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HENRY O'MALLEY, Commissioner

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PACIFIC SALMON FISHERIES

By JOHN N. COBB

APPENDIX XIII TO THE REPORT OF THE COMMISSIONER OF FISHERIES FOR 1930

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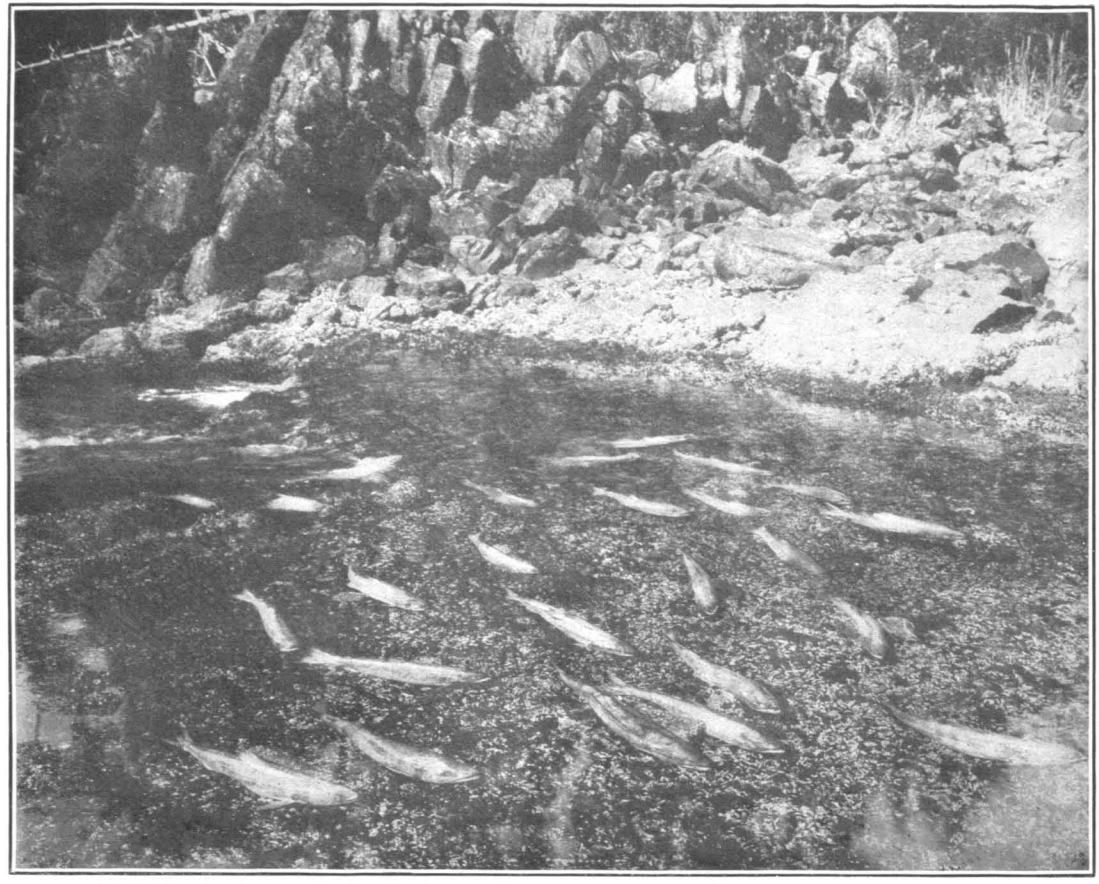

FIG. 1.—SALMON ON THE SPAWNING BEDS

PACIFIC SALMON FISHERIES[1]

By John N. Cobb
Dean, College of Fisheries, University of Washington

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[1] Appendix XIII to the Report of the U. S. Commissioner of Fisheries for 1930. B. F. Doc. No. 1092. Submitted for publication Nov. 9, 1929.

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INTRODUCTION

The most valuable commercial fisheries in the world, excepting only the oyster and herring fisheries, are those supported by the salmons. Of these the most important by far are the salmon fisheries of the Pacific coast of North America, where California, Oregon, Washington, and Alaska, including also British Columbia, possess industries representing millions of dollars of investment and millions of output annually. In Siberia the fishery is increasing in importance annually as means of transportation become better, while Japan is also becoming a large factor in the salmon markets of the world through her investments in the salmon fisheries of Siberia and, to a lesser extent, through fisheries prosecuted in her own waters.

In this fourth edition of the report [2] considerable new material has been added, while some chapters have been entirely remodeled and materially enlarged. The statistical data have been brought up to

[1] First edition: The Salmon Fisheries of the Pacific Coast. By John N. Cobb. U. S. Bureau of Fisheries Document No. 751, 180 pp. Washington, 1911.
Second edition: Pacific Salmon Fisheries. By John N. Cobb. U. S. Bureau of Fisheries Document No. 839, Appendix III, Report, U. S. Commissioner of Fisheries, 1916, 255 pp., 29 pls. Washington, 1917.
Third edition: Pacific Salmon Fisheries. By John N. Cobb. U. S. Bureau of Fisheries Document No. 902, Appendix I, Report, U. S. Commissioner of Fisheries, 1921, 268 pp., 48 figs. Washington, 1921.

January 1, 1929. The author is indebted to the Pacific Fisherman, of Seattle, Wash., for certain illustrations and to George C. Teal for permission to use his copyrighted picture shown as Figure 11. Most of the illustrations are from pictures taken by the author.

THE SPECIES OF SALMON AND THE RUNS

The Pacific coast salmons are all included in the genus *Oncorhynchus*. With them the fishermen incorrectly class the steelhead trout, which really belongs to the closely related genus *Salmo*.

As long ago as 1731 the species of *Oncorhynchus* were first made known by Steller, who, almost simultaneously with Krascheninikov, another early investigator, distinguished them with perfect accuracy under their Russian vernacular names. In 1792 Walbaum adopted these vernacular names in a scientific nomenclature for these fishes.

Five species of salmon (*Oncorhynchus*) are found in the waters of the north Pacific, ranging northward from Monterey Bay on the American Coast and Japan on the Asiatic, the extreme northern distribution of certain of the species having not yet been accurately determined. The five species are: (1) *Oncorhynchus tschawytscha*, quinnat, tyee, chinook, spring, or king salmon; (2) *Oncorhynchus nerka*, blueback, red, sukkegh, or sockeye salmon; (3) *Oncorhynchus kisutch*, silver, silverside, coho, or white salmon; (4) *Oncorhynchus keta*, chum or keta salmon; and (5) *Oncorhynchus gorbuscha*, humpback or pink salmon.

CHINOOK, QUINNAT, OR KING SALMON

The largest of the Pacific salmons is the chinook or king salmon (*O. tschawytscha*). It is found throughout the region from the Ventura River, Calif., to Norton Sound, Alaska, and on the Asiatic coast as far south as northern China. As knowledge extends, it will probably be recorded in the Arctic.

In the spring the body is silvery, the back, dorsal fin, and caudal fin having more or less of round black spots, and the sides of the head having a peculiar tin-colored metallic luster. In the fall the color is, in some places, black or dirty red. The fish has an average weight of about 22 pounds, but individuals weighing 70 to over 100 pounds are occasionally taken. One was caught near Klawak, Alaska, in 1909, which weighed 101 pounds without the head. The Yukon River is supposed to produce the finest examples, although this supposition is not based on very reliable observations. The southeast Alaska fish average as high as 23 pounds in certain seasons, followed by an average of about 22 pounds in the Columbia River and about 16 pounds in the Sacramento.

In most places the flesh is of a deep salmon red, but in certain places, notably southeast Alaska, Bristol Bay, Puget Sound, and British Columbia, many of the fish, the proportion being sometimes as much as one-third of the catch, have white flesh. A few examples have been taken with one side of the body red and the other white, while some are found with mottled flesh. No reasonable explanation of this phenomenon has yet been given.

In its southern range the quinnat strikes in at Monterey Bay in sufficient numbers to justify commercial fishing about the middle of April, where it is seen feeding upon the inshore moving schools of

herring and sardines, continuing until in August. There are two runs of spawning fish in the Sacramento, the first or "spring run" beginning in April and continuing throughout May and June, these fish spawning mainly in the cold tributaries of the Sacramento, such as the McCloud and Fall Rivers. The second or "fall run" occurs in August, September, and October, and these fish spawn in the riffles in the main river between Tehama and Redding, also entering the tributaries in that vicinity. The two runs merge into each other. It is also claimed that there is a third run which comes in December.

In former years the San Joaquin and the American and Feather Rivers of the Sacramento system had large runs of salmon, but excessive fishing and the operation of various mining and irrigation projects have practically depleted them.

The Eel and Mad Rivers of northern California have only a late or fall run, while the Klamath River has both a spring and a fall run, and Smith River has a spring run alone. Rogue River in Oregon has both a spring and a fall run, and the Umpqua and several other coast streams of Oregon have small early runs.

The Columbia River has three runs, the first entering during January, February, and March, and spawning mainly in the Clackamas and neighboring streams. The second, which is the best run, enters during May, June, and part of July, spawning mainly in the headwaters. The third run occurs during late July, August, September, and part of October, and spawns in the tributaries of the lower Columbia.

In Puget Sound chinook salmon are found throughout the year, although it is only during the spawning season that they are very abundant. In the Fraser River, a tributary of the Sound, the run occurs from March to August.

In the Skeena River, British Columbia, the run occurs from May to July, the same being approximately true of the Naas also.

In southeast Alaska they are found all months of the year. From March to the middle of June they are abundant and feeding in the numerous straits and sounds; in May and June the spawning fish enter the Unuk, Stikine, Taku, Chilkat, Alsek, and Copper Rivers in large numbers, and in a few smaller streams in lesser abundance. In August, September, and October they are again to be found in large numbers feeding in the bays and sounds, while during the winter months a few have been taken on trawls set for halibut, showing that they are living in the lower depths at this time.

In Cook Inlet the run occurs during May and June and is composed wholly of red-meated fish; in the rivers of Bristol Bay the run comes in June and July, principally in the first-named month, and the same is true of the Togiak, Kuskokwim, and Yukon Rivers, the late appearance of the fish in the upper courses of the Yukon being due to the immense distance the fish have to cover.

SOCKEYE, BLUEBACK, OR RED SALMON

The red or sockeye salmon (*O. nerka*), when it first comes in from the sea is a clear bright blue above in color, silvery below. Soon after entering the river for the purpose of spawning the color of the head changes to a rich olive, the back and sides to crimson, and finally to a dark blood red, and the belly to a dirty white. The maximum weight is about 12 pounds, and length 3 feet, with the average weight

about 5 pounds, varying greatly, however, in different localities. Observations of Chamberlain [3] in Alaska show that the average weight of a number of sockeyes taken from Yes Bay was 8.294 pounds, while the average weight of a number from Tamgas was only 3.934 pounds. Evermann and Goldsborough [4] report as a result of the weighings of 1,390 red salmon, taken from as many different places in Alaska as possible, an average weight for the males of 7.43 pounds; for the females, 5.78 pounds; or an average weight for both sexes of 6.57 pounds. A run of small, or dwarf, males accompanies certain of the main runs, being especially noticeable in the Chignik Lagoon (Alaska) run. This species usually enters streams with accessible lakes in their courses.

These fish are occasionally found landlocked in certain lakes, especially in the State of Washington, and are always much smaller in size than the sea-run fish. In Bumping Lake, near North Yakima, Wash., they are quite abundant and are mature when about a pound in weight. Despite the fact that these fish have a soft mouth, anglers consider them very gamey. They take bait, the fly, and the trolling spoon. Large numbers are hatched and distributed by the Washington Department of Fisheries under the name of "silver trout."

A few specimens of the sockeye have been taken as far south as the Sacramento River. In Humboldt County, Calif., small runs are said to occur in Mad and Eel Rivers, while 20 sockeyes are reported as having been taken in the Klamath River in the autumn of 1915. Only an occasional specimen appears in the coastal streams of Oregon. The Columbia is the most southern river in which this species is known to run in any considerable numbers, entering the river with the spring run of chinooks. From here south the species is called blueback exclusively. A considerable run enters the Quinault River, Wash., and there is also a small run in Ozette Lake, just south of Cape Flattery.

In the Puget Sound region, where it is known as the sockeye, this species ascends only the Skagit River in commercial numbers, although a small run appears in the Lake Washington system of lakes and, possibly, in the Snohomish, Stillaguamish, and Nooksack Rivers.

At one time the greatest of all the sockeye streams was the Fraser River, British Columbia, a stream famous from very early days for its enormous runs of this species, a peculiar feature of which is, that there is a marked quadrennial periodicity in the run. The maximum run occurs the year following leap year, the minimum on the year following that. The greater part of the catch of the Puget Sound fishermen is made from this run as it is passing through Washington waters on its way to the Fraser. The fish strike in during July and August on the southwest coast of Vancouver Island, apparently coming from the open sea to the northwest. They pass through the Straits of Juan de Fuca, Rosario, and Georgia, spending considerable time in the passage and about the mouth of the river. Small numbers run as early as May and as late as October, but the main body enters about the first week in August.

The sockeye occurs in most of the coastal streams of British Columbia, and is usually the most abundant species. The principal

[3] Some Observations on Salmon and Trout in Alaska. By F. M. Chamberlain, naturalist, U. S. Fisheries steamer *Albatross*. U. S. Bureau of Fisheries Document No. 627, p. 80. Washington, 1907.

[4] The Fishes of Alaska. By B. W. Evermann and E. L. Goldsborough. Bulletin, U. S. Bureau of Fisheries, 1906, Vol. XXVI, p. 257. Washington, 1907.

streams frequented are the Skeena, Rivers Inlet, Naas, Lowe Inlet, Dean Channel, Namu Harbor, Bella Coola, Smith Inlet, Alert Bay, and Alberni Canal.

In Alaska, where this fish is generally known as the red salmon, it is abundant and runs in great numbers in all suitable streams, of which the following are the most important: In southeast Alaska, Boca de Quadra, Naha, Yes Bay, Thorne Bay, Karta Bay, Nowiskay, Peter Johnson, Hessa, Hetta, Hunter Bay, Klawak, Redfish Bay, Stikine, Taku, Chilkoot, Chilkat, Alsek, Situk, Ankow, etc.; in central Alaska, Copper, Knik, Kenai, Susitna, Afognak, Karluk, Alitak, Chignik; and in the Bristol Bay region, the Ugashik, Egegik, Naknek, Kvichak, Nushagak, and Wood. It is also supposed to occur in small numbers in the Togiak, Kuskokwim, and Yukon Rivers, which debouch into Bering Sea, and possibly occurs in the Arctic streams of Alaska. The run in western Alaska begins usually early in June and extends usually to the middle of August, the bulk of the run occurring in the first three weeks of July. It begins earlier in Prince William Sound, however, and sometimes extends into September in southeast Alaska. The duration of the run averages about the same in each section.

SILVER OR COHO SALMON

The silver or coho salmon (*O. kisutch*) is silvery in spring, greenish on the upper parts, where there are a few faint black spots. In the fall the males are mostly of a dirty red. The flesh in this species is of excellent flavor, but paler in color than the red salmon, and hence less valued for canning purposes. The maximum weight is about 30 pounds, with a general average of about 6 pounds.

The silver salmon is found as far south as Monterey Bay, where it appears during the month of July, and is taken by the trollers. From Eel River, in California, north, it is found in most of the coastal streams. It usually appears in July, and runs as late as November, the time of appearance and disappearance varying somewhat in different sections. Owing to its late appearance comparatively few, and they usually in the early part of the season, are packed by the canneries, most of which shut down in August and September. This fish also tarries but a short time about the mouth of the stream it is to enter, and is wary of nets, which makes it rather unprofitable to fish for the latter part of the season when it is running alone.

HUMPBACK OR PINK SALMON

The humpback or pink salmon (*O. gorbuscha*), the smallest of American species, weighs from 3 to 11 pounds, the average being about 4 pounds. Its color is bluish above, silvery below, the posterior and upper parts with many round black spots, the caudal fin always having a few large black spots oblong in shape. The males in fall are dirty red and are very much distorted in shape, a decided hump appearing on the back, from which deformity the species acquires its name. The flesh is pale, hence its canned name, "pink" salmon.

The southern limit of the fish is the San Lorenzo River, Santa Cruz County, but only occasional specimens are found here and in the rivers to the northward until Puget Sound is reached. Here a large run appears every other year, the only place on the coast where such is the case.

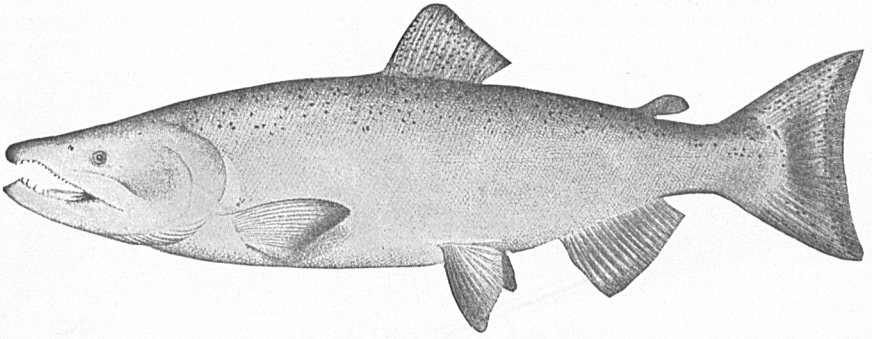

FIG. 2.—CHINOOK SALMON. BREEDING MALE

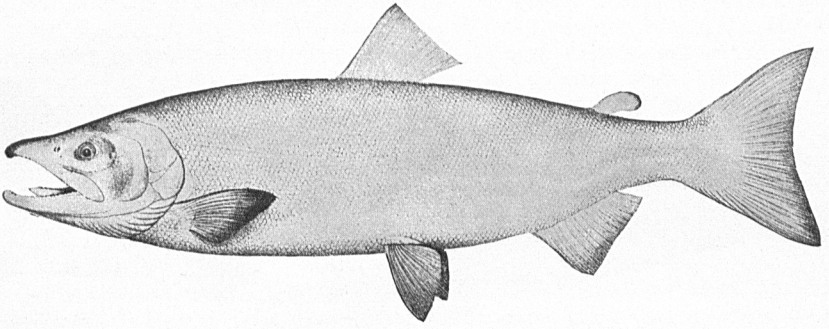

FIG. 3.—SOCKEYE SALMON. ADULT MALE

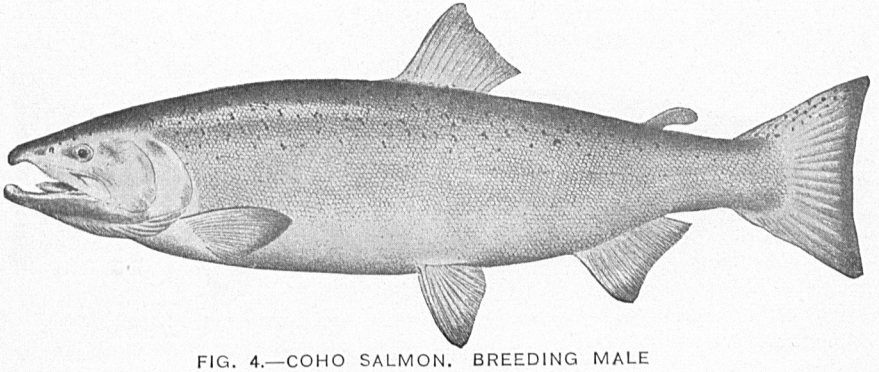

FIG. 4.—COHO SALMON. BREEDING MALE

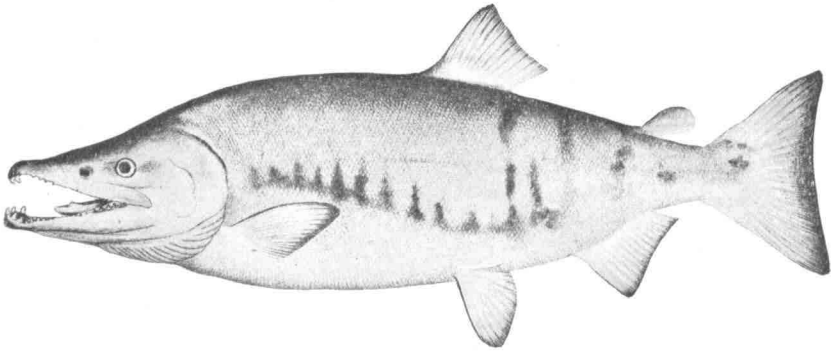

FIG. 5.—CHUM SALMON. BREEDING MALE

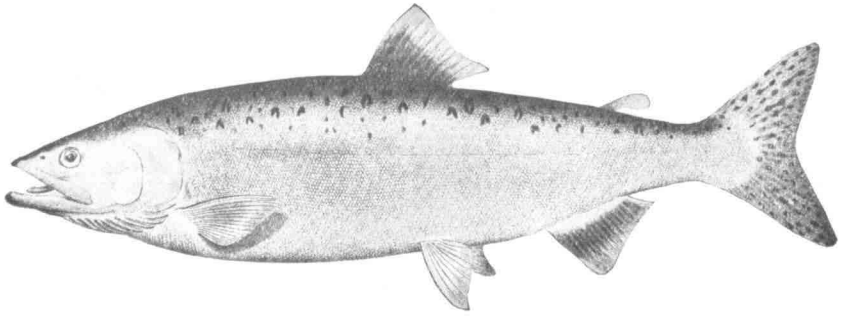

FIG. 6.—HUMPBACK SALMON. ADULT MALE

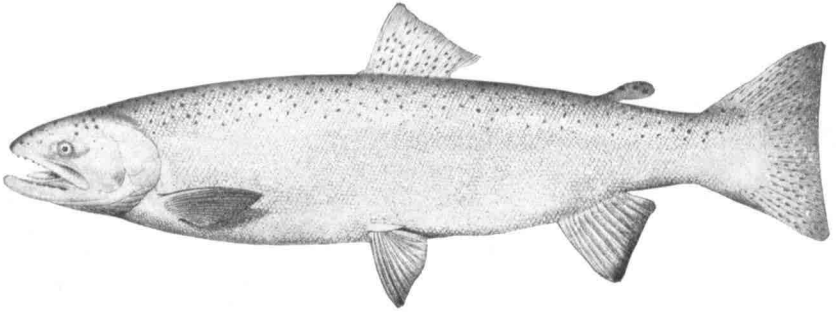

FIG. 7.—STEELHEAD TROUT

The humpback occurs in varying abundance in the waters of British Columbia, but it is in the waters of southeast Alaska that it appears in its greatest abundance. Many of the canneries in this region and some of those operating in central Alaska depend mainly upon the humpback for their season's pack, and the canned product now occupies an excellent position in the markets of the world. The fish spawn in nearly all of the small, short streams.

