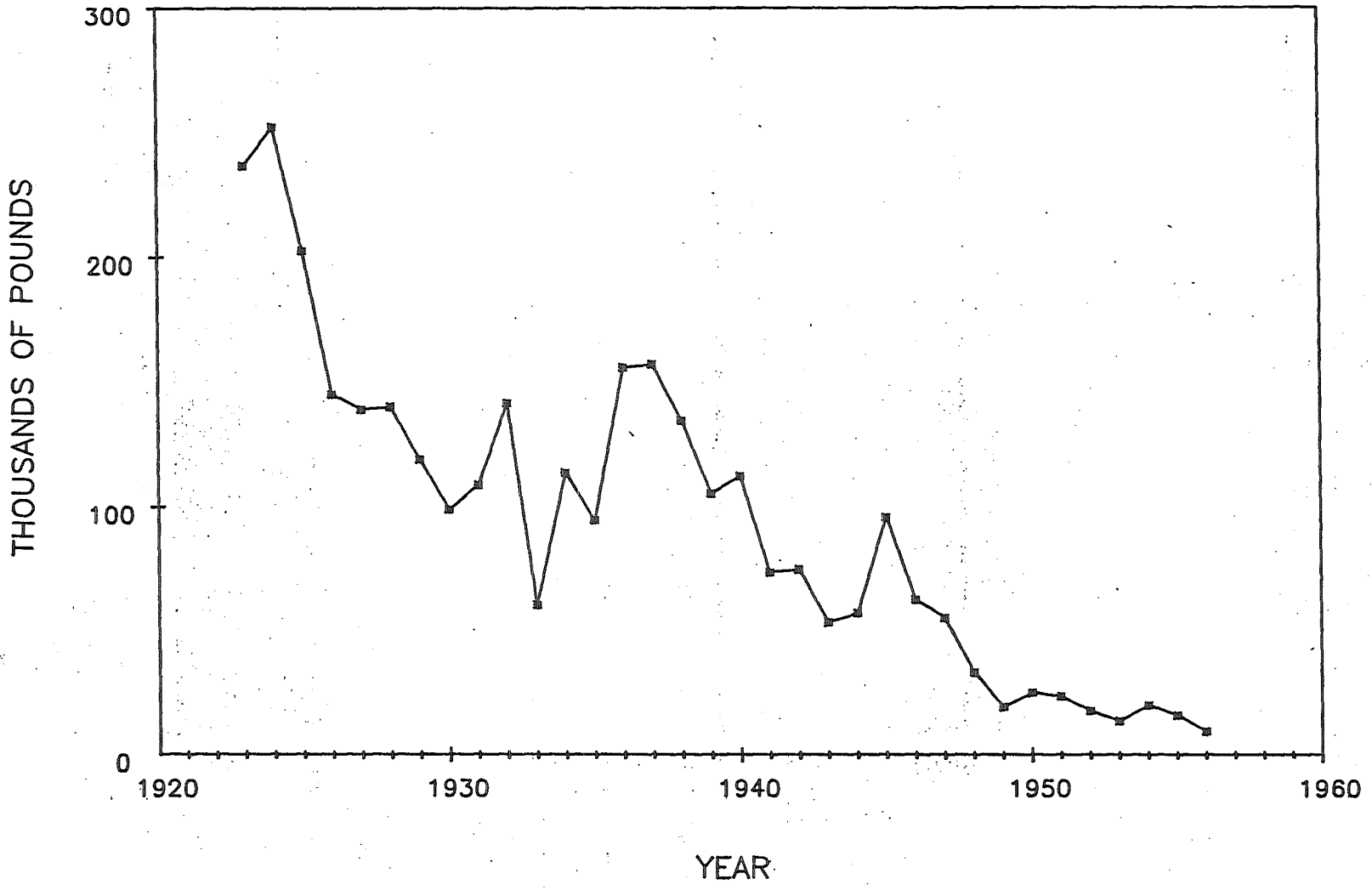
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	92,590	109,504	33,405	1,144	---	236,643
1924	---	---	---	---	---	---	---	109,630	112,128	29,477	878	35	252,148
1925	7	---	---	---	---	---	1,487	78,477	76,035	43,558	3,027	---	202,591
1926	---	---	---	---	---	---	---	65,505	53,189	23,494	3,116	28	145,332
1927	---	---	---	---	---	---	---	64,493	62,090	12,057	614	---	139,254
1928	---	---	---	---	---	---	---	60,243	52,957	24,245	2,990	---	140,435
1929	---	---	---	---	---	---	---	49,167	48,602	18,681	2,513	54	119,017
1930	---	100	---	---	---	---	---	31,521	39,809	26,966	597	---	98,993
1931	---	1,757	---	---	---	---	---	31,119	40,156	35,160	514	---	108,706
1932	---	1,593	---	---	---	---	---	50,254	54,708	29,484	5,950	---	141,989
1933	---	524	---	---	---	---	---	---	39,514	16,304	4,113	---	60,455
1934	---	1,150	---	---	---	---	---	53,916	39,395	18,890	320	---	113,671
1935	---	369	---	---	---	---	11,114	24,898	39,176	18,350	627	---	94,534
1936	12	374	---	---	---	---	17,431	19,425	77,849	39,086	1,899	17	156,093
1937	---	101	---	---	---	---	10,544	27,899	51,848	65,526	1,509	---	157,427
1938	---	540	---	---	---	---	5,729	24,137	47,780	53,049	3,566	---	134,801
1939	---	385	---	---	---	---	5,239	11,236	32,746	52,989	2,574	66	105,235
1940	180	---	---	---	---	472	14,510	23,210	41,483	31,618	861	---	112,334
1941	---	---	---	---	---	---	11,939	20,779	28,249	11,913	625	---	73,505
1942	---	148	---	---	---	---	226	7,875	35,704	29,223	1,521	---	74,697
1943	---	---	---	---	---	---	674	5,537	23,771	23,218	261	---	53,461
1944	---	1,513	---	---	---	---	164	2,582	28,544	23,083	1,235	---	57,121
1945	---	75	---	---	---	---	22	1,994	40,452	45,881	7,464	78	95,966
1946	---	948	---	---	---	---	196	2,383	27,567	29,862	1,591	---	62,547
1947	---	---	---	---	---	---	---	3,919	26,544	23,693	1,092	---	55,248
1948	---	---	---	---	---	---	---	---	17,973	14,480	1,002	---	33,455
1949	---	---	---	---	---	---	---	---	11,605	6,909	832	---	19,346
1950	---	---	---	---	---	---	---	---	10,759	13,637	783	---	25,179
1951	---	---	---	---	---	---	---	---	18,133	5,500	114	---	23,747
1952	---	---	---	---	---	---	---	---	14,251	2,714	975	---	17,940
1953	---	---	---	---	---	---	---	---	8,683	4,466	602	---	13,751

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	---	16,125	3,488	636	---	20,249
1955	---	---	---	---	---	---	---	---	11,477	4,138	482	---	16,097
1956	---	---	---	---	---	---	---	---	7,539	1,933	137	---	9,609

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE NEHALEM RIVER, 1923-1956.

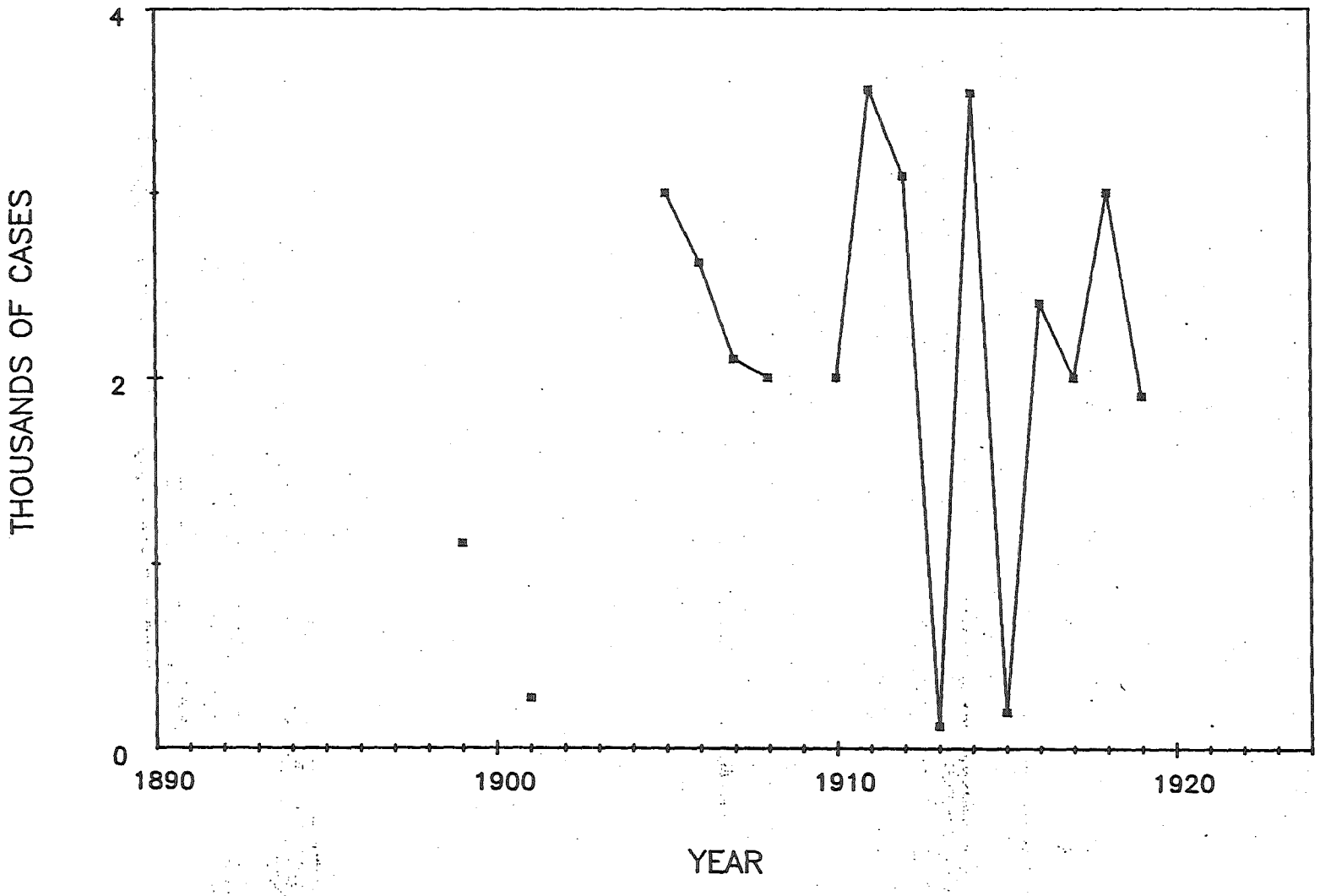
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	236,643	10
1924	252,148	11
1925	202,591	9
1926	145,332	6
1927	139,254	6
1928	140,435	6
1929	119,017	5
1930	98,993	4
1931	108,706	5
1932	141,989	6
1933	60,455	3
1934	113,671	5
1935	94,534	4
1936	156,093	7
1937	157,427	7
1938	134,801	6
1939	105,235	5
1940	112,334	5
1941	73,505	3
1942	74,697	3
1943	53,461	2
1944	57,121	3
1945	95,966	4
1946	62,547	3
1947	55,248	2
1948	33,455	1
1949	19,346	1
1950	25,179	1
1951	23,747	1
1952	17,940	1
1953	13,751	1
1954	20,249	1
1955	16,097	1
1956	9,609	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE NEHALEM RIVER, 1923–1956.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE NESTUCCA RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	---	---	---
1894	---	---	---
1895	---	---	---
1896	---	---	---
1897	---	---	---
1898	---	---	---
1899	1,109	75	3
1900	---	---	---
1901	279	19	1
1902	---	---	---
1903	---	---	---
1904	---	---	---
1905	3,000	204	9
1906	2,622	178	8
1907	2,100	143	6
1908	2,000	136	6
1909	---	---	---
1910	2,000	136	6
1911	3,562	242	11
1912	3,090	210	9
1913	126	9	<1
1914	3,542	241	11
1915	200	14	1
1916	2,400	163	7
1917	2,000	136	6
1918	3,000	204	9
1919	1,900	129	6
1920	---	---	---
1921	---	---	---
1922	---	---	---



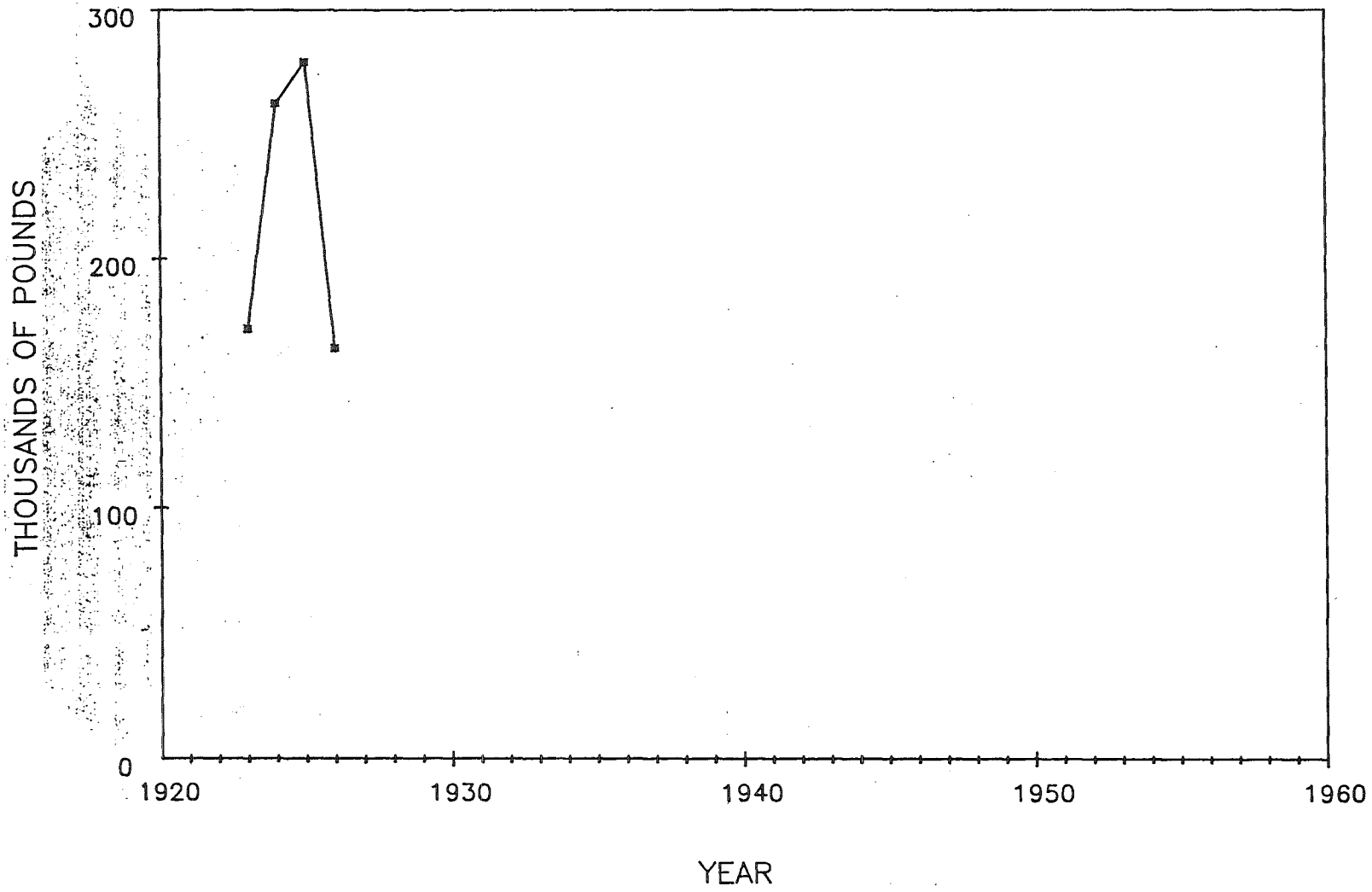
CASES OF CHINOOK SALMON CANNED ON THE NESTUCCA RIVER 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE NESTUCCA RIVER, BY MONTH, 1923-1926.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	31,106	88,152	52,056	350	61	171,725
1924	---	---	---	---	---	---	---	52,892	118,581	88,499	2,438	299	262,709
1925	---	---	---	---	---	1,324	66,018	16,037	99,585	80,407	15,705	115	279,191
1926	---	---	---	---	---	---	29,422	11,930	43,651	70,833	8,281	33	164,150

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE NESTUCCA RIVER, 1923-1926.

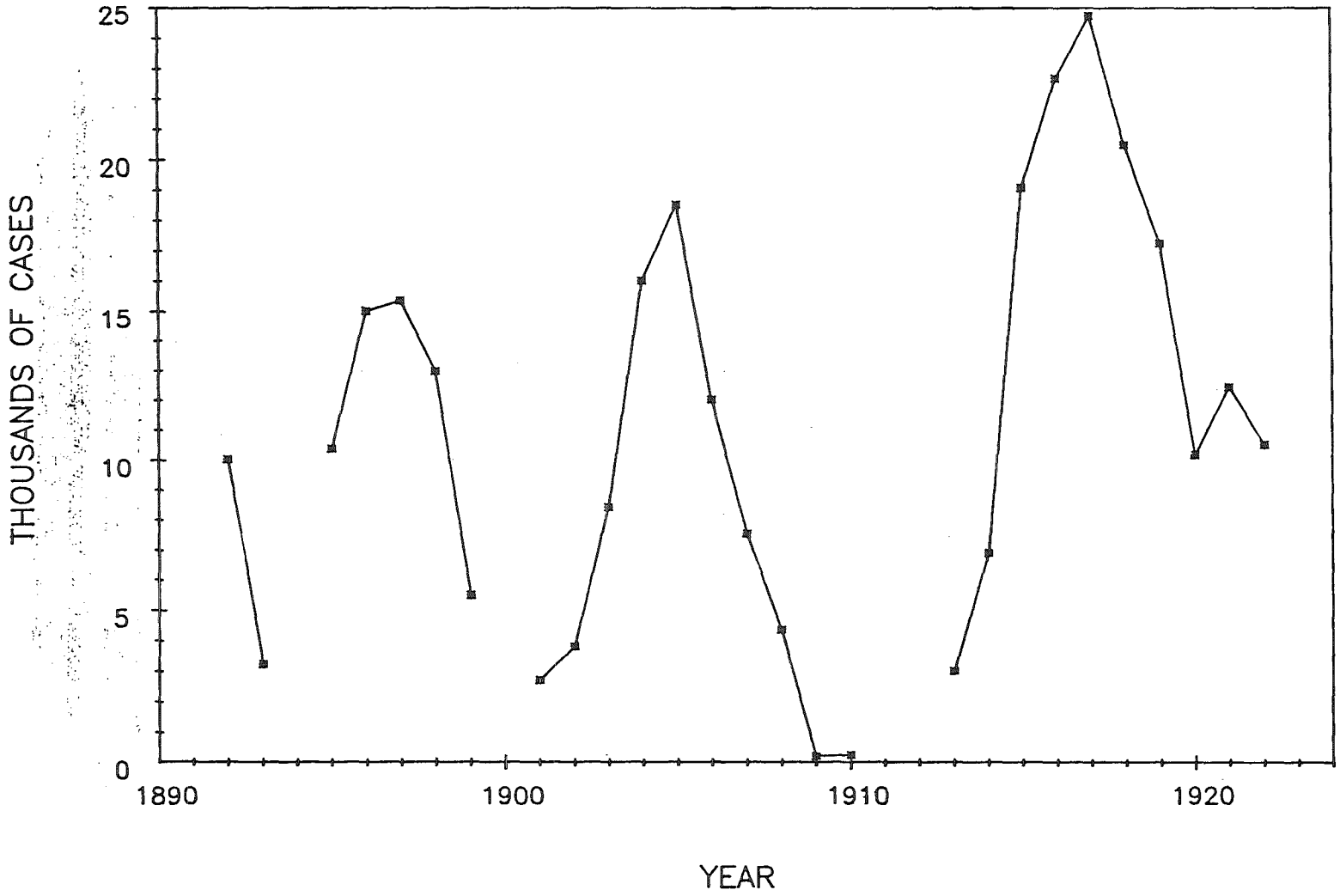
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	171,725	8
1924	262,709	12
1925	279,191	12
1926	164,150	7



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE NESTUCCA RIVER, 1923–1926.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE ROGUE RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	10,000	680	30
1893	3,200	218	10
1894	---	---	---
1895	10,377	706	31
1896	15,000	1,020	45
1897	15,355	1,044	46
1898	12,964	882	39
1899	5,481	373	16
1900	---	---	---
1901	2,681	182	8
1902	3,799	258	11
1903	8,418	572	25
1904	16,000	1,088	48
1905	18,500	1,258	56
1906	12,000	816	36
1907	7,537	513	23
1908	4,354	296	13
1909	186	13	1
1910	232	16	1
1911	---	---	---
1912	---	---	---
1913	3,020	205	9
1914	6,938	472	21
1915	19,094	1,298	57
1916	22,640	1,540	68
1917	24,707	1,680	74
1918	20,469	1,392	62
1919	17,237	1,172	52
1920	10,205	694	31
1921	12,496	850	38
1922	10,568	719	32



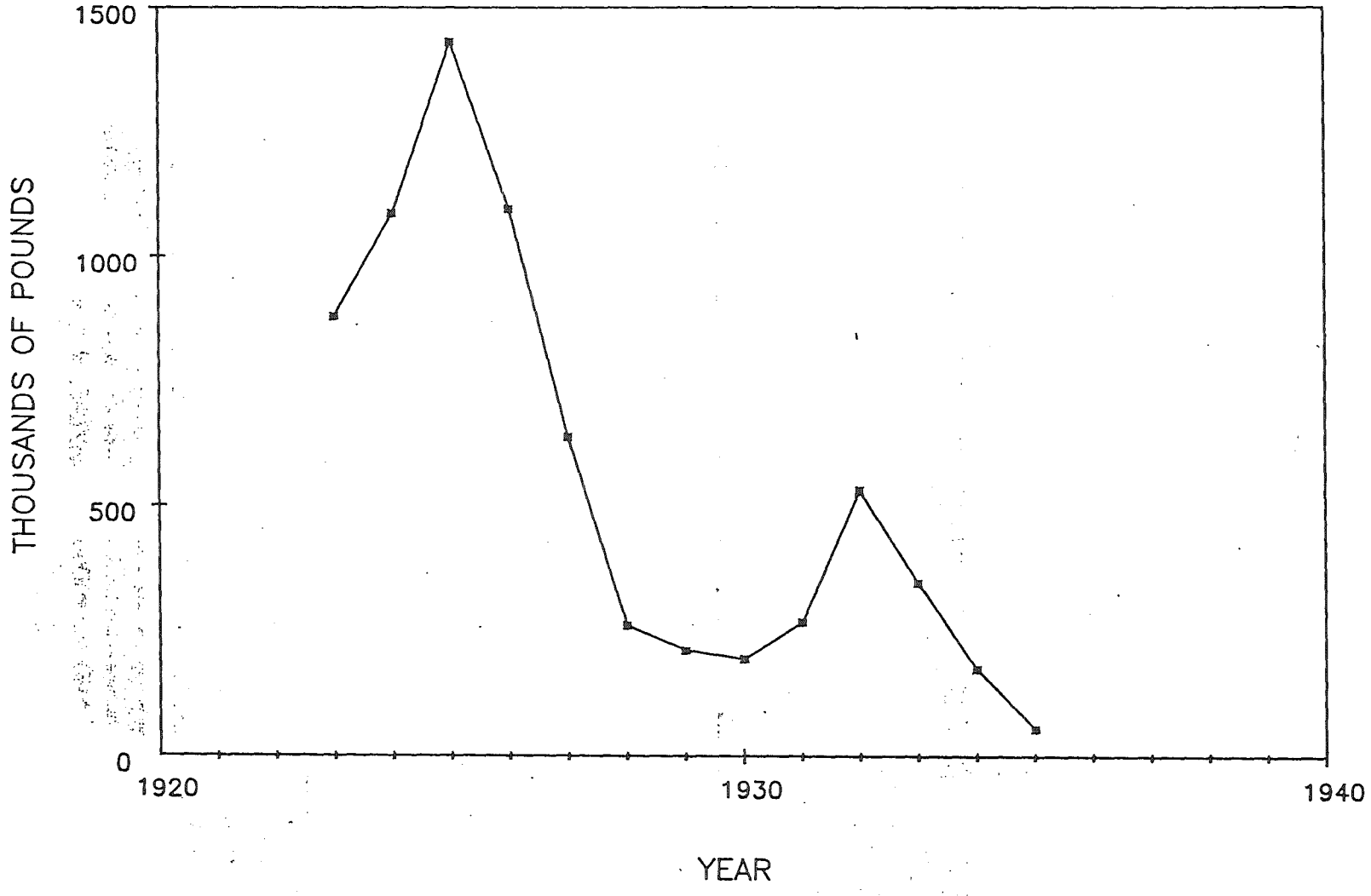
CASES OF CHINOOK SALMON CANNED ON THE ROGUE RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE ROGUE RIVER, BY MONTH, 1923-1935.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	202,002	474,594	140,105	8,972	17,961	7,784	26,022	---	877,440
1924	---	---	---	---	94,447	161,472	108,596	528,086	191,680	---	2,862	---	1,087,143
1925	---	---	---	---	21,698	135,616	233,326	766,327	274,391	---	---	---	1,431,358
1926	---	---	---	---	42,684	143,423	245,330	436,897	226,982	---	---	465	1,095,781
1927	---	---	---	---	50,124	121,778	175,239	63,735	224,853	37	---	---	635,766
1928	---	---	---	---	90,964	39,522	30,585	43,351	56,201	---	---	---	260,623
1929	---	---	---	---	25,620	30,893	22,912	70,747	61,393	---	---	---	211,565
1930	---	---	---	---	15,486	26,400	28,294	70,781	53,138	---	---	---	194,099
1931	---	---	---	---	46,246	63,085	61,485	92,485	4,465	---	---	---	267,766
1932	---	---	---	---	88,005	162,766	130,674	132,337	14,602	---	---	---	528,384
1933	---	---	---	---	120,885	102,259	41,228	54,323	28,467	---	---	---	347,162
1934	---	---	---	---	53,458	54,763	20,907	24,276	20,602	---	---	---	174,006
1935	---	---	---	---	42,092	12,953	---	---	---	---	---	---	55,045

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE ROGUE RIVER, 1923-1935.

YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	877,440	39
1924	1,087,143	48
1925	1,431,358	63
1926	1,095,781	48
1927	635,766	28
1928	260,623	12
1929	211,565	9
1930	194,099	9
1931	267,766	12
1932	528,384	23
1933	347,162	15
1934	174,006	8
1935	55,045	2



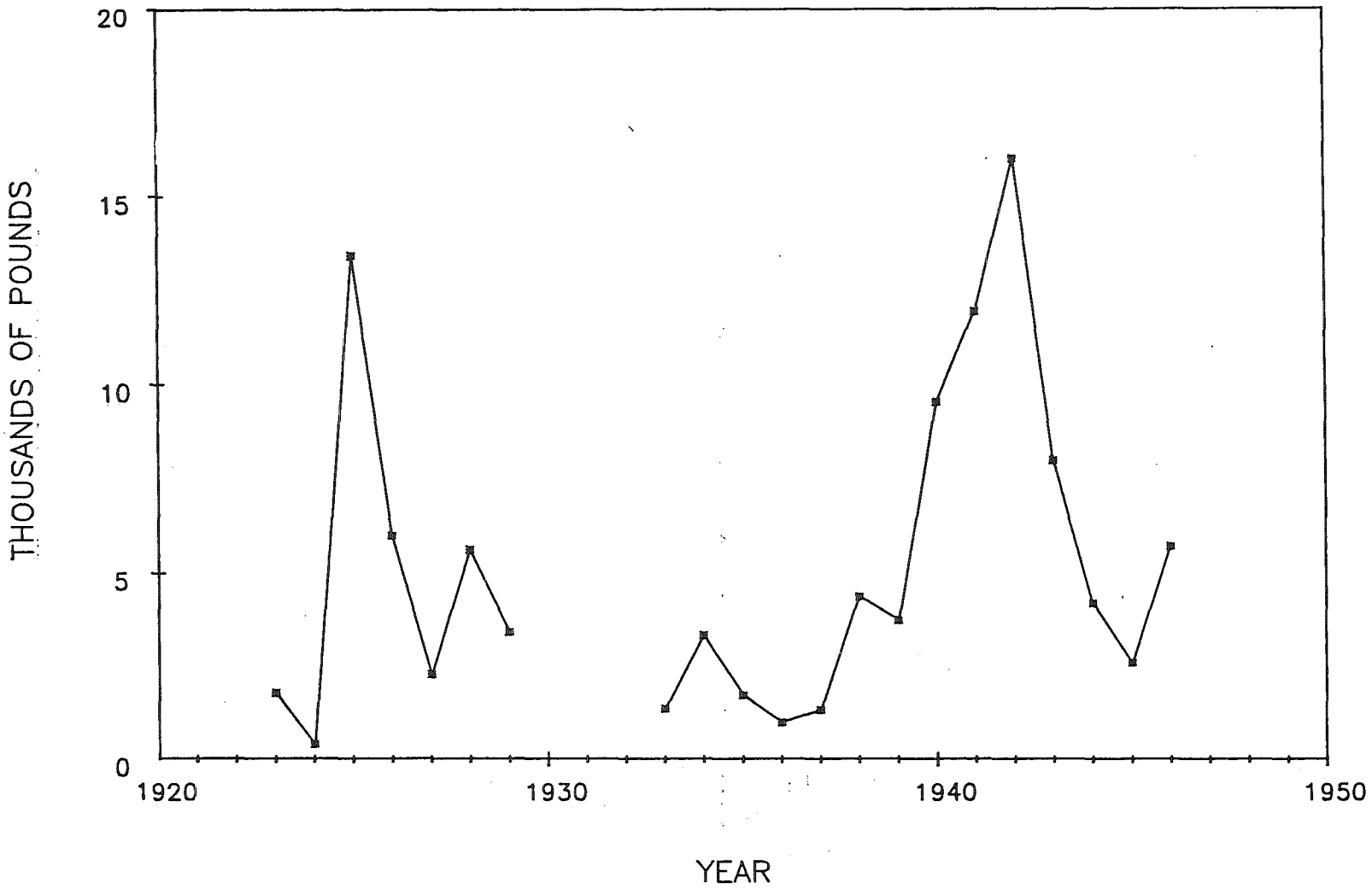
POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE ROGUE RIVER, 1923–1935.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SALMON RIVER, BY MONTH, 1923-1946.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	1,575	---	208	---	---	1,783
1924	---	---	---	---	---	---	---	---	---	395	---	---	395
1925	---	---	---	---	---	---	---	---	5,591	7,277	556	---	13,424
1926	---	---	---	---	---	---	---	628	2,544	1,911	909	---	5,992
1927	---	---	---	---	---	---	---	---	552	1,695	25	---	2,272
1928	---	---	---	---	---	---	---	---	2,232	2,499	901	---	5,632
1929	---	---	---	---	---	---	---	---	---	2,871	545	---	3,416
1930	---	---	---	---	---	---	---	---	---	---	---	---	---
1931	---	---	---	---	---	---	---	---	---	---	---	---	---
1932	---	---	---	---	---	---	---	---	---	---	---	---	---
1933	---	---	---	---	---	---	---	---	1,195	---	164	---	1,359
1934	---	---	---	---	---	---	---	---	2,162	1,176	---	---	3,338
1935	---	---	---	---	---	---	148	272	1,306	---	---	---	1,726
1936	---	---	---	---	---	---	---	---	---	---	985	---	985
1937	---	---	---	---	---	---	---	---	---	---	---	---	1,326
1938	---	---	---	---	---	---	---	---	---	---	---	---	4,388
1939	---	---	---	---	---	---	---	---	---	---	---	---	3,725
1940	---	---	---	---	---	---	---	---	---	---	---	---	9,548
1941	---	---	---	---	---	---	---	---	---	---	---	---	11,936
1942	---	---	---	---	---	---	---	---	---	---	---	---	16,014
1943	---	---	---	---	---	---	---	---	---	---	---	---	8,010
1944	---	---	---	---	---	---	---	---	---	---	---	---	4,198
1945	---	---	---	---	---	---	---	---	---	---	---	---	2,596
1946	---	---	---	---	---	---	---	---	---	---	---	---	5,713

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE SALMON RIVER, 1923-1946.