In western Alaska the runs are much smaller and the humpback is not much sought after by the cannery men, who are usually able to fill their cans with the more valuable species.

In southeast Alaska the run begins in June and continues until September. In western Alaska the period is somewhat shorter. In Puget Sound it continues until late in the fall, although but few are taken after September 15.

CHUM OR KETA SALMON

The chum or keta salmon (*O. keta*) reaches a maximum weight of 16 pounds, the average being about 8 pounds. When it first appears along the coast it is dirty silvery, immaculate or sprinkled with small black specks, the fins dusky, the sides with faint traces of gridironlike bars. Later in the season the male is brick red or blackish, and its jaws are greatly distorted. Its flesh is light yellow, especially when canned. It is especially good for freezing, salting, and smoking.

This species has a wide distribution. It is found as far south as San Lorenzo River, Santa Cruz County, Calif., but is not utilized commercially in California except on Eel River. It is found in most of the coastal streams from here north, being especially abundant from Puget Sound northward to southeast Alaska, both inclusive. In this region it is being utilized in greater abundance each year, as the market for it widens.

In central, western, and arctic Alaska the species occurs in varying abundance, but it is utilized sparingly, except by the natives, with whom it is the favorite species dried for winter food for their dogs.

The run of chum salmon comes later than that of any other species except the coho. In Alaska it begins in June, but the height of the season does not occur until late in August or early in September, and fish are found as late as November. In Puget Sound they run from about the middle of August till late in November, and practically the same is true in the Columbia River.

STEELHEAD TROUT

The steelhead trout (*Salmo gairdneri*) is commonly classed as one of the salmons by the fishermen of the Pacific coast, and it has been included in this report on this account. It is said to have received its common name from the hardness of the skull, several blows of the club being required to kill the salmon when taken into the boat. In different localities the average weight is placed at from 8 to 15 pounds, while extreme sizes reach 45 pounds. The excellent quality of its flesh causes it to be highly prized for the fresh and frozen markets, but owing to its pale color only limited quantities are canned.

The principal center of abundance of this species is the Columbia River. It is found from Carmel River, Calif., north to central Alaska, and possibly has an even wider range in Alaska. As a result of

extensive plants made during the last 10 or 11 years the range has been much extended on the Pacific coast as well as elsewhere in this country. It seems to be found in the rivers during the greater part of the year. In the Columbia River the spawning season is from February to May, in Puget Sound in the spring, and in southeast Alaska in May and June. The best commercial fishing is in January, February, and March. In California the catching of this species is restricted to hook and line fishing.

AGE OF SALMON AT MATURITY

As practically all salmon which have the opportunity spawn but once and then die, knowledge of the age at which this occurs is of great interest both from an economic and scientific standpoint. Many attempts have been made to solve the problem with the sockeye and king salmon, the most important commercially of the five species, by means of marking artificially reared fry, usually by clipping one of their fins before they are liberated, as noted elsewhere in this report, but with unsatisfactory results.

Fortunately, certain experiments carried on in Tomales Bay, Calif., and in New Zealand, where king fry were planted in streams not frequented by the species in question and the return of the adults noted, have yielded some interesting and accurate information on the subject. These indicated that the age was four or more years, as no run was reported until the fourth year.

A more certain method of determining the age of salmon has been developed in recent years through the adaptation by American scientists of the discovery by European investigators that the ridges observed on the scales of certain fishes indicated a period of growth of the animal itself.

The late Dr. Charles H. Gilbert, of Stanford University, as early as 1910, applied this method to the determination of the age of the various species of Pacific salmon. As to its application to the Pacific salmon and the general method followed, Doctor Gilbert has the following to say:

> While the method is new as regards Pacific salmon, it has been experimentally tested and fully approved by the Fisheries Board of Scotland in the case of the Atlantic salmon, and is now universally accepted as furnishing reliable data as to the age and many other facts in the life history of that fish. It has been shown to be applicable also to various species of trout, and its value has been demonstrated in fishes as widely divergent as the carp, the eel, the bass, the flounder, and the cod. Descriptions of this scale structure and its significance have appeared in a large number of papers, both scientific and popular. It will suffice here to repeat that the scale in general persists throughout life, and grows in proportion with the rest of the fish, principally by additions around its border. At intervals there is produced at the growing edge a delicate ridge upon the surface of the scale, the successive ridges thus formed being concentric and subcircular in contour, each representing the outline of the scale at a certain period in its development. Many of these ridges are formed in the course of a year's growth, the number varying so widely in different individuals and during successive years in the history of the same individual that number alone can not be depended on to determine age. For this purpose we rely upon the fact that the fish grows at widely different rates during different seasons of the year, spring-summer being a period of rapid growth and fall-winter a season when growth is greatly retarded or almost wholly arrested. During the period of rapid growth the ridges are widely separated, while during the slow growth of fall and winter the ridges are crowded closely together, forming a dense band. Thus it comes that the surface of the scale is mapped out in a definite succession of areas, a band of widely spaced rings always followed by a band of closely crowded rings, the two together constituting a single year's growth. That irregularities occur will not be denied, and this is

natural, inasmuch as growth may be checked by other causes than the purely seasonal one. Also a considerable experience is requisite for the correct interpretation in many cases, and a small residue of doubtful significance has always remained. This element is too small to affect the general results, and further investigation will almost certainly eliminate the doubtful cases altogether.[5]

As a result of his investigations up to this point, Doctor Gilbert presented the following conclusions drawn from the data collected:

1. The sockeye spawns normally either in its fourth or fifth year, the king salmon in its fourth, fifth, sixth, or seventh year, the females of both species being preponderatingly 4-year fish.
2. The young of both sockeye and king salmon may migrate seaward shortly after hatching, or may reside in fresh water until their second spring. Those of the first type grow more rapidly than the second, but are subject to greater dangers and develop proportionately fewer adults.
3. Coho salmon spawn normally only in their third year. The young migrate either as fry or yearlings, but adults are developed almost exclusively from those which migrate as yearlings.
4. Dog [chum] salmon mature normally either in their third, fourth, or fifth years, the humpback always in their second year. The young of both species pass to sea as soon as they are free swimming.
5. The term "grilse," as used for Pacific salmon, signifies conspicuously undersized fish which sparingly accompany the spawning run. They are precociously developed in advance of the normal spawning period of the species. So far as known, the grilse of the king salmon, coho, and dog [chum] salmon are exclusively males; of the sockeye, almost exclusively males, except in the Columbia River, where both sexes are about equally represented. The larger grilse meet or overlap in size the smaller of those individuals which mature one year later at the normal period.
6. Grilse of the sockeye are in their third year, of the king salmon in their second or third year, of the coho and the dog [chum] salmon in their second year.
7. The great differences in size among individuals of a species observed in the spawning run are closely correlated with age, the younger fish averaging constantly smaller than those one year older, though the curves of the two may overlap.[6]

Since 1910 Doctor Gilbert devoted much of his time to investigations[7] along this line, especially on the sockeye, with most interesting and valuable results.

His observations on the sockeye runs of British Columbia indicate that they consist principally of four and five year fish and that these two classes appear during successive seasons in widely differing proportions; that each stream has its distinctive race of sockeye, the progeny returning at maturity to the parent stream; that sockeye fry rarely survive when they proceed to sea within the year in which they are hatched; and that sea feeding, with the consequent rapid growth, is the most important factor in producing early maturity, an equal number of years in fresh water producing comparatively little effect.

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[5] Age at Maturity of the Pacific Coast Salmon of the Genus Oncorhynchus. By Charles H. Gilbert. Bulletin, U. S. Bureau of Fisheries, 1912, Vol. XXXII, pp. 4, 5. Washington, 1913.

[6] Age at Maturity of the Pacific Coast Salmon of the Genus Oncorhynchus. By Charles H. Gilbert. Bulletin, U. S. Bureau of Fisheries, 1912, Vol. XXXII, pp. 21, 22. Washington, 1913.

[7] Contributions to the Life History of the Sockeye Salmon. (No. 1.) By C. H. Gilbert. Report of British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1913, with Appendices, pp. R53–78. Contributions to the Life History of the Sockeye Salmon. (No. 2.) By C. H. Gilbert. Report British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1914, with Appendices, pp. N45–75. Contributions to the Life History of the Sockeye Salmon. (No. 3.) By C. H. Gilbert. Report British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1915, with Appendices, pp. S27–64, 6 pls. Contributions to the Life History of the Sockeye Salmon. (No. 4.) By C. H. Gilbert. Report British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1917, with Appendices, pp. Q33–80, 14 pls. Contributions to the Life History of the Sockeye Salmon. (No. 5.) By C. H. Gilbert. Report British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1918, with Appendices, pp. X26–52, 24 pls. Contributions to the Life History of the Sockeye Salmon. (No. 6.) By C. H. Gilbert. Report, British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1919, with Appendices, pp. U35–68, 6 pls. Victoria, British Columbia.

Much along this line has been done by other biologists, in Canada, the United States, and Japan, and it is hoped that some day a full report on the natural history of the Pacific salmons may be prepared and published.

MARKING SALMON

A favorite recreation for quite a number of Pacific coast people has been the marking of salmon fry in order to find out the age at which they return to spawn, the rate of growth, etc. Scattered through the reports of the various State fish commissions, and occasionally in the reports of the United States Bureau of Fisheries, are to be found detailed reports of such markings and the sometimes remarkable results attained, apparently at varying periods subsequent to the marking.

All sorts of marks were employed. The favorite was the removal of the adipose fin, the experimenters appearing to be of the opinion that the fish would miss this the least of any. However, the entire or partial removal of nearly every fin was practiced by some one or other of the many experimenters. Sometimes a V or a U was punched out of the tail or the gill cover, and in one or two instances a tag was employed.

In time these marking experiments became so numerous, and so imperfect a record was kept of them by any central authority, that frequently it was impossible to tell, when an apparently marked specimen was obtained, where and when it was marked, and as a result but little dependence could have been placed upon them even had there been no other factors conspiring to vitiate their value.

Fishermen are continually finding in their nets salmon which they feel sure have been marked by some hatchery. Scores of times in the course of his various investigations of the fisheries of this coast the writer has been told of or shown specimens which the fishermen thought had been marked. Many of these marks were on the side of the fish and represented an M or W, depending upon the angle from which viewed, and it was impossible, generally, to convince the fishermen that this mark was caused by the twine of his gill net pressing on the side of the fish. The obvious fact that a fish could not survive when in the fry stage the infliction of such a mark did not occur to them.

Frequently the scars left by the suctorial organs of the lamprey have been mistakenly supposed to be hatchery marks. This scar resembles very closely a date stamp on a canceled letter.

One of the most interesting cases of salmon marking, and one which drives home the necessity for accepting reports of returns from such markings with extreme caution, is that of F. M. Chamberlain, then naturalist of the Bureau of Fisheries steamer *Albatross*, on the Naha Stream in Alaska.

In August, 1903, 1,600 red salmon fry, reared for the purpose from the 1902 eggs, at the Fortmann hatchery of the Alaska Packers Association, near Loring, Alaska, were marked by Mr. Chamberlain by excising both ventrals with fine curved scissors. The fry were released in the Naha River as soon as marked, at which time they were about three months old.

In 1906 between 50 and 100 adult reds with ventral fins missing were reported by the superintendent of the hatchery at Yes Bay, which is located on the northern side of Behm Canal (Naha being on

the southern side) and some 15 miles farther up the canal than the mouth of Naha Stream. Some of these also had the adipose removed, this mark having also been used on some of the fry. At the Fortmann hatchery, where they were marked, only two of these fish were obtained in 1906.

From then on until 1912, a period of 9½ years, the return of a number of these supposedly marked fish is noted each year at the two hatcheries in question, the number reported in the latter year being larger than in some of the intervening years. In 1912 Mr. Chamberlain himself pointed out the impossibility of these all being from the fry he had marked and no further attention was paid to them.

The principal thing that this and some of the other many experiments in salmon marking prove is that the percentage of salmon which accidentally lose, either through disease or the attacks of their many enemies, one or more of their fins, or portions of same, is much larger than most people suppose. Out of the many millions taken annually in commercial and fish cultural operations it is not surprising that some should be minus such exposed portions of their anatomy, and this percentage would doubtless be found to be considerable were particular attention directed toward it. As it is now, it is only occasionally that the fisherman notices such loss, or mentions the same when he does, unless his attention has been directed to it by particular inquiry. In the Chamberlain experiment, for instance, after 1907 considerable publicity was given to the search for such marked fish, and the writer, in his travels through southeast Alaska during the succeeding years until the end of 1911, frequently was told by fishermen that they had caught salmon with missing fins. Inquiry developed that while a few of the lost fins were the same as Chamberlain had excised, a number were entirely different fins, showing that when the attention of fishermen was directed especially in this line many deformed fish would be found.

The confusion resulting from the many marking experiments carried on by different people shows the absolute necessity of some central authority regulating them if any real results are to be achieved from this line of endeavor. In 1908 the Secretary of Commerce, under authority of sections 11 and 12 of the Alaska fisheries law, directed that any persons desiring to mark and release salmon in Alaska first consult with and secure the written consent of the Commissioner of Fisheries or of the agent at the salmon fisheries of Alaska. It would be an excellent thing if some such control could also be exercised over these operations in the coastal States.

During the year 1916 Dr. Charles H. Gilbert, of Stanford University, assisted by Willis H. Rich, conducted salmon-marking experiments on an extensive scale. Late in the fall of 1915 a consignment of 100,000 eggs of the red salmon was forwarded to Seattle, Wash., from the station of the Bureau of Fisheries at Yes Bay, Alaska, of which 50,000 were reshipped to the Anderson Lake hatchery of the British Columbia Fisheries Department, located on the ocean side of Vancouver Island. The remaining 50,000 were sent to the Bureau of Fisheries hatchery at Quinault Lake, near the coast of Washington. The intention was as soon as the fry, hatched from these eggs, had developed into fingerlings to mark each lot with a distinctive marking and plant them in waters near the hatcheries, with the object of

proving that the adult fish would return to the stream in which they had passed their early existence, no matter where the eggs were taken.

This plan could not be carried out at Anderson Lake, as the young fish resulting from the eggs, which were sent there, were not strong enough to survive the experiment. They were therefore liberated without marking. Those hatched at Quinault Lake were marked, however, and liberated in the summer of 1916. Doctor Gilbert has strong hopes that upon the return of the marked fish important data relating to the life history of the species will be obtained.

During February, March, and April, 1916, some 50,000 yearling sockeyes, which had been reared at the Bonneville hatchery of the Oregon Fish and Game Commission from eggs obtained from the Yes Bay (Alaska) hatchery of the United States Bureau of Fisheries, were marked by the removal of the adipose and both ventral fins, and the fish then liberated in Tanner Creek, a tributary of the Columbia. The fish were in an apparently healthy condition when liberated. In order to make sure that they suffered no ill effects from the marking a few were held until the wounds had healed perfectly, and these were not affected adversely.

During the summer of 1918 a number of marked fish were reported to have returned and been caught.

During the same period close watch was kept on the Quinault River for the return of marked sockeyes from that marking experiment but none were observed so far as known.

OCEAN HOME OF THE SALMON

All sorts of conjectures have been hazarded as to the ocean home of the salmon after the young fish have gone to sea and disappeared apparently from the ken of man. Many have conjured up visions of the vast schools of adult salmon surging along the coast hundreds of miles seeking for some suitable river in which to spawn, explaining in this wise the variations in the seasonal runs in different sections. Others think the fish go out into the greater depths of the ocean and there hide from man until the spawning instinct leads them back to the coast and thence to the stream in which they were born or planted.

Discoveries of recent years have quite altered this uncertainty, and we now are reasonably certain that the vast majority of the salmon are comparatively near our coast line, while others stay in the bays, straits, and sounds virtually all the time when not in the rivers.

Some years ago it was first noticed that king salmon would take the hook while in salt and brackish waters. At first only the anglers were interested in this fact, but as the demand for king salmon for mild curing became more insistent the commercial fishermen, attracted by the high prices paid, began to devote some attention to the fish during the early spring months, and soon trolling became a recognized branch of the industry. It was first taken up on a considerable scale in southeast Alaska in 1905.[8] As the demand for the fish increased, the fishermen extended operations until almost all of southeast Alaska waters were being fished. The length of the fishing season was also increased until now only the severe weather of winter prevents them from fishing. However, the halibut trawls occasionally come up during the season with king salmon on them, showing that they are still on the ground.

[8] Report on the Fisheries of Alaska. By John N. Cobb. Bureau of Fisheries Document No. 618, pp. 19-21. Washington, 1907.

The above is also true to a certain extent of the waters of British Columbia and Puget Sound and to a lesser extent, so far as has been disclosed, of Monterey Bay and the Oregon coast.

It has been known for some years that the silver, or coho, salmon would also take the hook under practically the same conditions as the king salmon, and the only reason this species has not been fished for to the same extent as the king has been because it was not large enough to be attractive to the mild curers, and hence there was a much lesser demand for it.

It had been supposed that the other species did not feed when in coastal waters, but Marsh and Cobb [9] state quite differently:

> Other species of salmon, in addition to the king, are found to take the trolling hook. For several weeks in July trollers in Union Bay, in southeast Alaska, caught a number of cohos and humpbacks while trolling for kings. The humpbacks were caught mainly with a spoon, no bait being used. Most of them appeared to have been feeding on needlefish and herring, according to the cutter who dressed them. A few red salmon are reported to have been caught on the trolling line by fishermen operating for king salmon in the neighborhood of Mary Island, near Dixon Entrance. Several fishermen report having in previous years frequently taken dog [chum] salmon on a hook in the bays along Chatham Strait.

In 1909 Mr. J. R. Heckman, of Ketchikan, Alaska, a well-known cannery man, told the writer that, while he was trying to install a floating trap near Cape Chacon, at the lower end of Prince of Wales Island, southeast Alaska, he on several occasions observed red salmon feeding on what he called a red shrimp.

This was also observed in 1912, when Doctor Gilbert reported, in connection with his observations of salmon fishing on Swiftsure Bank, off the Straits of San Juan de Fuca, that "during the past summer it was observed by Mr. J. P. Babcock and the writer that the sockeye on the Bank were feeding extensively on a small shrimp-like crustacean (*Thysanoessa spinifera*, Holmes), which floats in incredible numbers on the tides and forms a favorite food for the other species as well as for the sockeye." [10] He also found all the other species feeding voraciously in this neighborhood.

The experience of the fishermen operating in and off Port Moller, in Bering Sea, also affords confirmatory evidence along this line. A cannery was established on Port Moller in 1913, the avowed purpose of the owners being to catch what they claimed would be the enormous schools which annually resort to the great rivers of Bristol Bay, some 210 miles to the eastward from Port Moller. This cannery made a fairly large pack for a season or two, using purse seines in Bering Sea and traps along the shore. Misled by this, three other canneries were built in 1916 and 1917. In a season or two the catches of the combined plants had dropped to much less than the catch of the one cannery when operating alone, thus showing that the fishermen were operating on a run which was local to that neighborhood. This is borne out by the fact that the Bristol Bay runs showed no appreciable diminution when the catch was lowest at Port Moller. The pack of the Port Moller canneries for certain years was as follows:

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[9] The Fisheries of Alaska in 1909. By Millard C. Marsh and John N. Cobb. U. S. Bureau of Fisheries Document No. 730, p. 26. Washington, 1910.

[10] The Salmon on Swiftsure Bank. By Charles H. Gilbert. Report of British Columbia Commissioner of Fisheries for year ending Dec. 31, 1912, and Appendix, p. I 16. Victoria, British Columbia.

Pack of the Port Moller canneries

Year	Number of canneries	Cases packed	Year	Number of canneries	Cases packed
1913	1	44,150	1917	4	39,688
1914	1	87,175	1918	4	124,884
1915	1	105,674	1919	2	29,849
1916	2	132,367			

These observations would tend to confirm the belief which has been steadily growing in favor for some years that the salmon either spend the greater part of their life in the bays, straits, and sounds, or else in regions adjacent to the coast line.

The reason they had not been found in this region earlier is doubtless due to the fact that during the fall, winter, and spring months the weather on the north Pacific coast is such that fishing operations can not be carried on along the open coast, while in summer the fishermen are all busy on the spawning runs and have no time to devote to fish not yet arrived at maturity, which are probably feeding along the coast as usual.

FISHING GROUNDS AND HISTORY OF THE FISHERIES [11]

WASHINGTON

Puget Sound.—Strictly speaking, the name Puget Sound should be restricted to that long, narrow arm extending south from the Strait of Juan de Fuca, but a practice has developed, and is now common among fishermen and others, of designating all the great water area in the State of Washington, comprising Puget Sound proper, Strait of Juan de Fuca, Canal de Haro, Rosario Strait, the Gulf of Georgia, and the smaller straits, bays, and sounds, as Puget Sound, and this practice, for the sake of convenience, has been followed in this report.

This great indentation in the coast, with its numerous islands and many fine harbors, has greatly aided the development of this portion of Washington and has been specially favorable to the prosecution of the salmon and other fisheries. Numerous rivers and creeks enter the Sound, the more important of these being on the eastern shore and comprising the Nooksack, Skagit, Stillaguamish, Snohomish, Duwamish, Puyallup, and Nisqually. On the southern and western shores the tributary streams are nearly all small, the more important being the Skokomish, Quilcene, Dungeness, and Elwha.