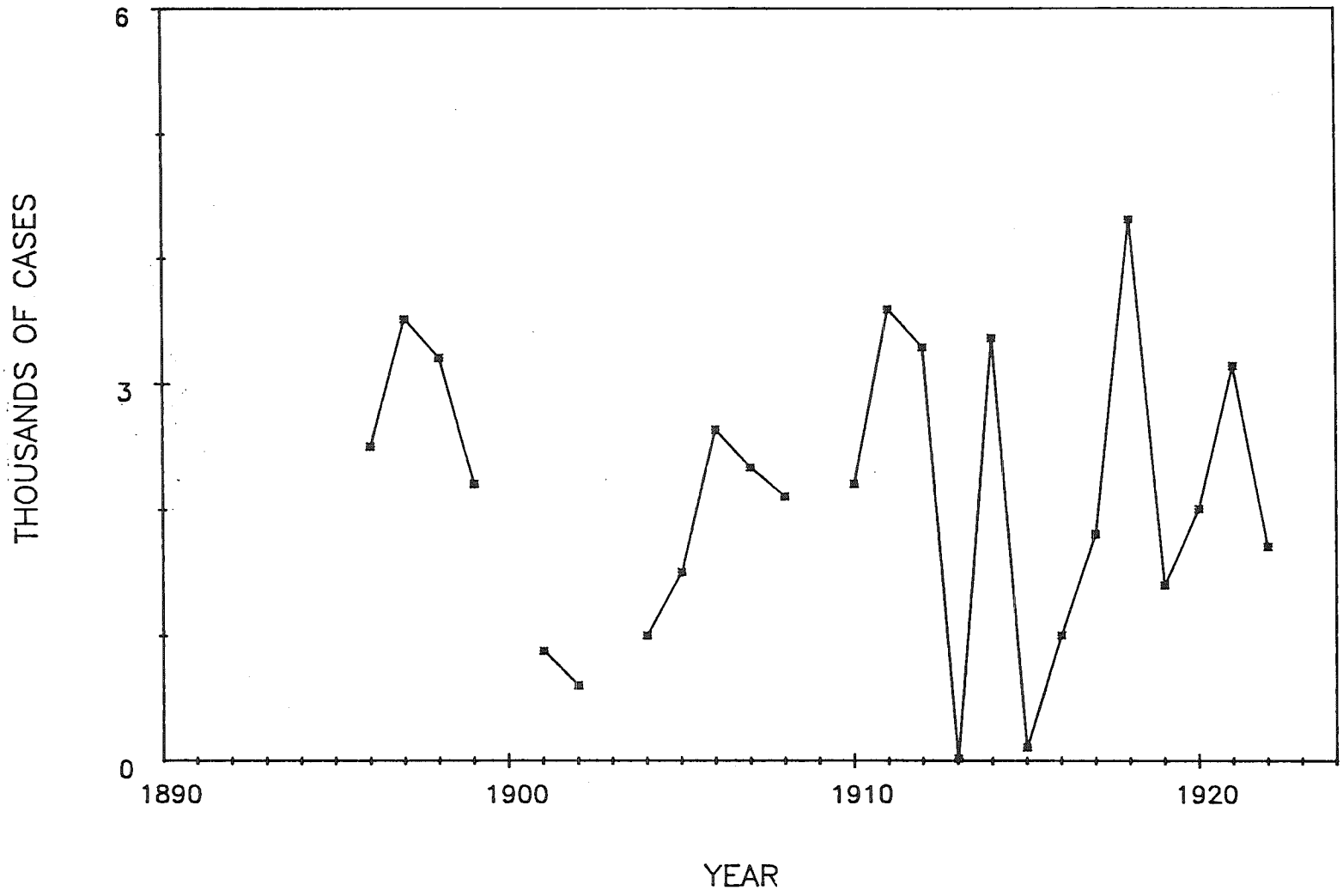
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	1,783	<1
1924	395	<1
1925	13,424	1
1926	5,992	<1
1927	2,272	<1
1928	5,632	<1
1929	3,416	<1
1930	---	---
1931	---	---
1932	---	---
1933	1,359	<1
1934	3,338	<1
1935	1,726	<1
1936	985	<1
1937	1,326	<1
1938	4,388	<1
1939	3,725	<1
1940	9,548	<1
1941	11,936	1
1942	16,014	1
1943	8,010	<1
1944	4,198	<1
1945	2,596	<1
1946	5,713	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SALMON RIVER, 1923–1946.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE SILETZ RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	---	---	---
1894	---	---	---
1895	---	---	---
1896	2,500	170	8
1897	3,510	239	11
1898	3,200	218	10
1899	2,200	150	7
1900	---	---	---
1901	876	60	3
1902	600	41	2
1903	---	---	---
1904	1,000	68	3
1905	1,500	102	5
1906	2,635	179	8
1907	2,333	159	7
1908	2,100	143	6
1909	---	---	---
1910	2,200	150	7
1911	3,584	244	11
1912	3,277	223	10
1913	15	1	<1
1914	3,356	228	10
1915	100	7	<1
1916	1,000	68	3
1917	1,800	122	5
1918	4,304	293	13
1919	1,393	95	4
1920	2,002	136	6
1921	3,136	213	9
1922	1,702	116	5



CASES OF CHINOOK SALMON CANNED ON THE SILETZ RIVER 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SILETZ RIVER, BY MONTH, 1923-1956.

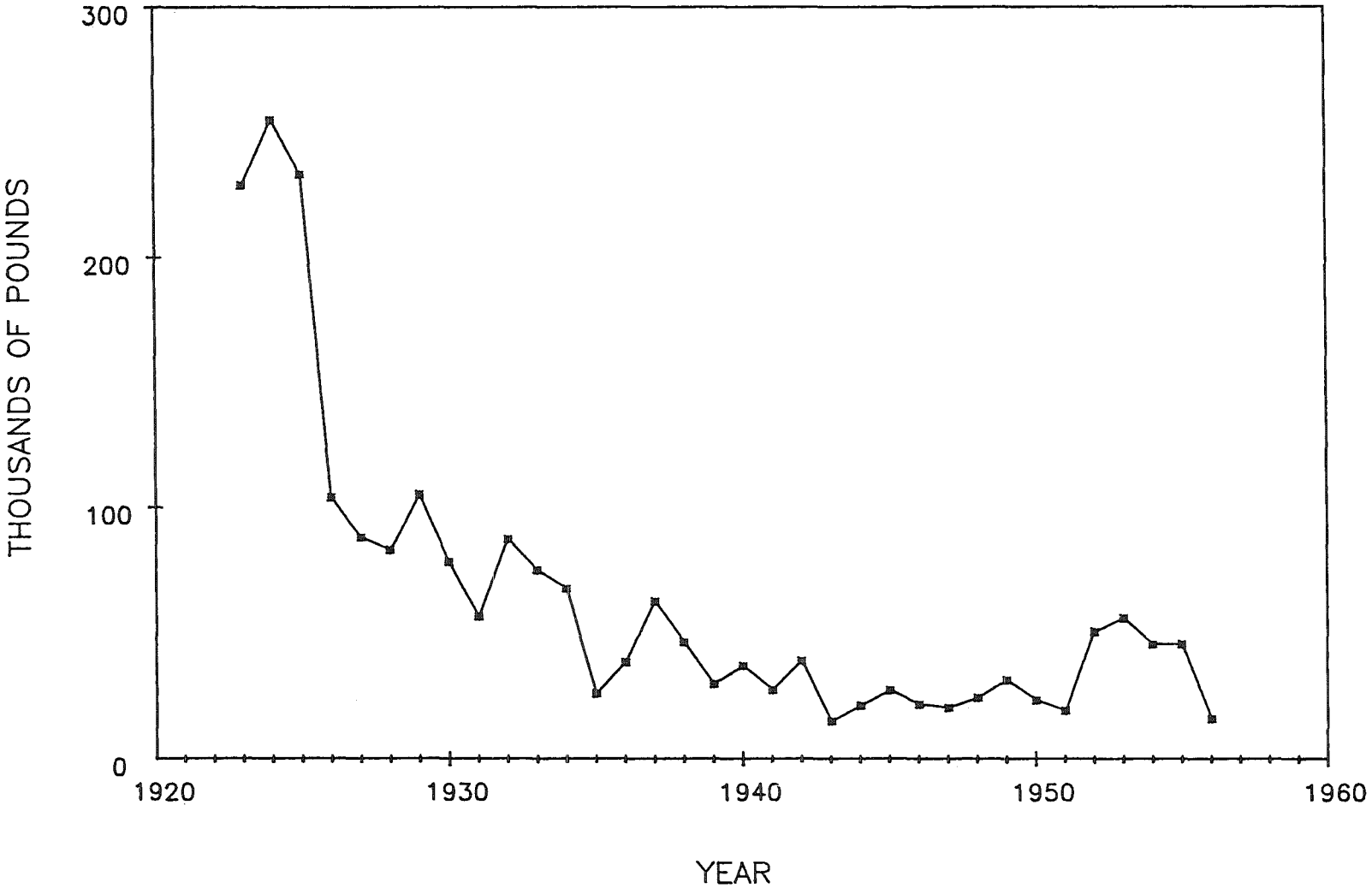
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	29,683	91,792	80,549	25,659	1,091	---	228,774
1924	---	---	---	---	---	---	27,079	79,671	97,339	50,292	636	---	255,017
1925	43	---	---	---	---	---	20,074	36,589	98,291	55,202	22,680	137	233,016
1926	---	---	830	---	---	---	2,948	20,296	44,364	30,102	5,157	---	103,697
1927	38	---	---	---	---	---	4,035	32,077	35,573	14,418	1,664	---	87,805
1928	---	---	---	---	---	---	7,088	24,571	30,624	19,481	1,062	---	82,826
1929	---	81	45	---	---	---	9,884	17,938	52,896	22,271	1,928	37	105,080
1930	---	---	---	---	---	---	4,744	12,037	37,340	23,787	177	---	78,085
1931	---	---	---	---	---	---	2,266	8,492	31,927	13,049	---	580	56,314
1932	---	442	5,930	---	---	---	8,776	26,285	29,865	15,712	124	56	87,190
1933	---	---	2,837	---	---	---	15,957	26,403	18,482	11,158	78	29	74,944
1934	---	---	5,429	---	---	---	19,791	16,355	16,497	9,464	74	---	67,610
1935	---	396	128	---	---	---	1,848	7,055	11,234	4,666	447	---	25,774
1936	---	40	62	---	---	---	2,417	6,903	14,762	11,063	2,449	572	38,268
1937	---	---	295	---	---	---	2,436	12,043	19,391	27,748	584	---	62,497
1938	---	870	76	---	---	---	1,574	7,284	22,785	12,198	1,407	---	46,194
1939	100	564	394	---	---	---	2,348	3,906	12,150	8,896	1,176	---	29,534
1940	---	482	225	---	---	---	2,577	8,167	14,847	9,806	614	121	36,839
1941	---	78	---	---	---	---	2,055	9,055	7,971	7,513	537	---	27,209
1942	---	572	---	---	---	---	166	5,826	17,240	13,483	1,619	---	38,906
1943	---	603	200	---	---	---	---	1,652	6,271	5,015	1,104	---	14,845
1944	---	2,074	518	---	---	---	---	401	8,884	8,941	238	---	21,056
1945	---	1,156	---	---	---	---	---	---	14,049	10,896	1,199	---	27,300
1946	---	231	673	---	---	---	63	2,189	11,072	7,104	198	---	21,530
1947	---	---	---	---	---	---	---	389	11,470	6,361	2,035	---	20,255
1948	---	---	---	---	---	---	---	815	14,079	8,794	502	---	24,190
1949	---	---	---	---	---	---	---	850	19,219	11,170	25	---	31,264
1950	---	---	---	---	---	---	---	1,155	15,910	6,248	---	---	23,313
1951	---	---	---	---	---	---	---	2,163	13,518	3,341	---	---	19,022
1952	---	---	---	---	---	---	---	5,942	31,133	13,413	---	---	50,493
1953	---	---	---	---	---	---	---	9,497	25,746	20,480	---	---	55,723

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	8,057	24,562	12,907	---	---	45,526
1955	---	---	---	---	---	---	---	6,062	28,610	10,926	---	---	45,598
1956	---	---	---	---	---	---	---	5,063	8,171	2,639	---	---	15,873

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE SILETZ RIVER, 1923-1956.

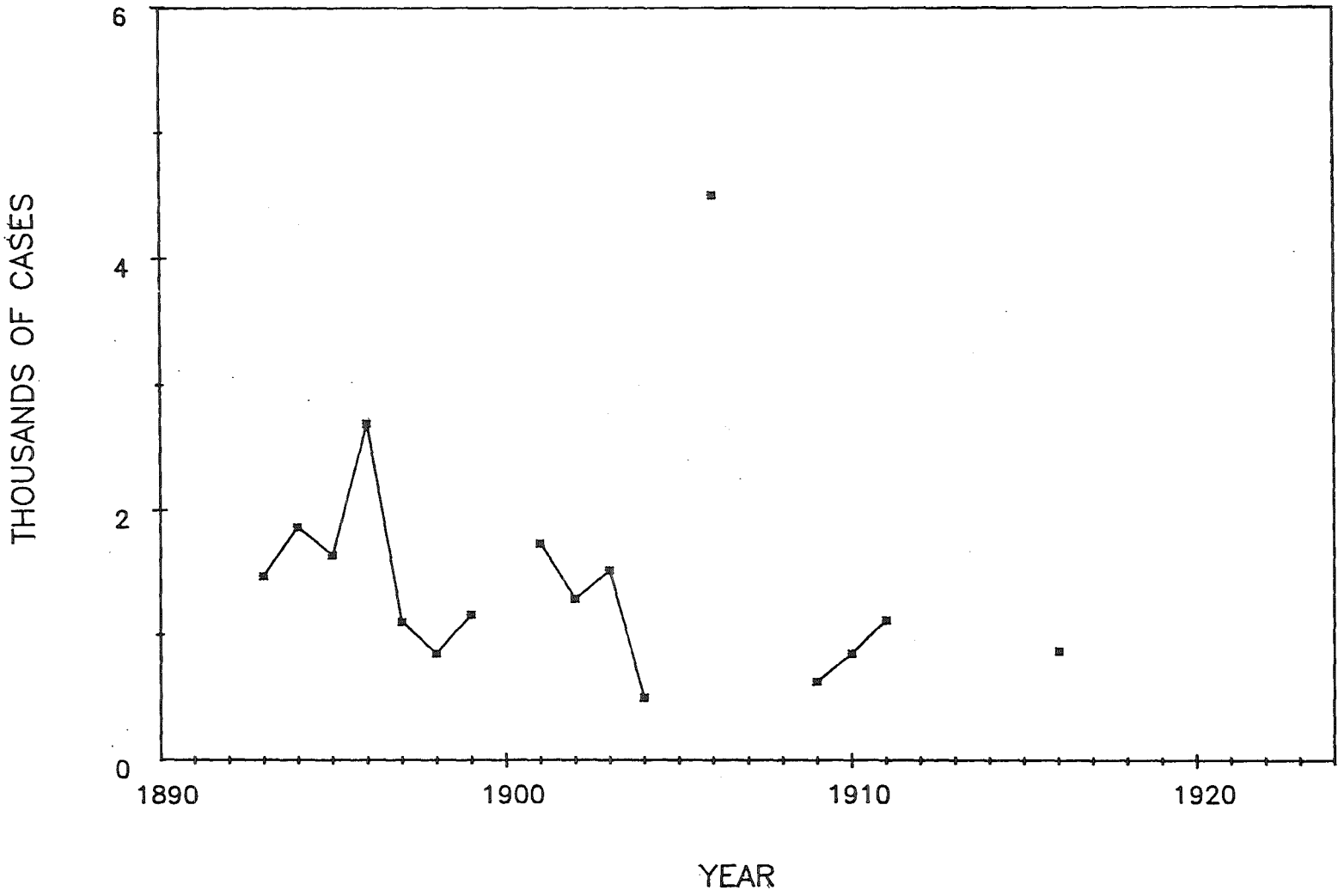
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	228,774	10
1924	255,017	11
1925	233,016	10
1926	103,697	5
1927	87,805	4
1928	82,826	4
1929	105,080	5
1930	78,085	3
1931	56,314	2
1932	87,190	4
1933	74,944	3
1934	67,610	3
1935	25,774	1
1936	38,268	2
1937	62,497	3
1938	46,194	2
1939	29,534	1
1940	36,839	2
1941	27,209	1
1942	38,906	2
1943	14,845	1
1944	21,056	1
1945	27,300	1
1946	21,530	1
1947	20,255	1
1948	24,190	1
1949	31,264	1
1950	23,313	1
1951	19,022	1
1952	50,493	2
1953	55,723	2
1954	45,526	2
1955	45,598	2
1956	15,873	1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SILETZ RIVER, 1923–1956.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE SIUSLAW RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	1,471	100	4
1894	1,871	127	6
1895	1,637	111	5
1896	2,700	184	8
1897	1,100	75	3
1898	850	58	3
1899	1,162	79	3
1900	---	---	---
1901	1,735	118	5
1902	1,288	88	4
1903	1,519	103	5
1904	500	34	2
1905	---	---	---
1906	4,500	306	14
1907	---	---	---
1908	---	---	---
1909	632	43	2
1910	856	58	3
1911	1,120	76	3
1912	---	---	---
1913	---	---	---
1914	---	---	---
1915	---	---	---
1916	875	60	3
1917	---	---	---
1918	---	---	---
1919	---	---	---
1920	---	---	---
1921	---	---	---
1922	---	---	---



CASES OF CHINOOK SALMON CANNED ON THE SIUSLAW RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SIUSLAW RIVER, BY MONTH, 1923-1956.

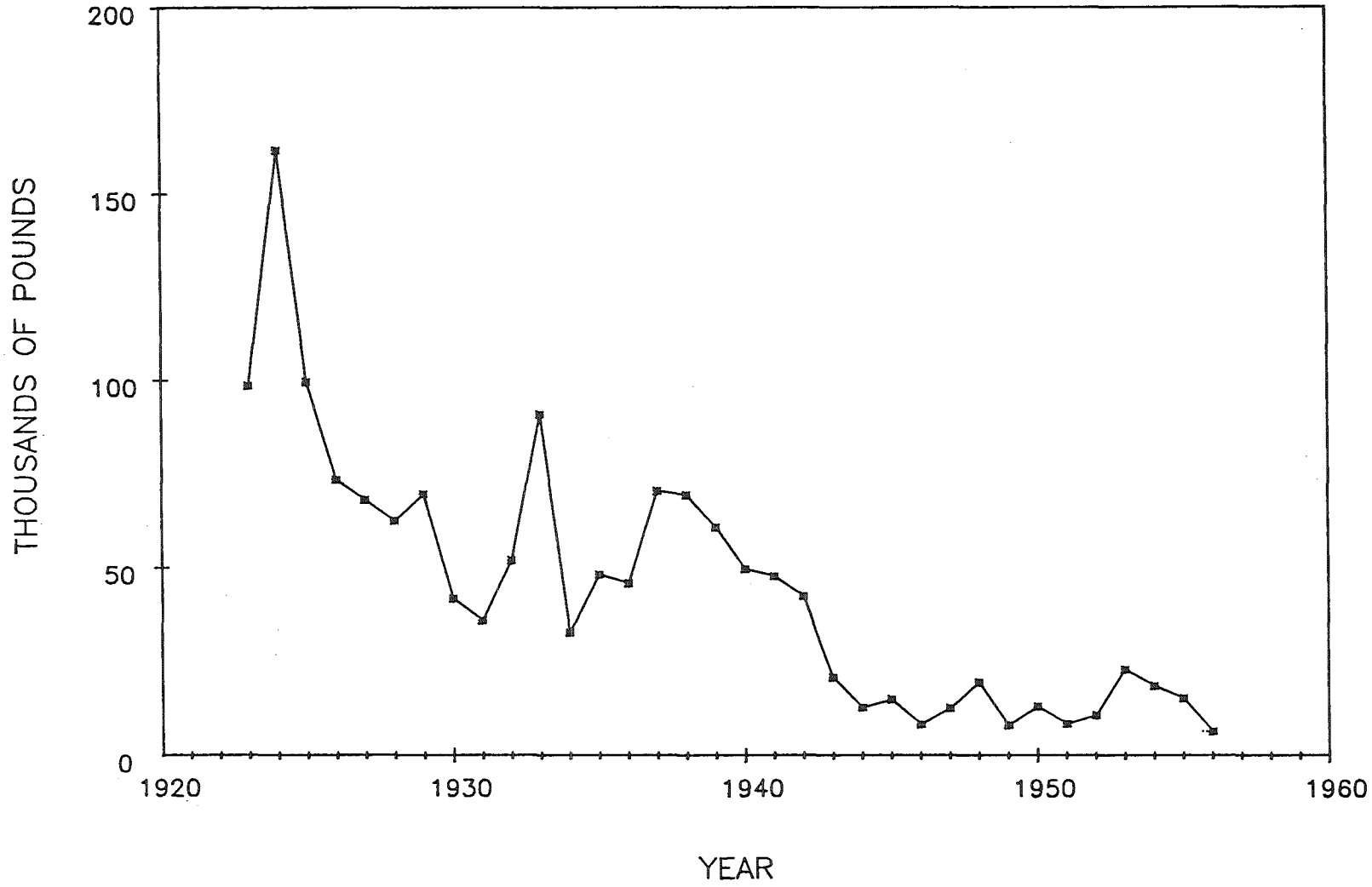
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	2,484	13,004	9,542	18,430	36,668	10,047	8,230	---	98,405
1924	---	---	---	---	2,994	11,631	28,151	24,507	58,227	15,801	20,441	---	161,752
1925	---	902	---	---	1,338	3,976	5,757	9,456	47,804	27,841	2,264	---	99,338
1926	---	---	---	---	196	3,871	1,897	10,084	30,563	25,666	970	49	73,296
1927	---	---	---	---	273	1,622	4,359	12,865	27,902	20,547	427	---	67,995
1928	---	---	---	---	---	390	2,286	6,936	13,665	38,202	789	---	62,268
1929	---	1,046	---	---	---	443	---	1,281	39,566	26,716	468	---	69,520
1930	---	34	---	---	---	652	---	5,982	7,925	26,637	373	---	41,603
1931	83	---	---	---	---	---	---	7,142	8,285	20,070	214	---	35,794
1932	---	---	837	---	156	5,698	4,232	5,738	24,978	10,086	116	---	51,841
1933	---	---	890	---	100	---	33,125	---	32,883	23,405	264	6	90,673
1934	---	---	---	---	20	2,485	14,617	5,262	7,216	390	23	2,629	32,642
1935	---	---	---	---	---	1,202	9,478	10,494	17,227	8,704	309	585	47,999
1936	---	---	---	---	---	262	6,559	6,329	15,300	16,368	312	455	45,585
1937	---	---	---	---	445	---	5,461	14,445	17,698	30,409	1,789	---	70,247
1938	---	---	---	---	20	351	3,841	17,356	31,926	13,241	2,350	53	69,138
1939	---	---	---	---	27	381	1,962	6,287	28,214	21,522	2,098	---	60,491
1940	---	---	---	---	61	294	7,471	15,624	16,751	8,858	323	---	49,382
1941	---	---	---	---	76	1,761	8,868	14,304	11,773	9,645	1,063	---	47,490
1942	---	---	---	---	---	105	1,784	8,793	16,857	11,916	2,773	---	42,228
1943	---	---	---	---	---	62	412	3,217	10,406	5,526	1,034	---	20,657
1944	---	---	---	---	---	---	426	2,484	6,131	3,539	191	---	12,771
1945	---	---	---	---	---	191	169	1,433	7,532	4,510	1,040	---	14,875
1946	---	---	---	---	22	---	---	406	4,060	3,109	470	---	8,067
1947	---	---	---	---	12	19	---	392	7,437	4,393	206	---	12,459
1948	---	---	---	---	32	---	---	---	12,436	6,820	100	---	19,388
1949	---	---	---	---	25	---	---	---	5,092	2,651	25	---	7,793
1950	---	---	---	---	---	---	---	---	8,284	4,532	124	---	12,940
1951	---	---	---	---	---	---	---	---	6,099	2,045	---	---	8,144
1952	---	---	---	---	---	---	---	---	8,274	2,275	101	---	10,650
1953	---	---	---	---	---	---	---	---	10,346	11,369	1,078	---	22,793

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	---	13,440	2,974	2,021	---	18,435
1955	---	---	---	---	---	---	---	---	11,482	2,520	1,121	---	15,123
1956	---	---	---	---	---	---	---	---	5,124	799	283	---	6,206

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE SIUSLAW RIVER, 1923-1956.