As on other bodies of water on the Pacific coast frequented by salmon, the Indians were fishing for them when the first whites visited the country. The natives at this time, and for many years after, used reef nets and hooks and lines in the salt water, and spears, dip nets, and weirs in the rivers. Traders first reached the headwaters of the Fraser River and gradually worked down the same until they reached the sea.

For many years this region was comparatively isolated from the rest of the world, and the completion of transcontinental railroads has not completely changed this, owing to its distance from large

[11] For some of the regions the historical data are fragmentary and can not be considered as other than historical notes. It is hoped that some one will write a history of the industry before all of the pioneers have passed away.

consuming centers. As a result of this isolation, it was necessary for many years to resort to methods of preparation which would insure the preservation of the product for indefinite periods. Salting naturally came first, followed by canning, while the shipping of fresh salmon has been steadily growing in importance as transportation facilities increased.

The Northwest Co., a large fur-trading organization, about the beginning of last century first introduced the salting process and this was continued by the Hudson Bay Co. Both companies carried on the business primarily for the purpose of providing a winter stock for the use of their employees and for local sale. As shipping developed on the Pacific, a considerable export trade in salted salmon was developed with the Hawaiian Islands, Australia, China, and Japan, and with the eastern United States. Quinnat, or spring, and sockeye salmon were the principal species employed in the earlier years.

After the boundary line between Canada and the United States had been established in 1846, and what is now the State of Washington was acknowledged as part of the latter, a number of small traders and fish packers succeeded the Hudson Bay Co. In the early sixties several men were engaged in the business at Point Roberts, according to the Olympia Columbian of September 10, 1853. In 1873 V. T. Tull, of Olympia, established a salmon fishery at Mukilteo, principally for putting up fish in barrels. The first year 500 barrels were packed at Mukilteo, after which the fishery was moved temporarily to Seattle to take the late run up the Duwamish River, which is usually large. Fifteen hundred good large salmon have been taken at one haul of the seine in the Puyallup.

Bancroft's History of Washington, Idaho, and Montana contains among others the following references [12] to the early fishermen of the Sound:

> In 1874 Corbette & Macleay, of Portland, founded a fishery at Tacoma. Sixty barrels were packed in five days, only three men being employed.—New Tacoma Tribune, November 14, 1874. In 1876, John Bryggot, a Norwegian, founded another fishery at Salmon Bay, 6 miles north of Olympia. In 1878 a company of Puget Sound men established a fourth at Clallam Bay. They put up the first season 600 casks of salmon and 700 of halibut.—Morse's Wash. Terr., MS., xviii, 17–18. In the following season D. D. Hume established a fishery near Steilacoom for the purpose of salting salmon. In 1880 H. Levy, of Seattle, went to London with 100 barrels to introduce Puget Sound salted salmon to that market. In 1882 a salmon packing establishment was opened at Old Tacoma by —— Williams. Salmon ran in great numbers this year. One boat brought in a thousand fish.

The extension of the railroad to Puget Sound, thus furnishing an outlet to the rapidly growing population in the Middle West, did much to aid the industry. This also gave opportunity to begin the shipping of fresh halibut and salmon to eastern points. Ainsworth & Dunn, of Seattle, operating later under the name of the Seattle Fish Co., were the first successful pioneers in this branch of the industry, beginning about 1889, and carrying it on until they sold out in 1901, as noted later.

[12] History of the Pacific States, Washington, Idaho, and Montana, 1845–1889, vol. 26, pp. 345–349. By Hubert Howe Bancroft.

In 1903 the San Juan Fishing & Packing Co., which had begun the fresh-fish business in 1899, bought this business from the Pacific Packing & Navigation Co., to which it had been sold in 1901.

The first salmon cannery on Puget Sound was erected by Jackson, Myers & Co., in 1877, at Mukilteo, in Snohomish County. The members of this firm had all been engaged previously in salmon canning on the Columbia River. The first pack was of 5,000 cases, composed wholly of silver, or coho, salmon. Later at this plant were put up the first humpbacks ever canned. In order to divert the minds of purchasers from the fact that the meat of the humpback was much lighter in color than the grades then known to the consuming public, the company printed on its label the legend, "Warranted not to turn red in the can." Even with this shrewd sizing up of the weak side of the consuming public the demand for humpback, or pink, salmon developed very slowly, and it was some years before it became a factor in the markets.

Within a year or two after the opening of the above plant another was started at Mukilteo by a man named Bigelow.

In 1880 the Myers's cannery was destroyed by a heavy fall of snow. It was rebuilt in West Seattle and was operated till 1888, when it was destroyed by fire. George T. Myers, now sole owner, built a new cannery at Milton, which was burned two years later, and he then came back to Seattle and built a cannery about where Ainsworth & Dunn's dock now stands. He remained here only one season, after which he moved to where the Pacific Coal Co.'s bunkers are now. Late in 1901 he sold out his plant to the United Fish Co., which company moved the plant to the foot of Connecticut Avenue, where they continued operations for two or three years and then quit.

The first Puget Sound sockeye cannery was built at Semiahmoo, near Blaine, by J. A. Martin and John Elwood about the year 1891. It was bought in 1892 for $500 by D. Drysdale, who shortly afterward rebuilt and greatly enlarged the plant. In the same year Mr. Drysdale demonstrated the commercial success of fish traps. Traps had been in operation before this, however. In 1893 Ainsworth & Dunn had a trap at Five Mile Rock, just beyond the lighthouse at Magnolia Bluff (now a part of Seattle), and there had been a trap or two in Elliott Bay even prior to this. Traps had not been profitable in this section, however, owing to the cheapness and abundance of salmon, haul seines being cheaper and more profitable to operate. A man named H. B. Kirby, who came originally from Nova Scotia, and another named Goodfellow put in the first trap for Mr. Drysdale.

During the early years of sockeye canning they were not sold to the trade as sockeyes, but as Alaska reds and Columbia River salmon, for which there had been an established market for some years.

H. Bell-Irving & Co., of Vancouver, British Columbia, were the pioneers in the labeling of the fish as sockeyes, this being in 1894–95. Like all virtually new products, sockeye salmon had a hard fight for several years to secure a foothold in the salmon markets, and it was not until the Spanish-American War in 1898 caused a heavy demand for canned foods that its position became finally established.

By 1900 a number of canneries had been erected on the shores of Puget Sound, most of which were then in active operation. In 1901 the Pacific Packing & Navigation Co. was organized under the laws

of the State of New Jersey for the purpose of acquiring a number of salmon canneries on the coast. It was supposed to be backed by unlimited eastern capital, and its authorized capitalization was as follows: Common stock, $12,500,000; 7 per cent accumulative preferred stock, $12,500,000; and 6 per cent debentures, $7,000,000. It actually issued $6,037,000 common stock, $6,963,000 preferred stock, and $3,000,000 debentures. Subsequently the management effected an exchange of preferred stock for debentures, increasing the former to about $7,500,000 and decreasing the debentures to about $1,650,000.

The new company purchased a number of canneries in Alaska, also the following Puget Sound plants: Pacific American Fisheries Co.'s canneries at Fairhaven (now Bellingham) and Friday Harbor, the Ainsworth & Dunn canneries at Blaine and Seattle, and the Fairhaven Packing Co. cannery at Fairhaven.

The company had a very short career, ending up in the bankruptcy courts in 1903, and when all its affairs were wound up the stockholders received nothing, while the bondholders got but an exceedingly paltry sum out of all the money put into it.

Most of the canneries secured on Puget Sound were repurchased by their former owners or by new people.

In 1915 there were 41 canneries in operation. From this time on the industry fluctuated considerably. The blockade in the Fraser River in the big sockeye year of 1913, as noted elsewhere, caused a great falling off in the sockeye pack in subsequent "big years," with the result that there were 45 canneries in operation in 1917, 23 in 1921, 23 in 1925, and 14 in 1928.

Soleduck River.—This is a small stream, about 30 miles in length, which flows through the southwestern part of Clallam County and empties directly into the ocean. The Quillayute Indian Reservation is located here and the natives formerly caught salmon and marketed them on Puget Sound, but a small cannery, started at Mora, on this river, in 1912, furnished a market for the catch up to the end of 1915, when it was abandoned.

Hoh River.—This is a comparatively small river, which is wholly within Jefferson County, and debouches into the ocean in the northwestern part of the county. It passes through the Hoh Indian Reservation in its lower reaches. A cannery was built here in 1917 by Fletcher Bros. and has been operated most seasons since. In the spring of 1919 it was moved to a more convenient location about a mile from the original site.

Queets River.—This river, which is about 35 miles long, rises in the northern part of Jefferson County and empties directly into the ocean in the northwestern part of Grays Harbor County, within the bounds of the Quinault Indian Reservation. A small salmon cannery was built at Queets, in Jefferson County, in 1905, and has been operated nearly every season since.

Quinault River.—This river, which enters the ocean in the northwestern part of Grays Harbor County, has a length from the ocean to Quinault Lake of about 40 miles, wholly within the boundaries of the Quinault Indian Reservation.

This stream is especially noted for its long-continued annual run of Quinault salmon (*O. nerka*). These fish, which are noted for their especially red-colored flesh, make their appearance early in

December, when the Indians generally catch them for their own use, as they fear that if the whites got hold of the fish they might throw away the hearts. Should a heart be eaten at this time by a dog or chicken, the Indians believe the run would not come. In January, when the fish begin to be abundant, all danger of this seems to have passed, for the Indians then usually have a considerable number for sale, and these are generally shipped to distant markets in a fresh condition by the buyers. As soon as the canneries open at Moclips most of the fish are disposed of at that place. The run continues up to July 1. May and June are the best fishing months.

There is a fall run of chinooks in this river, which usually arrives in August and ends about October 15.

The silver salmon appear about October 1 and the run is generally over by November 15; the chum salmon appear about November 1, and the run is usually over by the middle of the same month, while the steelhead trout run between November 20 and May 1. None of the latter are canned.

Moclips, the terminus of the railroad, is about 10 miles from the river, and the fish are all taken by team to this place. Twenty fish, weighing approximately 100 pounds, are put in each box, and these are piled onto the wagons until a load has been accumulated. The team owners get 50 cents a box for hauling the loaded ones to Moclips and 5 cents a box for bringing the empty ones back.

In 1915 the records of the Indian agent show that the Indians fishing on the north side of the river caught 219,654 Quinault salmon, valued at $49,820, while those on the south side caught 135,353 of these fish, valued at $30,528.60, or a grand total of 355,007 fish, valued at $80,348.60. This does not take into account the results of the fishing for the other species of salmon and steelhead trout, which quite materially swell the total.

Fishing is restricted to the Indians, who also make their own fishery laws, with the advice and approval of the Office of Indian Affairs, as the State laws have no force inside the bounds of the reservation. Under the regulations now in force a clear channel of one-third the width must be left in the middle of the stream, which is from 250 to 300 yards in width. Each owner of a fishing location has to fish it in person; provided, however, that widows, orphans, minor children, old Indians, and those who are sick or have gainful occupations other than fishing are allowed to lease their locations or hire some one to fish them, and then only with the approval of the officer in charge.

During the Quinault season stake nets are used, while the rest of the time, as a result of the freshets, drift gill nets are used in the eddies. The stake nets are arranged in a rather peculiar manner. A line of stakes is run out for about one-third the width at right angles to the shore, and to these are attached a net by short ropes. From each stake a section of net is run out and downstream, curving inward like a hook at the end, the latter part being held in place by three stakes.

The stake nets are 40 to 60 meshes deep, with 5¼-inch stretch mesh, and are set 85 yards apart. A set of these as described above forms one fishing location.

The chinook gill nets are usually 8¾ to 9 inches stretch mesh and 24 meshes deep, while the gill nets for silvers, chums, and steelheads are of 7-inch stretch mesh and 35 meshes deep.

For some years the salmon from the Quinault River were brought to Hoquiam and Aberdeen for canning. In 1911 W. W. Kurtz, of the former place, began the erection of a cannery at Moclips for the purpose of packing these fish, and the same season his example was followed by Frank Shafer. Only one cannery was in operation in 1928.

Grays Harbor.—This is the first important indentation on the coast of Washington south of Cape Flattery. It is about 40 miles long from east to west and about 20 miles wide in the widest part. The principal tributary is the Chehalis River, but there are a number of small streams which debouch into the harbor.

In 1883 B. A. Seaborg, who operated a cannery on the Columbia River, established a plant at what was later to be the thriving city of Aberdeen, although at that time it was practically a wilderness.

In 1902 the North American Fisheries Co. built a plant at Aberdeen. Shortly after it came into the possession of the Grays Harbor Packing Co., and on June 8, 1903, it was destroyed by fire. It was rebuilt and operated by this company until 1906, when it was sold to S. Elmore & Co.

The Hoquiam Packing Co. built a cannery at Hoquiam in 1904 and operated it each season for a number of years.

In 1910, 2 canneries were in operation at Aberdeen and Hoquiam, respectively; in 1915 there were 3 at the former place and 1 at the latter; in 1919 there were 6 in operation; while in 1928 there were 4 in operation.

Willapa Harbor.—The entrance to this harbor, which also includes Shoalwater Bay, is about 27 miles south of Grays Harbor. The harbor runs east and west and is about 25 miles long. Shoalwater Bay extends south from it a distance of about 30 miles, its southern portion ending about a mile from the Columbia River and its western side being separated from the ocean by a spit varying in width from three-fourths to one mile. The bay is shallow, excepting in the main channel. The principal salmon streams entering the harbor are the Nasel and North Rivers, in which most of the pound or trap nets are located.

In 1884 B. A. Seaborg, a Columbia River canner, established a plant on Shoalwater Bay, as the whole of Willapa Harbor was then known.

About 1900 F. C. Barnes established a cannery at Sunshine, on the Nasel River, but the run of salmon on this river soon became so small that the plant was abandoned and the machinery moved to Mr. Barnes's cannery at South Bend.

In 1904 P. J. McGowan, the Columbia River canner, opened a cannery on the North River. Mr. McGowan, who was over 80 years of age at the time, had turned the control of his important Columbia River canning interest over to his sons, but finding idleness not to his liking, started this cannery in order to have something to occupy his time. He operated it for several years and then abandoned the project.

In 1912 the Chetlo Harbor Packing Co., established a cannery at Chetlo Harbor, but operated it only that year and in 1914.

In 1919 only 2 canneries, both of them at South Bend, operated on Willapa Harbor, while in 1928 there were 4 in operation.

COLUMBIA RIVER

The Columbia, which is the largest river of the Pacific coast, rises in British Columbia, flows through Washington, reaching the northern border of Oregon about 75 miles west of the State's eastern boundary; from this point the river forms the dividing line between Oregon and Washington, its general course being westerly. It empties into the Pacific at Cape Disappointment. Its principal tributaries are the Spokane, Yakima, Snake, John Day, Deschutes, and Willamette Rivers, and through these the main river drains an enormous extent of territory.

This river, which has produced more salmon than any other river in the world, has had a most interesting history. Many years before the white man saw its waters the Indians visited its banks during the annual salmon runs and caught and cured their winter's supply of food. Along the shores of the river at The Dalles for 15 miles were notable fisheries where various bands, who lived south and north, had their respective fishing locations, and to which all others were forbidden access. They used spears and dip nets in catching the salmon, the majority of which were dried and smoked for winter use. This dip, or basket, net was fastened to a pole about 30 feet long and slid on a hoop. The Indian filled it by slinging it as far as possible up the stream and then hauling it up, the weight of the fish closing the net by drawing it on the hoop.

A favorite preparation of the Indians who resorted to the river was pemmican. This was the meat of the salmon cleaned of the bones, pounded up fine, and then packed in hempen sacks of home manufacture. A sack of pemmican weighed from 80 to 90 pounds and was worth in barter as much as an ordinary horse.

Captain Wilkes, United States Navy, has the following to say with respect to salmon fishing by natives at Kettle Falls on the Columbia River near the present city of Colville, Wash., at the time of his visit there in 1841:

> There is an Indian village on the banks of the great falls, inhabited by a few families, who are called "Quiarlpi" (basket people), from the circumstance of their using baskets to catch their fish (salmon). The season for the salmon fishery had not yet (in June ?) arrived, so that our gentlemen did not see the manner of taking the fish; but, as described to them, the fishing apparatus consists of a large wicker basket supported by long poles inserted into it and fixed in the rocks. The lower part, which is of the basket form, is joined to a broad frame spreading above, against which the fish in attempting to jump the falls strike and are thrown back into the basket. This basket during the fishing season is raised three times in the day (24 hours), and at each haul not unfrequently contains 300 fine fish. A division of these takes place at sunset each day under the direction of one of the chief men of the village, and to each family is allotted the number it may be entitled to; not only the resident Indians, but all who may be there fishing, or by accident, are equally included in the distribution.[13]

The first American to engage in fishing on the Columbia River was Capt. Nathaniel J. Wyeth, of Massachusetts, who in 1832 crossed overland to Oregon with the purpose of establishing salmon fisheries in connection with prosecuting the Indian and fur trade. He dispatched a vessel via Cape Horn to the Columbia with trading goods, but she was never heard from after sailing. In the meantime Wyeth had established a station at Fort Hall, on the Lewis River, a branch of the Columbia.

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[13] Narrative of the United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, and 1842. By Charles Wilkes, U. S. Navy, commander of the expedition. In 5 volumes. Vol. IV, pp. 444, 445. Philadelphia, Lee & Blanchard, 1845.

In 1833 Captain Wyeth returned overland to Boston, while the rest of his party dispersed throughout the Columbia Valley. Far from disheartened by the disaster to his vessel, Captain Wyeth dispatched the brig *May Dacre*, Captain Lambert, laden with trading goods and supplies, to the Columbia River via Cape Horn, while he crossed overland with 200 men. He established a salmon fishery and fort at the lower end of Wappatoo (now Sauvies) Island, at the mouth of the Willamette River.

The salmon fishery did not prove successful and the brig sailed in 1835 with only a half cargo of fish and did not come back. The same year Captain Wyeth broke up both the establishment here and on the Lewis River and, disheartened, returned to Massachusetts, having found the competition of the Hudson Bay Co. too powerful for him.

In August, 1840, Capt. John H. Couch, in command of the brig *Maryland*, which belonged to Cushing & Co., of Newburyport, Mass., arrived in the Columbia River. After taking a few salmon the vessel left in the autumn, never to return. On April 2, 1842, Captain Couch reappeared in the river with a new vessel, the *Chenamus*, named after the chief of the Chinooks. With his cargo of goods he established himself at the present site of Oregon City, the first American trading house to be established in the Willamette Valley. He also established a small fishery on the Columbia River. The vessel returned to Newburyport in the autumn.

The next American vessel to come in established a far from enviable record. There is no record of her name, but she was commanded by a man named Chapman and entered the river April 10, 1842. She came for the purpose of trading and fishing and remained till autumn. During her presence in the river it is charged she sold liquor to the Clatsop and other savages, as a result of which much bloodshed and discord resulted.

About 1857 John West began salting salmon in barrels at Westport, on the lower Columbia.

In February, 1859, the Washington Legislature passed an act prohibiting nonresidents from taking fish on the beach of the Columbia between Point Ellis and Cape Hancock.

Bancroft [14] states:

> On the 26th of January, 1861, J. T. Lovelace and W. H. Dillon were granted the exclusive right to fish in the Columbia for a distance of 1 mile along its banks and extending from low-water mark half a mile toward the middle of the stream.

In 1861 H. N. Rice and Jotham Reed began packing salted salmon in barrels at Oak Point, 60 miles below Portland. The first season's pack amounted to 600 barrels. The venture proved fairly profitable and was soon participated in by others.

In the spring of 1866 William Hume, who had assisted in starting the first salmon cannery in the United States on the Sacramento River in 1864, finding the run of fish in the latter stream rather disappointing, started a cannery for Hapgood, Hume & Co. on the Columbia at Eagle Cliff, Wash., about 40 miles above Astoria.

The year this first cannery operated the following fishermen were operating in the river: Jotham Reed used a trap and a small gill net opposite Oak Point; Mr. Wallace fished a small seine from the shore of an island of that name a short distance below; John T. M. Harrington (who was later to establish the Pillar Rock cannery), in

[14] History of the Pacific States, Washington, Idaho, and Montana, 1845–1889, vol. 26, p. 349. By Hubert Howe Bancroft.

conjunction with a man named Fitzpatrick, operated a seine at Tenasillihe, as did also a Mr. Welch; P. J. McGowan, who, with his sons, in 1884 started a cannery at McGowan, and later, at Warrendale, Ilwaco, etc., operated two small seines at Chinook Beach; and Hapgood, Hume & Co. had two small gill nets about 125 fathoms in length and 32 meshes deep. The gill net of Mr. Reed was much smaller than these. At this period the river literally swarmed with salmon, and the cannery had no trouble in packing 4,000 cases, which it increased to 18,000 the next year and to 28,000 cases in 1868.

In 1867 a crude cannery on a scow was started by S. W. Aldrich, a ship carpenter. The scow was about 50 by 20 feet, with a cabin on it, and in one end of this he constructed a brick furnace in which he set a large cast-iron cauldron for a cooker. Along one side he rigged a bench and manufactured the cans. Aldrich was a regular jack-of-all-trades, as he did everything from catching the fish to canning and cooking them ready for the market.

In 1868 a cannery was built near Eagle Cliff by one of the Humes, while in 1873 R. D. Hume built another at Bay View, Wash. He operated it until 1876, when Mr. Leveridge, of Leveridge, Wadhams & Co., of San Francisco, bought it and operated it during 1877 and 1878. George W. Hume took it then and a few years later sold it to David Morgan, jr., who got into financial difficulties, and the plant was ordered sold by the court. C. W. Fulton, of Astoria, later a United States Senator, had the matter in charge, but was unable to find a customer, and finally in desperation offered it to W. H. Barker, of George & Barker, for $600. Mr. Fulton closed with him the same day. It proved a most profitable transaction for the purchasers, who acquired a million and a half labels which could be utilized, the machinery was taken out for other plants, the timber on the land belonging to the tract sold, and the floating property sold for a considerable sum, after which the stripped plant and land were sold back to Mr. Morgan for $600, the purchase price. He sold it to George W. Hume, who wanted it to correct a title. It was sold for taxes a couple of years later and was bought in by B. A. Seaborg, who operated it for two years, since when it has been idle.