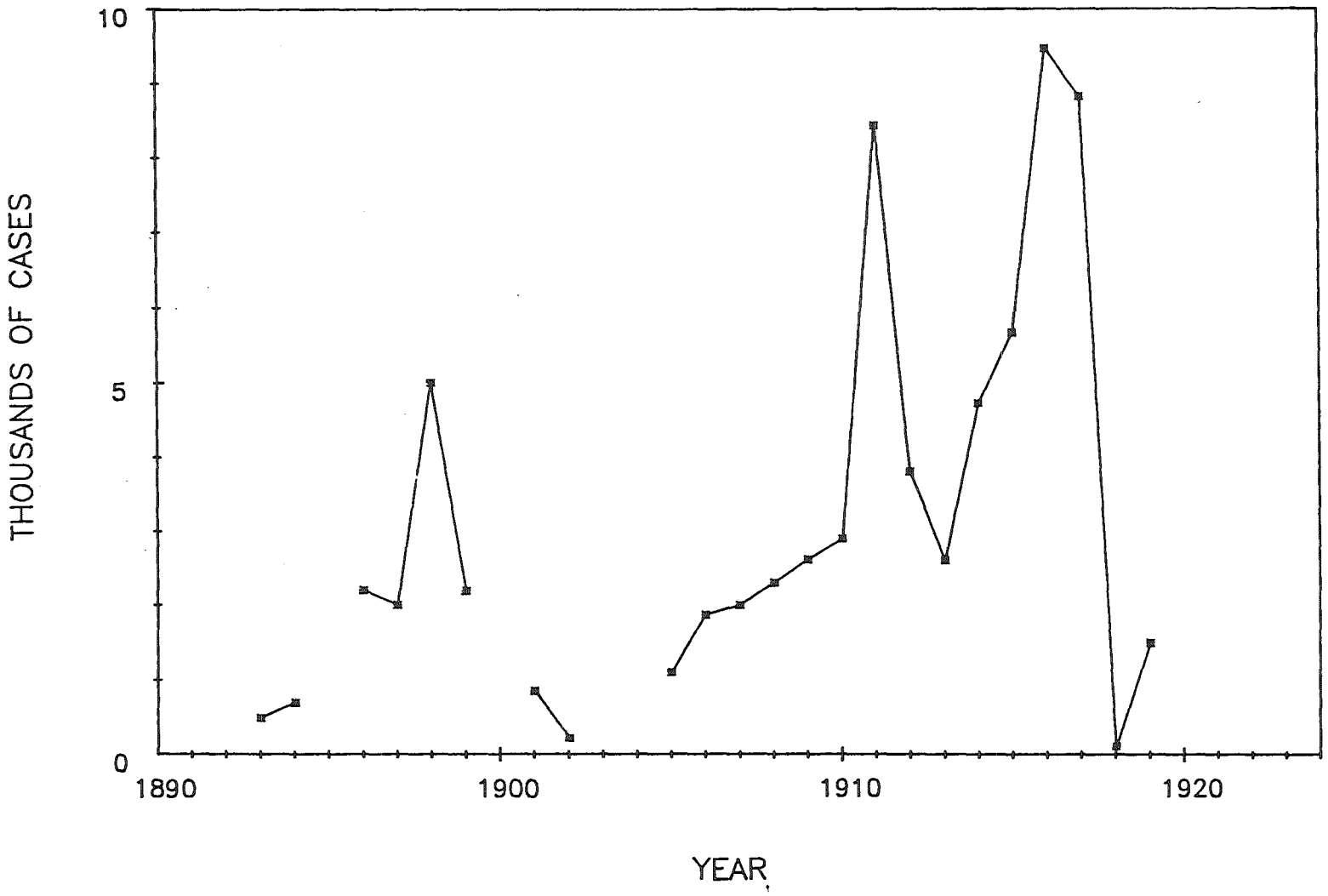
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	98,405	4
1924	161,752	7
1925	99,338	4
1926	73,296	3
1927	67,995	3
1928	62,268	3
1929	69,520	3
1930	41,603	2
1931	35,794	2
1932	51,841	2
1933	90,673	4
1934	32,642	1
1935	47,999	2
1936	45,585	2
1937	70,247	3
1938	69,138	3
1939	60,491	3
1940	49,382	2
1941	47,490	2
1942	42,228	2
1943	20,657	1
1944	12,771	1
1945	14,875	1
1946	8,067	<1
1947	12,459	1
1948	19,388	1
1949	7,793	<1
1950	12,940	1
1951	8,144	<1
1952	10,650	<1
1953	22,793	1
1954	18,435	1
1955	15,123	1
1956	6,206	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE SIUSLAW RIVER, 1923–1956.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON TILLAMOOK BAY, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	497	34	1
1894	700	48	2
1895	---	---	---
1896	2,200	150	7
1897	2,000	136	6
1898	5,000	340	15
1899	2,180	148	7
1900	---	---	---
1901	848	58	3
1902	215	15	1
1903	---	---	---
1904	---	---	---
1905	1,100	75	3
1906	1,870	127	6
1907	2,000	136	6
1908	2,300	156	7
1909	2,615	178	8
1910	2,900	197	9
1911	8,433	573	25
1912	3,811	259	11
1913	2,600	177	8
1914	4,734	322	14
1915	5,675	386	17
1916	9,465	644	28
1917	8,822	600	27
1918	107	7	<1
1919	1,500	102	5
1920	---	---	---
1921	---	---	---
1922	---	---	---



CASES OF CHINOOK SALMON CANNED ON TILLAMOOK BAY, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON TILLAMOOK BAY, BY MONTH, 1923-1961.

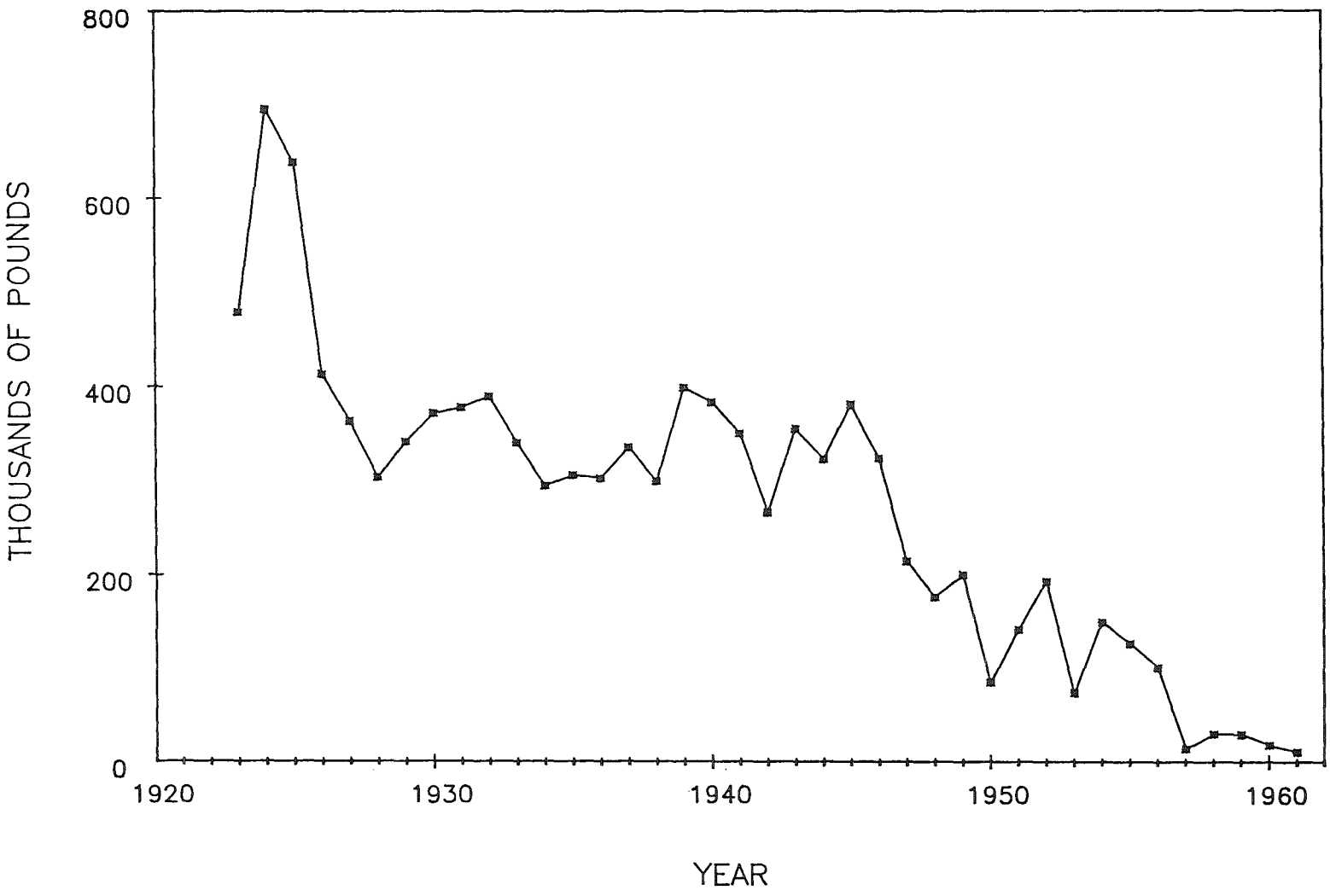
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	30,886	61,747	58,725	171,005	134,365	20,853	230	477,811
1924	63	---	---	---	---	64,663	118,006	105,348	219,964	174,379	11,789	515	694,727
1925	59	---	3,244	---	---	69,577	40,362	42,722	217,231	240,626	23,417	1,226	638,464
1926	35	---	---	---	---	36,730	36,271	21,260	134,037	155,280	27,396	1,012	412,021
1927	98	86	---	---	5,730	52,669	46,743	33,618	99,231	111,504	12,975	331	362,985
1928	28	---	---	---	12,310	54,958	43,357	24,650	50,518	102,297	14,575	526	303,219
1929	492	454	---	---	57,365	95,889	36,243	18,122	71,926	46,462	13,223	1,016	341,192
1930	---	19	---	---	82,866	93,750	26,615	8,937	71,901	79,798	7,293	323	371,502
1931	1,130	1,084	---	---	13,653	28,740	12,659	8,543	151,596	144,444	14,049	1,558	377,456
1932	4,247	---	---	---	27,309	45,683	28,108	16,648	113,750	140,061	12,563	844	389,213
1933	---	1,247	---	---	25,927	79,355	88,174	30,284	42,227	65,790	6,597	144	339,745
1934	3,398	---	---	---	20,869	86,160	49,597	30,207	43,696	56,145	3,818	141	294,031
1935	2,177	---	---	---	24,798	60,935	48,828	23,286	65,013	69,907	10,349	358	305,651
1936	24	2,219	---	---	15,896	31,221	16,398	15,403	50,627	158,670	10,570	760	301,788
1937	---	230	---	---	8,017	24,544	12,678	14,445	105,962	161,532	7,133	330	334,871
1938	32	331	---	---	2,809	27,486	14,315	12,800	83,471	138,130	18,699	611	298,684
1939	116	505	---	---	26,218	52,451	22,769	9,869	85,086	169,686	30,742	919	398,361
1940	60	1,400	---	---	30,036	42,587	25,315	18,315	117,156	137,196	9,977	424	382,466
1941	148	1,178	---	---	28,922	38,460	18,508	16,357	125,727	108,003	12,527	164	349,994
1942	277	224	---	---	10,879	15,488	5,131	8,709	20,555	185,763	18,381	653	266,060
1943	23	2,342	---	---	15,637	16,711	3,357	3,050	91,438	201,954	17,700	2,648	354,860
1944	---	1,107	---	---	11,963	9,240	6,665	4,590	97,188	171,172	19,154	1,401	322,480
1945	34	1,106	---	---	5,208	3,242	4,002	7,312	109,712	222,160	26,781	1,146	380,703
1946	5,072	158	---	---	2,999	2,085	2,243	4,393	69,490	202,605	32,506	1,682	323,233
1947	---	---	---	---	2,769	1,668	671	1,197	67,623	120,852	18,286	1,136	214,202
1948	---	---	---	---	---	---	---	2,838	55,168	92,748	24,172	1,065	175,991
1949	---	---	---	---	---	---	---	3,175	46,983	124,804	23,971	756	199,689
1950	---	---	---	---	---	---	---	70	14,204	39,938	25,691	4,886	84,789
1951	---	---	---	---	---	---	---	20	15,479	90,865	31,446	3,476	141,286
1952	---	---	---	---	---	---	---	457	10,943	111,060	67,265	3,491	193,216
1953	---	---	---	---	---	---	---	137	10,572	38,052	23,867	758	73,386

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	6,581	42,327	81,288	17,307	1,544	149,047
1955	---	---	---	---	---	---	---	3,929	35,505	69,336	15,708	1,434	125,912
1956	---	---	---	---	---	---	---	3,821	42,078	41,561	11,332	1,679	100,471
1957	---	---	---	---	---	---	---	---	---	---	13,021	---	13,021
1958	---	---	---	---	---	---	---	---	---	---	29,003	---	29,003
1959	---	---	---	---	---	---	---	---	---	---	28,542	---	28,542
1960	---	---	---	---	---	---	---	---	---	---	16,940	---	16,940
1961	---	---	---	---	---	---	---	---	---	---	9,814	---	9,814

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON TILLAMOOK BAY, 1923-1961.

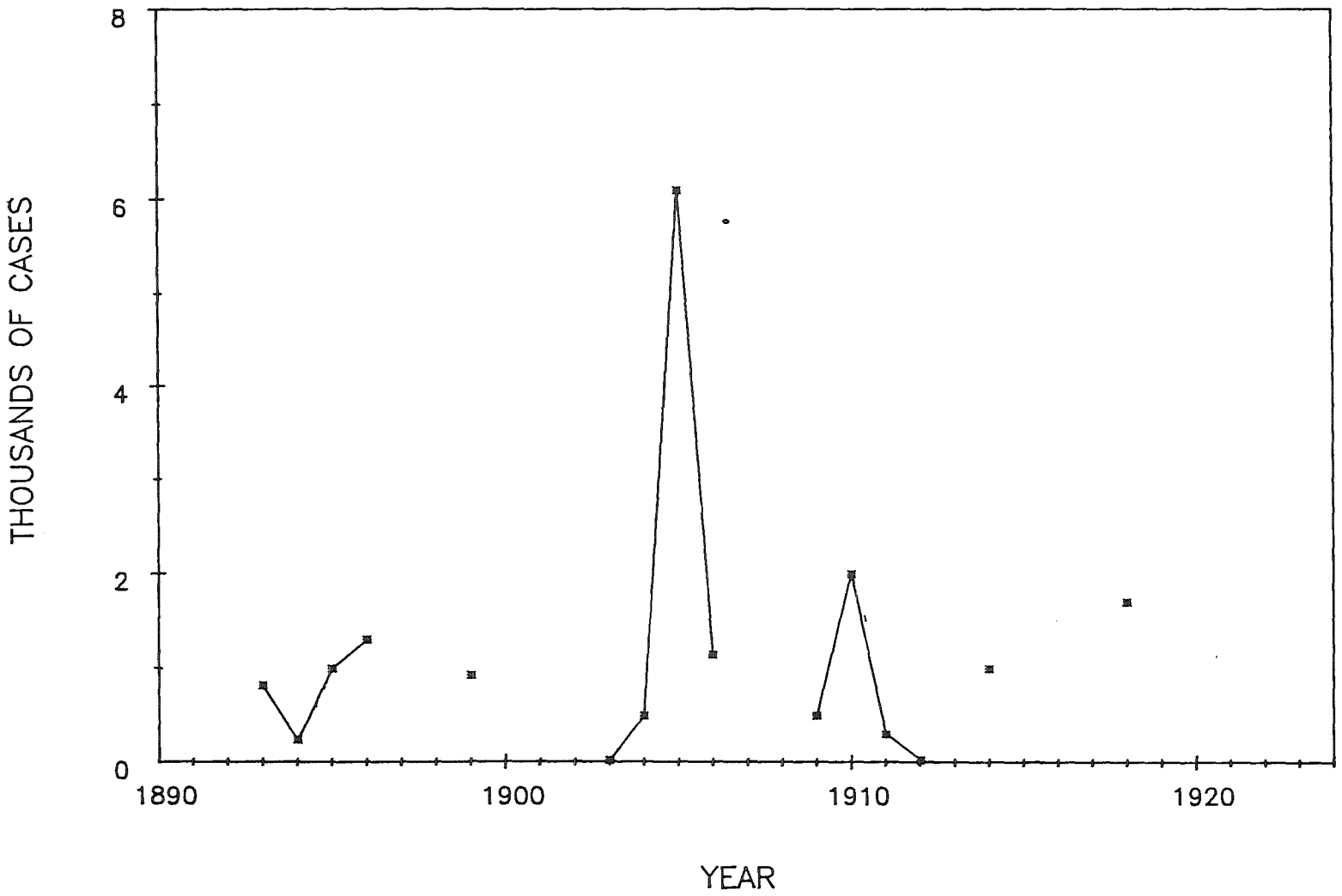
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	477,811	21
1924	694,727	31
1925	638,464	28
1926	412,021	18
1927	362,985	16
1928	303,219	13
1929	341,192	15
1930	371,502	16
1931	377,456	17
1932	389,213	17
1933	339,745	15
1934	294,031	13
1935	305,651	14
1936	301,788	13
1937	334,871	15
1938	298,684	13
1939	398,361	18
1940	382,466	17
1941	349,994	15
1942	266,060	12
1943	354,860	16
1944	322,480	14
1945	380,703	17
1946	323,233	14
1947	214,202	9
1948	175,991	8
1949	199,689	9
1950	84,789	4
1951	141,286	6
1952	193,216	9
1953	73,386	3
1954	149,047	7
1955	125,912	6
1956	100,471	4
1957	13,021	1
1958	29,003	1
1959	28,542	1
1960	16,940	1
1961	9,814	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON TILLAMOOK BAY, 1923–1961.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE UMPQUA RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	809	55	2
1894	235	16	1
1895	992	67	3
1896	1,300	88	4
1897	---	---	---
1898	---	---	---
1899	925	63	3
1900	---	---	---
1901	---	---	---
1902	---	---	---
1903	23	2	<1
1904	500	34	2
1905	6,100	415	18
1906	1,143	78	3
1907	---	---	---
1908	---	---	---
1909	500	34	2
1910	2,000	136	6
1911	300	20	1
1912	30	2	<1
1913	---	---	---
1914	1,000	68	3
1915	---	---	---
1916	---	---	---
1917	---	---	---
1918	1,703	116	5
1919	---	---	---
1920	---	---	---
1921	---	---	---
1922	---	---	---



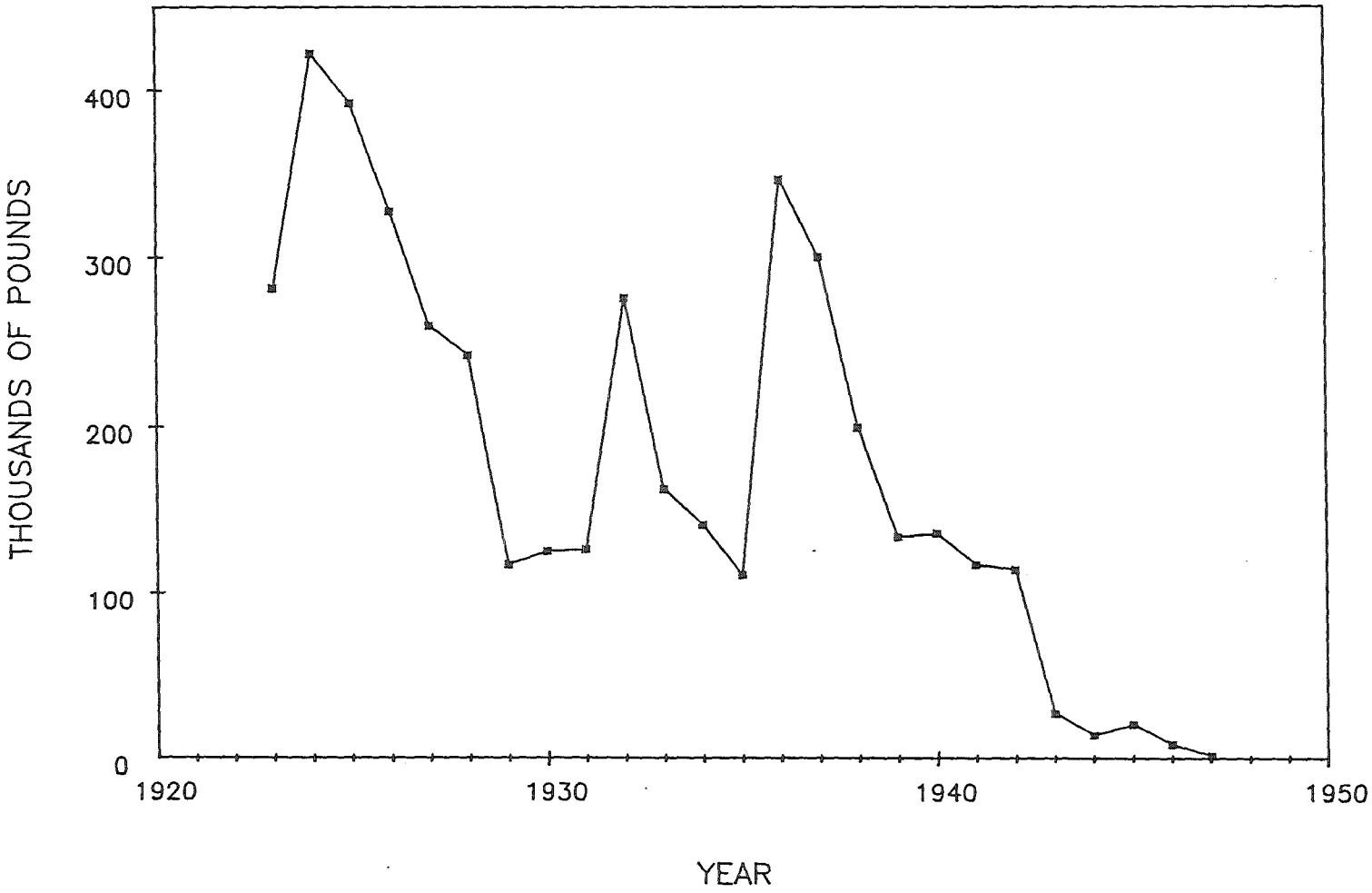
CASES OF CHINOOK SALMON CANNED ON THE UMPQUA RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE UMPQUA RIVER, BY MONTH, 1923-1947.

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	---	---	---	---	---	281,615
1924	---	---	---	---	---	---	---	---	---	---	---	---	421,589
1925	---	---	11,436	35,260	26,911	13,110	7,138	52,378	193,262	50,241	1,495	854	392,085
1926	---	921	17,864	36,659	22,395	27,486	23,788	38,488	99,957	55,921	3,879	94	327,452
1927	---	562	6,286	16,536	15,275	31,576	28,739	44,889	86,364	26,983	2,196	11	259,417
1928	---	---	---	26,800	14,716	21,309	16,186	32,374	91,900	34,368	4,386	---	242,039
1929	---	---	10,374	18,915	11,269	3,640	4,091	13,226	34,911	20,057	318	---	116,801
1930	---	---	---	13,724	13,937	6,708	2,107	15,447	52,238	20,018	991	34	125,204
1931	---	---	---	4,527	10,817	6,473	9,556	28,105	60,341	3,234	1,393	1,677	126,123
1932	---	---	---	20,831	50,333	29,026	29,157	43,018	55,892	47,370	337	---	275,964
1933	---	---	---	13,415	32,652	28,768	18,501	4,219	40,419	18,815	283	5,107	162,179
1934	---	---	---	268	13,057	17,340	13,674	35,497	47,191	12,940	582	323	140,872
1935	---	---	---	10,345	7,137	4,762	4,056	24,075	45,839	13,653	322	362	110,551
1936	---	---	---	14,569	22,535	6,922	12,564	54,580	168,830	61,699	4,943	---	346,642
1937	---	---	---	30,540	26,526	31,672	22,185	45,213	85,914	55,599	2,352	---	300,001
1938	---	---	---	10,963	1,951	13,546	13,451	49,769	78,821	27,585	2,727	---	198,813
1939	---	---	---	8,772	6,176	11,093	10,842	21,923	39,036	33,166	2,262	---	133,270
1940	---	---	---	4,183	10,680	20,682	21,665	33,077	32,776	11,879	743	---	135,685
1941	---	---	---	7,024	19,787	8,193	10,267	24,866	30,073	15,827	592	---	116,629
1942	---	---	---	7,229	25,399	9,881	1,587	10,255	41,843	16,275	1,268	---	113,737
1943	---	---	---	4,756	4,502	2,925	284	1,847	8,220	3,914	388	---	26,836
1944	---	---	---	5,271	1,239	249	189	318	3,744	2,661	207	---	13,878
1945	---	---	---	85	748	116	70	376	14,764	3,895	367	---	20,421
1946	---	---	---	788	1,135	241	956	635	1,609	2,537	334	---	8,235
1947	---	---	---	---	316	249	---	---	188	625	106	---	1,484

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE UMPQUA RIVER, 1923-1947.

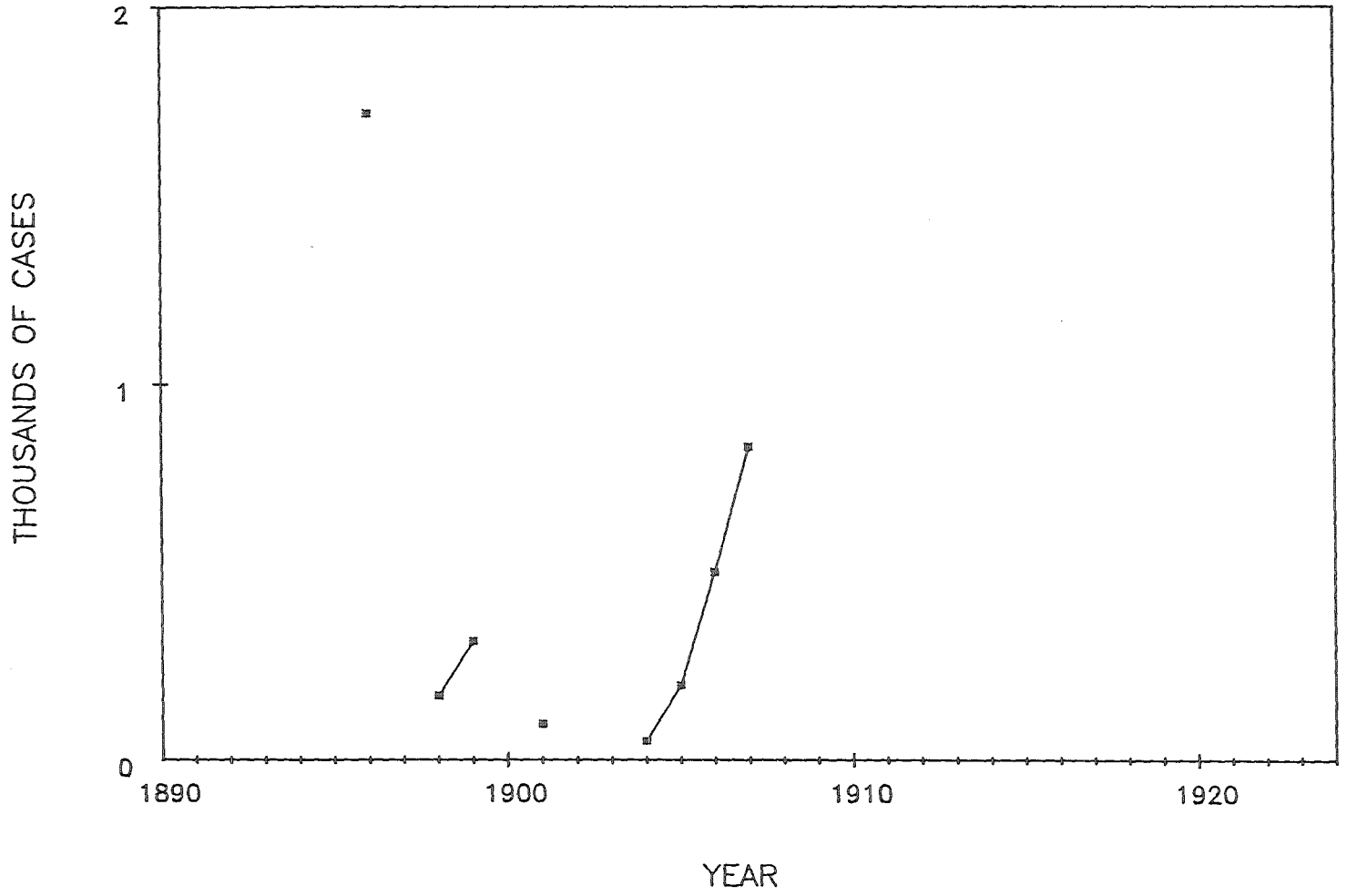
YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	281,615	12
1924	421,589	19
1925	392,085	17
1926	327,452	14
1927	259,417	11
1928	242,039	11
1929	116,801	5
1930	125,204	6
1931	126,123	6
1932	275,964	12
1933	162,179	7
1934	140,872	6
1935	110,551	5
1936	346,642	15
1937	300,001	13
1938	198,813	9
1939	133,270	6
1940	135,685	6
1941	116,629	5
1942	113,737	5
1943	26,836	1
1944	13,878	1
1945	20,421	1
1946	8,235	<1
1947	1,484	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE UMPQUA RIVER, 1923–1947.

CASES, ESTIMATED POUNDS (ROUND), AND ESTIMATED NUMBERS OF CHINOOK SALMON PACKED ON THE YAQUINA RIVER, 1892-1922.

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	---	---	---
1893	---	---	---
1894	---	---	---
1895	---	---	---
1896	1,714	117	5
1897	---	---	---
1898	170	12	1
1899	316	21	1
1900	---	---	---
1901	96	7	<1
1902	---	---	---
1903	---	---	---
1904	50	3	<1
1905	200	14	1
1906	500	34	2
1907	834	57	3
1908	---	---	---
1909	---	---	---
1910	---	---	---
1911	---	---	---
1912	---	---	---
1913	---	---	---
1914	---	---	---
1915	---	---	---
1916	---	---	---
1917	---	---	---
1918	---	---	---
1919	---	---	---
1920	---	---	---
1921	---	---	---
1922	---	---	---



CASES OF CHINOOK SALMON CANNED ON THE YAQUINA RIVER, 1892–1922.

POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE YAQUINA RIVER, BY MONTH, 1923-1956.