George W. Hume was the first salmon canner to employ Chinese. This was at Eagle Cliff in 1872. At this period the white laborers in the canneries were recruited from the riffraff and criminal element of Portland. He had a Chinese working for him and through this man secured a Chinese gang from Portland. This labor proved so satisfactory that the custom soon spread to the other canneries. It was not found that the Chinese could do the work any better or quicker than the white laborer, but they proved more reliable in their work and gave less trouble.

Donald and Kenneth Macleay, of Portland, and William Corbitt, of San Francisco, who were in business in Portland, were the first to make a direct shipment of canned salmon to Liverpool. This was in 1871, and the shipment abroad that year amounted to 30,000 cases.

Of the 35 canneries on the Columbia River in 1881, it is said that about one-half had been established by the Hume brothers. G. W. and William Hume were partners in the firm of Hapgood, Hume & Co., on the Sacramento River, and established the first cannery on

the Columbia. In 1881 William was the proprietor of two canneries, one at Astoria, Oreg., and one at Eagle Cliff, Wash. R. D. Hume, a third brother, in the same year had a cannery in operation on the Rogue River, and established three others, one at Eagle Cliff (then owned by William Hume), one at Rainier (then belonging to Jackson & Myers), and one at Astoria. The fourth brother, Joseph, came to the coast in 1871 and some time later established a cannery on the river.

One of the pioneer canners on the river was the late F. M. Warren, operating as the Warren Packing Co., who established a cannery at Cathlamet, Wash., in 1869. The same company is still operating the plant. Later another cannery was established at Warrendale, Oreg., and it also is still operated by this company. Mr. Warren was the inventor of a retort, patented on April 10, 1877, which was in use by the principal canneries on the coast for a number of years.

John West was another pioneer. He built a cannery at Hungry Harbor, Wash., about 1869. In 1881 he moved his plant to Westport, on the Oregon side of the river. Mr. West was the inventor of a packing machine for placing the fish in the cans.

In 1871 the firm of Megler & Jewett established a cannery on the present site of Brookfield, Wash., and named it in honor of Mrs. Megler's birthplace, North Brookfield, Mass. In 1876 the plant was greatly enlarged and J. G. Megler bought out his partners and took in Mr. Macleay, of Corbitt-Macleay, wholesale grocers, of Portland and San Francisco, and changed the firm name to J. G. Megler & Co., under which title it operated until 1929. In 1879 Mr. Megler bought out this partner and owned the plant until his death in 1915, since when it was operated by his widow for a number of years and then was leased.

The first soldering machine used on the Columbia River was in this plant, while the steam box and lacquering machines were first put in use on the river in this plant.

In 1874 the Adair brothers, S. D. and John, jr., erected a cannery at Astoria, the second one to be built there. Before packing began, A. Booth, the well-known Chicago fish dealer, and progenitor of the present Booth Fisheries Co., acquired a half interest in the plant, which was then named A. Booth & Co. John Adair, jr., was the manager. The brothers established canneries on the Fraser River and in some seasons exchanged places in operating on the two rivers. S. D. Adair sold out his cannery on the Fraser and bought one on the Columbia and operated it under the firm name of S. D. Adair & Co. After selling out his interest in A. Booth & Co., S. D. Adair formed a partnership with William B. Adair under the style of S. D. Adair & Co. in 1881. The brothers were active in the industry for a number of years.

J. O. Hanthorn, under the firm name of J. O. Hanthorn & Co., established one of the largest canneries on the river at Astoria in 1876. He invented a rotary can washer for washing cans after they were filled ready for soldering and before the tops were put on.

In the same year Marshall J. Kinney began his long and interesting career in the canning business by establishing a cannery at Astoria.

One of the most noted men the Columbia River produced was Mathias Jensen, a Dane, who fished there for some years. He achieved especial fame from his important inventions in canning machinery. His first invention, however, was a machine for filling

needles for knitting salmon nets. He next invented a can-filling machine, which is in common use to-day. He also invented the first topping machine, which was a marked success. The patent rights of both these machines were sold to the Alaska Packers Association. The machines were all made at the plant of the Astoria Iron Works, at Astoria, of which Mr. John Fox was the founder.

The first fish trap or pound on the river was constructed by Mr. Graham, in Baker Bay, on the Washington shore, in 1879. In1881 Mr. P. J. McGowan built some traps just below the bay. The traps were very successful at times.

The first purse seine on the river was operated by William Graham & Co. in 1906.

Below appears a list of the canneries operated on the Columbia River in 1881, together with the pack of each during the year in question:

J. Williams (Oregon side)	9, 000	J. W. & V. Cook	30, 000
Astoria Packing Co	30, 000	F. M. Warren	12, 000
Elmore Packing Co	7, 890	J. West	12, 000
Astoria Fishery (M. J. Kinney)	26, 000	Jackson & Myers (2 canneries)	13, 000
Wm. Hume	20, 000	Aberdeen Packing Co. (Washington Territory side)	17, 000
Geo. W. Hume	18, 000	Jos. Hume, Knappton	20, 225
Devlin & Co	20, 000	Pillar Rock Co	15, 000
Occident Packing Co	15, 000	J. G. Megler & Co	25, 000
West Coast	15, 000	Columbia Canning Co	8, 000
Badollet & Co	25, 000	R. D. Hume & Co	8, 300
Booth & Co	23, 000	Cathlamet Cannery	8, 000
Eagle Cannery	17, 300	Jas. Quinn	5, 000
Timmins & Co	8, 000	Cutting & Co	20, 000
Fishermen's Packing Co	19, 000	Eureka Packing Co	20, 000
S. D. Adair & Co	10, 000	Hapgood & Co	13, 000
Anglo-American Packing Co	10, 300	Eagle Cliff Cannery	10, 000
Hanthorn & Co	19, 000		
Scandinavian Co	20, 000	Total	549, 115

An interesting compilation prepared by the Portland Board of Trade [15] shows the total product in cases, the price per case of 48 pounds, and the price for each fish paid by the canneries to the fishermen from 1866 to 1881:

Year	Total product	Price	Cost of fish	Year	Total product	Price	Cost of fish
			Cents				*Cents*
1866	4, 000	$16. 00	15	1874	350, 000	$6. 50	25
1867	18, 000	13. 00	15	1875	375, 000	5. 60	25
1868	28, 000	12. 00	20	1876	450, 000	4. 50	25
1869	100, 000	10. 00	20	1877	460, 000	5. 20	25
1870	150, 000	9. 00	20	1878	460, 000	5. 00	25
1871	200, 000	9. 50	22½	1879	480, 000	4. 60	50
1872	250, 000	8. 00	25	1880	530, 000	4. 80	50
1873	250, 000	7. 00	25	1881	550, 000	5. 00	60

The banner year in the canning industry was 1884, when 620,000 cases of chinook salmon were marketed. At this time the runs were so enormous that tons and tons of salmon were thrown overboard by the fishermen because the canneries were unable to handle them.

As in other sections, there came a time when the market began to be glutted by the packs of the numerous canneries, and it was found

[15] The Commerce and Industries of the Pacific Coast of North America, pp. 372, 373. By John S. Hittell. San Francisco, 1882.

necessary to combine some of the plants in order to operate more cheaply and also to reduce the output.

In 1885 W. H. Barker and George H. George, who had been connected with various canneries, formed a partnership as George & Barker and purchased the Astoria cannery of the Port Adams Packing Co., then 2 years old.

Shortly before this a combination which was named the Eureka & Epicure Packing Co. had been formed and comprised the following plants: Knappton Packing Co., Knappton; North Shore Packing Co., just below Knappton; and the Eureka Packing Co. This combination got into financial difficulties, and the reorganizers persuaded George & Barker to join the combination and take charge.

In 1887 the Eureka & Epicure Packing Co., the plants of Samuel Elmore, M. J. Kinney, and J. W. Seaborg, all of Astoria; J. O. Hanthorn & Co., Astoria; Fishermen's Packing Co., Astoria; Scandinavian Packing Co., Astoria; Columbia Canning Co., and J. W. & V. Cook, Clifton, were combined under the name of the Columbia River Packers Association. In 1889 the association built a new cannery at Rooster Rock. Mr. George was with the association until his death, but Mr. Barker left it to become general manager of the British Columbia Packers Association, where he is at present, the dean of the Pacific coast cannerymen.

Early in the eighties the California Can Co. was engaged in the business of making cans in San Francisco. Later the Pacific Sheet Metal Works absorbed the company. A factory was started at Astoria, with F. P. Kendall in charge. The latter was one of the deans of the industry and had a long and interesting connection with all branches of the industry and in most sections. The American Can Co. later on bought the Pacific Sheet Metal Works, and the Astoria plant was moved to Portland.

The American Can Co. was the first to install sanitary can-packing machinery in the salmon industry, the venture being made in 1911, at the Sanborn-Cutting plant in Astoria.

At the present time (1928) there are 24 canneries in operation on the river, while large quantities of salmon are also frozen, mild cured, pickled, smoked, and sold fresh in the markets of the world.

Commercial fishing is carried on mainly between the mouth of the Columbia and Celilo, a distance of about 200 miles, and in the Willamette River. The most of it is in the lower part of the river, within about 40 miles of its mouth. Bakers Bay, on the Washington or north side, and just within the river's mouth, is the favorite ground for pound-net fishing. The principal gill-net drifting ground is from the river's mouth to about 20 miles above Astoria, but drifting is done wherever convenient reaches are found much farther up the river. Most of the drag seines are hauled on the sandy bars in the river near Astoria, which are uncovered at low water. Wheels are operated in the upper river above the junction of the Willamette with the main river.

Astoria is the principal center for all branches of the industry, but more especially for canning. Other places in addition to Astoria at which canneries are located are Ilwaco, Eagle Cliff, Altoona, Brookfield, Pillar Rock, Cathlamet, Longview, Chinook, Ellsworth, and Pt. Ellice on the Washington shore, and at Warrendale, Rooster Rock, Rainier, Warrenton, Hammond, and Seuferts, on the Oregon shore.

OREGON

Necanicum Creek.—This short stream is in Clatsop County and enters the Pacific Ocean about 10 miles south of the Columbia River. Its fisheries are of small importance.

Nehalem River.—The Nehalem is a small coastal river that rises in the mountains of Clatsop and Columbia Counties, and flows into the Pacific Ocean in the northern part of Tillamook County. As early as 1887 there was a small cannery here, and the business has been followed ever since. In 1911 an additional plant was built and both have operated each year to 1919, except in 1913, when one was shut down. Since 1919 none have been operated except in 1922.

Tillamook Bay and River.—Tillamook River is a very short stream which enters Tillamook Bay, the latter being in Tillamook County and about 45 miles south of the mouth of the Columbia River.

Fishing is carried on mainly in the bay. The earliest record we have of canneries on this bay is of 1886, when two were in operation. From 1891 to 1910 but one was operated, but in 1911 another plant was started. In 1915 a third cannery was built, and all three operated until 1918, when only one was in operation. In 1919 two operated. In 1920 and 1921 both were shut down. Since then from one to three have been operated.

Nestugga River.—This stream enters the ocean in the southwestern part of Tillamook County. A cannery operated here in 1887 and the business was carried on each season with but one intermission until 1919. Since then it has been closed each year except in 1926.

Siletz River.—This river has its source in the mountains of Polk County and enters the ocean in the northern part of Lincoln County. The commercial development of the fisheries was hampered for many years owing to the fact that the river was within the boundaries of what was then the Siletz Indian Reservation. The first cannery was established here in 1896. An additional one was built in 1918. Since 1919 only one has been operated.

Yaquina Bay and River.—The Yaquina ("crooked") River is about 60 miles long; its general course is nearly west through the county of Benton. The river is narrow throughout the greater part of its length. A few miles from its mouth it suddenly broadens out into an estuary from one-half to three-fourths of a mile wide, which is commonly called Yaquina Bay. The river enters the Pacific about 100 miles south of the Columbia.

Salmon canning was begun on this river in 1887, when two small canneries were constructed. The next year an additional plant was erected. The business has fluctuated considerably since then and there is now but one cannery, which has not been operated since 1911. In 1917 this plant was consolidated with the one at Waldport.

The fishing grounds are all in the bay and the lower section of the river. The fishermen of this section are fortunate in that they have railroad communication with the outside world.

Alsea Bay and River.—Alsea River rises in the southwestern part of Benton County, and flows in nearly a northwesterly direction to the Pacific, a distance of about 60 miles. Like the Yaquina, the "bay" is merely a broadening out of the river just inside its mouth.

The first cannery was established in 1886 and by 1888 there were three in operation. For many years but one was operated. In 1911 and each season since up to 1919 two canneries have been operated. In 1920 and 1923–26 one was operated each year.

The best fishing grounds are from the mouth of the river to about 5 miles inland.

Siuslaw River.—This river has its source in the mountains of Lane County, and its course lies first in a northwesterly direction and to the westward until the Pacific is reached. Through part of its course it is the dividing line between Lane and Douglas Counties. In 1915 a railroad line from Eugene to the mouth of the Siuslaw River, at which point it connected with a line to the Coquille River, was opened for traffic.

As early as 1878 there were two canneries operated on this river, but from 1879 till 1888 there are no data available showing the extent of the fisheries. In 1888 the Florence Canning Co., the Lone Star Packing Co., and the Elmore Packing Co. each operated a cannery. In 1896 A. W. Hurd built a cannery which was destroyed by fire in 1908. No cannery has been operated since 1919. The opening of a railroad line from Eugene to here, thus furnishing an outlet for fresh salmon shipments, has greatly helped in developing its fisheries, and has cut off the supply of salmon for canning.

The salmon fishing grounds extend from near the mouth of the river to about 20 miles upstream.

Umpqua River.—With the exception of the Columbia this is the largest and longest river in Oregon. It is formed by north and south forks, which unite about 9 miles northwest of Roseburg, and the river then flows northwestwardly and enters the Pacific. Practically all of this river is within the boundaries of Douglas County, one of the largest counties in the State. A railroad has recently been built along this river and in time there will doubtless be a large development of the fisheries of this region owing to the opportunities which will be offered for shipping fresh fish.

With the exception of Rogue River, this is the only river in Oregon south of the Columbia River in which a spring run of chinook salmon occurs.

As early as 1878 there were two canneries located on the Umpqua, one of which was built by George W. Hume. The number has never been larger than this, and usually there has been but one operating. In 1912 there was but one at Gardiner. In 1919 one was operated. Since then but one has operated and this only in 1923, 1924, 1925, 1926, and 1927.

In 1918 the Reedsport Fish Co., of Reedsport, purchased the cannery of the Umpqua Cooperative Co., at Gardiner.

Coos Bay and River.—Coos Bay is a navigable semicircular inlet of the ocean with numerous arms or branches. There is much marshy ground in the bay, and a number of sloughs, or small creeks, which empty into the bay from both sides. Coos River proper is an unimportant stream, but a few miles in length. North Bend, Marshfield, and Empire are the principal towns on the bay. A branch railroad is being built to these points from the main line of the Southern Pacific Railway, and as soon as this is completed the fishing industry will receive a great impetus. Heretofore this region has depended upon steamers and sailing vessels plying to Portland and San Francisco for its communication with the outside world, and this slow and infrequent means of shipment has very seriously handicapped the fisheries.

Salmon canning began here in 1887, when two canneries opened for business. The business has fluctuated considerably since, most of the time but one cannery being operated; none has been operated since 1918.

Fishing is carried on mainly in the bay. A few set nets are operated in the river.

Coquille River.—This river is formed by three branches, called the North, Middle, and South Forks, which rise in the Umpqua Mountains and unite near Myrtle Point, the head of tidewater, about 45 miles by river from the mouth of the stream. It is a deep and sluggish river, with no natural obstructions to hinder the free passage of fish. Its fisheries have been seriously hampered by the lack of railroad communication, but this has recently been remedied, as the railroad to Coos Bay connects with a short line now in existence between the Coquille River and Coos Bay, and thence on to the Siuslaw and from there to Eugene.

The principal towns on the Coquille River are Bandon, Prosper, Coquille, and Myrtle Point. Bandon is the shipping port.

Pickled salmon were cured and shipped from this river very early, the first recorded instance of any considerable quantity being in 1877, when 3,000 barrels of salmon were sent to San Francisco. The salt shipments were important until within recent years. The first salmon cannery was erected in 1883, at Parkersburg. In 1886 another was built at the same place, and the following year still another was erected close by. This was the largest number ever in operation in any one year. Since 1909 two canneries have been operated, both at Prosper. In 1916 the Macleay estate took over the Coquille River Fishermen's Cooperative Co.'s cannery near Bandon. None of the canneries operated in 1928.

The fishing grounds are from the mouth to Myrtle Point, about 45 miles inland.

Sixes River.—This small river is located in the northern part of Curry County, and is about 40 miles in length, entering the Pacific a very short distance above Cape Blanco. The salmon caught here are either salted or shipped fresh to the canneries on the Coquille River.

Elk River.—This is another small stream about 40 miles in length, which enters the Pacific just south of Cape Blanco. As on the Sixes River, the salmon are either salted or sold fresh to the canneries on the Coquille River.

Rogue River.—This river has as its source Crater Lake in the Cascade Mountains, on the western border of Klamath County, flowing a distance of about 325 miles to the ocean, which it enters at Wedderburn. Its principal tributaries are the Illinois, Applegate, and Stewart Rivers. Owing to canyons and falls in the main river between the mouth of the Illinois River and Hellgate, the latter near Hogan Creek which runs through the town of Merlin, navigation and fishing are impossible in that section. Except at the mouth of the river the population is very sparse until about the neighborhood of Hogan Creek, where the river approaches the railroad, and from here on for some miles there are numerous growing towns.

Owing to the fact of there being both a spring and a fall run of salmon in this river, the fisheries early became of importance, although sadly hampered because of being compelled to depend

wholly on vessel communication with San Francisco, many miles away. In the early years the salmon were pickled and shipped to San Francisco. Strong, Baldwin & Co. started in the business as early as 1859. In 1877 R. D. Hume, who had been canning salmon on the Columbia River, removed to the Rogue River, and established near the mouth a cannery which he operated every season (except 1894, when the cannery burned down) until his death in November, 1908, after which date it was operated by his heirs. Mr. Hume also operated a large cold-storage plant at Wedderburn for several years.

The development of the fisheries of the lower Rogue River was very much hampered by the monopoly which Mr. Hume acquired and maintained until his death. He bought both shores of the river for 12 miles from its mouth, and also owned an unbroken frontage on the ocean shore extending 7 miles north from the mouth of the river. As a result of this, independent fishermen could find no convenient places for landing, which was necessary in order to cure, handle, and ship the fish caught. Since Mr. Hume's death the property has been sold to the Macleay estate, but the people of Oregon, upon an initiative and referendum petition, voted in 1910 to close Rogue River to all commercial fishing, and it was so closed in 1911 and 1912 but reopened in 1913. A second cannery was built here in 1915 by the Seaborg Canning Co. A third cannery was built in 1919, but during the period from 1921 to 1926 but one was operated. Two operated in 1927 and 1928.

In the upper river ranchers living along the banks have engaged in fishing for a number of years, the catch for the most part being sold fresh. In recent years, as the country has developed, this fishery has become fairly important.

Chetco and Windchuck Rivers.—These two unimportant streams empty into the Pacific in the lower part of Curry County, not far from the California line. The former is about 20 miles and the latter about 25 miles in length. Both have runs of salmon, and small fisheries have been maintained for some years, the catch being either pickled or sold to the California canneries.

CALIFORNIA

Smith River.—This river, which is the most northerly one in the State, rises near the Siskiyou Mountains, and runs in a westerly

The Klamath River is important as a salmon stream because it has both a spring and fall run of salmon. In 1888 a cannery was established at Requa, at the mouth, and this has been operated occasionally ever since. The pickling of salmon has been done here for a number of years. Some years part of the catch has been shipped fresh to the cannery on Smith River or to the Rogue River (Oreg.) cannery. Since 1909 the cannery has been operated continuously by the Klamath River Packers Association.

Humboldt Bay and tributaries.—The shore line of Humboldt County is bold and high, except in the vicinity of Humboldt Bay, where it is rather flat. The latter is the only harbor along the county shore, and it is quite difficult of access, owing to the bar at the entrance upon which the sea breaks quite heavily. The bay is about 12 miles long and about 3 miles wide. Mad River, which has its rise in the lower part of Trinity County, runs in a northwesterly direction, then makes a sharp turn and enters the bay from the north side. Eel River, which has its rise in Lake County, far to the southeast, runs in a northwesterly direction and enters the bay at its southern extremity. Small railroads running south from Eureka traverse the shores of both rivers for some miles. A railroad now runs from the north side of San Francisco Bay to Eureka, and it has aided very materially in extending the market for salmon caught in these rivers.

Mattole River.—This is a small and unimportant river in the southern part of Humboldt County and is said to have a good run of salmon each year, but no commercial fishing has as yet been carried on here.

Noyo River.—In 1915 salmon fishing began at Fort Bragg, in Mendocino County, where the Noyo River debouches into the ocean. The building of a branch railroad to this point made the shipping of salmon a possibility. In 1915 and 1916 considerable salmon were caught and shipped fresh. In 1917 the Tillamook Ice & Cold Storage Co. built and operated a cannery here, while the Columbia & Northern Fishing & Packing Co. in the same year built and operated a cold-storage and mild-curing plant. The cannery has not been operated since 1920.

Sacramento and San Joaquin Rivers.—These two rivers are the most important rivers in California. The Sacramento is quite crooked, the distance by river from Red Bluff to San Francisco being about 375 miles, while the distance by rail between these two places is only 225 miles. The river rises in several small lakes in the mountains about 20 miles west of the town of Mount Shasta (formerly known as Sisson), in Siskiyou County, and for nearly half its length flows through a narrow canyon. The upper portion is a typical mountain stream, with innumerable pools and rapids. A little above Redding the river emerges from the canyon and widens into a broad, shallow stream. Below Sacramento it runs through a level country and is affected by tides. Sloughs are numerous in this stretch, some connecting it with the San Joaquin. The Sacramento and San Joaquin Rivers join as they empty into Suisun Bay.