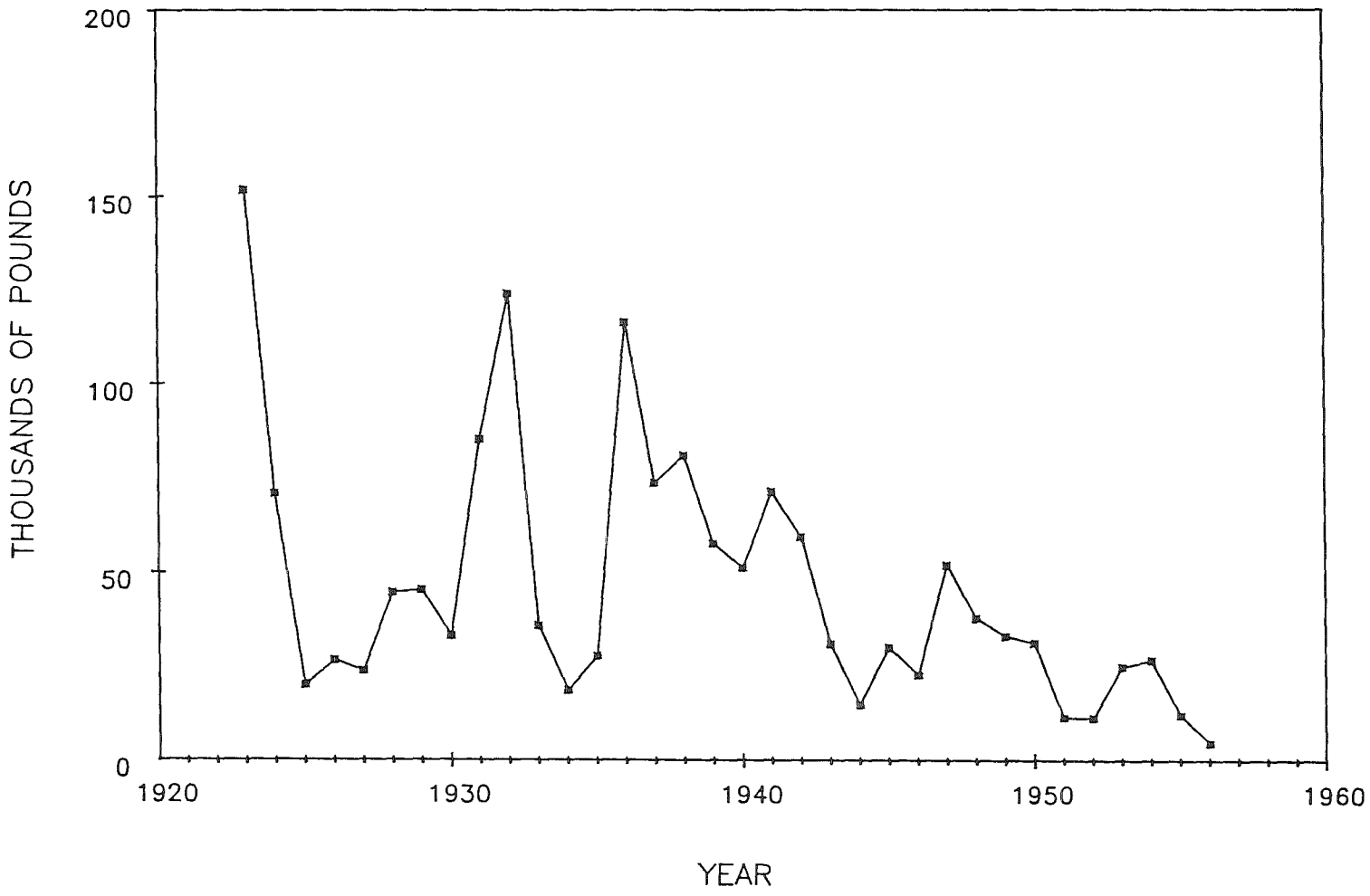
YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1923	---	---	---	---	---	---	---	825	125,531	23,981	1,496	54	151,887
1924	---	---	---	---	---	---	---	2,808	62,804	5,332	---	41	70,985
1925	---	---	---	---	---	---	---	---	16,293	3,890	---	---	20,183
1926	---	---	---	---	---	86	---	55	13,551	12,932	61	---	26,685
1927	---	---	---	---	---	---	---	2,546	15,491	5,861	60	---	23,958
1928	---	---	---	---	---	---	115	13,967	23,636	6,968	120	17	44,823
1929	---	---	---	---	---	---	---	5,023	33,564	6,796	147	---	45,530
1930	---	---	---	---	9	---	---	5,174	22,854	5,045	50	13	33,145
1931	---	---	---	---	---	---	1,617	11,433	52,923	19,257	181	---	85,411
1932	---	1,310	462	---	---	---	791	42,547	75,608	3,291	---	---	124,009
1933	---	1,416	---	---	---	323	1,745	1,538	26,993	3,200	217	350	35,782
1934	---	---	---	---	---	---	---	3,101	13,578	1,972	16	---	18,667
1935	---	714	658	---	---	---	339	159	22,539	3,179	227	---	27,815
1936	---	767	129	---	---	---	258	7,821	83,528	22,897	841	---	116,241
1937	---	50	221	---	---	---	---	4,410	40,033	28,716	211	---	73,641
1938	---	---	---	---	---	---	---	3,417	52,981	22,110	2,443	---	80,951
1939	---	---	---	---	---	---	---	2,912	36,961	16,235	1,446	---	57,554
1940	---	---	---	---	---	---	---	6,012	33,053	10,798	1,141	---	51,004
1941	---	---	---	---	---	---	350	21,517	31,478	17,378	635	---	71,358
1942	---	---	---	---	---	---	---	2,915	33,296	22,202	954	---	59,367
1943	---	---	---	27	---	36	---	3,147	18,150	7,869	1,696	---	30,925
1944	---	---	---	---	---	308	---	1,208	9,225	3,636	401	---	14,778
1945	---	---	---	---	---	---	---	---	17,372	12,261	456	---	30,089
1946	---	---	---	---	---	---	---	1,407	9,906	9,677	1,871	---	22,861
1947	---	---	---	---	---	---	---	2,715	21,935	26,172	1,096	---	51,918
1948	---	---	---	---	---	---	---	---	22,189	14,587	930	---	37,706
1949	---	---	---	---	---	---	---	---	15,523	15,875	1,585	---	32,983
1950	---	---	---	---	---	---	---	---	14,635	15,572	958	---	31,165
1951	---	---	---	---	---	---	---	---	7,971	3,554	---	---	11,525
1952	---	---	---	---	---	---	---	---	7,139	3,237	992	---	11,368
1953	---	---	---	---	---	---	---	---	14,976	9,273	710	---	24,959

CONTINUED

YEAR	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1954	---	---	---	---	---	---	---	---	16,259	7,243	3,215	---	26,717
1955	---	---	---	---	---	---	---	---	7,356	3,496	1,367	---	12,219
1956	---	---	---	---	---	---	---	---	3,209	1,357	172	---	4,738

POUNDS (ROUND) AND ESTIMATED NUMBER OF CHINOOK SALMON LANDED ON THE YAQUINA RIVER, 1923-1956.

YEAR	POUNDS	EST. NUMBER (THOUSANDS)
1923	151,887	7
1924	70,985	3
1925	20,183	1
1926	26,685	1
1927	23,958	1
1928	44,823	2
1929	45,530	2
1930	33,145	1
1931	85,411	4
1932	124,009	5
1933	35,782	2
1934	18,667	1
1935	27,815	1
1936	116,241	5
1937	73,641	3
1938	80,951	4
1939	57,554	3
1940	51,004	2
1941	71,358	3
1942	59,367	3
1943	30,925	1
1944	14,778	1
1945	30,089	1
1946	22,861	1
1947	51,918	2
1948	37,706	2
1949	32,983	1
1950	31,165	1
1951	11,525	1
1952	11,368	1
1953	24,959	1
1954	26,717	1
1955	12,219	1
1956	4,738	<1



POUNDS (ROUND) OF CHINOOK SALMON LANDED ON THE YAQUINA RIVER, 1923–1956.

Appendix A-7.

ESTIMATED HATCHERY RELEASES OF CHINOOK
FROM COASTAL STREAMS, FOR 1985 AND 1986

Stream	Hatchery Name	Fall	Spring
Alsea River	Fall Creek	220,000	
Burnt Hill Creek	OR Pacific		100,000
Coos Bay	Anadromous, Inc.	700,000	1,300,000
Coquille River	Bandon	0	
Elk River	Elk River	925,000	
Nehalem River	Nehalem		6,000
Nestucca River	Cedar Creek	94,000	68,000
Rogue River	Cole Rivers	105,000	1,192,000
Salmon River	Salmon River	210,000	
Siletz River	Siletz	0	0
Siuslaw River	DOMSEA	"nothing planned"	0
Trask River	Trask	338,000	
Umpqua River	Rock Creek	315,000	
Yaquina Bay	OreAqua	500,000	400,000

Adapted from: R. Wahle, draft, 1985.

Appendix A-8.

SUMMARY OF DISEASES BY HATCHERY

Hatchery	Stock	Disease incidence
Alsea	Trask	furunculosis, greytail, gill amoeba
Bandon	Lobster	Trichophrya
Cedar Creek	Nestucca	BGD, Hyamine 1622 toxicity, CWD, greytail, furunculosis, trichodina, muddy water stress
Cole Rivers	Rogue River	BKD, ceratomyxa, furunculosis, gill amoeba, columnaris (adults have everything, juveniles are disease free)
Elk River	Elk and Chetco	Gill amoeba, Enteric red mouth, Ichthyophthirius, mycobacteria furunculosis, costia, fungus, sunburn, greytail, CWD
Fall Creek	Fall Creek	---
North Nehalem	Trask	Furunculosis, gill amoeba, greytail, costia, fungus, CWD, columnaris, ichthyophthirius, enteric red mouth, poor water quality, ceratomyxa
Rock Creek	Umpqua	greytail, furunculosis, ichthyophthirius, enteric red mouth, columnaris, clubbed gill dropout
Salmon River	Salmon River	Furunculosis, CWD, costia, gill amoeba, ichthyophthirius, fungus, BGD, enteric red mouth, trichodina, eye lesions
Trask River	Trask River	Furunculosis, costia, gill amoeba, columnaris, BKD, greytail, ichthyophthirius, CWD, trichodina, handling stress, ceratomyxa

from: Tony Amandi, pers. comm. and based on data from three Fish Disease Reports, 1979-1982, for BY 1977 to 1981.

Appendix A-9.

SUSCEPTIBILITY OF PACIFIC SALMONIDS TO IHN VIRUS

Sockeye, Kokanee Salmon	very susceptible
Steelhead, Rainbow Trout	very susceptible
Cutthroat Trout	susceptible
Fall Chinook	moderately susceptible
Spring Chinook	resistant
Coho	refractory

from: Warren Groberg, pers. comm.

Appendix B Index

Appendix B-1.

STREAMS THAT ARE BELIEVED TO HAVE INDIGENOUS STOCKS
WITH NO DIRECT HATCHERY TRANSPLANTS IN RECENT YEARS
(from: McGie, pers. comm.)

Stream	Race
Beaver Creek	Ch.F.
Brush Creek	Ch.F.
Coquille River	Ch.F.
South Fork	Ch.F.; Ch.S.
Drift Creek (Alsea)	Ch.F.
Hunter Creek	Ch.F.
Illinois River (Rogue)	Ch.F.
Little Nestucca River	Ch.F.; Ch.S.
Siletz River	Ch.F.; Ch.S.
Schooner Creek	Ch.F.
Drift Creek	Ch.F.
Sixes River	Ch.F.
Smith River (Winchester Bay)	Ch.F.
Yachats River	Ch.F.

Ch.F. = fall chinook

Ch.S. = spring chinook

Appendix B-2.

ODFW SUMMARY OF STOCKING POLICY FOR

OREGON COASTAL STREAMS

(from McGie, pers. comm. and ODFW memo, 1982)

Stream	ODFW Management Designation	Race	Preferred Stock
Alsea River	routine stocking	Ch.F.; Ch.S.	Alsea
Drift Creek	wild fish management	Ch.F.	Alsea
Beaver Creek	wild fish management	Ch.F.	Alsea
Brush Creek	managed primarily for other species or stocks	Ch.F.	Elk
Burnt Hill	routine stocking	Ch.F.; Ch.S.	Chetco and Rogue (fall only)
Chetco	routine stocking	Ch.F.	Chetco
Coos Bay	routine stocking	Ch.F.; Ch.S.	Coos Bay (OAF/ANAD); Rogue; Chetco (if IHN-free)
Millicoma River	wild fish management	Ch.F.	Coos Bay, Chetco
South Fork Coos River	wild fish management	Ch.F.	Coos Bay
Coquille River	wild fish management	Ch.F.	Coquille
South Fork	wild fish management	Ch.F.	Coquille
	routine stocking	Ch.S.	Coquille
Elk River	routine stocking	Ch.F.	Elk
Euchre Creek	wild fish management	Ch.F.	Elk
Floras Creek	wild fish management	Ch.F.	Elk
Hunter Creek	wild fish management	Ch.F.	Chetco (if IHN-free)
Necanicum River	managed primarily for other species of stocks	Ch.F.	Trask
Nehalem River	wild fish management (stocking only for rehabilitation)	Ch.F.	Nehalem
Nestucca River	routine stocking	Ch.F.; Ch.S. ("non-distinct")	Nestucca

Little Nestucca	wild fish management	Ch.F.; Ch. S.	Nestucca
Pistol River	wild fish management	Ch.F.	Chetco (if IHN-free)
Rogue River	routine stocking	Ch.F.; Ch.S.	Rogue
Applegate River	wild fish management	Ch.F.	Applegate
	routine stocking	Ch.S.	Rogue
Illinois River	wild fish management	Ch.F.	Rogue
Salmon River	routine stocking	Ch.F.; Ch.S.	Salmon
Siletz River	wild fish management	Ch.F.; Ch.S.	Salmon, Alsea
Schooner Creek	wild fish management	Ch.F.	Salmon, Alsea
Drift Creek	wild fish management	Ch.F.	Salmon, Alsea
Siuslaw Bay	routine stocking	Ch.F.; Ch.S.	Siuslaw (DOMSEA)
Siuslaw River	wild fish management	Ch.F.	Rogue, Chetco (if IHN-free)
Sixes River	wild fish management	Ch.F.	Elk
Tillamook Bay	routine stocking	Ch.F.	Trask
Miami River	wild fish management	Ch.F.	Trask
Kilchis River	wild fish management	Ch.F.; Ch.S.	Trask
Wilson River	routine stocking	Ch.F.; Ch.S.	Trask
Trask River	routine stocking	Ch.F.; Ch.S.	Trask
Tillamook River	wild fish management	Ch.F.; Ch.S.	Trask
Winchester Bay	managed primarily for other species or stocks	Ch.F.; Ch.S.	Umpqua
Smith River	managed primarily for other species or stocks	Ch.F.	Umpqua
Umpqua River	routine stocking	Ch.F.	Umpqua
North Fork	wild fish management	Ch.F.	Umpqua
South Fork	routine stocking	Ch.S.	Umpqua
Winchuck	wild fish management	Ch.F.	Chetco (if IHN-free)
Yachats River	wild fish management	Ch.F.	Alsea
Yaquina Bay	routine stocking	Ch.F.; Ch.S.	Yaquina (UMF) Rogue, and Chetco (if IHN-free)
Yaquina River	wild fish management	Ch.F.	Yaquina

Ch.F. = fall chinook

Ch.S. = spring chinook

Appendix B-3.

COASTAL STREAMS WHERE SURPLUS EGGS HAVE BEEN AVAILABLE (TO 1982)

River/Stock	Race	Comments
Trask River	Ch. F.; Ch. S.	
Nestucca River	Ch. F.; Ch. S.	not "distinct" stocks
Salmon River	Ch. F.	
Umpqua River	Ch. S.	(recent shortages)
Elk River	Ch. F.	cannot be transferred because of IHN quarantine
Rogue River	Ch. S.	(recent shortages)
Chetco River	Ch. F.	cannot be transferred because of IHN quarantine

Brood stocks are not developed in:

Nehalem River	Ch. F.
Salmon River	Ch. S.
Alsea River	Ch. S.
Umpqua River	Ch. F.
Coquille River	Ch. F.

Brood stocks are being developed in:

Yaquina River (ODF)	Ch. S.; Ch. F.
Alsea River	Ch. F.
Siuslaw River (DOMSEA)	Ch.F.
Coos Bay (ODF/ANAD)	Ch. S.; Ch. F.
Coquille River	Ch. F.
Rogue River	Ch. F.
Applegate River	Ch. F.
Burnt Hill	Ch. S.; Ch. F.

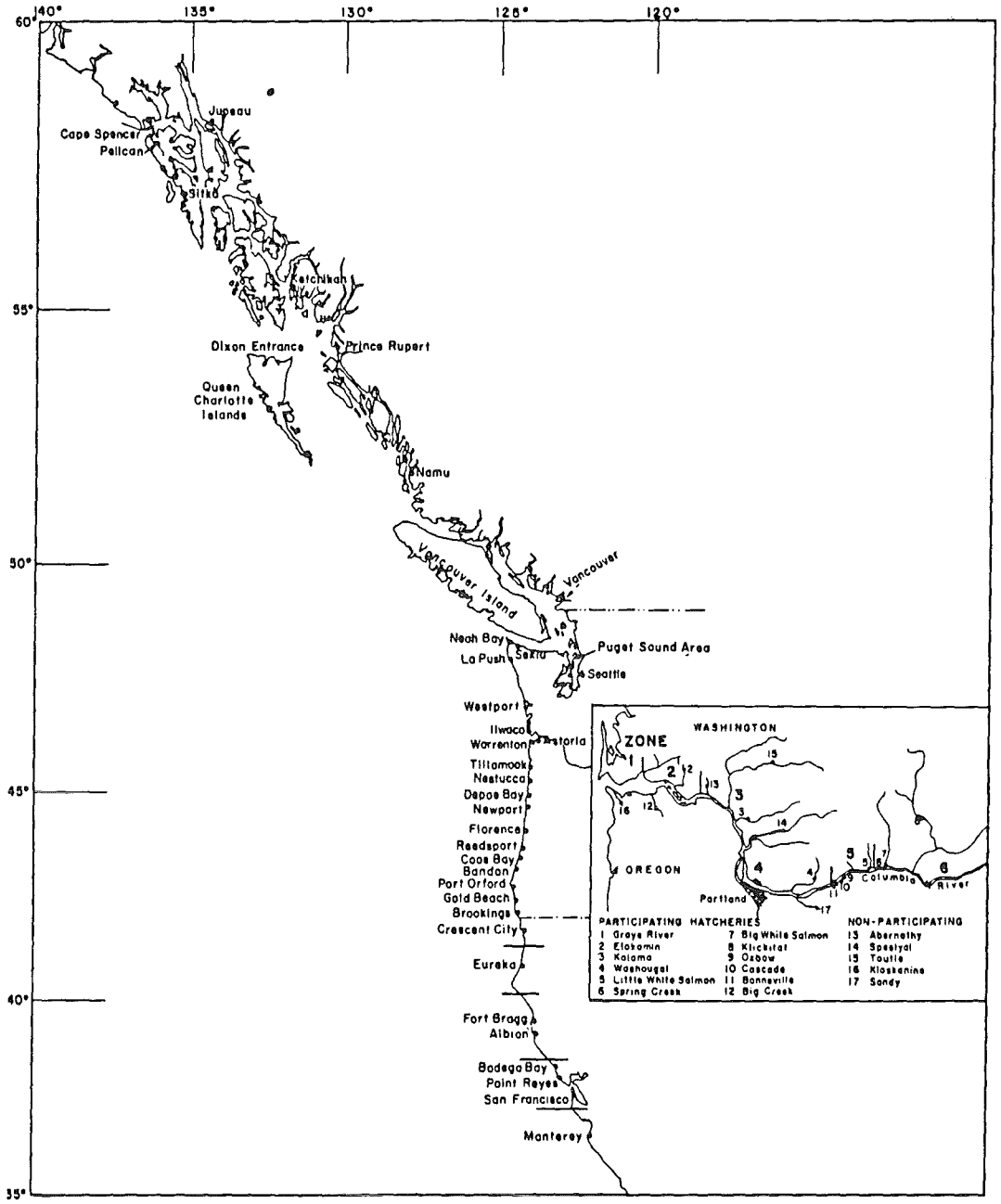
Ch. F. = fall Chinook

Ch. S. = spring Chinook

from: A. McGie, pers. comm.

Appendix B-4.

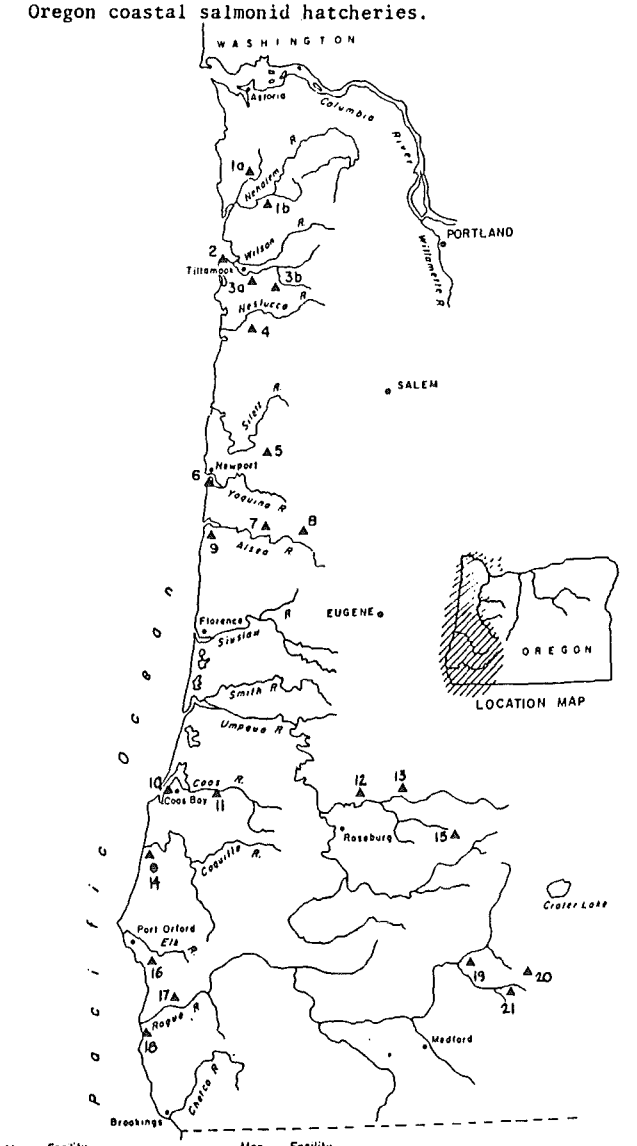
Hatcheries on the Columbia River and Oregon fishing ports.



From: Lander, 1970.

Appendix B-5.

Oregon coastal salmonid hatcheries.



Map No	Facility
1a	Nehalem
1b	Nehalem (old site)
2	Cape Mears Pond
3a	Trask
3b	Trask Pond
4	Cedar Creek
5	Siletz
6	Oregon Aqua-Foods
7	Lint Slough
8	Fall Creek (Alsea Salmon)
9	Alsea Trout
10	Anadromous Inc.
11	S. Coos
12	Whistlers' Bend Pond
13	Rock Creek
14	Bandon
15	Hemlock Meadows
16	Elk River
17	Libby Pond
18	Indian Creek Pond
19	Cole Rivers
20	Medco Pond
21	Butte Falls

From: Wahle and Smith, 1979.

Appendix C Index

APPENDIX C-1

THE NUMBER OF TROLL CAUGHT CHINOOK LANDED IN OREGON PORTS, 1952 to 1981.

From: Mullen, R., unpublished.

THE NUMBER OF TROLL-CAUGHT CHINOOK LANDED IN ALL OREGON PORTS

SPECIES.. YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
52	0	0	7233	19870	13687	37951	59136	72095	28046	9729	0	0	247747
53	0	0	2342	22550	4550	9355	32973	59124	19660	368	0	0	150922
54	0	0	11398	13438	9967	19487	45665	67498	27429	2514	0	0	197396
55	0	0	3882	15554	41494	54918	40159	100492	51276	2101	0	0	309876
56	0	0	0	24166	10263	41543	76859	157805	27616	4793	0	0	343045
57	0	0	0	4528	15671	51809	76911	77614	30227	157	0	0	256917
58	0	0	0	1722	14367	63016	53044	29223	10884	2620	0	0	174876
59	0	0	0	2950	4643	17341	10275	14287	3688	700	0	0	53884
60	0	0	0	2987	17047	12905	27745	48657	15007	3486	0	0	127834
61	0	0	0	1542	4559	19469	43534	29526	14545	2961	0	0	116136
62	0	0	0	736	2575	9874	14147	18345	6406	476	0	0	52559
63	0	0	0	2847	8027	28960	67816	39680	4699	742	0	0	152771
64	0	0	0	1366	8095	7588	17899	25797	5374	1386	0	0	67505
65	0	0	0	103	4179	10310	15994	14539	10850	1749	0	0	57724
66	0	0	0	660	8194	18471	31417	19715	15332	1780	0	0	95569
67	0	0	0	4396	8082	18652	34179	24321	9555	560	0	0	99745
68	0	0	0	4502	15937	14422	35793	37215	1555	726	0	0	110150
69	0	0	0	488	7470	51898	36769	34726	6074	2860	0	0	140285
70	0	0	0	1727	15154	35107	29004	43625	28290	11781	0	0	164688
71	0	0	0	1367	10743	23417	20605	38065	3465	5264	0	0	102926
72	0	0	0	16	6707	33681	32766	33670	11504	8943	0	0	127287
73	0	0	0	649	5596	25697	102817	145708	47884	34916	0	0	363267
74	0	0	0	496	13394	22639	58052	79420	37652	10561	1767	129	224110
75	0	0	0	130	5178	32204	68994	51760	56705	8821	859	57	224708
76	0	0	0	0	16405	33812	46771	53857	23187	8459	1854	0	184345
77	0	0	0	0	18359	50432	107568	116350	32701	10463	4141	0	340014
78	0	0	0	17	3199	40597	63087	46870	25023	9288	3451	0	191532
79	0	0	0	0	10872	375	80386	109738	16289	25726	2101	0	245487

Appendix C-1.2

THE NUMBER OF TROLL-CAUGHT CHINOOK LANDED IN ALL OREGON PORTS

SPECIES..	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG.	SEPT	OCT	NOV	DEC	TOTAL.
	80	0	0	0	0	25493	29554	39591	72524	25996	15154	1057	0	209369
CHINOOK	81	0	0	0	0	27825	740	29639	71604	16875	12344	1395	0	160422

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN ASTORIA

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	ASTORIA	52			7233	19870	13269	11397	6382	7438	2431	4945			72965
CHINOOK	ASTORIA	53			2329	22415	4375	4646	4430	3147	829	241			42412
CHINOOK	ASTORIA	54			11336	13409	6958	1240	1736	6538	3340	628			45185
CHINOOK	ASTORIA	55			3817	14547	6848	3921	4444	8561	2736	229			45103
CHINOOK	ASTORIA	56				23162	487	997	5089	6988	1220	231			38174
CHINOOK	ASTORIA	57				4196	2392	842	5171	2947	1256	11			16815
CHINOOK	ASTORIA	58				928	404	1441	2140	2691	276	81			7961
CHINOOK	ASTORIA	59				2196	414	1094	1222	2827	259	159			8171
CHINOOK	ASTORIA	60				1748	182	1420	2748	1686	657	113			8554
CHINOOK	ASTORIA	61				600	310	2205	1711	3008	1535	117			9486
CHINOOK	ASTORIA	62				102	728	2909	1422	1088	230	55			6534
CHINOOK	ASTORIA	63				2779	4886	4930	1033	1518	494	106			15746
CHINOOK	ASTORIA	64				1035	6133	1371	1475	526	962	47			11549
CHINOOK	ASTORIA	65				10	960	681	575	1233	769	631			4859
CHINOOK	ASTORIA	66				561	7047	6687	1351	821	1471	266			18204
CHINOOK	ASTORIA	67				2149	3541	4943	1479	6185	1465	27			19789
CHINOOK	ASTORIA	68				4238	12062	3448	1477	923	351	8			22507
CHINOOK	ASTORIA	69				115	925	5383	1834	1505	865	6			10633
CHINOOK	ASTORIA	70				1301	11658	7425	1687	1481	436	22			24010
CHINOOK	ASTORIA	71				1323	7820	4857	773	1029	219	39			16060
CHINOOK	ASTORIA	72				15	3309	3818	819	525	335	27			8848
CHINOOK	ASTORIA	73				480	3741	2258	950	733	291	160			8613
CHINOOK	ASTORIA	74				370	12648	1169	1733	1017	626	118			17681
CHINOOK	ASTORIA	75				81	4426	3447	1934	754	287	26			10955
CHINOOK	ASTORIA	76					13176	8445	3934	1523	814	210			28102
CHINOOK	ASTORIA	77					5754	8723	4231	1261	1218	697			21884
CHINOOK	ASTORIA	78					1104	5932	5036	1041	117	1966			15196
CHINOOK	ASTORIA	79					2527	130	1922	3823	1094	9			9505
CHINOOK	ASTORIA	80					5603	150	1203	2406	388	20			9770
CHINOOK	ASTORIA	81					10882	337	1952	548	20	21			13760
	ASTORIA														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN BANDON

SPECIES.. PORT..... YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK BANDON 52			0	0	0	0	294	285	312	0			891
CHINOOK BANDON 53			0	0	0	0	21	786	18	0			825
CHINOOK BANDON 54			0	0	6	12	81	4278	1444	0			5821
CHINOOK BANDON 55			0	0	23	763	1258	3750	832	0			6626
CHINOOK BANDON 56				0	0	14	180	2545	2187	0			4926
CHINOOK BANDON 57				0	0	504	3313	3690	278	0			7785
CHINOOK BANDON 58				0	42	1882	1579	620	304	2			4429
CHINOOK BANDON 59				10	28	538	119	84	0	0			779
CHINOOK BANDON 60				0	0	9	981	1785	620	25			3420
CHINOOK BANDON 61				3	0	76	277	283	238	0			877
CHINOOK BANDON 62				1	1	31	87	680	61	0			861
CHINOOK BANDON 63				0	0	413	2471	3535	17	0			6436
CHINOOK BANDON 64				0	3	167	391	2741	33	0			3335
CHINOOK BANDON 65				0	0	29	123	434	34	0			620
CHINOOK BANDON 66				0	0	68	588	1310	710	0			2676
CHINOOK BANDON 67				0	28	439	2286	1741	849	0			5343
CHINOOK BANDON 68				0	0	98	997	9006	12	0			10113
CHINOOK BANDON 69				0	117	1047	1943	6241	0	0			9348
CHINOOK BANDON 70				0	631	995	2200	3619	4139	412			11996
CHINOOK BANDON 71				0	38	366	400	2729	101	0			3634
CHINOOK BANDON 72				0	91	2052	1114	2946	113	3			6319
CHINOOK BANDON 73				0	0	1345	5753	8560	2819	120			18597
CHINOOK BANDON 74				0	0	417	1806	10735	7474	749			21181
CHINOOK BANDON 75				0	0	1248	3480	5066	6723	253			16770
CHINOOK BANDON 76					0	927	2844	6660	2717	954			14102
CHINOOK BANDON 77					2	2661	6844	11471	3791	280			25049
CHINOOK BANDON 78					0	1402	3760	3166	1608	11			9947
CHINOOK BANDON 79					5		2505	7514	435	24			10483
CHINOOK BANDON 80					0	2298	1579	3026	334	91			7328
CHINOOK BANDON 81					1		236	2619	0	0			2856
BANDON													

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN BROOKINGS

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	BROOKINGS	52			0	0	0	0	4	10	0	0			14
CHINOOK	BROOKINGS	53			0	0	0	0	6	13	0	0			19
CHINOOK	BROOKINGS	54			0	0	0	12	125	38	0	0			175
CHINOOK	BROOKINGS	55			0	0	0	91	185	114	3	0			393
CHINOOK	BROOKINGS	56				181	39	11	260	176	1	0			668
CHINOOK	BROOKINGS	57				0	84	263	136	201	6	2			692
CHINOOK	BROOKINGS	58				0	258	204	388	255	72	39			1216
CHINOOK	BROOKINGS	59				0	96	290	65	78	137	34			700
CHINOOK	BROOKINGS	60				0	0	107	1107	2426	4649	2415			10704
CHINOOK	BROOKINGS	61				85	2964	9950	14696	11306	173	468			39642
CHINOOK	BROOKINGS	62				165	1111	1233	5017	7809	638	97			16070
CHINOOK	BROOKINGS	63				4	1913	6451	26080	1980	1235	412			38075
CHINOOK	BROOKINGS	64				33	322	1317	8597	2490	1157	1232			15148
CHINOOK	BROOKINGS	65				59	984	2174	7790	2399	377	683			14466
CHINOOK	BROOKINGS	66				2	262	3544	2917	820	1050	1295			9890
CHINOOK	BROOKINGS	67				1988	3967	2843	7486	1200	715	492			18691
CHINOOK	BROOKINGS	68				2	1272	1328	5200	1721	252	383			10158
CHINOOK	BROOKINGS	69				11	2841	14579	6423	2020	168	1971			28013
CHINOOK	BROOKINGS	70				24	1287	8634	7638	9471	2230	714			29998
CHINOOK	BROOKINGS	71				1	1652	11578	13982	16736	816	2192			46957
CHINOOK	BROOKINGS	72				0	2490	7676	7547	2301	2583	5348			27945
CHINOOK	BROOKINGS	73				106	686	4344	12522	979	1094	3821			23552
CHINOOK	BROOKINGS	74				42	224	1503	4624	2251	2794	1090	781	108	13417
CHINOOK	BROOKINGS	75				3	208	3693	19619	2187	3448	1349	583	47	31137
CHINOOK	BROOKINGS	76					95	2364	4471	2413	3605	3453	758		17159
CHINOOK	BROOKINGS	77					1752	3066	12620	6689	3805	3601	1530		33063
CHINOOK	BROOKINGS	78					726	3969	2116	1338	2648	2274	1877		14948
CHINOOK	BROOKINGS	79					412		31164	19972	4804	13813	1252		71417
CHINOOK	BROOKINGS	80					5077	1224	2500	7154	9254	2036	772		28017
CHINOOK	BROOKINGS	81					4089	28	4246	34131	13372	9622	1022		66510
	BROOKINGS														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN COOS BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	COOS BAY	52			0	0	218	3500	10281	19161	3660	106			36926
CHINOOK	COOS BAY	53			0	0	0	1383	6054	10549	338	27			18351
CHINOOK	COOS BAY	54			0	1	1340	5470	7622	14658	5224	365			34680
CHINOOK	COOS BAY	55			65	251	9015	12652	8241	32497	13070	53			75844
CHINOOK	COOS BAY	56				0	1338	10322	17068	86469	10811	299			126307
CHINOOK	COOS BAY	57				160	7515	19300	30588	41389	5113	29			104094
CHINOOK	COOS BAY	58				16	8137	39910	17736	2094	1460	1020			70373
CHINOOK	COOS BAY	59				637	2044	7963	3021	657	443	163			14928
CHINOOK	COOS BAY	60				23	7792	6705	12307	25975	5445	303			58550
CHINOOK	COOS BAY	61				577	1004	3137	4243	5118	6817	940			21836
CHINOOK	COOS BAY	62				118	434	1513	1860	3599	3508	192			11224
CHINOOK	COOS BAY	63				7	630	8405	21506	12479	1376	159			44562
CHINOOK	COOS BAY	64				113	740	1633	2013	12791	1838	31			19159
CHINOOK	COOS BAY	65				22	601	2546	2670	4330	1829	75			12073
CHINOOK	COOS BAY	66				59	555	2366	4511	5178	7339	74			20082
CHINOOK	COOS BAY	67				6	164	2279	12864	8645	4439	9			28406
CHINOOK	COOS BAY	68				36	592	4603	17006	17770	151	2			40160
CHINOOK	COOS BAY	69				28	1647	17459	15892	16336	3701	131			55194
CHINOOK	COOS BAY	70				69	712	7499	8516	8602	13188	8706			47292
CHINOOK	COOS BAY	71				9	376	2677	1894	3553	969	2136			11614
CHINOOK	COOS BAY	72				1	210	10504	12034	5881	715	284			29629
CHINOOK	COOS BAY	73				7	182	7478	36064	71405	23225	11051			149412
CHINOOK	COOS BAY	74				14	159	10751	20696	40203	19609	7501	221		99154
CHINOOK	COOS BAY	75				25	120	10469	23821	18959	22892	6488			82774
CHINOOK	COOS BAY	76					973	11669	15883	15406	6566	1145			51642
CHINOOK	COOS BAY	77					5644	11584	31843	36744	8869	3567			98251
CHINOOK	COOS BAY	78					973	10553	19985	12071	2729	322	138		46771
CHINOOK	COOS BAY	79					1932	17	18241	32745	3266	7509			63710
CHINOOK	COOS BAY	80					3826	9950	17397	18687	7129	7425	4		64418
CHINOOK	COOS BAY	81					2357	59	4750	11202	1629	1550	47		21594
	COOS BAY														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN DEPOE BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	DEPOE BAY	52			0	0	14	1476	1551	2780	5047	855			11723
CHINOOK	DEPOE BAY	53			13	0	12	1124	1640	2182	277	27			5275
CHINOOK	DEPOE BAY	54			0	11	119	1849	2544	5016	491	117			10147
CHINOOK	DEPOE BAY	55			0	0	97	3566	998	1665	1473	130			7929
CHINOOK	DEPOE BAY	56				0	11	233	1929	2258	2672	966			8069
CHINOOK	DEPOE BAY	57				5	34	719	1159	2506	4842	26			9291
CHINOOK	DEPOE BAY	58				18	36	1217	5450	7372	1526	632			16251
CHINOOK	DEPOE BAY	59				0	21	490	1235	3692	817	155			6410
CHINOOK	DEPOE BAY	60				6	100	145	1051	2822	564	188			4876
CHINOOK	DEPOE BAY	61				16	12	451	1646	499	482	5			3111
CHINOOK	DEPOE BAY	62				6	3	47	195	347	324	2			924
CHINOOK	DEPOE BAY	63				1	3	128	230	796	67	46			1271
CHINOOK	DEPOE BAY	64				0	1	88	195	500	113	36			933
CHINOOK	DEPOE BAY	65				0	0	92	295	307	822	103			1619
CHINOOK	DEPOE BAY	66				0	0	195	323	926	232	6			1682
CHINOOK	DEPOE BAY	67				0	0	188	599	157	194	2			1140
CHINOOK	DEPOE BAY	68				0	4	120	371	633	85	7			1220
CHINOOK	DEPOE BAY	69				0	11	361	439	803	54	6			1674
CHINOOK	DEPOE BAY	70				0	4	1139	547	1092	317	55			3154
CHINOOK	DEPOE BAY	71				0	0	105	339	1153	12	14			1623
CHINOOK	DEPOE BAY	72				0	0	478	868	3920	79	54			5399
CHINOOK	DEPOE BAY	73				0	0	545	3734	3014	2899	1428			11620
CHINOOK	DEPOE BAY	74				0	17	769	3383	924	741	7			5841
CHINOOK	DEPOE BAY	75				0	10	627	902	1236	141	0			2916
CHINOOK	DEPOE BAY	76					1	450	1337	832	49	74			2743
CHINOOK	DEPOE BAY	77					170	1427	1645	1461	200	128			5031
CHINOOK	DEPOE BAY	78					0	276	1105	510	56	1			1948
CHINOOK	DEPOE BAY	79					33		461	422	4	0			920
CHINOOK	DEPOE BAY	80					0	0	308	330	3	0			641
CHINOOK	DEPOE BAY	81					33		682	521	13	0			1249
	DEPOE BAY														

Appendix C-1.8

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN GARIBALDI

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	GARIBALDI	52			0	0	61	349	220	89	69	5			793
[illegible]NOOK	GARIBALDI	53			0	0	53	30	122	454	81	0			740
[illegible]NOOK	GARIBALDI	54			0	9	0	35	241	2700	32	0			3017
CHINOOK	GARIBALDI	55			0	0	356	60	604	3328	431	0			4779
CHINOOK	GARIBALDI	56				0	32	4	592	874	118	0			1620
CHINOOK	GARIBALDI	57				0	0	424	1206	243	109	11			1993
CHINOOK	GARIBALDI	58				0	0	734	976	310	23	2			2045
CHINOOK	GARIBALDI	59				0	11	196	226	646	53	7			1139
CHINOOK	GARIBALDI	60				10	4	142	245	286	48	0			735
CHINOOK	GARIBALDI	61				9	1	79	126	308	80	25			628
CHINOOK	GARIBALDI	62				0	1	86	50	75	14	1			227
CHINOOK	GARIBALDI	63				0	0	4	51	396	227	15			693
CHINOOK	GARIBALDI	64				0	0	44	284	608	73	6			1015
CHINOOK	GARIBALDI	65				0	0	39	103	249	723	40			1154
CHINOOK	GARIBALDI	66				0	56	18	846	332	158	0			1410
CHINOOK	GARIBALDI	67				0	14	1150	766	1135	38	0			3103
CHINOOK	GARIBALDI	68				0	30	198	1985	845	19	0			3077
CHINOOK	GARIBALDI	69				0	225	1387	441	1202	252	135			3642
CHINOOK	GARIBALDI	70				0	1	1057	1186	338	116	25			2723
CHINOOK	GARIBALDI	71				0	12	284	294	957	46	3			1596
CHINOOK	GARIBALDI	72				0	54	434	441	1320	70	11			2330
CHINOOK	GARIBALDI	73				11	75	230	602	2222	947	323			4410
CHINOOK	GARIBALDI	74				0	55	270	1195	2565	673	135			4893
CHINOOK	GARIBALDI	75				0	6	418	1353	1155	360	4			3296
CHINOOK	GARIBALDI	76					1130	2707	1150	1144	346	51			6528
CHINOOK	GARIBALDI	77					143	9533	8287	1802	1224	331			21320
CHINOOK	GARIBALDI	78					23	1829	2871	689	144	139			5695
[illegible]OOK	GARIBALDI	79					128	144	1228	1664	25	156			3345
CHINOOK	GARIBALDI	80					575	304	466	2703	327	46			4421
CHINOOK	GARIBALDI	81					516		2816	1576	155	26			5089
	GARIBALDI														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN GOLD BEACH

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	GOLD BEACH	52			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	53			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	54			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	55			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	56				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	57				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	58				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	59				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	60				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	61				0	10	160	100	52	55	5			382
CHINOOK	GOLD BEACH	62				9	6	2	1	21	11	1			51
CHINOOK	GOLD BEACH	63				0	0	0	80	73	2	0			155
CHINOOK	GOLD BEACH	64				0	11	16	147	58	17	0			249
CHINOOK	GOLD BEACH	65				0	3	76	167	238	96	0			580
CHINOOK	GOLD BEACH	66				0	16	185	49	185	244	1			680
CHINOOK	GOLD BEACH	67				0	41	50	218	42	0	0			351
CHINOOK	GOLD BEACH	68				0	14	9	576	570	60	0			1229
CHINOOK	GOLD BEACH	69				0	0	442	192	666	26	0			1326
CHINOOK	GOLD BEACH	70				0	0	201	260	403	35	0			899
CHINOOK	GOLD BEACH	71				0	0	182	1001	2496	226	0			3905
CHINOOK	GOLD BEACH	72				0	10	1016	2027	4281	3051	155			10540
CHINOOK	GOLD BEACH	73				0	11	700	5745	1989	1140	54			9639
CHINOOK	GOLD BEACH	74				0	0	237	1578	773	457	0			3045
CHINOOK	GOLD BEACH	75				0	0	660	2714	821	1118	2			5315
CHINOOK	GOLD BEACH	76					0	74	1982	5465	3039	0			10560
CHINOOK	GOLD BEACH	77					0	206	11769	9152	3187	123			24437
CHINOOK	GOLD BEACH	78					1	950	2564	4639	2856	41			11051
CHINOOK	GOLD BEACH	79					1	67	2380	18062	963	147			21620
CHINOOK	GOLD BEACH	80					475	414	766	6206	2239	21	5		10126
CHINOOK	GOLD BEACH	81					57		149	4681	66	8			4961
	GOLD BEACH														

Appendix C-1.10

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN NEWPORT

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	NEWPORT	52			0	0	84	15925	33394	27433	15443	3808			96087
[illegible]OOK	NEWPORT	53			0	135	107	1466	16238	30489	16895	67			65397
CHINOOK	NEWPORT	54			62	0	1235	8061	20786	17512	9792	655			58103
CHINOOK	NEWPORT	55			0	292	15488	21817	14571	33969	28916	1659			116712
CHINOOK	NEWPORT	56				430	4698	20091	35290	33934	8828	3239			106510
CHINOOK	NEWPORT	57				147	3080	18311	21748	8079	16466	54			67885
CHINOOK	NEWPORT	58				747	3073	5305	17344	12640	4240	616			43965
CHINOOK	NEWPORT	59				92	1262	3530	1868	5387	1574	104			13817
CHINOOK	NEWPORT	60				836	7086	2884	5198	10257	1311	390			27962
CHINOOK	NEWPORT	61				238	180	2582	15691	4687	3513	1169			28060
CHINOOK	NEWPORT	62				259	186	1819	2105	2569	1158	102			8198
CHINOOK	NEWPORT	63				5	117	3080	2079	2978	846	4			9109
CHINOOK	NEWPORT	64				185	738	1277	912	2461	599	25			6197
CHINOOK	NEWPORT	65				0	110	2822	2204	3061	6028	209			14434
CHINOOK	NEWPORT	66				38	182	3425	3360	5056	1794	135			13990
CHINOOK	NEWPORT	67				198	262	6060	5794	3089	933	25			16361
CHINOOK	NEWPORT	68				207	1566	2445	1685	1611	186	11			7711
CHINOOK	NEWPORT	69				305	1470	6042	3520	1298	190	14			12839
CHINOOK	NEWPORT	70				291	684	3306	2591	10731	3527	1537			22667
CHINOOK	NEWPORT	71				34	739	1531	1135	2977	460	46			6922
CHINOOK	NEWPORT	72				0	425	2264	2785	5726	1351	1931			14482
CHINOOK	NEWPORT	73				38	820	4695	15472	37781	10687	15570			85063
CHINOOK	NEWPORT	74				64	247	5570	15692	7104	2911	152			31740
CHINOOK	NEWPORT	75				9	361	6261	5287	7674	1512	189			21293
CHINOOK	NEWPORT	76					581	3612	8865	11337	1189	1616			27200
CHINOOK	NEWPORT	77					3283	9696	10241	30116	2883	369			56588
CHINOOK	NEWPORT	78					259	7991	15189	14655	11408	2566	106		52174
[illegible]OOK	NEWPORT	79					4473	16	12491	11157	5106	3088	2		36333
CHINOOK	NEWPORT	80					7238	9297	4647	14237	2846	4696	1		42962
CHINOOK	NEWPORT	81					8707	316	7429	8078	327	571			25428
	NEWPORT														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN PACIFIC CITY

SPECIES.. PORT..... YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK PACIFIC CITY 52			0	0	0	0	16	2	12	0			30
NOOK PACIFIC CITY 53			0	0	0	0	3	7	0	0			10
CHINOOK PACIFIC CITY 54			0	0	0	2	81	48	0	0			131
CHINOOK PACIFIC CITY 55			0	0	0	10	112	37	40	0			199
CHINOOK PACIFIC CITY 56				0	2	31	299	768	18	1			1119
CHINOOK PACIFIC CITY 57				0	0	47	173	44	143	6			413
CHINOOK PACIFIC CITY 58				0	4	6	635	455	161	0			1261
CHINOOK PACIFIC CITY 59				0	12	92	152	300	27	14			597
CHINOOK PACIFIC CITY 60				0	7	30	89	50	84	0			260
CHINOOK PACIFIC CITY 61				0	0	7	63	91	37	4			202
CHINOOK PACIFIC CITY 62				0	0	0	6	33	46	0			85
CHINOOK PACIFIC CITY 63				0	0	3	21	53	13	0			90
CHINOOK PACIFIC CITY 64				0	0	4	38	114	164	0			320
CHINOOK PACIFIC CITY 65				0	0	8	9	17	43	0			77
CHINOOK PACIFIC CITY 66				0	1	33	210	191	51	0			486
CHINOOK PACIFIC CITY 67				0	2	69	110	237	96	0			514
CHINOOK PACIFIC CITY 68				0	0	149	568	859	249	296			2121
CHINOOK PACIFIC CITY 69				0	2	238	271	615	245	86			1457
CHINOOK PACIFIC CITY 70				34	36	606	274	409	334	60			1753
CHINOOK PACIFIC CITY 71				0	1	83	170	910	235	17			1416
CHINOOK PACIFIC CITY 72				0	11	240	281	1073	154	13			1772
CHINOOK PACIFIC CITY 73				0	0	242	820	1552	565	113			3292
CHINOOK PACIFIC CITY 74				0	0	410	1103	820	261	52			2646
CHINOOK PACIFIC CITY 75				0	1	490	824	1191	46	0			2552
CHINOOK PACIFIC CITY 76					0	839	868	751	51	39			2548
CHINOOK PACIFIC CITY 77					7	594	2682	1292	158	92			4825
CHINOOK PACIFIC CITY 78					1	489	968	860	63	62			2443
NOOK PACIFIC CITY 79					1		315	619	6	3			944
CHINOOK PACIFIC CITY 80					2	13	229	1277	146	8			1675
CHINOOK PACIFIC CITY 81					2		1414	1098	12	38			2564

PACIFIC CITY

Appendix C-1.12

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN PORT ORFORD

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	PORT ORFORD	52			0	0	0	2777	2761	8594	920	0			15052
[illegible]NOOK	PORT ORFORD	53			0	0	0	93	1525	6213	32	0			7863
[illegible]NOOK	PORT ORFORD	54			0	0	0	140	1576	9425	898	0			12039
CHINOOK	PORT ORFORD	55			0	0	0	1755	1980	4233	936	0			8904
CHINOOK	PORT ORFORD	56				0	2	341	2980	8379	12	0			11714
CHINOOK	PORT ORFORD	57				0	11	2926	5925	13198	821	0			22881
CHINOOK	PORT ORFORD	58				0	752	8793	2946	618	1764	135			15008
CHINOOK	PORT ORFORD	59				0	13	1258	1905	272	156	32			3636
CHINOOK	PORT ORFORD	60				0	22	593	1858	1201	919	0			4593
CHINOOK	PORT ORFORD	61				0	0	11	129	961	118	0			1219
CHINOOK	PORT ORFORD	62				0	0	25	28	639	66	0			758
CHINOOK	PORT ORFORD	63				0	14	549	3390	6108	30	0			10091
CHINOOK	PORT ORFORD	64				0	0	351	1603	1731	217	0			3902
CHINOOK	PORT ORFORD	65				0	1	919	1072	1912	6	0			3910
CHINOOK	PORT ORFORD	66				0	0	192	16250	3628	2044	0			22114
CHINOOK	PORT ORFORD	67				0	23	379	1808	1563	730	0			4503
CHINOOK	PORT ORFORD	68				4	17	221	4107	2459	110	19			6937
CHINOOK	PORT ORFORD	69				17	89	2923	3529	2738	172	511			9979
CHINOOK	PORT ORFORD	70				8	65	2711	2690	5425	3786	250			14935
CHINOOK	PORT ORFORD	71				0	97	1149	146	4609	17	770			6788
CHINOOK	PORT ORFORD	72				0	102	3905	2748	5531	2727	762			15775
CHINOOK	PORT ORFORD	73				0	37	2501	8288	6494	3375	834			21529
CHINOOK	PORT ORFORD	74				6	2	1085	3316	11205	1719	705	765	21	18824
CHINOOK	PORT ORFORD	75				1	4	1685	4316	8644	18755	506	276	10	34197
CHINOOK	PORT ORFORD	76					15	673	2120	5144	4586	846	1096		14480
CHINOOK	PORT ORFORD	77					2	1705	10571	7458	6814	1186	2611		30347
CHINOOK	PORT ORFORD	78					9	5509	5145	4482	2877	1900	1330		21252
[illegible]OOK	PORT ORFORD	79					0		2840	9393	465	896	847		14441
CHINOOK	PORT ORFORD	80					725	2436	4916	14312	2238	769	275		25671
CHINOOK	PORT ORFORD	81					719		2099	5805	1217	498	326		10664
	PORT ORFORD														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN SIUSLAW BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	SIUSLAW BAY	52			0	0	35	1804	2959	5003	33	4			9838
CHINOOK	SIUSLAW BAY	53			0	0	0	494	2525	4723	1083	0			8825
CHINOOK	SIUSLAW BAY	54			0	0	87	1385	4255	5769	4925	652			17073
CHINOOK	SIUSLAW BAY	55			0	0	250	1328	541	5537	1541	0			9197
CHINOOK	SIUSLAW BAY	56				0	636	1504	7215	3062	213	0			12630
CHINOOK	SIUSLAW BAY	57				0	429	2333	3427	2941	548	2			9680
CHINOOK	SIUSLAW BAY	58				0	382	711	2086	1487	786	0			5452
CHINOOK	SIUSLAW BAY	59				0	495	1408	226	200	126	6			2461
CHINOOK	SIUSLAW BAY	60				339	1448	727	1878	1060	180	3			5635
CHINOOK	SIUSLAW BAY	61				8	0	636	3818	638	929	173			6202
CHINOOK	SIUSLAW BAY	62				62	65	1908	2955	650	295	23			5958
CHINOOK	SIUSLAW BAY	63				49	114	4130	10196	9084	279	0			23852
CHINOOK	SIUSLAW BAY	64				0	85	1145	1933	1149	27	8			4347
CHINOOK	SIUSLAW BAY	65				12	1357	655	455	339	108	0			2926
CHINOOK	SIUSLAW BAY	66				0	40	1417	481	746	53	0			2737
CHINOOK	SIUSLAW BAY	67				0	0	40	171	40	1	0			252
CHINOOK	SIUSLAW BAY	68				0	56	156	74	89	3	0			378
CHINOOK	SIUSLAW BAY	69				0	0	44	25	32	11	0			112
CHINOOK	SIUSLAW BAY	70				0	0	108	50	275	0	0			433
CHINOOK	SIUSLAW BAY	71				0	0	28	123	247	110	0			508
CHINOOK	SIUSLAW BAY	72				0	0	386	309	39	5	0			739
CHINOOK	SIUSLAW BAY	73				0	0	116	2161	3025	129	47			5478
CHINOOK	SIUSLAW BAY	74				0	5	24	694	487	54	18			1282
CHINOOK	SIUSLAW BAY	75				0	0	485	1996	2197	243	0			4921
CHINOOK	SIUSLAW BAY	76					12	339	767	1110	8	42			2278
CHINOOK	SIUSLAW BAY	77					2	110	1269	747	179	0			2307
CHINOOK	SIUSLAW BAY	78					1	553	972	267	331	0			2124
[illegible]OOK	SIUSLAW BAY	79					143	1	1942	1648	27	1			3762
CHINOOK	SIUSLAW BAY	80					1268	505	1387	664	107	5			3936
CHINOOK	SIUSLAW BAY	81					331		1463	487	0	5			2286
	SIUSLAW BAY														

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN WINCHESTER

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	WINCHESTER	52			0	0	6	723	1274	1300	119	6			3428
CHINOOK	WINCHESTER	53			0	0	3	119	409	561	107	6			1205
CHINOOK	WINCHESTER	54			0	8	222	1281	6618	1516	1283	97			11025
CHINOOK	WINCHESTER	55			0	464	9417	8955	7225	6801	1298	30			34190
CHINOOK	WINCHESTER	56				393	3018	7995	5957	12352	1536	57			31308
CHINOOK	WINCHESTER	57				20	2126	6140	4065	2376	645	16			15388
CHINOOK	WINCHESTER	58				13	1279	2813	1764	681	272	93			6915
CHINOOK	WINCHESTER	59				15	246	466	233	143	90	26			1219
CHINOOK	WINCHESTER	60				25	405	141	282	1104	510	45			2512
CHINOOK	WINCHESTER	61				6	78	175	1022	2575	560	55			4471
CHINOOK	WINCHESTER	62				10	39	298	416	821	52	1			1637
CHINOOK	WINCHESTER	63				1	93	841	673	673	113	0			2394
CHINOOK	WINCHESTER	64				0	59	168	294	602	152	0			1275
CHINOOK	WINCHESTER	65				0	148	269	516	0	0	0			933
CHINOOK	WINCHESTER	66				0	35	341	528	273	186	3			1366
CHINOOK	WINCHESTER	67				55	40	212	598	287	95	5			1292
CHINOOK	WINCHESTER	68				15	324	1647	1747	729	77	0			4539
CHINOOK	WINCHESTER	69				12	143	1993	2260	1270	390	0			6068
CHINOOK	WINCHESTER	70				0	76	1426	1365	1779	182	0			4828
CHINOOK	WINCHESTER	71				0	8	577	348	669	254	47			1903
CHINOOK	WINCHESTER	72				0	5	908	1793	127	321	355			3509
CHINOOK	WINCHESTER	73				7	44	1243	10706	7954	713	1395			22062
CHINOOK	WINCHESTER	74				0	37	434	2232	1336	333	34			4406
CHINOOK	WINCHESTER	75				11	42	2721	2748	1876	1180	4			8582
CHINOOK	WINCHESTER	76					422	1713	2550	2072	217	29			7003
CHINOOK	WINCHESTER	77					1600	1127	5566	8157	373	89			16912
CHINOOK	WINCHESTER	78				17	102	1144	3376	3152	186	6			7983
CHINOOK	WINCHESTER	79					1217		4897	2719	94	80			9007
CHINOOK	WINCHESTER	80					704	2963	4193	1522	985	37			10404
CHINOOK	WINCHESTER	81					131		2403	858	64	5			3461
	WINCHESTER														

Appendix C-1.15

NUMBER OF SALMON LANDED BY THE TROLL FISHERY IN MISCELLANEOUS PORTS

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	Misc.	59					1	16	3	1	6				27
CHINOOK		60					1	2	1	5	20	4			33
100K		61							12	0	8				20
CHINOOK		62				4	1	3	5	14	3	2			32
CHINOOK		63				1	257	26	6	7					297
CHINOOK		64					3	7	17	26	22	1			76
CHINOOK		65					15		15	20	15	8			73
CHINOOK		66							3	249					252

Misc.

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APPENDIX C-2

TOTAL CHINOOK POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN OREGON PORTS, 1952 to 1981.

From: Mullen, R., unpublished.