The principal tributaries of the Sacramento which are frequented by salmon are the Pit and McCloud Rivers and Battle Creek. At one time salmon frequented the American and Feather Rivers, but mining and irrigation operations along these streams either killed them off or drove them away.

The San Joaquin River has its source in the Sierra Nevada Moun-
tains. Flowing westerly and forming the boundary between Fresno

Mr. Hapgood set out on the journey and arrived at San Francisco on March 23, 1864, and a few days later at the location where the operations were afterwards conducted.[16]

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For a considerable time after the salmon-canning business was inaugurated the packers suspended operations in the early part of July of each year as at that time the market would take only goods which showed a rich oil and the best food values.[17]

The business languished after the firm established its cannery on the Columbia River, but in 1874 was renewed again by others and continued with varying success until 1905, when it ceased temporarily, owing to the smaller quantity of fish available and the difficulty of competing with the mild-cure packers and the fresh-fish dealers. Several times since small packs have been made when, for some reason, mild-curing was unprofitable.

Monterey Bay.—The first harbor south of San Francisco is Monterey Bay, a large indentation cutting into Santa Cruz and Monterey Counties. Only a portion of it is well sheltered, however. For a number of years it had been known that salmon frequented the waters of this bay for the purpose of feeding on the young fishes which swarmed there. Sportsmen frequently caught them with rod and reel, but it was not until the early eighties that the industry was established on a commercial basis. It has since grown very rapidly. The catch has either been mild cured at Monterey or shipped fresh. A few have been canned in recent years.

ALASKA [18]

Alaska is the most favored salmon-fishing region. Many rivers, some of great length and draining enormous areas, intersect the district in every direction, while the number of small creeks is countless. Almost every one of these have runs of salmon of varying abundance. The principal streams entering Bering Sea are the Yukon, Kuskokwim, Togiak, Nushagak, Kvichak, Naknek, Egegik, and Ugashik; in Central Alaska the Chignik, Karluk, Alitak, Susitna, and Copper Rivers are the main streams, while in southeast Alaska are found, among many others, the Ankow, Situk, Alsek, Chilkat, Chilkoot, Taku, Stikine, and Unuk Rivers. Most of the fishing in Alaska is carried on in the bays into which these rivers debouch. In southeast Alaska, which is composed largely of islands, the fishing is carried on mainly in the bays, sounds, and straits among these.

Even before the purchase of the district from Russia in 1867 our fishermen occasionally resorted to southeast Alaska and prepared salted salmon. The salmon fisheries did not become important, however, until canning was begun.

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[16] The description of the machinery used and the methods of canning have been quoted in full under "Canning" elsewhere in this report.

[17] The First Salmon Cannery. By R. D. Hume. Pacific Fisherman, Seattle, Wash., Vol. II, No. 1, January, 1904, pp. 19-21.

[18] The material for the history of the salmon fisheries of Alaska for the period from the inception of salmon canning to 1900 was obtained almost wholly from the following excellent and valuable reports by Capt. Jefferson F. Moser, to whom I am deeply indebted for this and other valuable data.

The Salmon and Salmon Fisheries of Alaska. Report of the Operations of the United States Fish Commission Steamer *Albatross* for the year ended June 30, 1898. By Jefferson F. Moser. Bulletin, U. S. Fish Commission, 1898, Vol. XVIII, pp. 1-178. Washington, 1899.

Alaska Salmon Investigations in 1900 and 1901. By Jefferson F. Moser. Bulletin, U. S. Fish Commission, 1901, Vol. XXI, pp. 173-398. Washington, 1902.

SOUTHEAST ALASKA

One of the most favorable sections for carrying on fishing operations is southeast Alaska. Here a narrow strip of mainland, about 30 miles wide, separates British Columbia from salt water and forms the "panhandle" of Alaska. Outside this is a fringe of numerous islands, large and small, close to the coast line, conforming to its irregularities and separated from it and from each other by deep straits and channels. These islands, about 1,100 in number, extend from the coast an average distance of about 75 miles and along the general contour for about 250 miles. Some of these islands are very large, indented with deep bays and sounds, and they in turn fringed with smaller islands.

The largest streams in this region are the Unuk, Stikine, Taku, and

and 1879, then it was closed down. In 1882 the machinery was taken by another company to Cook Inlet.

In 1882 M. J. Kinney, of Astoria, under the name of the Chilkat Packing Co., built a cannery on the eastern shore of Chilkat Inlet and made a pack the same year. The cannery changed hands several times and finally was burned in 1892, and not rebuilt. The cannery packed every year from 1883 to 1891, both inclusive, except in 1888, when it was closed.

In 1883 the Northwest Trading Co. built a cannery on Pyramid Harbor, a little bay on the western side of Chilkat Inlet. It was operated by this company in 1883 and 1884, was idle in 1885, and in 1888 was sold to D. L. Beck & Sons, of San Francisco, and operated by that firm. In the spring of 1889, it was burned, but was rebuilt at once and a pack made that year. In 1893 it joined the Alaska Packers Association, which operated it, except in 1905, until the end of the season of 1908, when it was finally abandoned.

On the north shore of Boca de Quadra, about 8 miles from the entrance, a cannery was built in 1883 by M. J. Kinney, of Astoria, and operated under the name of the Cape Fox Packing Co. from 1883 to 1886. Late in the last-named year it was sold and moved to Ketchikan, operating there under the name of the Tongass Packing Co. during 1887, 1888, and until August, 1889, when it was burned and not rebuilt.

In 1886 Rhode & Johnson erected a saltery at Yes Bay. The following year the firm became Ford, Rhode & Johnson. In 1887 work was begun on a cannery which was finished in 1888. Packing was begun in 1889 under the name of the Boston Fishing & Trading Co. In 1901 it was included in the Pacific Packing & Navigation Co. consolidation, and when that concern failed was purchased in 1905 by the Northwestern Fisheries Co. In 1906 the cannery was purchased by C. A. Burckhardt & Co., who have operated it each year to date, either under that name or subsequent incorporations known as the Yes Bay Canning Co. and the Alaska Pacific Fisheries.

In 1887 the Aberdeen Packing Co., of Astoria, Oreg., built a cannery on the Stikine River, about 8 miles above the mouth. In 1889 the cannery was moved to Point Highfield, on the northern end of Wrangell Island, and operations commenced under the name of the Glacier Packing Co. In 1893 it joined the Alaska Packers Association, who have operated it continuously, except in 1905, until it was finally shut down at the end of the 1926 season.

The Loring cannery of the Alaska Packers Association was built in 1888 by the Alaska Salmon Packing & Fur Co., of San Francisco, and operated by the Cutting Packing Co. The company was incorporated in 1883 and operated a saltery until the cannery was built. When the Alaska Packers Association was formed in 1893 it joined that organization. The cannery has operated every year since it was built, and in some seasons has made the largest pack of any in the Territory.

Shortly after William Duncan and his community of Tsimpsean Indians had settled, in 1887, on Annette Island, which island had been set aside by the Federal Government as a reserve for them, plans were under way for a salmon cannery, but funds came in so slowly that it was not until 1890 that any pack was attempted. In 1891 it was in full operation, and operated from then continuously until 1913, when the plant was shut down for that and the two suc-

ceeding years. Much dissatisfaction had been expressed by the natives over the operation of this and other industrial plants on the island, and finally the Federal authorities took possession of practically everything, as guardian of the natives, and early in 1916 leased the cannery to P. E. Harris & Co., of Seattle, the understanding being that they were to employ natives when available. Unfortunately the plant burned down on May 17, just before the fishing season began. In 1918 the Annette Island Packing Co. built and operated a cannery here and has continued to do so to date.

For the purpose of assisting the natives of Annette Island in operating this cannery the President in 1916 issued a proclamation making a fishery reserve of the island and among other things provided that—

> the waters within 3,000 feet from the shore lines at mean low tide of Annette Island, Ham Island, Walker Island, Lewis Island, Spire Island, Hemlock Island, and adjacent rocks and islets, located within the area segregated by the broken line upon the diagram hereto attached, and made a part of the proclamation, also the bays of said islands, rocks, and islets are hereby reserved for the benefit of the Metlakahtlans and such other Alaskan natives as have joined them or may join them in residence on these islands, to be used by them under the general fisheries laws and regulations of the United States as administered by the Secretary of Commerce.

One white trap-net owner refused to remove his trap from the waters in question, and when decision was rendered against him in the lower court, carried the case to the United States Supreme Court, which, in December, 1918, upheld the right of the President to grant exclusive fishing rights in public waters.

James Miller operated a saltery on Burroughs Bay, on Behm Canal, in 1886 and 1887. In 1888 Andrew and Benjamin Young, of Astoria, Oreg., built a cannery here and operated it under the name of the Cape Lees Packing Co. in 1888, 1889, and 1890. It was closed in 1891 and 1892. In 1893 it became a part of the Alaska Packers Association, and was dismantled the following year.

About 1888 a saltery was established on Thorne Bay, Prince of Wales Island. The following year it was sold to the Loring cannery. In 1892 it was sold to Robert Bell, who moved it to the upper end of the northwest arm, on the western shore. Salting was not carried on each season, as it was sometimes found to be more profitable to sell the fish fresh to the canneries. The plant was finally abandoned.

In 1889 Messrs. Sanborn and Ellmore, of Astoria, built a cannery in Pavlof Harbor, Freshwater Bay, on the eastern side of Chichagof Island, and operated it under the name of the Astoria & Alaska Packing Co. It made a pack that year and in the spring of 1890 was moved to Point Ellis, on the eastern side of Kuiu Island, packing that year and also in 1891. It was burned in May, 1892. Only one building was left standing, and it and the site were purchased by John H. Mantle, of Wrangell, who operated a saltery on each arm of the bay. Mr. Mantle began operations here in 1893.

In 1889 the Baranof Packing Co. built and first operated a cannery at the Redoubt, about 12 miles below Sitka. It was also operated in 1890 and then moved to Redfish Bay, on the western coast of Baranof Island. It made its first pack here in 1891 and was then operated every year until 1898, when it was sold to the Alaska Packers Association and dismantled.

In 1889 the Thlinket Packing Co., organized at Portland, Oreg., built a cannery at Point Gerard, on the mainland opposite Point

Highfield, at the head of Wrangell Island. It was operated that and the subsequent year.

In 1901 this company built another cannery at Santa Anna, on the north side of Cleveland Peninsula, and made a pack the same year.

In 1901 both plants became part of the Pacific Packing & Navigation Co. In 1902 the Gerard Point plant was closed and was not opened again. In 1903, 1904, and 1905 the Santa Anna plant was closed also. Early in 1905 these plants were purchased by the Northwestern Fisheries Co. at the assignee's sale of the old corporation's properties. The Santa Anna plant was operated in 1906 and each year since up to the end of the 1920 season.

The Chilkat Canning Co. put up a plant at Chilkat village, on Chilkat Inlet, in 1889. It was operated from 1889 to 1893, and then sold to the Alaska Packers Association. It was held in reserve for some years but was finally dismantled.

In 1890 a cannery was built by the Bartlett Bay Packing Co. on Bartlett Bay, Icy Straits, and operated by Williams, Brown & Co., of San Francisco. A saltery was contructed here prior to that date, and in 1889 a pack of 4,300 cases was made in a crude way. In 1891 the ice piled up in Glacier Bay to such an extent that the cannery could do almost nothing. It was not operated after this date. In 1893 it became a part of the Alaska Packers Association and was dismantled in 1894.

In 1896 the Pacific Steam Whaling Co. built a cannery on the northern side of Hunter Bay, near the southern end of Prince of Wales Island, and made a pack the same year. Miller & Co. had a saltery at this place and it was purchased by the company and removed to make room for the cannery. Miller & Co. also had a saltery on Nutqua Inlet, which was built in 1896, and this also was sold to the canning company. In 1901 the cannery became a part of the Pacific Packing & Navigation Co. It was closed in 1904. Upon the dissolution of the company in 1905 this plant was purchased by the Northwestern Fisheries Co., which company, after keeping it closed in 1905 and 1906, has operated it intermittently since.

The Quadra Packing Co. built a cannery on Mink Arm, in Boca de Quadra, in the spring of 1896 and made its first pack that year. In 1901 the plant was purchased by the Pacific Packing & Navigation Co. It was closed in 1904, 1905, and 1906. Upon the dissolution of the company in 1905 the plant was purchased by the Northwestern Fisheries Co. It was reopened in 1907 and has been operated intermittently since.

In 1899 the Icy Straits Packing Co., consisting of stockholders of the Quadra Packing Co., built a cannery and sawmill at a point on the southeastern shore of Wrangell Narrows, about a mile south of the northern entrance to same, and named the town site Petersburg. The cannery was ready and operated in 1900. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1903, 1904, and 1905. In 1905 it was purchased at the sale of the company's properties by the Northwestern Fisheries Co. In 1906 the Pacific Coast & Norway Packing Co., which had been operating a cannery

In 1900 the Western Fisheries Co., of Portland, built a cannery at the head of Dundas Bay, and made a pack the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904. At the assignee's sale of the company's properties in 1905 this plant was purchased by the Northwestern Fisheries Co. and operated in 1905 and most years since.

In 1900 the Fidalgo Island Packing Co. built a cannery on the southern side of Ketchikan Creek. A pack was made the same year. The plant was closed in 1903, only a little salting being done that year, was reopened in 1904, was closed again in 1905, and was reopened in 1906, since when it has been operated each season to date, except in 1909.

In 1900 the Pacific Coast & Norway Packing Co. operated a floating saltery while prospecting for a cannery location. In 1901 the company built a cannery at Tonka, about midway of Wrangell Narrows, on the western side, and made a pack in that and subsequent years until 1906. In that year the company purchased the Petersburg cannery and thenceforth operated from there. The Tonka plant was dismantled a few years later.

In 1900 the Royer-Warnock Packing Co., of San Francisco, built a small cannery on Beecher Pass, which connects Duncan Canal with Wrangell Narrows, using the old Buck saltery for the cannery proper. It operated only the one season. It was a hand-pack plant.

The Taku Fishing Co. in 1900 built a cannery on the southern side of the entrance to Port Snettisham, and made a pack in that year. In 1901 it became a part of the Pacific Packing & Navigation Co. The plant was closed in 1902 and not reopened again.

In 1900 the Taku Packing Co., organized in Astoria, Oreg., built a cannery on the western shore of Taku Inlet and made a pack the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904 and not reopened again. In 1905 it became the property of the Northwestern Fisheries Co.

In 1900 the Chilkoot Packing Co., organized at Aberdeen, Wash., built a cannery at the head of Chilkoot Inlet, and operated the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904 and not reopened again.

The Pacific Packing & Navigation Co. (an account of whose inception, operation, and failure appears under Puget Sound) was organized in 1901 and acquired the following canneries in Alaska: Canneries of Pacific Steam Whaling Co. at Nushagak, Bristol Bay; Chignik, Alaska Peninsula; Uyak, Kodiak Island; Kenai, Cook Inlet;

Alaska canneries the Sitkoh Bay plant was sold to George T. Myers & Co., while the Orca plant was leased to Capt. Omar J. Humphreys, from whom the Northwestern Fisheries Co. later on secured it.

The San Juan Fishing & Packing Co., of Seattle, established a cannery and cold-storage plant in 1901 at Taku Harbor, a small bay on the mainland a short distance south of Taku Inlet, and made a pack the same year. This plant was purchased in 1903 by the Pacific Cold Storage Co. and operated by it in 1903, 1904, and 1905. In 1906 it was leased and operated by the Taku-Alaska Packing Co. From 1907 to 1911 the plant was leased and operated by John L. Carlson & Co. In 1911 the plant was purchased by Mr. Carlson and the name changed to the Taku Canning & Cold Storage Co., under which name it has been operated each year since. In 1918 it was purchased by Libby, McNeill & Libby, who have operated it since.

In 1901 the Chatham Straits Packing Co. built a cannery on Sitkoh Bay, Chichagof Island. The same year this cannery became a part of the Pacific Packing & Navigation Co. Upon the dissolution of the latter, early in 1905, this plant was purchased by George T. Myers & Co., which company has operated it to date without a break.

In 1901 F. C. Barnes, of Portland, Oreg., built a cannery at Lake Bay, on the east side of Prince of Wales Island, and made a pack that season. This cannery was operated in 1902, but was closed in 1903. It was reopened in 1904, and operated each season after that. In 1910 it was incorporated under the name of F. C. Barnes Co.

In 1901 the Union Packing Co., organized in Tacoma, Wash., built a cannery on Kell Bay, an arm of Affleck Canal, on the southern side of Kuiu Island. In 1904 this plant was moved to the Kvichak River in Bering Sea.

In 1902 the Kasaan Bay Co. built a cannery on the north side of Kasaan Bay, Prince of Wales Island, and made a pack the same year. It was shut down in 1904 and 1905, but reopened in 1906 by Gorman & Co., of Seattle, who had purchased control of the company. Shortly after the closing of the packing season the plant burned down, but it was rebuilt in time to operate the following season. In 1909 the plant was closed, but was reopened in 1910. On September 12 of that year the plant was again destroyed by fire, but was rebuilt in time to operate the following season. On October 29, 1911, the plant was once more destroyed by fire, but was rebuilt in time to operate in 1912. In 1915 the plant was purchased by the Anacortes Fisheries Co., a subsidiary of the Booth Fisheries Co., who operated it each year until the close of 1920. In 1921 the Anacortes Fisheries Co. was dissolved and its canneries were transferred to the Northwestern Fisheries Co., also a subsidiary of the Booth Fisheries Co. The Kasaan plant was closed that year but has been operated each year since.

In 1902 the Alaska Fish & Lumber Co. built a cannery at Shakan, on Kosciusko Island, near the head of Prince of Wales Island, and made a pack the same year. It was shut down in 1904. In 1905 the property was taken over by the Shakan Salmon Co., a new company composed largely of members of the old corporation, who operated it that season. In 1906 Gorman & Co., of Seattle, obtained control of this cannery and operated it each season under the name of the Shakan Salmon Co. until 1915, when it was sold to the Anacortes Fisheries Co., a subsidiary of the Booth Fisheries Co. The plant was idle in 1921 and 1922, but has been operated each year since by the Northwestern Fisheries Co.

In 1902 the Columbia Canning Co. built a cannery on the southern side of Chilkoot Inlet, and made a pack that year. In 1910 C. A. Burckhardt & Co., under the name of the Chilkoot Fisheries Co., purchased and operated this plant. In 1911 the name was changed to the Alaska Pacific Fisheries. Early in 1919 the plant was totally destroyed by fire.

The only cannery in this section lost to Alaska by action of the Federal Government was that of the Wales Island Packing Co., which was built on Wales Island, near Dixon Entrance, in 1902. When the Alaska Boundary Arbitration Commission declared Wales Island a part of Canada in 1903, this cannery automatically ceased to be an American one. After the change of government it lay idle for some time, but later was put in use once more by Canadian parties.

In 1902 the Thlinket Packing Co. built a cannery on Funter Bay, on the west side of Admiralty Island, and made a pack that year and every subsequent year until 1926, when it sold the plant to the Sunny Point Packing Co., who continued operations thereafter.

In 1902 the Pillar Bay Packing Co. built and operated a cannery near Point Ellis, on Kuiu Island, and operated it until 1918, when it was sold to the Fidalgo Island Packing Co., who have since operated it.

In 1902 the Alaska Fisheries Union, organized in Seattle, built a cannery on the east side of Chilkat Inlet, and made a pack that year. After operating to 1905, the plant was in that year leased to and operated by the Lynn Canal Packing Co. The plant was purchased in 1906 by the Pacific American Fisheries. In 1908 it was moved to Excursion Inlet and has been operated each season to date.

The Tacoma Fishing Co. in 1902 established a saltery and halibut station at Tee Harbor, on Lynn Canal, and made a pack that year. Later it became the property of the International Fisheries Co. In 1910 the plant was purchased by the Tee Harbor Packing Co., which established a cannery and operated first in 1911. Thereafter the plant was operated each season, with changes of ownership in 1920 and 1922, until the fall of 1924, when it was destroyed by fire and was not rebuilt.

In 1907 the Alsek Fisheries Co. did some salting on the Alsek River. The late Malcolm Campbell was interested in the above company and in subsequent years operated under his own name. In 1910 the St. Elias Packing Co. established a cannery near the saltery and made a pack the same year, and in 1911 and 1912. Since then the plant has been closed and was sold in 1916 to Libby, McNeill & Libby.

The Astoria & Puget Sound Packing Co., in 1908, built and operated a cannery on Excursion Inlet. It was closed the following year, but has been operated each year since. It was burned in 1917, but was rebuilt in time to operate the following season.

The year 1911 witnessed a considerable increase in the number of canneries. Among the new plants built and operated were the following: Hidden Inlet Canning Co., Hidden Inlet, Portland Canal; Hawk Fish Co. (later changed to P. E. Harris & Co.), Hawk Inlet, Admiralty Island; Lindenberger Packing Co., Roe Point, Behm Canal; Deep Sea Salmon Co., Cape Edwards, Chichagof Island; L. Gustave & Co., Skowl Arm, Prince of Wales Island (changed in 1912 to Skowl Arm Packing Co.), and M. E. Lane (a small hand-pack plant), Meyers Chuck, Cleveland Peninsula.

An innovation in Alaska salmon canning this year was when the old ship *Glory of the Seas* was fitted out as a floating cannery by the Alaska Fish Co., and operated in Hawk Inlet, Admiralty Island, and at Ketchikan. Quarters for the crew were built over the cabins on the quarter deck, the latter being reserved for officials. The remainder of the upper deck was used for receiving, dressing, and cleaning the fish, which were brought on board by means of a portable elevator attached to the side of the ship. The "iron chink" and the sliming and cleaning tanks were also on this deck. The fish were carried in chutes to the second deck, where a line of sanitary machinery had been installed. The retorts were placed on the forward part of the second deck. The third deck was used for cooling and storing the pack. No lacquering or labeling was carried on aboard the vessel.

In 1912 this plant and the ship *William H. Smith*, the latter by the Weiding & Independent Fisheries Co., of Seattle, were operated. The *William H. Smith* also did some freezing of salmon.

Yakutat Bay is the only harbor available for vessels from Cape Spencer to Prince William Sound. In 1902 C. A. Fredericks & Co., of Seattle; Mulvey & Wilson, of Yakutat; Jewell Fish Co.; and Ankow Fish Co. all established salteries here. While their primary purpose was the salting of herring, considerable salmon was also salted. These plants operated only the one season.

In 1904 the Yakutat & Southern Railway Co. built a cannery here. This plant is noted for being the only one that hauls its fish by railway from the fishing streams to the cannery. The railroad is a little over 9 miles in length, and for some years an engine which had seen service on the elevated railroads of New York City and was discarded when the latter were electrified was used. A more modern engine is now in use. The fish are carried in open freight cars. Later this company was purchased by Gorman & Co., and now is the property of Libby, McNeill & Libby.

Nineteen new canneries were built and operated in southeast Alaska in 1912, while 1 new cannery was built in 1914, 2 in 1915, and 7 in 1916. In 1917 the heavy demand created for foodstuffs by the World War caused a considerable increase in the number of new canneries in Alaska. In the southeast Alaska section 9 were built and operated in that year. This demand persisted into 1918, 1919, and 1920. In 1918, 15 new canneries were built and operated; in 1919, 9; and in 1920, 8. Since then hardly a year has passed without one or more new plants being put into use; and while each year a few were shut down temporarily or abandoned entirely, the total number has tended to increase.

Although the war ended late in 1918, the demand for canned salmon continued strong into 1920. The diminution in demand which the more far-sighted packers had anticipated and prepared for started late in 1920, and for several years the industry went through a rather severe period of readjustment during which a number of canneries were closed down permanently and others temporarily. This expensive experience brought home to some of the operators the fact that the industry had been overbuilt, and numerous attempts since have been made looking to the consolidation of the independent plants into groups, which would vastly decrease the enormous overhead of the individual companies and also lead to other economies. Prac-

tically all of these attempts were failures, however. Three of the strongest groups financially, however, have tended to ease the situation somewhat by buying outright various other competing canneries.

There are still too many canneries operating in the southeast Alaska section, and the only measure of relief that will meet the situation would be a material reduction in the number. This would not mean a reduction in the total pack, as the industry has reached a stage where the intrusion of a new cannery merely means that its pack correspondingly reduces the pack of its near-by competitors. As the pack of the southeast Alaska canneries is mainly of low-grade species in the sale of which heavy competition exists, the undue expansion of the number of companies operating tends to greatly enhance the cost of operation, and unless this is very materially reduced in the near future our operators are going to be greatly handicapped in the world's markets.

Salmon salteries.—At one time salteries were of considerable importance in this section, but the establishment of canneries, with the consequent heavy demand for fresh salmon, induced most of the salteries to sell their high-grade fish to the canneries and pack only the cheaper grades. Many of them quit the business as a result of the competition, while others were forced out by the low prices prevailing at times for salted salmon. As many of the salters moved from place to place, and frequently changed their operating name, it has been difficult to keep track of them, and in this review only those are listed who attained to some prominence either through longevity or largeness of pack.

James Millar, one of the earliest whites to take up his residence here after the purchase of Alaska, and his sons were very active in starting and operating salteries, and it was an unusual thing during the period previous to 1910 when one of the family was not operating such a plant.

Jacob Louth established a saltery on the south arm of Moira Sound about 1900 and operated it for some years.

John C. Frey established a saltery on Etolin Island in the nineties and ran it until his death in 1904, when John H. Mantle purchased and operated it until about 1910.

Anderson & King built a saltery on Cholmondeley Sound, Prince of Wales Island, in the nineties. In 1904 it was operated under the name of A. E. King. After Mr. King's death his widow operated it from 1906 to 1909. In 1910 the saltery was purchased by C. A. Burckhardt & Co., who built a cannery on the site and began operations in 1911. In 1912 the name was changed to the Alaska Pacific Fisheries.

In 1889 D. Blauw, of Tacoma, Wash., built a saltery on Grouse Island, Boca de Quadra, and dry-salted chum salmon. He operated only one season.

About 1890 a saltery was established on the north shore of the mouth of Quadra Stream, on Boca de Quadra, by Clark & Martin. It was operated intermittently until about 1898, when it was abandoned. The same parties also established a saltery at Ketchikan shortly after the one on Quadra Stream was built and operated this until about 1898, when the plant was turned into a steamer wharf and warehouse for the new town of Ketchikan which was building up around it.

In 1897 a saltery was built on Taku Point, near the head of Taku Inlet. In 1898 and 1899 it was operated by the Quadra Packing Co. In 1900 the Icy Straits Packing Co. operated it.

In 1897 a small saltery was in operation by Cyrus Orr at Point Barrie, Kupreanof Island. In the same year Walter Kosmikoff operated a small saltery at Shipley Bay, on Prince of Wales Island. In 1900 he sold it to the Icy Straits Packing Co.

Fred Brockman in 1897 built and operated a small saltery on Sarkar Stream, Prince of Wales Island. Mr. Brockman operated this saltery intermittently until his death in 1915.

In 1897 Banter & West were operating a saltery at Sukkwan, on Sukkwan Island. In the same year Miller & Co. started another saltery on Kassook Inlet, on Sukkwan Island, while Thomas McCauley was operating a saltery on Whale Passage.

In 1900 the Great Northern Fish Co. operated a floating saltery. Its principal business was salting chum salmon for the Japanese trade, and it operated only one season. J. E. Rice, of Whatcom, Wash., in the same year packed chum salmon on Karta Bay for the same trade.

In 1901 the Muir Glacier Packing Co. put up a saltery on Ideal Cove, Dry Pass, near Wrangell. It has operated mainly as a mild-cure station. It was closed down in 1903, but was opened in 1904. It was then closed in 1905, 1906, and 1907. It was opened in 1908 by K. J. Johansen and operated in 1908 and 1909.

The Seattle-Scandinavian Fish Co. built a saltery on Snug Harbor, Tenakee Inlet, Chichagof Island, in 1902 and made a pack. It packed in 1903 also, but shut down in 1904. The plant was leased in 1905 and then shut down for good.

The Alaska Fish & Mining Co. built and operated a saltery at Revilla, on Tongass Narrows, during the single season of 1902, while the Rice Fisheries Co., in the same year, built and operated a saltery on Boca de Quadra.

The United Fish Co., of Seattle, salted at Tolstoi Bay on the east side of Prince of Wales Island, 1903 and 1904.

The Alaska Fish & Development Co. built a saltery on Pleasant Bay, Admiralty Island, in 1903, and operated it from 1903 to 1905. In 1907 it was operated by the Alaska-American Fish Co., but has been closed since.

Of recent years there have been but few new salteries started in this section, while some of the old plants have been transformed into canneries.

PRINCE WILLIAM SOUND AND COPPER RIVER

The great indentation known as Prince William Sound, and the Copper River delta, a short distance south of the sound, were not exploited as much as many other portions of Alaska until about 1915, due largely to the limited means of transportation and the consequent heavy expense of operation.

The principal source of salmon supply is the Copper River, a glacial stream about 300 miles long, which empties into the Gulf of Alaska through a delta nearly 40 miles in width and extending upstream about 25 miles.

Owing to the constantly shifting shoals in the delta, special knowledge is needed in navigating them, while special flat-bottomed vessels are required as run boats. The gill net and dip net are the only

important apparatus in use in the river. In Prince William Sound traps and purse seines catch most of the salmon.

In 1889 a company known as the Central Alaska Co. built a cannery on Wingham, or Little Kayak Island, about 15 miles west from Cape Suckling. It made a pack that year, and the following spring was moved to Thin Point, on the southern side of the Alaska Peninsula.

The Peninsula Trading & Fishing Co. built a cannery on the same island in 1889. In 1891 it was moved to one of the sloughs of the Copper River delta, known as Coquenhena, and operated in 1891. It was closed in 1892 and 1893. The Pacific Steam Whaling Co. operated it until 1897, when it was abandoned.

In 1916 the Hoonah Packing Co. built and operated a cannery on Bering River.

Louis Sloss & Co., of San Francisco, built a cannery under the title of Pacific Packing Co. in 1889 at the extreme eastern end of the sound, close by the present site of Cordova, and called it Odiak. The cannery was closed in 1892. In 1893 it joined the Alaska Packers Association and was operated each season until 1905. In 1906 the buildings and site were sold to the Copper River & Northwestern Railroad Co., which was preparing to build a railroad from Odiak to the headwaters of the Copper River.

In 1889 the Pacific Steam Whaling Co. built a cannery close by the Odiak plant, but in the spring of 1895 it was moved to the spot now known as Orca, about 3 miles north of Cordova. It was closed in 1892, and has been operated ever since except in 1919 and 1920. In 1901 it was taken into the Pacific Packing & Navigation Co. combination. When the latter's assets were sold in 1904, this cannery was not included in the sale, as at the time the plant was under lease to Capt. Omar J. Humphrey. In 1905 it was sold to the Northwestern Fisheries Co., which had purchased most of the Alaska plants of the defunct company, and they have operated it nearly every season since.

In 1915 the Copper River Packing Co. built a cannery on the Copper River at Mile 55, and made a pack the same year. The cannery uses no run boats, but has an arrangement with the Copper River & Northwestern Railroad Co. to haul the fish from the fishing stations to the cannery, and bring the finished product to Cordova for shipment by steamer. In 1918 the name was changed to the Abercrombie Packing Co. The plant was abandoned in 1920.

The Canoe Pass Packing Co., which had built a cannery at Canoe Pass, southeast Alaska, in 1912, and had not operated it subsequently, in 1915 moved the machinery to Cordova and installed it in a rented building and made a pack. It built its own cannery at Shepard Point, near Cordova, in 1917.

In 1916 the Carlisle Packing Co. built a cannery at Cordova, while the Clark-Graham Co. built one at Eyak, a few miles away.

In 1917 the following new canneries were operated: Valdez Packing Co., Valdez; Copper River Packing Co., Port Nellie Juan; Lighthouse Canning Co. and Moore Packing Co., Cordova; and San Juan Fishing & Packing Co., Seward. The latter plant was also equipped for freezing salmon and other fishes. The Lighthouse Canning Co. was canning clams in 1916, the first year of its operation. The Alaska Sea Food Co. took over the Turner cannery, which had been built in 1916 and used in packing clams. The plant was destroyed by fire on

April 4, but was rebuilt the same year, although not operated with salmon until 1918.

A number of salmon salteries were started in Prince William Sound after 1915. Charles Matthews in 1916 operated a salmon saltery at Seward; The Kenai Fishing & Trading Co. in 1916 acquired the J. Bettles saltery on Eshamy Bay. In 1918 the company expanded into a canning plant. A. C. Hoodenpyle operated a saltery at Port Wells in 1918.

In 1919 the following new canneries were started: Franklin Packing Co., Port Ashton; and Pioneer Packing Co., Cordova (this plant had been operating on clams for a couple of seasons). The Eyak River Packing Co. took over the Clark-Graham Co., while the Hillery-Scott Co. succeeded the Lighthouse Canning Co.

The World War led to a considerable expansion in the number of canneries started in this section after 1919. The temporary collapse in demand for canned salmon shortly after the close of the 1920 season had a disastrous effect upon the weakly financed companies, with the result that a number of them failed. As time went on the industry readjusted itself, but, as is the case in southeast Alaska, the region is overmanned with canneries, and the best thing that could happen would be a material decrease in the number at present operating and ready to operate.

COOK INLET

While this great inlet has an abundant supply of salmon, it is one of the most difficult sections in all Alaska in which to fish successfully. The tides and currents in the inlet are strong and treacherous, increasing in height and force as its head is approached, where the tide comes in with a bore which is extremely dangerous to small craft. Shoals make out a long distance from shore and are continually changing.

The first cannery to be built on the inlet was in 1882, when the Alaska Packing Co., of San Francisco, built one at Kasilof, on the right bank of the Kasilof River at the mouth, utilizing the available machinery from the cannery built by the Cutting Packing Co. at old Sitka in 1878. In 1885 this cannery was sold to the Arctic Fishing Co. In 1890 the loss of its cannery ship forced it to close that season. In 1893 it joined the Alaska Packers Association. At the height of the season of 1905 the plant was burned. It was rebuilt the next spring and has been operated each year since with the exception of 1924–1926 and 1928.

The cannery of the Northern Packing Co. was built in 1888 on the eastern side of Cook Inlet, at Kenai, at the mouth of the Kenai River. It was operated up to and including 1891. In 1893 it joined the Alaska Packers Association, but has not been operated since 1891.

In 1897 the Pacific Steam Whaling Co. built a cannery at Kenai, but did not install the machinery and operate it until the next year. In 1901 this cannery was taken over by the Pacific Packing & Navigation Co. In 1903 the plant burned down. Upon the sale of its assets in 1905 the site passed to the Northwestern Fisheries Co. In 1910 the company put up a new plant here and has operated it continuously since, except in 1921 and 1922. During the period when the site was unused a mild-curing establishment was operated here by

the San Juan Fishing & Packing Co. in 1907 and 1908. This plant burned down just before the fishing season of 1916 began but was rebuilt in time to operate in 1917 and in the seasons since.

In 1890 George W. Hume, of San Francisco, built a cannery at Kasilof, on the right bank of the river, about half a mile above its mouth. It was operated in 1890, 1891, and 1892. In 1893 it joined the Alaska Packers Association and was consolidated with the plant of the Arctic Fishing Co.

C. D. Ladd operated a saltery on the left bank and at the mouth of the Chulitna River, about 6 miles above Tyonek. This saltery was purchased by the Alaska Salmon Association in 1899. The following spring it erected a cannery here and made a small pack. It was operated also in 1901 and 1902, and then abandoned.

In 1907 J. A. Herbert & Co. established a saltery at English Bay and operated it until 1910.

In 1911 the Seldovia Salmon Co. built a cannery at Seldovia and operated it until late in 1915, when the company went into the hands of a receiver. In 1916 it was reopened by the Columbia Salmon Co. In 1917 it was bought by the Northwestern Fisheries Co. and operated in this and the succeeding year, but was closed in 1919.

In 1912 the Fidalgo Island Packing Co., which already operated a cannery at Ketchikan, in southeast Alaska, built a cannery at Port Graham, at the lower end of the Kenai Peninsula. A pack was made that year and each year since.

The same year Libby, McNeill & Libby built a cannery at Kenai and operated that year and each subsequent year.

In 1915 the Deep Sea Salmon Co., which operates a cannery in southeast Alaska, built a plant near Knik, on the west side of Cook Inlet, and made a small pack. This plant was abandoned at the end of 1917 and part of the equipment sold to a new plant in southeast Alaska.

During the last 10 years a number of small canneries have been started in Cook Inlet and have met with indifferent success. Like most of the other sections, the region has been overfished.

Of recent years considerable salting of salmon has been carried on in Cook Inlet. In 1916 Dr. Knut A. Kyvig, of Anchorage, did some salting at Swanson Creek, Turnagain Arm, under the name of the Kyvig Packing Co. In 1917 the Beluga Whaling Co. salted salmon at Beluga. In 1918 Dr. Kyvig disposed of his interest in the Kachemak Bay plant to the Kachemak Canning Co. Several plants have been started and operated intermittently since.

AFOGNAK ISLAND

Afognak Island lies to the northwest of Kodiak, and it is separated from it by a narrow strait.

In 1889 the Royal Packing Co. built a cannery at the head of Afognak Bay and operated it in 1889 and 1890. It became a member of the Alaska Packers Association in 1893. It has not been operated since 1892.

The Russian-American Packing Co. in 1889 built a cannery immediately above that of the Royal. It was operated in 1889 and 1890. In 1893 it became a member of the Alaska Packers Association. It has not been operated since 1890.

In accordance with an act of Congress approved March 3, 1891, the President, by proclamation of December 24, 1892, set aside the whole island and within 1 mile from the shores thereof as a fish-cultural reserve for the use of the United States Commission of Fish and Fisheries. As a result of this action both canneries were forced to move from the island entirely.

From this time on salmon fishing was restricted to natives, who were permitted to dispose of their catch to canneries and salteries located outside of the reserve.

KODIAK ISLAND

This island has been the scene of some of the best fishing in Alaska. The Russians early settled here, one of the most fertile spots in the usually sterile soil of Alaska, and undoubtedly they must have prosecuted the fisheries from an early date, although but little data are extant showing their operations in this line.

Karluk River and Lagoon.—One of the greatest salmon streams in the world is the Karluk River, and although its importance is much diminished now through long-continued and heavy fishing, it still produces annually a large pack of canned salmon, and has the distinction of having produced more salmon than any other river in Alaska.

It will doubtless surprise most readers to hear that the river which has yielded so many countless thousands of salmon is only 16½ miles in length. It has its source in two lakes, the larger of which is about 8, the smaller, 3 miles long. The mouth of the river is about 2 miles above the canneries, and spreads out here into a lagoon. This lagoon has at the head a width of about 300 yards, and gradually widens until it is nearly half a mile across as it approaches the spit. The lagoon has a general east and west direction, is about 2 miles in length, and, except for the shingle spit which is thrown across its mouth by the action of the sea, its shores are bluff, rising from about 50 to 100 feet. The spit is three-fourths of a mile long with an average width of about 200 feet. The outlet of the lagoon is only 90 feet wide at its mouth. The western side of the mouth of the lagoon is Karluk Head, a precipitous mountain mass about 1,600 feet high.

The outer side of the spit is where the fishing is carried on. Haul seines are used exclusively. As bowlders used to be common here it was necessary to remove a number of them in the early days when a seine shore was to be prepared. The red salmon run here is an exceptionally long one, the season extending from about the middle of June to about the middle of September. The other species of salmon also run here; sometimes humpbacks appear in large numbers. As the beach is open to Shelikof Strait, in which storms are frequent, seining is often interrupted.

As early as 1867 the salting of salmon was carried on at Karluk. In 1870 the Alaska Fur Trading Co. and the Alaska Commercial Co. began to salt salmon and continued this on a gradually expanding scale.

In 1882 Smith & Hirsch, who had been engaged in salting on Karluk Spit, built the first cannery on Kodiak Island. After operating it until 1884 it was organized under the title of the Karluk Packing Co., and packed under that name every year until 1911,

when canning operations were transferred to the new cannery in Larsen Bay. In 1893 it joined the Alaska Packers Association.

The Kodiak Packing Co. in 1888 built a cannery on the eastern side of the spit and operated it in 1888, 1889, 1890, 1891, and 1893. It joined the Alaska Packers Association in 1893, but has not been operated since that season.

The Hume Packing Co. built a cannery on the spit about 400 yards westward of Kodiak cannery in 1889. In 1892 it was consolidated with the Aleutian Islands Fishing & Mining Co., which had built a cannery about 100 yards westward of the Hume cannery in 1888. In 1893 the consolidation became a member of the Alaska Packers Association. This plant was not operated in 1900.

In 1888 the Alaska Improvement Co. built a cannery on the left bank of the outlet, opposite the point of the spit and facing the Shelikof Strait. It was ready to pack in 1888, but was not operated on account of the loss of its cannery ship, the *Julia Ford*. In the spring of 1897 it was sold to the Alaska Packers Association and has since been operated by that company.

In 1893 the Hume Canning & Trading Co. built a cannery on the beach under Karluk Head, about three-fourths of a mile northward of the Alaska Improvement Co., in what is known locally as Tanglefoot Bay. It was operated in 1893 and 1894, and in 1895 it was sold to the Alaska Packers Association and operated by that company. It has been closed since.

The great increase in the number of canneries in Alaska in 1888 and 1889 caused such an enlargement of the pack that the markets became glutted, and it was soon apparent that steps would have to be taken to reduce the output if the operators were to avoid bankruptcy.

Captain Moser in "Salmon and Salmon Fisheries of Alaska"[20] thus describes the attempts of the canners to find a working solution of this important problem and the final result of their endeavors:

In 1890 the three canneries at Chignik combined under an operating agreement known as the Chignik Bay Combination, under which the plant of the Chignik Bay Co. was operated, the three canneries sharing the expense and dividing the output equally. This arrangement remained in force during the seasons of 1890 and 1891. Its evident success in 1890 probably led to the local combinations on Kodiak Island in 1891, and then to the association which now exists.

The large packs during this period and the glutted market caused the cannery interests to devise some scheme to meet the conditions. The combination at Chignik in 1890 permitted the pack to be made there at a lower rate and, as previously stated, it was continued in 1891. The same year (1891) the canneries at Karluk, Uyak, and Afognak entered a combination, under the name of the Karluk River Fisheries, under which it was agreed that each cannery should have a quota of fish from the several localities, based upon the average packs of each cannery in 1889 and 1890. The estimated pack for the canneries interested was placed at 250,000 cases, and upon this estimate the apportionment of the work at each cannery was made. Under this agreement four of the eight canneries were closed, their quota being packed in the other four canneries as follows, viz, that of the Royal at the Karluk, of the Arctic at the Kodiak, of the Aleutian Islands at the Hume, and of the Russian-American at the Alaska Improvement.

In the summer of 1891 the Kodiak Packing Co. and the Arctic Packing Co., both at Alitak Bay, also had a mutual agreement under which only one cannery, the Arctic, was operated, the quota of fish of the Kodiak being packed in the

[20] The Salmon and Salmon Fisheries of Alaska. Report of the Operations of the U. S. Fish Commission, Steamer *Albatross* for the year ended June 30, 1898. By Jefferson F. Moser. Bulletin, U. S. Fish Commission, 1898. Vol. XVIII, pp. 18-21. Washington, 1899.

Arctic cannery. By these combinations the full pack of the Karluk district was made in half the number of canneries and the expense of packing very considerably reduced.

In September, 1891, the Alaska Packers Association was formed to dispose of the unsold salmon of that season's pack (some 363,000 cases) and five trustees were appointed to manage the business. This association was not incorporated and expired after the salmon were sold.