TOTAL CHINOOK POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN ALL OREGON PORTS

SPECIES.. YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
54	0	0	129897	172729	108750	237783	497614	757602	282271	26199	0	0	2212845
55	0	0	49342	183317	533288	669653	504869	1202651	535648	23675	0	0	3702443
56	0	0	0	303125	166815	616244	1085365	1890483	283638	54135	0	0	4399805
57	0	0	0	50317	198730	799030	942684	757233	275124	2070	0	0	3025188
58	0	0	0	19586	149029	610611	528177	374127	124709	28396	0	0	1834635
59	0	0	0	26813	46987	172988	103059	139675	36769	6408	0	0	532699
60	0	0	0	31501	194976	151211	337406	611321	163435	37772	0	0	1527622
61	0	0	0	17668	49331	231454	547733	381022	154230	30234	0	0	1411672
62	0	0	0	9722	30514	136455	202232	219850	83057	5486	0	0	687316
63	0	0	0	32937	90267	322747	704586	412505	48029	7535	0	0	1618606
64	0	0	0	13250	81784	83143	189924	281286	56237	17025	0	0	722649
65	0	0	0	1230	48567	124502	184908	164212	113720	21356	0	0	658495
66	0	0	0	6493	77063	200167	199184	242830	168043	25852	0	0	919632
67	0	0	0	45385	85893	241195	467516	317582	117048	8705	0	0	1283324
68	0	0	0	44223	156926	157236	374114	375814	21705	12403	0	0	1142421
69	0	0	0	6032	73916	513623	369694	327461	55551	35413	0	0	1381690
70	0	0	0	15511	158551	385167	345285	555401	340618	137251	0	0	1937784
71	0	0	0	14435	118086	273849	234171	415860	39328	55088	0	0	1150817
72	0	0	0	165	69294	408345	368300	376601	126719	149866	0	0	1499290
73	0	0	0	8701	65351	256115	1090454	1651972	446729	461197	0	0	3980519
74	0	0	0	5287	138441	289921	722104	926907	409397	107052	31853	3003	2633965
75	0	0	0	1724	57288	481701	978432	694733	643960	94134	17501	1353	2970826
76	0	0	0	0	191998	400062	580512	650678	258950	102750	24863	0	2209813
77	0	0	0	0	184767	609336	1300085	1335676	355012	132746	67064	0	3984686
78	0	0	0	170	35277	455675	715303	496351	273863	127804	73221	0	2177664
79	0	0	0	0	149084	4258	1020108	1282972	203900	267265	39377	0	2966964
80	0	0	0	0	313785	357055	481712	859180	293205	172408	19889	0	2497234
81	0	0	0	0	294042	7774	364583	803393	167488	149060	23094	0	1809434

CHINOOK

Appendix C-2.2

TOTAL CHINOOK POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN ALL OREGON PORTS

SPECIES.. YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
25	0	0	0	0	1347	16109	227906	210067	66748	6965	0	0	529142
26	0	0	0	0	311	34329	239208	272949	23576	2192	0	0	572565
27	0	0	0	0	52336	99034	484345	541645	80828	11645	967	0	1270800
28	0	0	0	0	118448	45948	162664	454615	158713	6518	1035	0	947941
29	0	0	0	806	290568	181014	345212	474182	115830	7586	80	0	1415278
30	0	0	9352	77502	63692	181034	177968	326034	44143	1694	142	0	881561
31	0	0	0	2492	45121	28880	54271	81809	18492	5436	0	0	236501
32	0	0	0	17136	10304	44296	35548	93052	30877	27982	0	0	259195
33	0	0	0	12274	0	227924	736108	649069	28004	27235	969	0	1681583
34	0	0	0	0	276	5156	319406	278777	65348	29487	0	0	698450
35	0	0	135	17102	1405	47306	217744	141934	48682	10084	219	14	484625
36	0	895	4039	133337	2958	5394	45166	437947	528574	248421	22029	612	1429372
37	0	0	0	39	14714	29765	530005	668901	134308	58595	928	0	1437255
38	0	0	107	69932	633	134065	297057	160278	41163	4916	7	0	708158
39	0	0	18245	75655	2025	164445	207459	98020	35866	12987	100	0	614802
40	0	0	7622	58877	27027	99890	359331	276537	120864	7411	0	0	957559
41	0	125	93315	56762	66762	233754	279530	516716	314855	8055	89	94	1570057
42	0	94	7507	91733	126036	89984	171281	85681	77005	979	724	141	651165
43	62	131	51623	83735	31460	55467	99113	127181	29367	7816	3722	1456	491133
44	16	288	58085	143008	86119	230155	153322	406196	221110	32817	150	76	1331342
45	0	9870	14669	391838	409821	143298	38878	458832	434552	85755	8257	945	1996715
46	23	12780	185749	409431	282224	163519	244970	720329	386795	46519	133	156	2452628
47	41	31185	15813	247705	362858	122260	652455	799955	313794	19173	481	228	2565948
48	3317	916	2369	69560	232153	83045	238865	652938	213853	13429	366	0	1510811
49	0	0	616	91009	58765	135790	382174	570142	80657	13528	18	0	1332699
50	0	0	1807	82337	52343	242460	132775	279245	173919	6244	0	0	971130
51	0	0	31018	146645	97150	331144	1017395	601059	365922	10236	0	0	2600569
52	0	0	96283	231695	144320	468788	820739	949534	283648	94265	0	0	3089272
53	0	0	28393	268570	48578	129759	480417	773586	194770	3771	0	0	1926844

Appendix C-2.3

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN ASTORIA

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	ASTORIA	25	0	0	0	0	1347	15266	103279	123958	29833	6931	0	0	280614
CHINOOK	ASTORIA	26	0	0	0	0	14	33949	163233	246485	9313	1610	0	0	454604
CHINOOK	ASTORIA	27	0	0	0	0	52336	86791	440521	452472	70943	9927	967	0	1113957
CHINOOK	ASTORIA	28	0	0	0	0	15390	40048	140132	357602	148884	4171	241	0	706468
CHINOOK	ASTORIA	29	0	0	0	806	259010	177978	99680	299102	61587	2372	80	0	900615
CHINOOK	ASTORIA	30	0	0	9352	77502	63692	124931	91306	204649	28147	149	142	0	599870
CHINOOK	ASTORIA	31	0	0	0	2492	37783	10583	13137	56732	17305	3356	0	0	141388
CHINOOK	ASTORIA	32	0	0	0	17136	10304	38209	14900	51116	26271	27982	0	0	185918
CHINOOK	ASTORIA	33	0	0	0	12274	0	219650	562151	510860	6967	3443	969	0	1316314
CHINOOK	ASTORIA	34	0	0	0	0	254	458	206003	224442	40020	26963	0	0	498140
CHINOOK	ASTORIA	35	0	0	135	17102	445	38909	69994	52768	14449	8672	207	14	202695
CHINOOK	ASTORIA	36	0	895	4039	133337	2680	2778	62	203565	206418	87990	6591	60	648415
CHINOOK	ASTORIA	37	0	0	0	39	14500	14691	58277	197767	40534	29714	906	0	356428
CHINOOK	ASTORIA	38	0	0	107	69089	228	25267	21540	39547	10103	2521	7	0	168409
CHINOOK	ASTORIA	39	0	0	18245	75575	1847	779	24760	63533	8622	4754	100	0	198215
CHINOOK	ASTORIA	40	0	0	7622	58613	24861	88342	42975	86074	26776	6012	0	0	341275
CHINOOK	ASTORIA	41	0	125	93315	56762	66353	167518	18344	136634	294461	628	89	71	834300
CHINOOK	ASTORIA	42	0	71	7507	91733	124294	19946	3926	59782	24560	192	0	124	332135
CHINOOK	ASTORIA	43	41	108	51577	83722	31393	42117	3875	25432	3268	114	53	20	241720
CHINOOK	ASTORIA	44	0	288	58085	141734	85648	120116	39024	64615	7310	3529	0	66	520415
CHINOOK	ASTORIA	45	0	9734	14669	390437	392599	79316	14641	59071	48574	17960	472	877	1028350
CHINOOK	ASTORIA	46	0	12723	185735	408334	170628	28975	32120	121192	125590	8097	108	156	1093658
CHINOOK	ASTORIA	47	41	28275	12752	34495	108727	25047	40604	313242	79320	3287	25	219	646034
CHINOOK	ASTORIA	48	3317	916	2369	66721	200601	63641	36328	129504	45697	1566	366	0	551026
CHINOOK	ASTORIA	49			454	33772	28142	24415	41337	81948	11533	2025	18		223644
CHINOOK	ASTORIA	50			1726	81723	48528	53660	16618	82899	6902	1202			293258
CHINOOK	ASTORIA	51			31018	141684	84391	29542	75016	52326	48986	2010			464973
CHINOOK	ASTORIA	52			96283	231695	139308	98162	68695	117955	26278	47883			826259
CHINOOK	ASTORIA	53			28199	266530	46340	61915	56651	48990	10347	2464			521436
CHINOOK	ASTORIA	54			129182	172398	72735	15369	19342	69320	37027	5210			520583
CHINOOK	ASTORIA	55			48594	171471	93872	36796	43651	98252	31334	2140			526110
CHINOOK	ASTORIA	56				289522	4669	9392	68004	91131	11293	2107			476118
CHINOOK	ASTORIA	57				45843	22890	9048	48763	38359	13073	118			178094
CHINOOK	ASTORIA	58				10291	4698	14188	21040	37048	4623	884			92772
CHINOOK	ASTORIA	59				19445	3994	11322	11378	24055	3032	1149			74375
CHINOOK	ASTORIA	60				17485	1991	14476	28599	22525	8223	1430			94729
CHINOOK	ASTORIA	61				6641	4807	24552	18363	41583	17416	1211			114573
CHINOOK	ASTORIA	62				1342	8976	35662	18367	15030	2818	758			82953
CHINOOK	ASTORIA	63				32125	57989	57867	11110	22262	6147	1322			188822
CHINOOK	ASTORIA	64				9769	60460	14434	16384	6954	10463	587			119051
CHINOOK	ASTORIA	65				113	9442	6741	6649	16685	8730	7144			55504
CHINOOK	ASTORIA	66				5410	64897	66347	14374	9969	17114	2953			181064
CHINOOK	ASTORIA	67				21928	33734	46099	16120	70287	17969	444			206581
CHINOOK	ASTORIA	68				41045	114701	31732	15377	10770	5301	130			219056
CHINOOK	ASTORIA	69				1106	8837	55485	18560	15069	9021	70			108148
CHINOOK	ASTORIA	70				13768	116615	73376	17707	17500	4754	221			243941
CHINOOK	ASTORIA	71				13752	79477	47735	8556	10633	2155	323			162631
CHINOOK	ASTORIA	72				143	30139	38174	10640	5852	3477	297			88722
CHINOOK	ASTORIA	73				5875	37005	22166	9773	7813	3010	1722			87364
CHINOOK	ASTORIA	74				3780	129150	13905	18104	10842	6355	1308			183444
CHINOOK	ASTORIA	75				838	43973	41422	23079	9254	3272	301			122139
CHINOOK	ASTORIA	76					151959	90481	32892	18938	11674	2540			308484
CHINOOK	ASTORIA	77					54205	96900	42137	14112	14524	8221			230099
CHINOOK	ASTORIA	78					12631	67886	66831	12835	1734	28636			190553
CHINOOK	ASTORIA	79					30485	1640	24727	48392	11194	82			116520

Appendix C-2.4

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN ASTORIA

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	ASTORIA	80					69764	2034	15007	31917	4363	263			123348
CHINOOK	ASTORIA	81					114869	3325	22576	6839	277	370			148256
	ASTORIA														

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN BANDON

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	BANDON	52			0	0	0	0	3529	3499	3204	0			10232
CHINOOK	BANDON	53			0	0	0	0	283	9572	227	0			10082
CHINOOK	BANDON	54			0	0	65	128	804	50569	13248	0			64814
CHINOOK	BANDON	55			0	0	225	9392	15666	44671	9221	0			79175
CHINOOK	BANDON	56				0	0	188	2467	29674	20543	0			52872
CHINOOK	BANDON	57				0	0	6971	39585	33272	2180	0			82008
CHINOOK	BANDON	58				0	420	18377	15670	6868	3022	18			44375
CHINOOK	BANDON	59				98	289	5078	1214	889	0	0			7568
CHINOOK	BANDON	60				0	0	104	12012	21693	6589	262			40660
CHINOOK	BANDON	61				32	0	897	3311	3628	2531	0			10399
CHINOOK	BANDON	62				18	14	421	1234	7907	754	0			10348
CHINOOK	BANDON	63				0	0	4657	26137	44161	150	0			75105
CHINOOK	BANDON	64				0	30	1865	4584	29580	330	0			36389
CHINOOK	BANDON	65				0	0	366	1466	4456	326	0			6614
CHINOOK	BANDON	66				0	0	783	7365	15669	7521	0			31338
CHINOOK	BANDON	67				0	364	5756	32857	23824	10054	0			72855
CHINOOK	BANDON	68				0	0	1104	10398	87099	133	0			98734
CHINOOK	BANDON	69				0	1084	10151	19122	57024	0	0			87381
CHINOOK	BANDON	70				0	7108	12237	31331	48132	49009	4916			152733
CHINOOK	BANDON	71				0	392	4290	5376	36815	1240	0			48113
CHINOOK	BANDON	72				0	1298	26142	12967	29174	1298	21			70900
CHINOOK	BANDON	73				0	0	12352	71999	103857	22768	1065			212041
CHINOOK	BANDON	74				0	0	5093	20969	129013	80322	6553			241950
CHINOOK	BANDON	75				0	0	19387	54474	75503	80836	2752			232952
CHINOOK	BANDON	76					0	10193	35232	76820	23634	7780			153659
CHINOOK	BANDON	77					22	31678	78892	115539	37909	2842			266882
CHINOOK	BANDON	78					0	15887	35162	29901	16975	96			98021
OOK	BANDON	79					50		32493	84216	5074	240			122073
CHINOOK	BANDON	80					0	27631	18213	33040	3821	968			83673
CHINOOK	BANDON	81					10		2496	30205	0	0			32711
	BANDON														

Appendix C-2.6

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN BROOKINGS

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	BROOKINGS	52			0	0	0	0	48	123	0	0			171
CHINOOK	BROOKINGS	53			0	0	0	0	88	153	0	0			241
CHINOOK	BROOKINGS	54			0	0	0	127	1243	445	0	0			1815
CHINOOK	BROOKINGS	55			0	0	0	1111	2297	1356	33	0			4797
CHINOOK	BROOKINGS	56				2060	659	152	3552	2057	9	0			8489
CHINOOK	BROOKINGS	57				0	1091	3634	1626	1816	50	25			8242
CHINOOK	BROOKINGS	58				0	2558	1987	3849	2822	716	390			12322
CHINOOK	BROOKINGS	59				0	987	2739	668	829	1354	332			6909
CHINOOK	BROOKINGS	60				0	0	1222	13559	29475	49391	25645			119292
CHINOOK	BROOKINGS	61				991	30945	116032	175062	145041	1843	4649			474563
CHINOOK	BROOKINGS	62				2198	12957	16816	71297	90808	7871	1080			203027
CHINOOK	BROOKINGS	63				41	18783	63537	259178	20449	12168	4053			378209
CHINOOK	BROOKINGS	64				321	3288	14076	82008	23992	12192	15110			150987
CHINOOK	BROOKINGS	65				669	10139	24496	84807	29447	4431	10017			164006
CHINOOK	BROOKINGS	66				30	2596	37924	32415	8781	13078	20506			115330
CHINOOK	BROOKINGS	67				19794	45019	34656	90822	14750	9060	7619			221720
CHINOOK	BROOKINGS	68				20	11870	14138	49966	18959	3467	6005			104425
CHINOOK	BROOKINGS	69				105	26667	134423	62669	20881	1687	25484			271916
CHINOOK	BROOKINGS	70				271	14128	94971	81087	109626	26680	11029			337792
CHINOOK	BROOKINGS	71				10	19267	135366	146806	156502	7748	26316			492015
CHINOOK	BROOKINGS	72				0	25507	84178	75243	28244	31905	103866			348943
CHINOOK	BROOKINGS	73				1987	14941	47875	123207	10420	10779	70380			279589
CHINOOK	BROOKINGS	74				431	2412	17389	49291	23668	31451	17323	15607	2599	160171
CHINOOK	BROOKINGS	75				27	3259	43610	227563	28599	46967	21657	10572	1070	383324
CHINOOK	BROOKINGS	76					1382	27746	48016	25729	38309	49375	10512		201069
CHINOOK	BROOKINGS	77					19301	35274	134880	71422	47045	51858	29052		388832
CHINOOK	BROOKINGS	78					7018	38096	20253	14857	31840	33277	43130		188471
CHINOOK	BROOKINGS	79					3435		319042	201282	68415	134484	21683		748341
CHINOOK	BROOKINGS	80					61967	14422	27622	77373	102106	27575	13244		324309
CHINOOK	BROOKINGS	81					40296	263	42540	345328	132329	116610	17019		694385
	BROOKINGS														

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN COOS BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	COOS BAY	25	0	0	0	0	0	738	78338	0	9077	0	0	0	88153
CHINOOK	COOS BAY	26	0	0	0	0	297	380	54048	17259	13963	559	0	0	86506
CHINOOK	COOS BAY	27	0	0	0	0	0	7781	31084	74943	8577	1206	0	0	123591
CHINOOK	COOS BAY	28	0	0	0	0	103058	4438	17340	86004	7377	1139	444	0	219800
CHINOOK	COOS BAY	29	0	0	0	0	31558	949	171837	148903	24047	4806	0	0	382100
CHINOOK	COOS BAY	30	0	0	0	0	0	54782	48296	64257	7345	1504	0	0	176184
CHINOOK	COOS BAY	31	0	0	0	0	5858	9230	23961	16597	946	2080	0	0	58672
CHINOOK	COOS BAY	32	0	0	0	0	0	1826	5841	7185	3504	0	0	0	18356
CHINOOK	COOS BAY	33	0	0	0	0	0	7476	67796	53591	13159	23266	0	0	165288
CHINOOK	COOS BAY	34	0	0	0	0	22	2695	32643	8427	10182	2417	0	0	56386
CHINOOK	COOS BAY	35	0	0	0	0	0	441	65134	59495	29463	1199	12	0	155744
CHINOOK	COOS BAY	36	0	0	0	0	278	1758	33049	134908	186477	57756	13087	0	427313
CHINOOK	COOS BAY	37	0	0	0	0	214	11838	17588	120255	60528	7146	0	0	217569
CHINOOK	COOS BAY	38	0	0	0	843	405	11036	133958	74741	16096	1934	0	0	239013
CHINOOK	COOS BAY	39	0	0	0	80	178	15145	37160	11469	11086	5362	0	0	80480
CHINOOK	COOS BAY	40	0	0	0	264	236	6423	191533	131953	58051	328	0	0	388788
CHINOOK	COOS BAY	41	0	0	0	0	46	14502	103731	54715	16910	7225	0	23	197152
CHINOOK	COOS BAY	42	0	23	0	0	1030	31976	107723	23351	43004	500	578	17	208202
CHINOOK	COOS BAY	43	21	0	0	0	0	9340	59745	85801	23022	7590	3669	1436	190624
CHINOOK	COOS BAY	44	16	0	0	0	313	79610	69892	301120	194122	26790	145	10	672018
CHINOOK	COOS BAY	45	0	36	0	1283	2892	57283	18725	257316	209085	28021	3317	16	577974
CHINOOK	COOS BAY	46	0	0	0	177	37192	81724	155922	277565	58219	10379	0	0	621178
CHINOOK	COOS BAY	47	0	2685	2791	80336	93712	43993	223089	109167	37340	2712	317	0	596142
CHINOOK	COOS BAY	48	0	0	0	928	7053	13649	134808	285506	44502	5944	0	0	492390
CHINOOK	COOS BAY	49			124	2959	14112	9039	36244	85512	16918	859	0		165767
CHINOOK	COOS BAY	50			0	0	998	43091	45873	40956	47632	975			179525
CHINOOK	COOS BAY	51			0	68	3367	51403	190086	302822	123879	98			671723
CHINOOK	COOS BAY	52			0	0	2377	38120	123429	235332	37549	1092			437899
CHINOOK	COOS BAY	53			0	0	0	18042	82698	128471	4226	345			233782
CHINOOK	COOS BAY	54			0	14	15407	59003	75548	173286	47942	4197			375397
CHINOOK	COOS BAY	55			748	2890	87288	155826	102618	387151	144890	617			882028
CHINOOK	COOS BAY	56				0	22456	139238	233371	1008279	101572	3034			1507950
CHINOOK	COOS BAY	57				2083	97653	267004	365452	373137	40165	371			1145865
CHINOOK	COOS BAY	58				153	80745	389635	176019	23221	14493	10120			694386
CHINOOK	COOS BAY	59				6228	21149	75252	30917	6952	4379	1588			146465
CHINOOK	COOS BAY	60				265	84886	76704	150702	315581	57845	3216			689199
CHINOOK	COOS BAY	61				6748	10479	36601	50546	65648	72298	9335			251655
CHINOOK	COOS BAY	62				1569	5061	20633	26436	41844	43279	2147			140969
CHINOOK	COOS BAY	63				87	6419	94494	227271	123164	12366	1489			465290
CHINOOK	COOS BAY	64				1180	8080	18277	23587	138063	18332	403			207922
CHINOOK	COOS BAY	65				294	7828	31868	31916	44410	17647	704			134667
CHINOOK	COOS BAY	66				684	6026	27344	56321	61961	77961	656			230953
CHINOOK	COOS BAY	67				82	2167	29970	185077	118341	52473	116			388226
CHINOOK	COOS BAY	68				378	5699	52177	177202	171897	1724	23			409100
CHINOOK	COOS BAY	69				383	15203	169308	156397	149259	31443	1380			523373
CHINOOK	COOS BAY	70				716	7642	83867	107405	113535	158682	96886			568733
CHINOOK	COOS BAY	71				97	4863	31262	22137	43477	9514	17596			128946
CHINOOK	COOS BAY	72				22	2931	134076	132123	57541	6541	3295			336529
CHINOOK	COOS BAY	73				111	1422	59533	347165	767697	232329	170543			1578800
CHINOOK	COOS BAY	74				154	2681	138451	252754	460287	203397	65673	3960		1127357
CHINOOK	COOS BAY	75				477	2375	161798	360452	238896	225345	58190			1047533
CHINOOK	COOS BAY	76					12276	140637	198980	179730	66882	11691			610196
CHINOOK	COOS BAY	77					52058	128713	372761	382943	87170	34716			1058361
CHINOOK	COOS BAY	78					10060	110400	193209	105169	29433	3254	2383		453908
CHINOOK	COOS BAY	79					26354	207	229745	368412	38359	77132			740209

Appendix C-2.8

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN COOS BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	COOS BAY	80					48117	115459	205281	208244	83100	80098	103		740402
CHINOOK	COOS BAY	81					24176	696	55643	132602	15926	15292	560		244895
	COOS BAY														

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN DEPOE BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	DEPOE BAY	52			0	0	229	23045	23904	37563	50438	8279			143458
C 'OOK	DEPOE BAY	53			194	0	163	17015	25511	29333	2641	254			75111
C..nOOK	DEPOE BAY	54			0	124	1493	24704	29840	52835	5661	1231			115888
CHINOOK	DEPOE BAY	55			0	0	1582	44620	13574	20328	14690	1493			96287
CHINOOK	DEPOE BAY	56				0	175	3836	28233	28743	30758	11114			102859
CHINOOK	DEPOE BAY	57				68	473	13192	15843	33145	45765	366			108852
CHINOOK	DEPOE BAY	58				217	425	10991	54569	96904	18910	7439			189455
CHINOOK	DEPOE BAY	59				0	203	5577	12351	37368	7982	1514			64995
CHINOOK	DEPOE BAY	60				68	1221	1927	13400	38107	6748	2168			63639
CHINOOK	DEPOE BAY	61				184	139	6086	22562	6295	4967	54			40287
CHINOOK	DEPOE BAY	62				76	35	789	3039	4507	4853	28			13327
CHINOOK	DEPOE BAY	63				17	39	1581	2830	8143	765	449			13824
CHINOOK	DEPOE BAY	64				0	9	971	2282	5872	1263	440			10837
CHINOOK	DEPOE BAY	65				0	0	1144	3804	3644	8640	981			18213
CHINOOK	DEPOE BAY	66				0	0	2287	3830	12267	2745	68			21197
CHINOOK	DEPOE BAY	67				0	0	3130	8665	2301	2732	44			16872
CHINOOK	DEPOE BAY	68				0	46	1471	4628	8157	1302	126			15730
CHINOOK	DEPOE BAY	69				0	129	4220	5122	8933	623	90			19117
CHINOOK	DEPOE BAY	70				0	55	13378	6725	15175	4160	693			40186
CHINOOK	DEPOE BAY	71				0	0	1510	4874	14888	164	141			21577
CHINOOK	DEPOE BAY	72				0	0	6595	10825	47036	937	565			65958
CHINOOK	DEPOE BAY	73				0	0	7139	46535	39815	26632	12841			132962
CHINOOK	DEPOE BAY	74				0	181	10269	44827	10729	8776	86			74868
CHINOOK	DEPOE BAY	75				0	185	10664	16527	17503	1698	0			46577
CHINOOK	DEPOE BAY	76					13	5691	19272	11103	645	942			37666
CHINOOK	DEPOE BAY	77					2145	19088	22549	17106	2213	1460			64561
CHINOOK	DEPOE BAY	78					0	3977	14717	6203	659	18			25574
C 'OOK	DEPOE BAY	79					467		6783	6042	53	0			13345
CHINOOK	DEPOE BAY	80					0	0	4058	4498	35	0			8591
CHINOOK	DEPOE BAY	81					390		8553	6066	126	0			15135
	DEPOE BAY														

Appendix C-2.10

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN GARIBALDI

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	GARIBALDI	52			0	0	641	3008	2369	1411	745	46			8220
OOK	GARIBALDI	53			0	0	561	405	1561	7098	1012	0			10637
CHINOOK	GARIBALDI	54			0	104	0	440	2686	28627	354	0			32211
CHINOOK	GARIBALDI	55			0	0	4881	563	5928	38195	4940	0			54507
CHINOOK	GARIBALDI	56				0	303	37	7907	11395	1090	0			20732
CHINOOK	GARIBALDI	57				0	0	4562	11369	3165	1129	115			20340
CHINOOK	GARIBALDI	58				0	0	7227	9599	4265	387	27			21505
CHINOOK	GARIBALDI	59				0	110	2029	2105	5502	624	50			10420
CHINOOK	GARIBALDI	60				98	40	1445	2552	3824	603	0			8562
CHINOOK	GARIBALDI	61				94	17	884	1348	4263	905	257			7768
CHINOOK	GARIBALDI	62				0	15	1057	644	1036	167	18			2937
CHINOOK	GARIBALDI	63				0	0	49	543	5803	2826	182			9403
CHINOOK	GARIBALDI	64				0	0	461	3156	8029	798	71			12515
CHINOOK	GARIBALDI	65				0	0	388	1188	3365	8217	453			13611
CHINOOK	GARIBALDI	66				0	513	178	9004	4040	1840	0			15575
CHINOOK	GARIBALDI	67				0	129	10721	8344	12900	470	0			32564
CHINOOK	GARIBALDI	68				0	286	1824	20661	9869	281	0			32921
CHINOOK	GARIBALDI	69				0	2148	14299	4469	12043	2632	1490			37081
CHINOOK	GARIBALDI	70				0	9	11973	13199	4119	1527	352			31179
CHINOOK	GARIBALDI	71				0	112	3192	3510	10955	644	35			18448
CHINOOK	GARIBALDI	72				0	511	5394	5054	14157	838	181			26135
CHINOOK	GARIBALDI	73				138	712	2531	5930	26525	7910	2691			46437
CHINOOK	GARIBALDI	74				0	596	2818	13682	29845	7064	1421			55426
CHINOOK	GARIBALDI	75				0	113	5490	17728	14758	4012	83			42184
CHINOOK	GARIBALDI	76					13660	33419	13600	12527	4762	681			78649
CHINOOK	GARIBALDI	77					1549	124858	103297	18733	13881	4363			266681
CHINOOK	GARIBALDI	78					331	23687	33215	9589	1888	2312			71022
OOK	GARIBALDI	79					1342	1623	18006	20215	401	2340			43927
CHINOOK	GARIBALDI	80					6688	3915	5526	29411	3556	679			49775
CHINOOK	GARIBALDI	81					4823		30618	17804	2254	541			56040
	GARIBALDI														

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN GOLD BEACH

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	GOLD BEACH	52			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	53			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	54			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	55			0	0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	56				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	57				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	58				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	59				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	60				0	0	0	0	0	0	0			0
CHINOOK	GOLD BEACH	61				0	104	1868	1176	679	583	46			4456
CHINOOK	GOLD BEACH	62				115	72	21	19	242	141	13			623
CHINOOK	GOLD BEACH	63				0	0	0	842	716	17	0			1575
CHINOOK	GOLD BEACH	64				0	124	175	1725	630	172	0			2826
CHINOOK	GOLD BEACH	65				0	33	949	1995	2438	930	0			6345
CHINOOK	GOLD BEACH	66				0	169	2133	616	2208	2590	6			7722
CHINOOK	GOLD BEACH	67				0	551	653	3131	577	0	0			4912
CHINOOK	GOLD BEACH	68				0	138	102	5994	5513	683	0			12430
CHINOOK	GOLD BEACH	69				0	0	4291	1893	6085	223	0			12492
CHINOOK	GOLD BEACH	70				0	0	2400	3235	5107	376	0			11118
CHINOOK	GOLD BEACH	71				0	0	2516	14009	26540	1987	0			45052
CHINOOK	GOLD BEACH	72				0	168	11489	24639	52460	29619	2032			120407
CHINOOK	GOLD BEACH	73				0	190	7630	60404	24215	9676	490			102605
CHINOOK	GOLD BEACH	74				0	0	2820	18761	8282	4953	0			34816
CHINOOK	GOLD BEACH	75				0	0	8609	37904	11660	14879	33			73085
CHINOOK	GOLD BEACH	76					0	904	24017	57963	36195	0			119079
CHINOOK	GOLD BEACH	77					0	2593	164371	108066	38977	1391			315398
CHINOOK	GOLD BEACH	78					8	11542	33979	63572	36794	651			146546
CHINOOK	GOLD BEACH	79					20	584	29961	197938	14146	1865			244514
CHINOOK	GOLD BEACH	80					5604	4810	8635	71873	25254	191	76		116443
CHINOOK	GOLD BEACH	81					614		1969	51389	676	86			54734
	GOLD BEACH														