The successful operation of these arrangements led, in 1892, to an arrangement in which nearly all (31) of the canneries joined, entering under the name of the Alaska Packing (not Packers) Association, for the purpose of leasing and operating and therefore controlling the canneries and reducing the Alaska pack for that year, it being found too great for the market's demands. All the canneries in operating condition in 1892 were members of this association except the following: Metlakahtla Industrial Co., at Metlakahtla; Boston Fishing & Trading Co., at Yes Bay; Baranoff Packing Co., at Redfish Bay; Chilkat Canning Co., at Pyramid Harbor; Alaska Improvement Co., at Karluk; and the Bering Sea Packing Co., at Ugashik.

The association was regularly incorporated on January 13, 1892, and shares were distributed on the basis of 1 for each 2,000 cases packed in 1891, and the profits were divided equally on all shares, regardless of the amount of profits derived at the different points. Of the 31 canneries, 9 were operated by the association, while the others were closed, the Alaska pack being reduced one-half.

The year 1893 found the Alaska Packers Association organized and incorporated February 9. This association was formed from the canneries that had joined the Alaska Packing Association of 1892, except the Pacific Steam Whaling Co., at Prince William Sound, and the Peninsula Trading & Fishing Co., the latter's cannery having been moved from Little Kayak Island to the Copper River delta in 1891.

The agreement of 1893 was similar to that of 1892, except that the amount of profit was taken into consideration in addition to the probable average quantity which could be packed at the different points. This was subject to adjustment for each district, and no arbitrary rule was followed. Each cannery entering the association was obliged to purchase an additional amount of stock, equaling two-thirds of the number of shares received by it for its plant; that is, a company which received 1,500 shares for its plant was required to purchase 1,000 shares additional. The money received from this sale of extra stock was used as working capital. No shares were sold to the general public, the owners of canneries subscribing for the full amount.

This association was then and is now (1928) the largest operator in Alaska, and, with its one operating cannery on Puget Sound, is also a factor in that region.

At a number of its canneries the association has always maintained physicians, whose services and supplies have been free to its own employees and to all natives applying for medical advice and medicines. This service has been of incalculable benefit to the latter, a large proportion of whom suffer from disease in some form or other. A number of the other canneries also have doctors at their plants.

No canning has been done at Karluk since 1911, when a new cannery was built at Larsen Bay, a branch of Uyak Bay, and the equipment remaining in the plants on the spit removed to it. This was done because frequent storms had caused havoc to vessels anchored in the open straits opposite the mouth of the lagoon. Since then fishing has been carried on as usual, the fish being carried to the canneries on Uyak Bay. The Alaska Packers Association and Northwestern Fisheries Co.—the oldest operators there—have an agreement to divide the fish on the basis of seven to the former for every three given to the latter.

Numerous attempts have been made of recent years by other operators to participate in fishing operations off Karluk Spit with varying success. As the two companies named above own the greater part of the adjacent beach, where beach seines have to be drawn

in order to land the fish, while frequent storms badly hamper the operations of purse seines, other operators have been unable to accomplish much; and this is no more than right, as the original operators were put to much expense to clear the beach and adjacent bottom area for seine hauling. The decrease in the number of salmon entering Karluk of recent years has led the Government to discourage an expansion of operations here.

Alitak Bay.—Alitak Bay, or the "South End", as it is termed locally, is a deep indentation, with several arms, on the southwestern end of Kodiak Island, about 65 miles from Karluk. The seine and trap are the principal apparatus used here.

In 1889 the Arctic Packing Co. built a cannery in the southwest bight of Olga Bay, which is a branch of Alitak Bay and is connected with it by a long, narrow passage. In 1893 it entered the Alaska Packers Association.

In 1889 the Kodiak Packing Co. built a cannery at Snug Harbor, a cove in the passage connecting Olga Bay with Alitak Bay, and operated it in 1889 and 1890. Its quota of fish was packed by the Arctic Packing Co. in 1891. In 1893 it joined the Alaska Packers Association and the same year was dismantled.

In 1918 the Alitak Packing Co. built a cannery on Alitak Bay.

Uyak Bay.—Uyak Bay is on the northwestern side about the middle of Kodiak Island and is a considerable body of water with ramifying arms. On the western shore, near the entrance and about 18 miles from Karluk, is Uyak Anchorage. The harbor is formed by the main shore of the island and Bear and Harvester Islands, and is frequently used as an anchorage by cannery ships and the steamers from Karluk during bad weather. As there are no red salmon streams in Uyak, fishing is carried on elsewhere. Most of it is at Karluk Spit.

In the spring of 1897 the Pacific Steam Whaling Co. and Hume Bros. & Hume built canneries on the main shores at Uyak Anchorage. In 1901 both plants became a part of the Pacific Packing & Navigation Co. and were operated by it. In 1905 the Uyak plants were purchased by the Northwestern Fisheries Co., and the same year one of the plants was destroyed by fire and was not rebuilt. The remaining plant has been operated each year since, except in 1927.

Five miles southeast from Uyak Anchorage is a narrow arm called Larsen Bay. It is 4 miles long. Immediately within the entrance on the northern shore is the site of the cannery of the Arctic Packing Co., which was built in 1888, and operated in that year and 1889 and 1890, since which date it has been closed. In 1893 it became a part of the Alaska Packers Association and in 1896 it was dismantled.

As the association had lost several ships while loading at Karluk, it finally decided to move its plants from that place, and in 1911 a cannery was built at the old site on Larsen Bay, and from that time all cannery operations formerly carried on at Karluk have been performed at this plant.

Uganik Bay.—This bay is next to the eastward of Uyak. For several years a saltery was operated here by Oliver Smith, who sold it to the Alaska Packers Association in 1896. The same year the latter built a cannery on the bay. It made a pack in 1896 and a partial pack in 1897. This cannery was abandoned in 1900.

During the past 12 years various shore and floating canneries have been built and operated for varying periods at other places around Kodiak Island, especially along Karluk Straits.

Kodiak.—Salting operations have been carried on at this old Russian settlement for a number of years.

In order to furnish work for the natives, the Alaska Commercial Co. and Blodgett & Blinn salted the catches made by them in 1906 and subsequent years until 1912, when the Kodiak Fisheries built a cannery and has operated it each year since.

The Woman's American Baptist Home Missionary Society had carried on a home and school for native children on Wood Island, close to Kodiak, for some years. In 1902 the society established a salmon saltery here in order to furnish employment for the natives. No data are recorded in the official reports of further activities on the part of this plant.

CHIGNIK BAY

Chignik Bay is on the southern side of the Alaska Peninsula and is the first important indentation after leaving Cook Inlet on the way to the westward. The bay is about 150 miles southwest of Karluk. On the westward side of the bay is a small deep bay known as Anchorage Bay. Several of the canneries are located here, and the transporting vessels of all the canneries make their anchorage at this point. In the extreme southwest corner of Chignik Bay is the entrance to Chignik Lagoon. At the head of this lagoon, from which all the canneries draw their supplies of red salmon, is the mouth of the stream up which go the schools.

Chignik River is about 6 miles long, with an average width of 100 yards, and its depth is such that a boat can ascend only at high water. It has its rise in two lakes, each about 10 miles long.

Red salmon predominate in the runs, although all five species are to be found. A run of very small red salmon, weighing about 2 pounds, and known as Arctic salmon, appears here every year.

Practically all of the fishing here is with traps, although gill nets and seines have also been used at times.

This bay, next to Karluk Spit, has been the scene of more bitter fights for supremacy in canning than any other place in Alaska.

In 1888 the Fishermen's Packing Co., of Astoria, Oreg., sent a party to Chignik Bay to prospect for fish, and they returned in the fall with 2,160 barrels of salt salmon.

The next year, this company, operating under the name of the Chignik Bay Co., built a cannery on the eastern shore of the Lagoon, 2½ miles from the entrance.

The same year the Shumagin Packing Co., composed of capitalists from Portland, Oreg., and the Chignik Bay Packing Co., of San Francisco, built and operated canneries close to that of the Chignik Bay Co. All three of these companies soon arrived at a working agreement and finally combined into one organization. All were operated in 1889, 1890, and 1891. In 1892 they all joined the pool of the Alaska Packing Association, and the cannery of the Chignik Bay Co. alone operated. In 1893 they all became members of the Alaska Packers Association.

Since 1891 only the cannery of the Chignik Bay Co. has been operated. The Shumagin building has been moved alongside the former

and the machinery consolidated, so as to form practically one large cannery.

In the spring of 1896 Hume Bros. & Hume built a cannery on the eastern side of Anchorage Bay and made a pack that year and in 1897.

The same spring the Pacific Steam Whaling Co. built a cannery one-fourth of a mile south of the Hume cannery, and made a pack that year and in 1897. In 1901 this plant, also that of Hume Bros. & Hume, became part of the Pacific Packing & Navigation Co. The failure of this company in 1904 threw its properties onto the market and most of them, including the two Chignik canneries, were purchased by the Northwestern Fisheries Co., which in 1905 shut down the Hume Bros. & Hume plant for good and has operated the other plant ever since.

In 1910 the Columbia River Packers Association built and operated a cannery on Anchorage Bay, and has operated it every year since.

The three companies operating here have an amicable agreement under which they each operate the same number of traps and divide equally the salmon caught.

ALASKA PENINSULA, SOUTH SIDE

Orzenoy.—In 1889 a cannery, under the title of the Western Alaska Packing Co., was built at Orzenoy, on the western side of Stepovak Bay, south side of the Alaska Peninsula. It packed that year and in 1890, but the fish were so scarce that the cannery was dismantled in 1891 and the site abandoned.

Nothing was done with it for some years, but about 1905 Bostrop Omundsen located there and established a saltery. In the winter of 1912–13 August Lindquist purchased a half interest in the plant and it was operated under their joint names until the death of the senior partner in the fall of 1915; since then it has been operated by Lindquist alone.

Thin Point.—Thin Point is on the southern side of the Alaska Peninsula, near its extreme western end. A saltery was operated here for several years, until the Thin Point Packing Co. was organized by Louis Sloss & Co., of San Francisco, and the cannery was built in 1889. It was operated in 1889, 1890, and 1891, and was closed after that date. In 1890 the cannery ship *Oneida*, en route for this place, struck on the Sannaks in April and nearly all of the 77 Chinese on board were lost. In 1893 the plant became a member of the Alaska Packers Association. In 1894 the cannery was moved to the Naknek River, in Bering Sea, and became a part of the cannery of the Arctic Packing Co.

The Alaska Packers Association operated a saltery at Thin Point in 1894, 1895, and 1896, and then abandoned the place.

The cannery of the Central Alaska Co. was moved in 1890 from Little Kayak Island, near Katalla, to Thin Point. It operated during 1890 and 1891, was closed in 1892, and in 1893 joined the Alaska Packers Association, but was no longer operated. In 1895 the available machinery was moved to Koggiung, on the Kvichak River, in Bering Sea.

In 1908 Osmund & Andersen established a saltery at Thin Point and operated it in 1908, 1909, and 1910.

In 1911 the Pacific American Fisheries built a cannery at King Cove, on the south side of the Alaska Peninsula, a few miles east of Thin Point, and in the fall purchased the saltery. The cannery was operated in 1911 and each year since.

In 1917 the Pacific American Fisheries built and operated a new cannery at Ikatan, on Isanotski Strait, at the eastern end of Unimak Island. The Sockeye Salmon Co. built and operated in the same year a new cannery on Morzhovoi Bay, a few miles from the strait, and on the Alaska Peninsula. In 1920 the latter was moved to the Unimak Island side of the strait, and in 1921 sold to P. E. Harris & Co.

SHUMAGIN AND SANNAK ISLANDS

Small salteries have been operated at different places on the Shumagin and Sannak groups. The plants have usually been crude and primitive affairs and were operated whenever the price of salted salmon was high enough to justify same. As the ownership and the location in many instances changed frequently, no attempt has been made even to list them.

In 1920 the Shumagin Packing Co. installed the necessary machinery in its saltery and put up a pack of canned salmon.

BERING SEA

Bristol Bay.—The great redfish producing section of the world is in the Bristol Bay portion of Bering Sea. This bay lies in the eastern section of Bering Sea, inside of a line drawn from Port Moller to Cape Newenham, and a number of important rivers debouch into it, in all of which the annual runs of salmon, especially reds, are important.

Bristol Bay is considerably off the line of steamship travel, and as a result the companies operating here are compelled to have ships in which to bring up their employees and supplies in the spring and to take back the men and prepared products in the late summer or early fall when the season has ended.

Cannery ships belonging to the Nushagak plants are taken into the bay and anchored as near the canneries as possible. Owing to shoals this can not be done on Kvichak Bay and the Naknek and Egegik Rivers. In the early days of the fisheries the ships running to the latter canneries were brought as close to the plants as possible, unloaded by means of scows, and then taken to the Nushagak for shelter. When their numbers were too great to permit of this they were moored in the open about 5 miles off the point separating Kvichak Bay and Naknek River, where the anchorage is good and the vessels have very little trouble in riding out storms. Usually the captain and a boy are left aboard the ship.

NUSHAGAK RIVER AND BAY

The Nushagak River, sometimes called the Tahlekuk, with its tributaries, and the Wood River, which enters the head of Nushagak Bay close by the mouth of the Nushagak, form a favorite resort of the red salmon, while all other species also ascend them.

But little is known of the upper courses of the Nushagak River, except that they drain the region between Lakes Clark and Iliamna on the east and the Kuskokwim on the West.

The river is said to be 200 miles long to the first lake, a large one. Beyond this lake there are three other smaller lakes, all connected by short stretches of river. The largest tributary of the river is the Malchatna, which enters it about 100 miles from the mouth. There are also several small tributaries, two of these being Tikchik River and Portage Creek. There are three or four Indian villages on the Nushagak, Kaknak being the largest. A launch drawing 3 to 3½ feet of water can navigate about 120 miles from the mouth. It is necessary to use a "bidarka" to go into the upper reaches. There are four rapids, around which a portage must be made in each case.

The river on its lower course is large, and flows a great quantity of water into the head of Nushagak Bay.

Wood River is about 24 miles long from its mouth to the first lake. Shoals and bars are frequent in the river, the depth of these at low water being 2½ feet and at high water 4 feet.

Aleknagik Lake, the first of the chain of three, is about 24 miles long, and has an average width of about 2 miles.

An interesting counting experiment was carried on by the Bureau of Fisheries at Wood River. This very important work was first taken up in 1908, as an indirect result of the order closing Wood and Nushagak Rivers to the commercial fishermen, as noted below, and was continued, with the exception of 1914, until the close of the 1919 season. This work was made possible in early years by the generosity of the Alaskan Packers Association of San Francisco and the Alaska-Portland Packers Association of Portland, Oreg., who furnished the material and erected the barricade, also the labor needed throughout the season, while the Bureau of Fisheries furnished the personnel required to carry on the direct work of counting the fish and making other observations. Later everything was furnished by the bureau.

A rack or trap was constructed across the foot of Lake Aleknagik, at a constriction in the lake contour something more than 200 yards wide, for the purpose of intercepting all salmon entering the lake and passing them through gates or tunnels at such a rate and in such a manner that an accurate estimate of their numbers could be obtained. The pot of the trap was located near the left bank, and this had three gates by which the salmon could be passed from the pot into the lake. Each gate was 2 feet in width, and its bottom rested on a wooden platform covered with white oilcloth, so that the fish could readily be seen as they passed over it when the gate was raised. When fish were passing through a gate a small wooden frame with a glass center was arranged so it would float on the water, and in order to hold it in position it was fastened to the framework of the gate. This was for the purpose of making the water smooth so the fish could readily be seen even though the surface were disturbed by ripples, etc.

The following table shows for each year from 1908 to 1919, inclusive, the commercial catch of salmon made in Nushagak Bay, the number of fish passing from Wood River into Lake Aleknagik, the total of both, and the percentage of salmon that escaped the fishermen.

Year	Nushagak Bay catch	Wood River tally	Total	Per cent of escape
1908	6,140,031	2,603,655	8,740,686	30.0
1909	4,687,635	893,244	5,580,879	16.0
1910	4,384,755	670,104	5,054,859	13.2
1911	2,813,637	354,299	3,167,936	11.1
1912	3,866,950	325,264	4,192,214	7.7
1913	5,236,008	753,109	5,989,117	12.5
1914	6,174,097	(1)		
1915	5,676,457	259,341	5,935,798	4.3
1916	3,592,574	551,959	4,144,533	13.3
1917	5,679,818	1,081,508	6,761,326	15.9
1918	6,078,965	943,202	7,022,167	13.4
1919	1,452,931	145,114	1,598,045	9.0

[1] Work not carried on this year.

Snake River, a tributary of Nushagak Bay, is about 30 miles in length, very crooked, and has its rise in a single lake close by Aleknagik Lake. There is an Indian village on the river just below the lake. Red salmon are abundant in this stream.

Igushik River is about 50 miles in length and enters Nushagak Bay about 4 miles above Nichols Hills. So far as known it has its source in two lakes—Amanka and Ualik. A short distance below the first lake there are rapids and a small falls. The quite large Indian village of Yacherk is located here, and the natives do most of their fishing in the rapids. Peter M. Nelson established a saltery about 10 or 12 miles above its mouth in 1902, and operated it until he sold it to the Alaska Fishermen's Packing Co., who have operated it since. There is a small Indian village close by the saltery.

Nushagak Bay, in which practically all the fishing is carried on, is about 35 miles long and from 5 to 15 miles in width. Sand bars and mud flats, which are visible at low water, occupy the greater part of its area.

The drift gill net is the favorite apparatus in this bay, although a few traps were also used in previous years. The fish begin to run very early here. Kings usually appear about June 5, reds about June 5 to 8, cohos either late in June or early in July, chum salmon about the middle of June, and humpbacks about the same time. The reds do not run in large numbers until late in June.

Considerable fishing was carried on in both the Nushagak and Wood Rivers until in 1908, when, as a result of a hearing held by the Secretary of Commerce and Labor on December 16 and 17, 1907, it was decreed that beginning January 1, 1908, "it is hereby ordered that until further notice Wood River, a tributary of Nushagak Bay, in the district of Alaska, and the region within 500 yards of the mouth of said Wood River be closed to all commercial fishing, and that all commercial fishing be prohibited in Nushagak River proper."

The earliest fishing by whites in the Bristol Bay section was for

This cannery eventually became a member of the Alaska Packers Association, and has not been operated for some years.

The second cannery to be built was by an Astoria company, the Alaska Packing Co., and it was erected on the western side near the head of the bay and about 1½ miles below the junction of the Wood and Nushagak Rivers. It has been operated every year to date, being since 1893 a member of the Alaska Packers Association. It is popularly known as the "Scandinavian" cannery.

In 1886 the Bristol Bay Canning Co. was organized by San Francisco parties, and built a cannery on the western shore of Nushagak Bay in a bend about 2 miles below the cannery of the Alaska Packing Co., at a place called Dillingham. It became a member of the Alaska Packers Association in 1893 and was operated each year until 1907. A couple of years later it was dismantled. This plant was popularly known as the "Bradford" cannery.

The Nushagak Canning Co. built a cannery on the eastern shore of Nushagak Bay in 1888, at a place known as Clark Point, 5½ miles below Fort Alexander. This cannery also became a member of the Alaska Packers Association in 1893, but from 1891 to 1901 was not operated, but held in reserve. In the last-named year a large double cannery was built here and put into operation and has been operated nearly every year since.

This company also built and operated a saltery on the Igushik River in 1886. Three years later it was moved to the mouth of the Nushagak. In 1893 C. E. Whitney & Co. purchased an interest in it and by 1899 owned it all. In 1902 the saltery was sold to the Alaska Packers Association, which closed it down.

In 1899 the Pacific Steam Whaling Co. built a cannery and commenced canning on the eastern shore of Nushagak Bay at Fort Alexander, or Nushagak village. This cannery was purchased by the Pacific Packing & Navigation Co. in 1901, and upon the sale of its properties in 1904 became a part of the Northwestern Fisheries Co. It has been operated each year since the latter company acquired it.

The same year the Alaska Fishermen's Packing Co., of Astoria, built a cannery immediately below that of the Pacific Steam Whaling Co., and operated it every year to date, control of the company passing to Libby, McNeill & Libby in 1913.

In 1901 the Columbia River Packers Association, the Alaska-Portland Packers Association, and the Alaska Salmon Co. all built canneries on the Nushagak and have operated them to date, except the last named in 1909, when its supply ship was wrecked, and the Alaska Portland Packers Association plant in 1921. The Alaska Fishermen's Packing Co. also built a saltery here. The latter plant was abandoned in 1904.

In 1903 the North Alaska Salmon Co. operated a new cannery on the Nushagak, a few miles below Clark Point. This was later sold to Libby, McNeill & Libby.

In 1910, on August 10, shortly after the packing season had ended, the plant of the Alaska-Portland Packers Association was completely destroyed by fire. The plant was rebuilt in time to operate the next season.

KVICHAK RIVER AND BAY

The Kvichak River is about 80 miles in length, varies from 100 yards to a mile in width, and discharges a vast quantity of water.

The influence of the tide is felt 30 miles from the mouth. The current is very swift, running in places as much as 7 miles an hour. The upper half of the river is filled with low, grassy islands, the channels in many places being quite narrow. A launch drawing 3 feet of water can reach Lake Iliamna with very little difficulty. In most sections there are over 2 fathoms of water in the channels. The river drains Iliamna Lake, the largest lake in Alaska, which is about 90 miles long and about 30 miles wide, and Lake Clark. There are a number of Indian villages along the shores of the river and lakes.

Practically all of the fishing here is carried on in Kvichak Bay, gill nets being the only form of apparatus in use. As it is not convenient for the fishermen to take the catch to the canneries, large house lighters and scows are moored in convenient places and the fishermen live aboard the former, while the fish are put aboard the latter and taken to the canneries by the run boats. The numerous shoals in the bay seriously impede both fishing and navigation.

The first fishing operations on the Kvichak were in 1894, when the Prosper Fishing & Trading Co. and the Alaska Packers Association each established a saltery and operated that year and in 1895; in 1896 the latter purchased the plant of the former and consolidated the two.

In 1895 the Point Roberts Packing Co., which was owned by the Alaska Packers Association, built a cannery at Koggiung, the site of the former saltery, and operated it the next year.