Appendix C-2.12

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN NEWPORT

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	NEWPORT	25	0	0	0	0	0	105	46289	86109	27838	34	0	0	160375
CHINOOK	NEWPORT	26	0	0	0	0	0	0	21927	9205	300	23	0	0	31455
CHINOOK	NEWPORT	27	0	0	0	0	0	4462	12740	14230	1308	512	0	0	33252
CHINOOK	NEWPORT	28	0	0	0	0	0	1462	5192	11009	2452	1208	350	0	21673
CHINOOK	NEWPORT	29	0	0	0	0	0	2087	73695	26177	30196	408	0	0	132563
CHINOOK	NEWPORT	30	0	0	0	0	0	1321	38366	57128	8651	41	0	0	105507
CHINOOK	NEWPORT	31	0	0	0	0	1480	9067	17173	8480	241	0	0	0	36441
CHINOOK	NEWPORT	32	0	0	0	0	0	4261	14807	34751	1102	0	0	0	54921
CHINOOK	NEWPORT	33	0	0	0	0	0	798	106161	84618	7878	526	0	0	199981
CHINOOK	NEWPORT	34	0	0	0	0	0	2003	80760	45908	15146	107	0	0	143924
CHINOOK	NEWPORT	35	0	0	0	0	960	7956	82616	29671	4770	213	0	0	126186
CHINOOK	NEWPORT	36	0	0	0	0	0	858	12055	99474	135679	102675	2351	552	353644
CHINOOK	NEWPORT	37	0	0	0	0	0	3236	454140	350879	33246	21735	22	0	863258
CHINOOK	NEWPORT	38	0	0	0	0	0	97762	141559	45990	14964	461	0	0	300736
CHINOOK	NEWPORT	39	0	0	0	0	0	148521	145539	23018	16158	2871	0	0	336107
CHINOOK	NEWPORT	40	0	0	0	0	1930	5125	124823	58510	36037	1071	0	0	227496
CHINOOK	NEWPORT	41	0	0	0	0	363	51734	157455	325367	3484	202	0	0	538605
CHINOOK	NEWPORT	42	0	0	0	0	712	38062	59632	2548	9441	287	146	0	110828
CHINOOK	NEWPORT	43	0	23	46	13	67	4010	35493	15948	3077	112	0	0	58789
CHINOOK	NEWPORT	44	0	0	0	1274	158	30429	44406	40461	19678	2498	5	0	138909
CHINOOK	NEWPORT	45	000	100	0	118	14330	6699	5512	142445	176893	39774	4468	52	390391
CHINOOK	NEWPORT	46	23	57	14	920	74404	52820	56928	321572	202986	28043	25	0	737792
CHINOOK	NEWPORT	47	0	225	270	132874	160419	53220	388762	377546	197134	13174	139	9	1323772
CHINOOK	NEWPORT	48	0	0	0	1911	24499	5755	67729	237928	123654	5919	0	0	467395
CHINOOK	NEWPORT	49			38	50908	4494	87408	234061	259856	36359	9753	0		682877
CHINOOK	NEWPORT	50			59	601	2804	134818	50449	54619	102989	899			347238
CHINOOK	NEWPORT	51			0	2708	2965	209381	493523	163692	127455	7586			1007310
CHINOOK	NEWPORT	52			0	0	1321	248692	514554	370663	154321	36868			1326419
CHINOOK	NEWPORT	53			0	2040	1476	22184	252650	409857	161062	639			849908
CHINOOK	NEWPORT	54			715	0	15491	107714	243804	184469	112830	6926			671949
CHINOOK	NEWPORT	55			0	3624	251831	272964	198226	414844	288291	19083			1448863
CHINOOK	NEWPORT	56				7064	77211	330162	516604	431987	101620	37284			1501932
CHINOOK	NEWPORT	57				2066	43282	336067	297364	106838	155602	759			941978
CHINOOK	NEWPORT	58				8794	36190	47886	173632	166128	52557	7257			492444
CHINOOK	NEWPORT	59				900	12327	40187	18686	54528	15388	1015			143031
CHINOOK	NEWPORT	60				9422	86302	38193	66241	138507	15698	4488			358851
CHINOOK	NEWPORT	61				2820	2022	34849	215149	59188	36181	12377			362586
CHINOOK	NEWPORT	62				3385	2159	30589	32735	33329	17349	1157			120703
CHINOOK	NEWPORT	63				64	1460	38135	25634	30459	9644	40			105436
CHINOOK	NEWPORT	64				1980	8193	14142	10685	28944	6669	297			70910
CHINOOK	NEWPORT	65				0	1335	35371	28385	36256	63085	1968			166400
CHINOOK	NEWPORT	66				369	2043	40261	39779	66951	21254	1632			172289
CHINOOK	NEWPORT	67				2811	3069	100779	83858	45267	13157	419			249360
CHINOOK	NEWPORT	68				2582	20364	29926	21037	20783	2840	217			97749
CHINOOK	NEWPORT	69				4060	17683	70563	41073	14430	2205	210			150224
CHINOOK	NEWPORT	70				177	10899	38581	31303	143599	42792	18152			285503
CHINOOK	NEWPORT	71				576	12501	23155	18545	43345	6327	425			104874
CHINOOK	NEWPORT	72				0	6984	34505	40303	74289	18017	19672			193770
CHINOOK	NEWPORT	73				493	10220	54009	190387	448124	87807	161157			952197
CHINOOK	NEWPORT	74				877	2907	75197	222048	106155	42240	1977			451401
CHINOOK	NEWPORT	75				154	6598	111073	90445	111257	20040	2503			342070
CHINOOK	NEWPORT	76					7581	49244	131904	162123	16612	17317			384781
CHINOOK	NEWPORT	77					40837	126817	146234	419607	32888	4631			771014
CHINOOK	NEWPORT	78					3949	101558	205982	171258	120343	25006	1765		629861
CHINOOK	NEWPORT	79					70724	190	213700	175943	58189	31422	32		550200

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN NEWPORT

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	NEWPORT	80					88098	116486	68963	208250	32340	49235	23		563395
C' 'OOK	NEWPORT	81					96093	3490	106250	116515	3404	7153			332905
	NEWPORT														

Appendix C-2.14

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN PACIFIC CITY

SPECIES.. PORT..... YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK PACIFIC CITY 52			0	0	0	0	250	33	121	0			404
CHINOOK PACIFIC CITY 53			0	0	0	0	47	100	0	0			147
CHINOOK PACIFIC CITY 54			0	0	0	25	948	506	0	0			1479
CHINOOK PACIFIC CITY 55			0	0	0	121	1526	457	399	0			2503
CHINOOK PACIFIC CITY 56				0	25	512	4383	9782	204	14			14920
CHINOOK PACIFIC CITY 57				0	0	867	2364	576	1349	79			5235
CHINOOK PACIFIC CITY 58				0	43	56	6358	5987	2001	0			14445
CHINOOK PACIFIC CITY 59				0	114	1042	1523	3039	263	139			6120
CHINOOK PACIFIC CITY 60				0	90	395	1129	669	1001	0			3284
CHINOOK PACIFIC CITY 61				0	0	91	870	1144	376	38			2519
CHINOOK PACIFIC CITY 62				0	0	0	95	431	695	0			1221
CHINOOK PACIFIC CITY 63				0	0	42	253	547	153	0			995
CHINOOK PACIFIC CITY 64				0	0	41	442	1343	1823	0			3649
CHINOOK PACIFIC CITY 65				0	0	104	112	202	450	0			868
CHINOOK PACIFIC CITY 66				0	10	388	2482	2529	601	0			6010
CHINOOK PACIFIC CITY 67				0	18	1153	1592	3467	1352	0			7582
CHINOOK PACIFIC CITY 68				0	0	1830	7085	11076	3804	5719			29514
CHINOOK PACIFIC CITY 69				0	20	2783	3168	6833	2857	1281			16942
CHINOOK PACIFIC CITY 70				494	524	7440	3456	5950	5169	940			23973
CHINOOK PACIFIC CITY 71				0	13	1173	2264	10939	3700	258			18347
CHINOOK PACIFIC CITY 72				0	115	3294	3650	11025	2292	245			20621
CHINOOK PACIFIC CITY 73				0	0	3134	10222	17704	5366	1837			38263
CHINOOK PACIFIC CITY 74				0	0	4939	13744	8841	4030	935			32489
CHINOOK PACIFIC CITY 75				0	12	7636	13344	17782	850	0			39624
CHINOOK PACIFIC CITY 76					0	12224	12557	8819	680	486			34766
CHINOOK PACIFIC CITY 77					78	7134	34135	16432	2212	1381			61372
CHINOOK PACIFIC CITY 78					21	6590	13443	12503	979	950			34486
CHINOOK PACIFIC CITY 79					20		4801	9534	99	48			14502
CHINOOK PACIFIC CITY 80					32	183	3062	17939	2191	147			23554
CHINOOK PACIFIC CITY 81					23		17440	13243	229	423			31358
PACIFIC CITY													

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN PORT ORFORD

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	PORT ORFORD	52			0	0	0	30248	33141	105544	9439	0			178372
CHINOOK	PORT ORFORD	53			0	0	0	1209	20841	75662	405	0			98117
CHINOOK	PORT ORFORD	54			0	0	0	1509	15621	111422	8240	0			136792
CHINOOK	PORT ORFORD	55			0	0	0	21611	24662	50430	10384	0			107087
CHINOOK	PORT ORFORD	56				0	31	4596	40752	97705	114	0			143198
CHINOOK	PORT ORFORD	57				0	141	40475	70796	118990	6446	0			236848
CHINOOK	PORT ORFORD	58				0	7465	85851	29234	6849	17497	1342			148238
CHINOOK	PORT ORFORD	59				0	139	11882	19496	2874	1539	314			36244
CHINOOK	PORT ORFORD	60				0	245	6787	22752	14589	9766	0			54139
CHINOOK	PORT ORFORD	61				0	0	133	1545	12335	1252	0			15265
CHINOOK	PORT ORFORD	62				0	0	344	391	7431	814	0			8980
CHINOOK	PORT ORFORD	63				0	139	6204	35862	60410	272	0			102887
CHINOOK	PORT ORFORD	64				0	0	3933	18791	18686	2168	0			43578
CHINOOK	PORT ORFORD	65				0	12	11512	12809	19608	61	0			44002
CHINOOK	PORT ORFORD	66				0	0	2211	20370	43393	20794	0			86768
CHINOOK	PORT ORFORD	67				0	307	4965	25993	21393	8643	0			61301
CHINOOK	PORT ORFORD	68				37	160	2500	42794	23787	1250	183			70711
CHINOOK	PORT ORFORD	69				224	821	28348	34731	25014	1459	5408			96005
CHINOOK	PORT ORFORD	70				85	712	31327	32665	67210	45224	4062			181285
CHINOOK	PORT ORFORD	71				0	1359	15890	1888	48670	143	9587			77537
CHINOOK	PORT ORFORD	72				0	1577	46657	30201	54946	27333	13419			174133
CHINOOK	PORT ORFORD	73				0	419	29046	104806	64686	32071	13575			244603
CHINOOK	PORT ORFORD	74				45	23	13763	36357	118698	16873	11288	12286	404	209737
CHINOOK	PORT ORFORD	75				22	46	24409	68363	115293	228468	8568	6929	283	452381
CHINOOK	PORT ORFORD	76					185	7259	22841	58002	56953	11165	14351		170756
CHINOOK	PORT ORFORD	77					17	22648	121108	83066	71877	20564	38012		357292
CHINOOK	PORT ORFORD	78					114	54768	45305	38772	26805	33509	25943		225216
CHINOOK	PORT ORFORD	79					0		41516	103402	5858	18512	17662		186950
CHINOOK	PORT ORFORD	80					8507	32539	56481	149912	23460	12851	6443		290193
CHINOOK	PORT ORFORD	81					7417		25514	66684	11548	8471	5515		125149
	PORT ORFORD														

Appendix C-2.16

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN SIUSLAW BAY

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	SIUSLAW BAY	52			0	0	384	19642	35521	61444	333	38			117362
CHINOOK	SIUSLAW BAY	53			0	0	0	6436	34493	57517	13509	0			111955
CHINOOK	SIUSLAW BAY	54			0	0	1002	14950	42181	68204	45198	7514			179049
CHINOOK	SIUSLAW BAY	55			0	0	2418	16355	6741	65944	17081	0			108539
CHINOOK	SIUSLAW BAY	56				0	10663	20292	98647	35704	2002	0			167308
CHINOOK	SIUSLAW BAY	57				0	5580	32272	40948	26514	4301	31			109646
CHINOOK	SIUSLAW BAY	58				0	3789	6945	20704	16489	7799	0			55726
CHINOOK	SIUSLAW BAY	59				0	5122	13308	2307	2117	1249	56			24159
CHINOOK	SIUSLAW BAY	60				3880	15782	8323	22997	12863	1917	37			65799
CHINOOK	SIUSLAW BAY	61				89	0	7423	45490	8185	9853	1719			72759
CHINOOK	SIUSLAW BAY	62				827	758	26015	41996	7561	3639	257			81053
CHINOOK	SIUSLAW BAY	63				583	1167	46429	107747	89662	2509	0			248097
CHINOOK	SIUSLAW BAY	64				0	924	12808	22657	12398	273	110			49170
CHINOOK	SIUSLAW BAY	65				154	17674	8201	5437	3474	1038	0			35978
CHINOOK	SIUSLAW BAY	66				0	431	16369	6002	8926	567	0			32295
CHINOOK	SIUSLAW BAY	67				0	0	523	2453	551	10	0			3537
CHINOOK	SIUSLAW BAY	68				0	543	1768	772	867	37	0			3987
CHINOOK	SIUSLAW BAY	69				0	0	422	246	289	90	0			1047
CHINOOK	SIUSLAW BAY	70				0	0	1175	698	3741	0	0			5614
CHINOOK	SIUSLAW BAY	71				0	0	427	1671	3230	1571	0			6899
CHINOOK	SIUSLAW BAY	72				0	0	5448	3897	504	61	0			9910
CHINOOK	SIUSLAW BAY	73				0	0	1477	23452	29734	1272	714			56649
CHINOOK	SIUSLAW BAY	74				0	61	352	8018	6486	594	192			15703
CHINOOK	SIUSLAW BAY	75				0	0	7766	30786	31383	3213	0			73148
CHINOOK	SIUSLAW BAY	76					155	4794	9793	14603	107	464			29916
CHINOOK	SIUSLAW BAY	77					23	1473	17431	8826	2091	0			29844
CHINOOK	SIUSLAW BAY	78					6	7564	12927	2897	4457	0			27851
CHINOOK	SIUSLAW BAY	79					2042	14	31539	26174	276	13			60058
CHINOOK	SIUSLAW BAY	80					16301	5994	17356	8256	1255	41			49203
CHINOOK	SIUSLAW BAY	81					3856		20208	6448	0	45			30557
	SIUSLAW BAY														

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN WINCHESTER

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	WINCHESTER	52			0	0	60	7871	15299	15967	1220	59			40476
C OOK	WINCHESTER	53			0	0	38	1553	5594	6833	1341	69			15428
C...OOK	WINCHESTER	54			0	89	2557	13814	65597	17919	11771	1121			112868
CHINOOK	WINCHESTER	55			0	5332	91191	110294	89980	81023	14385	342			392547
CHINOOK	WINCHESTER	56				4479	50623	107839	81445	144026	14433	582			403427
CHINOOK	WINCHESTER	57				257	27620	84938	48574	21421	5064	206			188080
CHINOOK	WINCHESTER	58				131	12696	27468	17503	7546	2704	919			68967
CHINOOK	WINCHESTER	59				142	2543	4406	2386	1508	893	251			12129
CHINOOK	WINCHESTER	60				283	4411	1607	3448	13424	5425	477			29075
CHINOOK	WINCHESTER	61				69	818	2038	12169	33033	5940	548			54615
CHINOOK	WINCHESTER	62				138	458	4066	5914	9543	642	9			20770
CHINOOK	WINCHESTER	63				13	950	9452	7112	6647	1012	0			25186
CHINOOK	WINCHESTER	64				0	649	1883	3441	6501	1520	0			13994
CHINOOK	WINCHESTER	65				0	1930	3362	6169	0	0	0			11461
CHINOOK	WINCHESTER	66				0	378	3942	6587	3272	1978	31			16188
CHINOOK	WINCHESTER	67				770	535	2790	8604	3924	1128	63			17814
CHINOOK	WINCHESTER	68				161	3119	18664	18200	7037	883	0			48064
CHINOOK	WINCHESTER	69				154	1324	19330	22244	11601	3311	0			57964
CHINOOK	WINCHESTER	70				0	859	14442	16474	21707	2245	0			55727
CHINOOK	WINCHESTER	71				0	102	7333	4535	9866	4135	407			26378
CHINOOK	WINCHESTER	72				0	64	12393	18758	1373	4401	6273			43262
CHINOOK	WINCHESTER	73				97	442	9223	96574	111382	7109	24182			249009
CHINOOK	WINCHESTER	74				0	430	4925	23549	14061	3342	296			46603
CHINOOK	WINCHESTER	75				206	727	39837	37767	22845	14380	47			115809
CHINOOK	WINCHESTER	76					4787	17470	31408	24321	2497	309			80792
CHINOOK	WINCHESTER	77					14532	12160	62290	79824	4225	1319			174350
CHINOOK	WINCHESTER	78				170	1139	13720	40280	28795	1956	95			86155
(OOK	WINCHESTER	79					14145		67795	41422	1836	1127			126325
CHINOOK	WINCHESTER	80					8707	33582	51508	18467	11724	360			124348
CHINOOK	WINCHESTER	81					1475		30776	10270	719	69			43309
	WINCHESTER														

Appendix C-2.18

TOTAL SALMON POUNDS (ROUND) LANDED BY THE TROLL FISHERY IN MISCELLANEOUS PORTS

SPECIES..	PORT.....	YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL.
CHINOOK	Misc.	49			0	3370	12017	14928	70532	142826	15847	891	0		260411
CHINOOK		50			22	13	13	10891	19835	100771	16396	3168			151109
CHINOOK		51			0	2185	6427	40818	258770	82219	65602	542			456563
CHINOOK		52					0	0	0	0	0				0
CHINOOK		53					0	0	0	0	0				0
CHINOOK		54					0	0	0	0	0				0
CHINOOK		55					0	0	0	0	0				0
CHINOOK		56					0	0	0	0	0				0
CHINOOK		57					0	0	0	0	0				0
CHINOOK		58					0	0	0	0	0				0
CHINOOK		59					10	166	28	14	66				284
CHINOOK		60					8	28	15	64	229	49			393
CHINOOK		61							142	0	85				227
CHINOOK		62				54	9	42	65	181	35	19			405
CHINOOK		63				7	3321	300	67	82					3777
CHINOOK		64					27	77	182	294	234	7			821
CHINOOK		65					174		171	227	165	89			826
CHINOOK		66							39	2864					2903

Appendix C-3.

Commercial Troll and Ocean Sport Chinook Catches, 1971-1979.

Commercial troll and ocean sport chinook catches (thousands of fish), 1971-1984 and 1971-1975 average.

Year	California			Oregon[b/]			Washington[c/]			PFMC Area			Southeast		
	Troll	Sport	State Total	Troll	Sport	State Total	Troll	Sport	State Total	Troll	Sport	Total	Canadian Troll	Alaska Troll	Grand Total
1971	434	188	622	103	30	133	252	160	412	789	378	1,167	1,270	334	2,771
1972	492	200	692	127	44	171	203	212	415	822	456	1,278	1,223	242	2,742
1973	817	198	1,015	363	61	424	317	204	521	1,497	463	1,960	1,091	308	3,359
1974	492	157	649	224	37	261	353	215	568	1,069	409	1,478	1,178	322	2,978
1975	579	104	683	225	76	301	274	262	536	1,078	442	1,520	1,103	287	2,910
1971-1975 Average	563	170	733	209	49	258	280	210	490	1,052	429	1,481	1,173	299	2,953
1976	540	81	621	184	79	263	361	171	532	1,085	331	1,416	1,249	231	2,896
1977	563	127	690	340	61	401	268	175	443	1,171	363	1,534	1,111	272	2,918
1978	519	84	603	192	23	215	166	96	262	877	203	1,080	1,033	376	2,489
1979[a/]	659	123	782	245	21	266	148	77	225	1,052	221	1,273	997	338	2,608
1980[a/]	575	86	661	209	19	228	133	54	187	917	159	1,076	1,002	300	2,378
1981[a/]	549	84	633	160	29	189	117	84	201	826	197	1,023	868	248	2,147
1982[a/]	750	149	899	232	39	271	160	107	267	1,142	295	1,437	994	242	2,762
1983[a/]	274	62	336	79	25	104	77	48	125	430	135	565	772	271	1,608
1984[a/]	291	89	380	64	17	81	29	?	36	384	113	497	802	240	1,539

a/ Preliminary from 1979 for California; from 1979 for Washington, and from 1981 for Oregon.
b/ Includes catches from California, Washington, and Alaska landed in Oregon.
c/ Includes catches from California, Oregon, and Alaska landed in Washington.

From: K. Brown, ODFW, Portland, Oregon.

Appendix C-4.

Coastal Spring Chinook

Sport catch of spring chinook salmon in Oregon coastal streams, 1970-79.[a,b] (Berry 1981).

Sport catch of spring chinook salmon in Oregon coastal streams, 1970-1979.

From: Solazzi and Martin, 1982, p.100.

Stream	Run Year 1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Coastal Tributaries										
Alsea River & Bay	35	30	10	5	11	17	7	25	4	8
Alsea River, N.F.	--	--	--	--	--	--	--	6	4	13
Applegate River	--	--	--	--	--	--	--	--	0	3
Big Elk Creek	--	--	--	--	--	--	--	--	0	3
Coos River & Bay	--	--	--	--	--	--	--	--	0	5
Coos River, S.F.	--	--	--	--	--	--	--	--	0	10
Coquille River & Bay	--	--	--	--	--	--	--	--	0	17
Illinois River	--	--	--	--	--	--	--	111	0	3
Kilchis River	8	43	3	19	16	29	22	48	94	22
Miami River	5	0	0	4	0	8	4	6	0	0
Nestucca River & Bay	132	340	245	228	478	623	421	1,040	627	741
Nestucca River,Little	8	0	0	14	4	1	9	5	6	0
Rogue River	11,970	9,395	9,577	6,589	6,836	5,223	4,566	4,600	6,683	11,328
Salmon River	103	0	28	7	0	24	26	33	5	8
Siletz River & Bay	56	89	39	15	118	100	94	237	47	58
Siletz River, N.F.	--	--	--	--	--	--	--	3	0	0
Siulsaw River & Bay	673	10	389	25	39	0	0	0	0	0
Slick Rock Creek (Salmon River)	--	--	--	--	--	--	--	--	3	0
Tillamook Bay	75	51	29	29	40	0	45	122	334	396
Tillamook River	25	28	1	10	18	4	0	3	0	0
Trask River	416	1,150	190	828	1,182	1,149	1,980	2,510	2,101	1,541
Trask River, N.F.	--	--	--	--	--	--	--	6	12	0
Trask River, S.F.	--	--	--	--	--	--	--	--	9	6
Umpqua River	12,059	7,854	7,236	3,193	2,854	4,092	3,252	1,505	1,008	1,010
Umpqua River, N.F.	2,016	1,659	3,973	2,052	2,286	1,902	2,691	1,568	1,124	737
Umpqua River, S.F.	19	4	11	0	5	37	57	14	3	3
Wilson River	72	363	147	218	287	503	286	887	1,004	469
Yaquina River & Bay	--	--	--	--	--	--	--	--	0	9
Unclassified	--	--	--	--	--	--	--	1,060	20	--
Total	27,672	21,016	21,878	13,236	14,174	13,712	13,460	13,789	13,088	16,390

[a] 1977 is the first year to list catch in all open streams; in prior years catch in most tributary streams was included in the mainstem totals. [illegible] Estimates for 1971 not [illegible] for this

AN ECONOMIC ASSESSMENT OF THE COASTAL COMMUNITY IMPACTS OF INCREASING THE ABUNDANCE AND HARVEST OF CHINOOK SALMON IN THE OREGON OFFSHORE FISHERY

SUBMITTED TO THE

OREGON COASTAL ZONE MANAGEMENT ASSOCIATION, INC.

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BY

HANS RADTKE

FREELANCE ECONOMIST

YACHATS, OREGON

AUGUST, 1985

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Notarization must be signed
and dated in the presence
of the witness and
acknowledged in their capacity

SUMMARY.

Any reprogramming or enhancement efforts should rely on sound biological, environmental and management factors. The purpose of this assessment is to show that such a program has the potential to have a positive economic effect on the Oregon coastal communities. No specific recommendations for management policies are made with this assessment.

INTRODUCTION.

A review of current information available on the health of the Chinook Salmon in the Oregon offshore fishery[1] was recently presented to the Oregon Coastal Zone Management Association, Inc. (OCZMA) by Hillary Egna and Jim Lannan.

The report contains a synthesis of available information on the status of the Oregon coastal chinook stocks and on the interaction of hatchery and native fish. The report considers the following: 1) contribution to the Oregon offshore fishery; 2) abundance; 3) distribution and disease problems of Oregon coastal chinook stocks. Genetic risks and carrying capacity limitations are evaluated qualitatively.

The report identifies several Oregon coastal chinook stocks that tend to contribute heavily to the Oregon offshore fishery. These are the Umpqua spring, the Rogue spring and fall, the Chetco fall and the Elk fall chinook. Of these, the Rogue and the Umpqua stocks have no history of disease problems that would limit their exposure.

The report also reviews important aspects of the coastal chinook resources

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[1]Egna, Hillary S. and Lannan, James E.---"A Preliminary Feasibility Review of Increasing the Abundance and Harvest of Chinook Salmon in the Oregon Offshore Fishery." Report prepared for the Oregon Coastal Zone Management Association, Inc. (OCZMA); Newport, Oregon; July, 1985.

that need to be considered in future studies. It stresses that further study is needed before actual reprogramming or enhancement programs are undertaken.

It is with this same cautious note that this economic assessment should be reviewed. This assessment depends a great deal on biological and physical relationships reported and assumed. It is stressed that many of these assumptions used in this assessment are preliminary. The results should only be used to identify programs for consideration in future management policies.

ECONOMIC ANALYSIS OF COMMUNITY IMPACTS OF SALMON MANAGEMENT.

People interested in economic stability or economic development in coastal communities are often interested in estimating the impacts of economic changes (such as plant openings or closings), changes in available timber or fish for harvest, etc.) or to forecast population, employment, business activity or public service demands.

--INPUT/OUTPUT (I/O) MODELS.

Economic input/output (I/O) models are often used to estimate the impact of resource changes or to calculate the contributions of an industry to the local economy. The basic premise of the I/O framework is that each industry sells its output to other industries and final consumers and in turn purchases goods and services from other industries and primary factors of production. Therefore, the economic performance of each industry can be determined by changes in final demand and the specific inter-industry relationships.

Input/Output models can be constructed using surveys of a regional economy (a method that is very expensive) or by using secondary data to construct

estimates of local economic activity.[2]

The model developed for use in this assessment utilizes one of the best known secondary I/O models available. The U.S. Forest Service has developed a computer program called IMPLAN which can be used to construct county or multi-county I/O models for any region in the U.S. The regional I/O models used by the U.S. Forest Service are derived from technical coefficients of a national I/O model and localized estimates of total gross outputs by sections. The computer program (IMPLAN) adjusts the national level data to fit the economic composition and estimated trade balance of a chosen region. Input/output models have been constructed for Clatsop, Tillamook, Lincoln, Coos and Curry counties with the use of the U.S. Forest Service IMPLAN[3] model.

--MEASURING THE IMPORTANCE OF LOCAL ECONOMIC ACTIVITY.

One way of measuring the importance of a particular economic activity is to look at the amount of goods and services it sells and buys outside the local economy. A local community has exports and imports just as the United States has exports and imports. Harvesting and processing fish locally and selling fillets to Portland or Los Angeles residents are an export; so are lodging and services purchased by the recreational fishermen. Although a recreationalist (tourist) comes into the county, the goods and services he purchases are paid for with dollars he earned somewhere

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[2]For a detailed discussion of these methods and the methodology used in estimating local impacts see: Radtke, Hans D. and Jensen, William--- "Fisheries Economic Assessment Model". West Coast Fisheries Development Foundation, Draft Report; Portland, Oregon; July 1985.

[3]Siverts, Eric; Palmer, Charles and Walters, Ken---"IMPLAN Users Guide", U.S. Forest Service; Fort Collins, Colorado; September 1983.

outside the local area. All exports bring outside dollars into the economy, stimulating the local economic growth.

To estimate the initial economic change a salmon made available for harvest can bring into the commercial or the recreational sector of the local area, representative budgets for fish harvesting, processing and recreational fishing are used.[4]

The individual expenditure categories of these industries are used to estimate the total community income impacts for several Oregon communities of each dollar of harvested salmon revenue (Table I); each processed salmon pound (Table II); and each recreation day (Tables III and IV). These impacts are summarized in Tables V and VI.

The impacts per commercial fish harvested and per recreation day are used to assess the impacts of increasing the abundance and harvest of chinook salmon in the Oregon offshore fishery.

ECONOMIC ASSESSMENT OF COMMUNITY IMPACTS.

Egna and Lannan identified several stocks of chinook that tend to contribute heavily to the Oregon offshore fishery and that are also apparently free from diseases and therefore not quarantined. These stocks are the Umpqua and Rogue spring chinook and the Rogue and Coos fall chinook.

Figures 1, 2, and 3 diagram the contribution to the coastal areas of several stocks of chinook salmon originating from Oregon waters. Figure 1 also shows that about 15% of the Oregon chinook harvested are sport caught. This information along with the information in Tables V and VI is used to

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[4]For an explanation see: "Progress Report on the Economic Aspects of the Recreational/Commercial Allocation of the Coho Salmon in the Ocean Fisheries". For Commission Review. Oregon Department of Fish and Wildlife; Portland, Oregon; August 23, 1985.

calculate the community impacts on the Oregon coastal communities of average fish harvested. For example, for every Umpqua spring chinook made available for the offshore fishery[5], the Oregon coastal communities will receive $20.12 of local income. On the other hand, a Trask fall chinook made available to the offshore fishery will contribute $.16 to Oregon coastal communities income (Table VII). This analysis does not include price differentials between types of Chinook. Columbia "Tules" historically bring a lower price than the average $2.74 per pound of chinook used. Inclusion of such specific price information would reduce the estimates for Columbia "Tules".

Total catch rates per smolt released are very critical in the total impact of a stock on coastal communities. Notes from Bob Garrison, Oregon Department of Fish and Wildlife show that such rates can vary a great deal from stock-to-stock (Appendix) and from year-to-year. The contribution to the coastal communities (in terms of income and jobs) can be very significant, especially at the higher survival rates (Table VII). A ten million smolt release of Umpqua spring chinook that contributed to the offshore fishery in the same manner as postulated in this assessment model could increase Oregon coastal community income by $201,200 and total full-time equivalent employment by 11 jobs at a 1 percent survival rate and up to $1,006,000 income and by 56 jobs at a very high survival rate of 5 percent.

The estimates in Table VII of local impacts are an assessment of possible management decisions relating to increasing or reprogramming the abundance or harvest of chinook salmon. The factors in this assessment are very general and should be read with caution in any specific situation.

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[5]Inland harvest not included.

Table I.

Calculations to Estimate the Local Community Impacts of Expenditures of Commercial Salmon Harvested per $ of Revenue in Areas of the Oregon Coast

Variable expenses [a]	Percent of [b] Total Revenues	IMPLAN Coefficients [c] Astoria	Tillamook	Newport	Coos Bay	Brookings	Total Income Impact per $ Astoria	Tillamook	Newport	Coos Bay	Brookings
Vessel & Engine Repair	.041	.5111	.5463	.5210	.5606	.5092	.021	.022	.021	.023	.021
Gear Replacement	.068	.6233	.5736	.5477	.6071	.4988	.042	.039	.037	.041	.034
Fuel & Lubricants	.103	.7160	.6121	.5683	.5711	.5515	.074	.063	.059	.059	.057
Food & Supplies	.051	.6071	.5068	.4223	.5621	.3945	.037	.026	.022	.029	.020
Ice & Bait	.010	.0966	.4849	.7865	.8421	.7788	.009	.005	.008	.008	.008
Dues & Fees	.007	.5932	.3321	.4384	.5536	.3612	.004	.002	.003	.004	.003
Transportation	.025	.6619	.6077	.6242	.6229	.5978	.017	.015	.016	.016	.015
Miscellaneous	.025	1.2955	1.0525	1.1353	1.2156	.9839	.032	.026	.028	.030	.025
Crew Share & Interest Net Return	.624	.6229	.4919	.4893	.5602	.4007	.389	.307	.305	.350	.250
Total	.954						.625	.505	.499	.560	.413

Total Local Impact Per $ of Harvesting Revenues

Initial change in return to households (Crew dues, etc.)		Impact of Expenditures Astoria	Tillamook	Newport	Coos Bay	Brookings		Total Local Impact per Harvest Dollar Astoria	Tillamook	Newport	Coos Bay	Brookings
.624	+	.625	.505	.499	.560	.413	=	1.25	1.13	1.12	1.18	1.04

[a] Short term policy or resource changes analysis includes variable expenses and net returns (in a stagnant industry it is assumed that all revenues that would otherwise go toward interest payments and depreciation become part of household income)

[b] For an explanation of the Sullivan Method (see Siverts, et. al.)

[c] Estimated with the U.S. Forest Service IMPLAN Input/Output model for these areas of the Oregon Coast.

Table II.

Calculations to Estimate the Local Community Income Impacts of Commercial Salmon (Per Pound) Processed in Areas of the Oregon Coast

Variable expenses [a]	Expenditures per Processed Pound	IMPLAN Coefficients [b]					Total Income Impact Per Pound ($)				
		Astoria	Tillamook	Newport	Coos Bay	Brookings	Astoria	Tillamook	Newport	Coos Bay	Brookings
Labor	$.16	.6229	.4919	.4893	.5602	.4007	.100	.079	.079	.090	.064
Other:											
Utilities	.03	1.0161	.7865	.8518	.8930	.7392	.030	.024	.026	.027	.022
Packaging	.02	.1060	.1032	.0969	.0891	.0791	.002	.002	.002	.002	.002
Miscellaneous	.01	1.0415	.9779	1.0561	1.1092	.9372	.010	.010	.011	.011	.009
Total	.22[a]						.142	.115	.118	.130	.097

Total Local Impact Per $ of Harvesting Revenues

Initial change in return to labor		Impact of Expenditures						Total Local Impact per Processed Pound ($)				
		Astoria	Tillamook	Newport	Coos Bay	Brookings		Astoria	Tillamook	Newport	Coos Bay	Brookings
.16	+	.142	.115	.118	.130	.096	=	.30	.27	.28	.29	.26

Total local impact per lb. of harvested lb. that is processed = yield = .95

	.29	.26	.27	.28	.25

[a] Short term or resource changes analysis includes variable expenses only. For processors, the margin per pound between the purchased price and sales price remains fairly constant (about $.52 per lb. including yield percentages). A fairly large portion of the margin ($.30 of the $.52) includes fixed cost and will not change when annual policy changes are made.

[b] Estimated with the USFS IMPLAN Input/Output model for these areas of the Oregon coast.

Table III.

Calculations to Estimate the Local Community Income Impacts of The Recreational Ocean Fishery in $ per Recreation Day for Private Boats in Areas of the Oregon Coast

	Expenditures [a]	IMPLAN Coefficients [b]					Total Income Impact ($)				
	per Day	Astoria	Tillamook	Newport	Coos Bay	Brookings	Astoria	Tillamook	Newport	Coos Bay	Brookings
Variable expenses											
Restaurants	$10.83	.7619	.8242	.7267	.8129	.6939	8.25	8.93	7.85	8.80	7.51
Groceries	5.26	.6730	.6098	.7240	.5946	.5299	3.54	3.21	3.81	6.44	2.79
Camping etc.	3.02	1.1373	.8741	1.0857	1.0555	1.3882	3.43	2.64	3.28	1.80	4.19
Loding	5.94	1.3308	1.2073	1.1793	1.2370	1.0402	7.90	7.17	7.01	7.35	6.18
Boat/Motor Rental Fees	0.22	1.3967	1.0331	1.2012	1.2279	1.1969	.31	.23	.26	.27	.26
Boat Landing Fees	1.87	1.1373	.8741	1.0857	1.0555	1.3882	2.13	1.63	2.03	1.97	2.60
Gas for Boat	14.48	.7160	.6121	.5683	.5711	.5515	10.38	8.86	8.23	8.27	7.99
Miscellaneous	4.30	1.0519	.8951	.9665	1.0335	.8728	4.52	3.85	4.16	4.44	3.75
Total	45.92						40.41	36.52	36.63	39.43	34.97

[a] Basic data taken from Crutchfield and Schelle (1979).
Expenditure data is adjusted to 1984 dollars using the GNP price deflator.

[b] Estimated with the U.S. Forest Service Input/Output model for these areas of the Oregon Coast.

Table IV.

Calculations to Estimate the Local Community Income Impacts of The Recreational Fishery for Ocean Salmon Charter Boats in Areas of the Oregon Coast.

Charter Boat Expenditures	% of Total	Portion of $31.26 Day by Category[a]	IMPLAN Coefficients[b] Astoria	Tillamook	Newport	Coos Bay	Brookings	Total Income Impact ($) Astoria	Tillamook	Newport	Coos Bay	Brookings
Wages, Salaries												
Returns	57.7	$18.03	.6229	.4919	.4893	.5602	.4007	11.23	8.87	8.82	10.10	7.22
Crew Wages	(5.0)											
Skipper	(31.3)											
Net Returns	(21.4)											
Fuel	9.4	2.94	.7160	.6121	.5683	.5711	.5515	2.11	1.67	1.65	1.68	1.62
Maintenance	7.3	2.28	.5111	.5403	.5201	.5606	.5092	1.17	1.23	1.19	1.28	1.16
Booking Commision & Fees	10.9	3.41	1.0519	.8951	.9665	1.0335	.8728	3.59	3.05	3.30	3.52	2.98
Other	1.7	.53	1.0519	.8951	.9665	1.0335	.8728	.56	.47	.51	.55	.39
Total	87.0	27.19						18.66	15.29	15.47	17.13	13.07
								+	+	+	+	+
					Initial change in return to wages, skipper & net returns			18.03	18.03	18.03	18.03	18.03
								+	+	+	+	+
Charterboat Users Destination Expenditures												
					Impact from charterboat destination expenditures			27.64	25.80	26.11	28.83	24.42
								=	=	=	=	=
(Restaurant, groceries, camping, lodging, misc.)		29.35										
taken from previous table)		56.23						63.74	59.12	59.61	63.99	55.22

[a] Basic data taken from Crutchfield and Schelle (1979)
[b] Moorage of 1.4%; insurance of 4.1% taxes, fees etc. of 7.5%are considered fixed costs.

Table V.

Economic (Income) Impacts of Ocean Salmon Commercial Fishing
(Impacts Related to Policy Decision)
Commercial Impacts (Impacts on Local Household Income

	Astoria	Tillamook	Newport	Coos Bay	Brookings
Harvester impacts per dollar	$1.25	$1.13	$1.12	$1.18	$1.04
Processor impacts per pound	0.29	0.26	0.27	0.28	0.24
Examples (Harvester & processor impacts per fish)					
Average Weights Used					
Chinook	8.5	8.5	8.5	8.5	8.5
Coho	5.1	5.1	5.1	5.1	5.1
Average Prices Used ($)					
Chinook	2.74	2.74	2.74	2.74	2.74
Coho	1.66	1.66	1.66	1.66	1.66
Total Local Impacts on Income of Policy ($ per fish)					
Chinook	31.68	28.53	28.38	29.86	26.43
Coho	12.06	10.90	10.86	11.42	10.08

Table VI.

Economic (Income) Impacts of Ocean Salmon Recreational Fishing (Private and Charter Boat) per Angler Day Destination Impacts

(Impacts Related to Policy Decision)

	Astoria	Tillamook	Lincoln	Coos Bay	Brookings
Destination expenditures ($)					
Private Boats	45.92	45.92	45.92	45.92	45.92
Charter Boats	56.23	56.23	56.23	56.23	56.23
Impacts on Household Income ($)					
Private Boats	40.41	36.52	36.52	39.34	34.97
Charter Boats	63.74	59.12	59.16	63.99	55.52

Table VII.

OFFSHORE OREGON SALMON HARVEST--LOCAL INCOME IMPACTS RELATED TO REPROGRAMMING OR ENHANCEMENT PROGRAMS

Stock	Oregon Offshore Catch[1] %	Community Impact Per Fish[2] $	Average Impact Per Fish $	Per Million Smolts Released--Survival Rates: Low 1/2% $	Low 1/2% Jobs[3]	Medium 1% $	Medium 1% Jobs[3]	High 2% $	High 2% Jobs[3]	Very High 5% $	Very High 5% Jobs[3]
SPRING CHINOOK											
Umpqua	62	32.45	20.12	106,000	5.59	201,000	11.18	402,400	22.36	1,006,000	55.89
Rogue	38	32.45	12.33	61,650	3.49	123,300	6.85	246,600	13.70	616,500	34.25
Trask	13	32.45	4.22	21,100	1.18	42,200	2.34	84,400	4.70	211,000	11.75
Willamette	1	32.45	.32	1,600	.09	3,200	.18	6,400	.36	16,000	.90
FALL CHINOOK											
Rogue	46	32.45	14.93	74,650	4.15	149,300	8.29	248,600	16.58	746,500	41.45
Coos	15	32.45	4.87	24,850	1.36	48,700	2.71	99,400	5.42	248,500	13.55
Trask	1/2	32.45	.16	800	.05	1,600	.09	3,200	.18	8,000	.45
Salmon River	1	32.45	.32	1,600	.09	3,200	.18	6,400	.36	16,000	.90
Columbia "Tules" (Big Creek)	8	32.45	2.60	13,000	.72	26,000	1.44	52,000	2.88	130,000	7.20

[1]Taken from Figure I.

[2]Used the Newport area as a representative impact for the total Oregon Coast (from Tables V and VI). The rates of ocean troll to ocean recreation (85% to 15%) and recreation private boat to charter boat (84% to 16%) are used to calculate the impact per average fish harvested.

[3]Assumed an $18,000 annual income is equal to one full-time job.

Figure 1.

From Bob Garrison, 1984

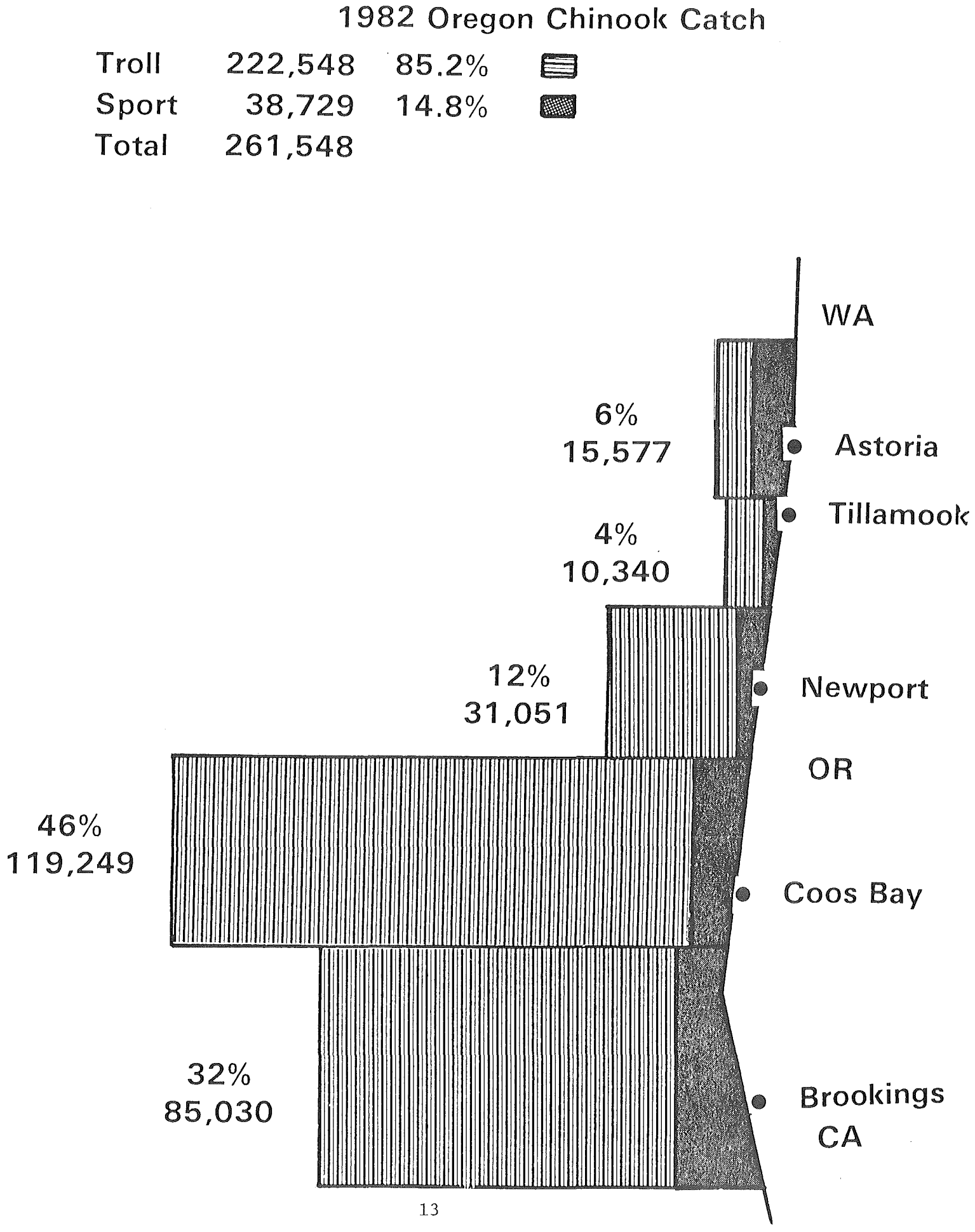


Figure 2.

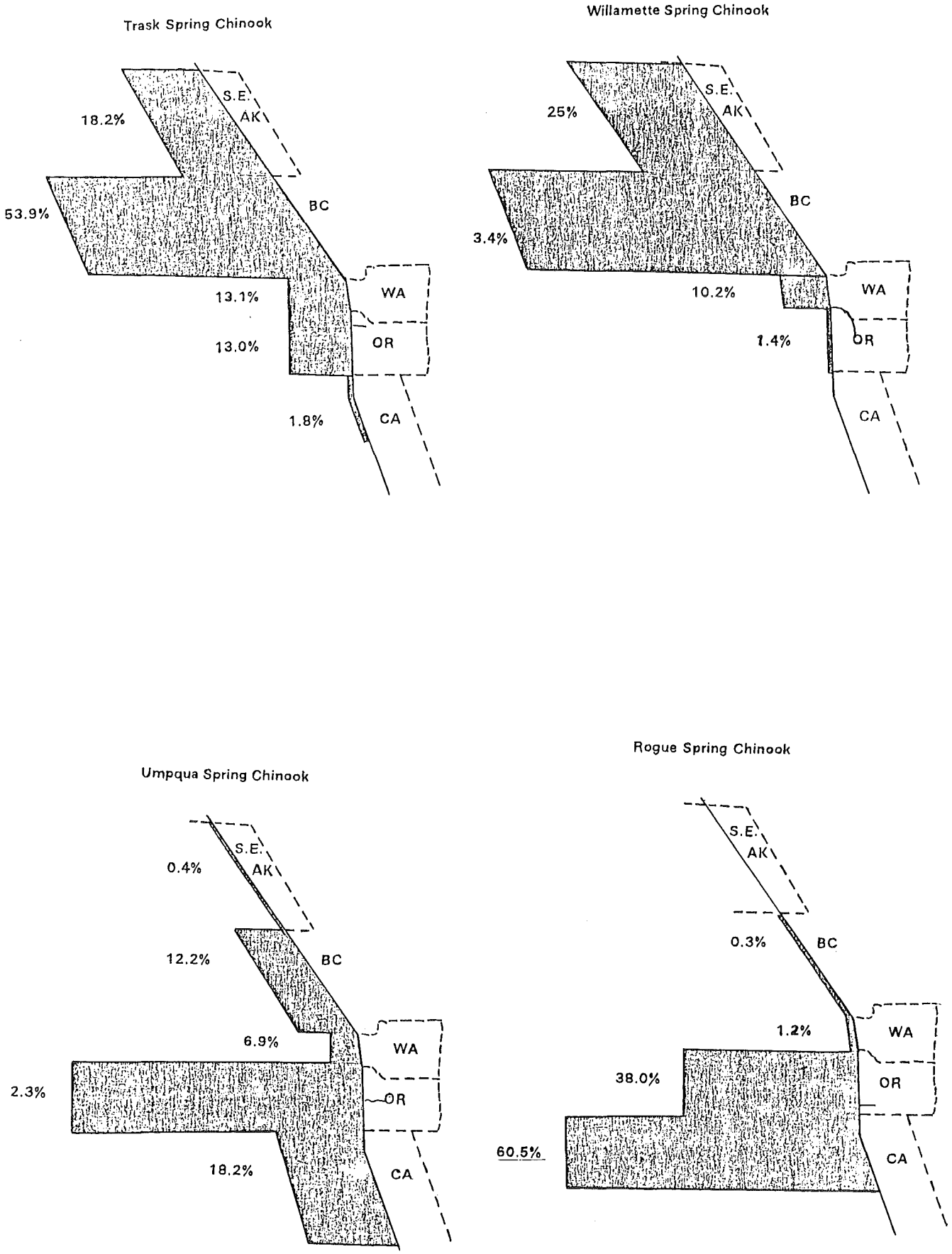
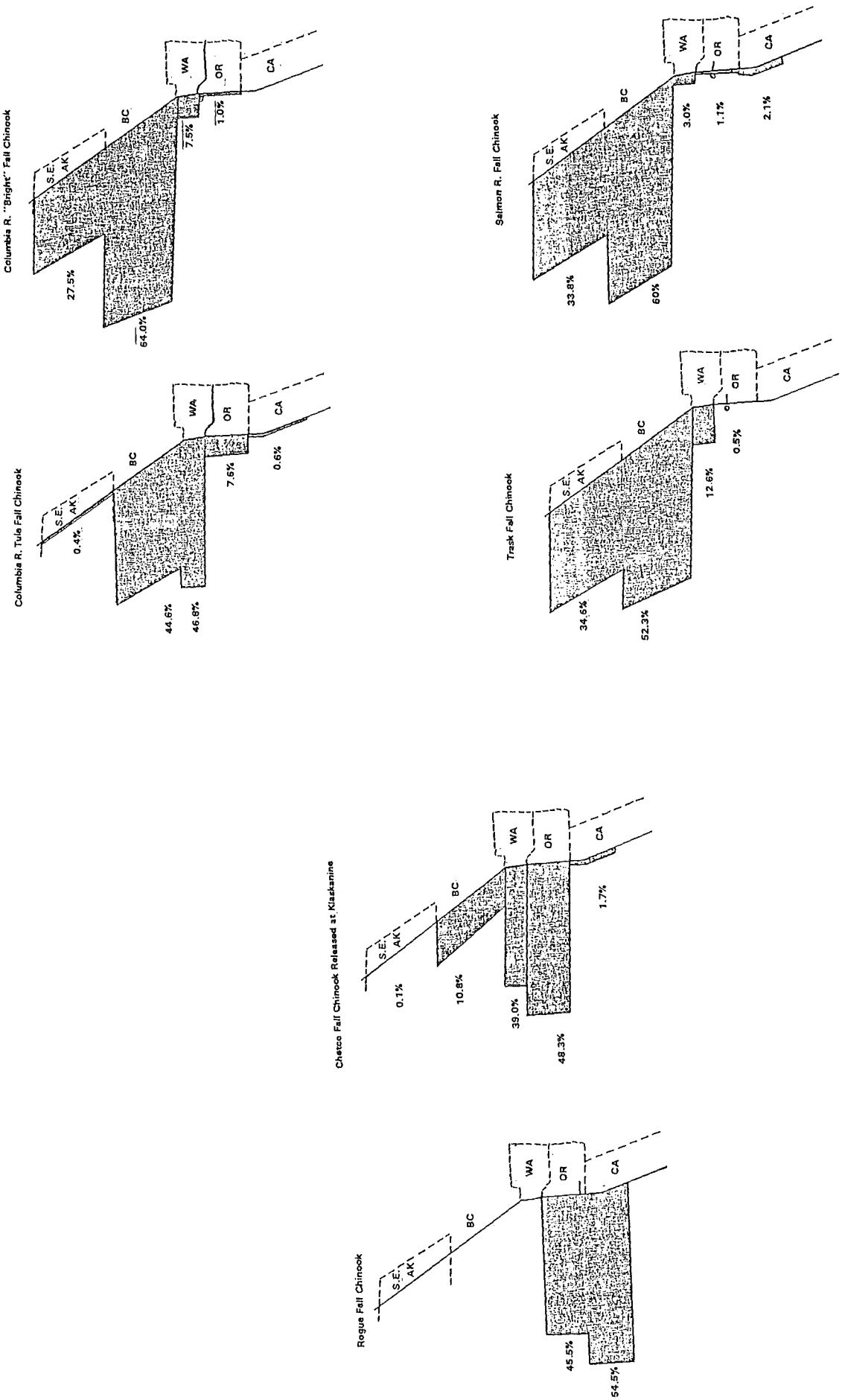

Trask Spring Chinook
S.E. AK
18.2%
BC
53.9%
13.1%
WA
13.0%
OR
1.8%
CA
Willamette Spring Chinook
S.E. AK
25%
BC
3.4%
10.2%
WA
1.4%
OR
CA
Umpqua Spring Chinook
S.E. AK
0.4%
12.2%
BC
6.9%
WA
2.3%
OR
18.2%
CA
Rogue Spring Chinook
S.E. AK
0.3%
BC
1.2%
WA
38.0%
OR
60.5%
CA

Figure 3.


Columbia R. "Bright" Fall Chinook
S.E. AK
BC
WA
OR
CA
27.5%
64.0%
7.5%
1.0%
Columbia R. Tule Fall Chinook
0.4%
44.6%
46.8%
7.6%
0.6%
Salmon R. Fall Chinook
33.8%
60%
3.0%
1.1%
2.1%
Trask Fall Chinook
34.6%
52.3%
12.6%
0.5%
Chetco Fall Chinook Released at Klaskanine
0.1%
10.8%
39.0%
48.3%
1.7%
Rogue Fall Chinook
45.5%
54.5%

APPENDIX

NOTES FROM

BOB GARRISON

OREGON DEPARTMENT OF FISH AND WILDLIFE

NOTES FROM BOB GARRISON, OREGON DEPARTMENT OF FISH AND WILDLIFE

ROGUE CHINOOK SPRING

Br	CWT Number	Date	Size/Lb.	Total Catch Rate	#/1,000 Contribution to Oregon Sport	Troll
75	09-04-04	12-15-76	11.1	1.24%	0.05	2.6
75	09-03-15	12-15-76	5.4	0.51%	0.06	1.3
75	09-04-01	10-13-76	10.9	0.91%	0.38	3.6
75	09-04-02	10-13-76	5.3	1.79%	0.35	4.9
76	09-16-16	12-13-77	9.5	1.18	0.00	5.4
76	09-16-18	12-13-77	6.7	1.22%	0.12	4.9
76	09-16-19	12-13-77	6.2	1.59%	0.11	6.6
76	09-16-33	10-18-77	10.3	3.47%	0.35	18.4
76	09-16-20	10-18-77	8.0	4.77%	0.18	21.2
76	09-16-17	10-18-77	5.6	7.53%	0.28	26.7
77	07-16-29	10-25-78	6.4	0.78%	0.00	5.5
77	07-16-39	3-14-79	7.3	0.13%	0.00	0.1
78	07-19-38	12-17-79	10.2	0.43%	0.00	3.0
78	07-19-37	12-17-79	10.3	0.33%	0.00	1.8
78	07-19-36	12-20-79	7.8	0.86%	0.00	4.1
78	07-19-35	12-20-79	7.6	1.04%	0.10	4.7
78	07-19-34	10-21-79	12.2	0.42%	0.00	2.4
78	07-19-33	10-21-79	11.5	0.48%	0.00	2.2
78	07-19-31	10-21-79	6.7	1.85%	0.00	5.2
78	07-19-32	10-21-79	6.7	1.62%	0.00	4.8
78	07-18-54	3-01-80	6.8	1.90%	0.53	8.2
79	07-22-14	12-12-80	10.8(BKD)	0.20%	0.50	0.7
79	07-22-13	12-12-80	9.9	0.43%	0.22	1.9
79	07-22-11	12-12-80	7.4	0.11%	0.00	0.4
79	07-22-12	12-12-80	7.7	0.35%	0.06	2.0
79	07-22-09	10-16-80	9.5	0.87%	0.28	3.5
79	07-22-10	10-16-80	9.5	0.44%	0.00	2.0
79	07-22-15	10-16-80	8.4	0.51%	0.18	2.4
79	07-22-16	10-16-80	7.6	0.23%	0.00	1.4
79	07-22-31	3-02-81	5.8	0.33%	0.02	1.6
80	07-25-14	8-14-81	9.2	0.38%	0.90	1.0
80	07-25-15	10-21-81	5.3	0.13%	0.29	0.5
80	07-20-23	3-15-82	4.4	0.12%	0.43	0.2

NOTES FROM BOB GARRISON, OREGON DEPARTMENT OF FISH AND WILDLIFE

ROGUE CHINOOK FALL

Br	CWT Number	Date	Size/Lb.	Total Catch Rate	#/1,000 Contribution to Oregon Sport	Troll
77	07-16-36 (Applegate Stock)	10-25-78	11.8	0.26%	0.00	0.8
78	07-18-53	10-25-79	7.3	1.77%	0.50	8.2
80	02-17-09 (Lobster Creek Stock)	9-24-81	10.1	0.46%	0.98	1.8

UMPQUA CHINOOK SPRING

76	09-16-41	3-07-78	4.8	0.69%	0.03	3.3
76	09-16-55	3-07-78	5.0	0.52%	0.50	2.0
77	07-16-49	3-01-79	5.1	1.95%	0.60	14.6
77	07-16-50	11-21-78	5.8	2.06%	0.40	11.9
78	07-20-03	11-07-79	8.6(SICK)	0.19%	0.00	0.8
79	07-22-29	2-26-81	4.0	2.06%	1.23	11.3
79	07-22-28	10-28-80	4.0	1.88%	1.31	6.6
80	07-25-01	10-12-81	5.5	0.72%	0.94	3.4
80	07-25-02	3-02-82	6.2	0.65%	0.80	2.8
81	07-26-18	10-22-82	4.6	0.17%	0.13	0.7
81	07-26-19	3-01-82	4.9	0.37%	1.67	0.6