In 1900 there was a considerable development in this region. The Kvichak Packing Co., owned by the Alaska Packers Association, built a cannery on the northern point of entrance to Bear Slough, while the North Alaska Salmon Co. built two canneries about 1,000 feet apart on the left bank of the Kvichak, about 6 miles above Koggiung.

The latter company built a cannery at Hallerville on the Lockenuck River, a tributary of the Kvichak, in 1904. In 1913 a large new cannery to take the place of the Hallerville plant was built on the lower side of Pedersen Point, lower down on Kvichak Bay. In 1916 all the plants of this company were purchased by Libby, McNeill & Libby and have been operated by that company since.

The second plant of the Alaska Packers Association, known as the Coffee Creek plant, was burned down in 1906. It was rebuilt in 1908 and operated again in 1909 and has been operated continuously ever since.

In 1904 the Union Packing Co. established a cannery on the left bank a little distance above the canneries of the North Alaska Salmon Co., having moved this plant from its original location on Kell Bay, in southeast Alaska. It was operated until 1907, when it was abandoned.

About 1905 the Northwestern Packing Co. built a saltery on the east side of the bay. In 1908 it was sold to and operated by Nelson, Olsen & Co., who in 1910 sold it to the Alaska Fishermen's Packing Co., which the following year turned it into a cannery. In 1913 Libby, McNeill & Libby bought this and the Nushagak plant and continued to operate them under the old name. This cannery was destroyed by fire in the spring of 1915. It was rebuilt and operated in 1916.

In 1922 the Carlisle Packing Co.'s floating plant, which was forced to move from the Yukon River by the closure of that river, began operations here. In 1924 a shore plant was established to replace the floater. This plant was sold to the Alaska Packers Association in 1927.

After Peter M. Nelson sold out his saltery interests in 1910, he crossed to the west side of the bay and established a saltery there. In 1925 this plant was sold to the Nakat Packing Corporation, which replaced it with a cannery and named the location Nakeen.

NAKNEK RIVER

But little is known of the Naknek River for more than 10 or 15 miles from its mouth. It is said that the river is about 60 miles long and has its rise in a lake which is of considerable size. With the exception of a short series of rapids, up which it is possible to haul a boat with a rope from the shore, the river is navigable for small craft. Shoals and banks, many of which uncover at low water, are abundant in the lower courses of the river.

Red salmon is the principal species entering this river, although all the other species are to be found here in lesser abundance. They appear here a little later than in the Nushagak Bay. Only gill nets are used in fishing.

The first commercial fishing on the Naknek River was in 1890, when the Arctic Packing Co. built and operated a saltery on the east bank about 4 miles from the mouth. This plant was sold to the Alaska Packers Association in 1893. The next year the latter built a cannery here, made the first pack in 1895, and has operated the cannery every year since. Ultimately the saltery was merged with the cannery.

In 1901 the association built another cannery about a mile nearer the mouth, and in 1911 still another was built close to the mouth.

In 1890 L. A. Pedersen built and operated a small saltery on the right bank about 3 miles from the mouth. In 1894 the Naknek Packing Co. purchased the saltery and erected a cannery a short distance above. This saltery and another built on the shore of Kvichak Bay in 1897 were operated for some years. In 1907 the latter was turned into a cannery and operated by Mr. Pedersen under the name of the Bristol Bay Packing Co. The Naknek Packing Co. cannery has been operated to date, the operations being taken over by the Red Salmon Canning Co. in 1928.

In 1916 the Red Salmon Canning Co. built and operated a cannery on the river about 2 miles above the plant of the Naknek Packing Co.

In 1918 the Northwestern Fisheries Co. operated a new cannery on the river about 2 miles below the plant of the Naknek Packing Co.

In 1919 the Alaska-Portland Packers Association operated a new cannery on the river several miles above the upper cannery of the Alaska Packers Association. In 1929 this plant and the one operated by the same company on the Nushagak River were sold to the Pacific American Fisheries.

EGEGIK RIVER

According to the natives, this river, which is sometimes called the Egegak, Igagik, or Ugaguk, is about 80 miles long from the mouth to Lake Becharof, at the head. The lake itself is about 45 miles long and

15 miles wide. The river is navigable for small boats to within 10 miles of the lake, whence there is a succession of rapids, around which it is necessary to portage. The lower part of the river has numerous shoals, some of which are exposed at low water. King Salmon River, the principal tributary, enters about 7½ miles from the mouth.

The red salmon is the principal species, although all the other species are found in much lesser abundance. Gill nets alone are used here.

In 1895 the Alaska Packers Association established a fishing station on the right bank about 5 miles from the mouth and operated as a saltery until 1900, when the apparatus was moved to the cannery site.

In 1899 the Alaska Packers Association, under the name of the Egegak Packing Co., commenced building a cannery on the left bank opposite and a little above the salting station. This plant was finished in 1900 and packs were made that year and each succeeding year except 1905 and 1906.

In 1903 the North Alaska Salmon Co. built and operated a cannery on the opposite shore from the Alaska Packers Association and has operated it nearly every year since, of late years under the name of its new owners, Libby, McNeill & Libby.

UGASHIK RIVER

This river has its rise in a chain of two lakes, but with the exception of that portion below the upper cannery, about 25 miles, it is very little known to the whites. The river is very tortuous in its course. It has two known tributaries—King Salmon River, which enters through the left bank about 17 miles from the bar at the mouth, and Dog Salmon River, which enters through the left bank about 37 miles from the bar. From Smoky Point to the capes at the mouth the river widens very greatly, being about 20 miles across at the mouth. Shoals are numerous, but there is a channel with about 9 feet at low water. Gill nets exclusively are used here.

This river is essentially a red salmon stream, but the other species are also taken in small numbers, although the humpback is very scarce.

C. A. Johnson was the first man to operate commercially on this river, having erected a saltery on the left bank, about 23 miles above Smoky Point, in 1889, and operated it continuously from 1889 to 1898, both inclusive. This saltery was merged in the cannery of the Bering Sea Packing Co. In 1894 Mr. Johnson established and operated another saltery on the right bank of the river, about 12 miles from the bar, which he sold in 1899 to the Alaska Packers Association, who absorbed it in their cannery plant.

The Bering Sea Packing Co., a branch of the Alaska Improvement Association, in 1890 built the first cannery on the river, this being located on the left bank near the first Johnson saltery. A small pack was first made in 1891. The plant was closed in 1892 and 1893, and as the location had proven far from suitable, it was, in 1894, moved to a point on the left bank, about 15 miles above Smoky Point, where it was operated until 1896. The next year it was sold to the Alaska Packers Association. The machinery and equipment were utilized in the latter company's cannery, and the old location abandoned.

In 1893, Charles Nelson established a saltery on the left bank of the Ugashik, immediately above the last site of the Bering Sea Packing Co. It was operated in 1893 and 1894, and then sold to the Alaska Packers Association, who closed it down.

In 1893 the Alaska Packers Association also built a saltery on the left bank of the river about a mile below the last site of the Bering Sea Packing Co. It was operated each year until 1895, when it was merged into the association's cannery.

In 1895 the Alaska Packers Association built a cannery, known as the Ugashik Fishing Station, on the right bank of the river immediately above the pilot station, which is about 12 miles from the bar. It made the first pack in 1896 and packed every year until 1907, when it was closed. In 1906 its outfit was destroyed in the San Francisco fire, and it was decided to operate it as a saltery, but the burning down of the Coffee Creek cannery of the association on the Kvichak changed the plans, and a part of the saved outfit of the latter was sent to the Ugashik and the plant operated as a cannery. After being closed down for some years it was rebuilt in 1919 but was not put into operation until 1920, since when it has been operated each year.

The Bristol Packing Co. built a cannery on the left bank of the river about 25 miles from Smoky Point in 1900. A pack was made the same year and the plant operated continuously until 1906, when it was shut down, and a small salting crew operated a portion of the plant. Eventually the plant was dismantled without operating again as a cannery.

In 1901 the Alaska Packers Association built and put into operation another cannery about 15 miles up the river from the other one. In 1906 this plant was shut down and eventually it was dismantled.

In 1901 the Red Salmon Canning Co. also built and operated a cannery still farther up the river and has operated it continuously to date.

In 1922 the International Packing Co. operated the floating cannery *Santa Flavia* here in the early season, and then moved her to Uyak for the late run. In 1924 the floater was operated during the latter part of the season in Makushin Bay, on Unalaska Island. In 1928 the *International* replaced the *Santa Flavia*.

ALASKA PENINSULA, BERING SEA SIDE

Of recent years canneries have been located on the Bering Sea side of the Alaska Peninsula, outside of Bristol Bay proper, but it is probable that their numbers will not be large in the future, as the fisheries tributary to them are not very extensive, and are also very much scattered, making transportation expensive.

Port Heiden.—This important indentation on the Bering Sea side of the Alaska Peninsula, about midway between the Ugashik River and Port Moller, has never figured to any considerable extent in fishing operations. In 1912 and 1913 Gorman & Co. had the schooner *Harriet G.* located here throughout the season, engaged in salting salmon. The Illnik Packing Co. operated a saltery here in 1918.

Port Moller.—This great indentation in the Alaska Peninsula, between Port Heiden and Nelson Lagoon, was neglected for many years for the more profitable Bristol Bay region.

About 1902 the Bering Sea Packing & Trading Co. (there seems to be some confusion between this name and that of the Peninsular Packing Co., the latter being the name the company was known by after the first year or two in the official records), established a saltery on Bear River, which debouches a little east of Port Moller, and operated it until 1906, after which operations were suspended and but little is now left of the plant.

In 1912 the Pacific American Fisheries erected a cannery on Port Moller, but it was not operated until 1913. This concern has been successful mainly because of its introduction of purse seines in fishing.

In 1916 the Bering Sea Packing Co. built and operated a cannery on Herendeen Bay, a branch of Port Moller. In 1917 two new canneries were built and operated here, that is, the Fidalgo Island Packing Co. and the Phoenix Packing Co. In 1918 the Bering Sea Packing Co. was taken over by the Everett Packing Co. In 1919 all three Herendeen Bay canneries, as a result of the exceedingly slight runs of the two previous seasons, combined forces for the season and put up all the fish caught at the plant of the Fidalgo Island Packing Co. This plant was subsequently dismantled. In 1920 the Everett Packing Co. operated its cannery in the interest of the Herendeen Bay consolidated canneries and in 1921 both that and the Phoenix Packing Co. cannery were in operation. Since then only the Everett Packing Co. cannery has been operated each year.

Nelson Lagoon.—Nelson Lagoon is on the Bering Sea side of the Alaska Peninsula, is about 6 miles in length and about 2 miles in width. At its western end debouches the Nelson River, which is about a mile wide at its mouth. About 18 miles from the mouth the river divides, both branches having their rise in lakes. There is an easy portage from the lakes to Pavlof Bay, on the Pacific side of the peninsula, and this route is used frequently by both white men and Indians. The run is mainly of red salmon, and gill nets and traps are utilized. During the last few years purse seines have been used in this region with considerable success.

In 1902 Charles Johnson, who had operated on the Ugashik River, established a saltery here and operated it under the name of the Lagoon Salmon Co., and made a pack that and the succeeding year. In 1904 and 1905 it was shut down. It was reopened in 1906 and continued to operate until it was sold in 1914. In 1915 the new owners, the Nelson Lagoon Packing Co., built a cannery here which was operated until 1920, when it was shut down.

Unalaska Island.—In 1916 the Pacific American Fisheries, having obtained a permit from the Department of Commerce, built a cannery at Unalaska, on Unalaska Island. This cannery is located inside of the Aleutian Islands reserve, and permit was given for its building and operation so that it might be possible for the Indians of Unalaska and Dutch Harbor to obtain work at home and save them the long trip to the Bristol Bay plants. It ceased operations at the end of the 1917 season. Since then only floating canneries have operated here.

KUSKOKWIM RIVER

This, one of the great rivers of Alaska, has been but little exploited as yet. Very little accurate data have been obtainable about the river until within recent years, and this relates mainly to the bay

and a few miles of the adjacent river, which the United States Coast and Geodetic Survey has charted.

We know that the river has considerable runs of salmon, but usually ice conditions have been such in the spring that a cannery crew frequently could not get in in time to prepare for the run. In 1906 a salting outfit was sent here by Seattle dealers, but arrived too late for the run of fish. The outfit was cached at Bethel.

During a number of years mild curing of king salmon has been carried on here, but the lack of cold storage, both ashore and on the vessels operating to and from the river, has prevented any considerable development of this industry.

YUKON RIVER

The 1918 report of the Alaska agent of the United States Bureau of Fisheries [21] contains the following account of the development of the salmon fisheries of the Yukon River:

The development of the Yukon salmon fisheries began in 1918 with the establishment of a floating cannery at Andreafski. The season's operations resulted in a pack of 13,463 cases of salmon, divided as follows: Cohos 2,661, chums 6,471, humpbacks 107, and kings 4,224 cases. In addition to this, 10,400 pounds of cohos and chums were dry-salted. The total catch of salmon for the cannery was 115,531, of which 26,144 were cohos, 73,921 chums, 3,227 humpbacks, and 12,239 kings. Fishing was carried on from the mouth of the Yukon to a point above the junction of Clear River, chiefly in that part of the Yukon delta known as Kwikluak Pass. The fishing seasons were as follows: Kings, June 26 to August 17; chums, June 28 to September 8; humpbacks, July 7 to July 29; and cohos, August 3 to September 8. Some of the cannerymen and others frequently refer to salmon of one kind by the name "Yukons" or "Yukon salmon." In so doing they mean bright or fresh-run chums.

An investment of $48,000 was made in the plant. One stern-wheeler, the *Martha Clow* (65 tons net), one gas boat, the *Althea* (17 tons net), and three smaller power boats were operated in connection with the cannery. Salmon were taken with 124 gill nets aggregating 9,869 fathoms, and 6 wheels of the 2-scoop pattern. Employment was given to 169 men, 55 being fishermen, 102 shoresmen, and 12 transporters. Of these, 36 were natives, 13 of whom were listed as fishermen.

Stokes & Stokes operated a small saltery on the lower Yukon, packing 15 barrels of chum salmon. Their plant was valued at $1,500. Equipment consisted of one power boat and 300 fathoms of gill nets. They report having located too far up the river, but before another season will move to a point lower down.

Warden C. F. Townsend reported that one Sepella operated a saltery on the Yukon about 12 miles from salt water and that a pack of 110 barrels of chums and cohos was made. Salmon were taken with gill nets and one wheel. Mr. Townsend also advised that the Delta Fishing Co. was in the field in a small way.

Statistics compiled at the close of the season of 1918 indicate that exclusive of gear operated by the cannery and salteries near the mouth of the river, the whites and natives on the Yukon and tributary waters used 393 fish wheels, valued at $19,650, and 130 gill nets aggregating 3,250 fathoms, valued at $6,500. The estimated catch for local requirements was 1,400,000 salmon, which when dried represented approximately 700 tons of fish, valued at $140,000.

The total population of the Yukon region of Alaska, dependent in some measure on the fisheries, was estimated late in 1918 as being 10,907, of which number 6,638 were whites and 4,269 were natives. The number of dogs in the region was estimated at 6,183.

Prior to the season of 1918 the size of the run of salmon in the Yukon was an almost unknown quantity. The belief was expressed in some quarters that a comparatively small run ascended its waters, but others who were interested in

[21] Alaska Fisheries and Fur Industries in 1918. By Ward T. Bower. Appendix VII, Report, U. S. Commissioner of Fisheries, 1918, pp. 29-30. Washington, 1919.

the commercial exploitation of its fisheries held the opinion that a run aggregating many millions of salmon annually ascended the river. The necessity of maintaining the fisheries is paramount at all times, and if it is reasonable to suppose that a serious depletion of the supply by unrestricted fishing seems imminent, limitations must necessarily be imposed. This was done on December 14, 1918, by the promulgation of regulations affecting commercial fishing for salmon in the Yukon River. The closing order which is published in full on page 11 in this report became effective January 1, 1919.

In 1922 Waechter Bros. located a plant on Leslie's Island, outside the protected zone, and mild-cured and froze salmon for a couple of seasons.

MISCELLANEOUS PLACES

At times small quantities of salted salmon have been packed in Bering Sea in the neighborhood of Nome and St. Michael. In 1917 the Arctic Fish Co. operated on a large scow on Golovin Bay, near Nome.

ARCTIC OCEAN

Although it is known that there are good runs of salmon in some of the rivers debouching into the Arctic, the ice and other conditions have deterred people from attempting to extend their operations into this region. In 1912, however, the Midnight Sun Packing Co. built and operated a small cannery on Kotzebue Sound, in the Arctic Ocean. A small pack, mostly of Dolly Varden trout, was made in that and subsequent years. The plant was not operated in 1919 and was later on abandoned entirely.

BRITISH COLUMBIA [22]

Fraser River.—This, the largest river in British Columbia (over 1,000 miles in length), has been important from a fishery standpoint ever since salmon canning was taken up commercially.

The Hudson Bay Co., the first to prepare salmon for commercial purposes, bought the fish from the Indians and pickled them in barrels for export, mainly to the Hawaiian Islands and Asia.

Howay,[23] in his work on British Columbia, after describing briefly the fishing operations carried on by the Hudson Bay Co. in the Fraser River, has the following to say with respect to the development of the commercial salmon fisheries and the preparation of the catch by salting and canning on the part of the independents who succeeded the company:

SALMON CANNING INDUSTRY

No sketch of our history could be called complete without containing some reference to the origin and development, during the early stages, at any rate, of the industry of salmon canning.

By its charter the Hudson Bay Co. was granted " the fishing of all sorts of fish, whales, sturgeons, and all other royal fishes in the seas, bays, inlets, and rivers, within the premises (that is within the undefined area surrounding Hudson Bay), and the fish taken therein." Though no similar grant was contained in the exclusive license of trade with the Indians west of the Rocky Mountains, which was the only title the company had in this region, yet it claimed and exercised a monopoly of the salmon fishing on the Fraser River.

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[22] The author is indebted to Henry Doyle, of Vancouver, British Columbia, for practically all of the historical data relating to the canning industry of British Columbia, and hereby expresses his deep appreciation for this and many other courtesies.

[23] British Columbia, From the Earliest Times to the Present. By F. W. Howay. 4 vols., illus. Vancouver, 1914.

Reference has already been made to the salmon fishery carried on by the company at San Juan Island. In August, 1829, at Fort Langley (the name of this place has since been changed to Derby) 7,544 salmon were obtained from the natives at a cost of £13 17s. 2d. in goods. The trade increased; in 1835 and for many years thereafter 3,000 or 4,000 barrels of salt salmon were exported, principally to the Hawaiian Islands. With the revocation of the license in 1858 this claim of monopoly fell.

Capt. William Spring, in 1863, began salting and curing salmon at Beechy Bay. In the following year Mr. Annandale, with whom Mr. Alexander Ewen was associated, opened a salmon saltery on Fraser River. This venture was almost a complete failure, owning to the attempt to use the Scotch trap nets instead of drift nets. The former were found utterly unsuited to the conditions on Fraser River. When this enterprise failed, Mr. Ewen introduced drift nets and carried on an extensive business in salted salmon with the Hawaiian Islands and Australia.

The first attempt, on the Fraser River, to preserve salmon in hermetically sealed cans was made in 1867 by James Symes. This was not a commercial effort, but a mere experimental test to ascertain the possibility. A few cases were prepared, filled, and cooked by boiling on an ordinary kitchen stove. The result was most encouraging. The product was shown at the agricultural exhibition held in New Westminster in October, 1867, and was pronounced excellent, the directors making special mention of it.

About the same year Donald McLean established another salmon-curing establishment at New Westminster. Besides salted salmon, he put up pickled salmon, salmon boiled and preserved in vinegar, and smoked and kippered salmon.

The canning of salmon as a business was first undertaken on the Fraser by Alexander Loggie & Co. The persons interested were Alexander Loggie, Alexander Ewen, James Wise, and David S. Hennessy. Mr. Wise was an experienced fisherman; Messrs. Loggie and Hennessy had had experience in the canneries of New Brunswick. In June, 1870, these persons built, in connection with a salmon saltery, the first salmon cannery in British Columbia. It was located at Annieville, about 3 miles below New Westminster. The cannery was a very primitive affair; the cylinders upon which the cans were shaped were of wood covered with sheet iron; the trays were small wooden contrivances holding about three dozen one-pound cans. There was practically no machinery; the operations were almost entirely by hand. The fish after being put into the cans was preserved by boiling in large wooden vats. Great difficulty was experienced in thoroughly cooking the fish, the boiling point of ordinary water not proving sufficient; to overcome this, salt was added to the water, and by this means the temperature was raised to 230°. The room in which the cooking was performed was, in temperature like a Turkish bathroom; no windows or doors were allowed to be opened, except of necessity, under the mistaken idea that the cold currents of air would injure the product.

Captain Stamp, who has been frequently mentioned in the foregoing pages, also entered the business at the same time. His cannery was located at Sapperton, New Westminster. He did not attempt to manufacture his cans, but obtained his supply from Mr. Deas, a tinsmith of Victoria.

About 1873, Loggie & Co. removed their cannery to New Westminster, where in the meantime Messrs. Lane, Pike & Nelson had established themselves in the same business. These latter persons conceived the plan of canning the salmon whole; the sockeyes, being of an almost uniform size, lent themselves readily to this attempt. It was, however, a failure, as owing to the great vacuum in the cans they became much distorted.

In 1872 Holbrook & Co. purchased a small cannery which had been started at Sapperton by Captain Stamp some time before, and operated it for a few years.

In 1876 there were three canneries running, consisting of Holbrook & Co., Ewen & Co., and the British Columbia Canning Co. (Deas Island).

The following year this was increased by English & Co. and Finlayson & Lane, the latter quitting after one season, being succeeded in 1878 by Lane, Pike & Nelson. King & Co., the British Columbia cannery (Annieville), and the Delta cannery also commenced operations the latter year.

In 1879 Holbrook & Co., and Lane, Pike & Nelson dropped out, and Haigh & Sons (succeeded in 1884 by the Bon Accord Packing Co.) commenced operations.

King & Co. were burned out in 1880, and Adair & Co., afterwards known as the Wellington Packing Co., commenced. A year later Laidlaw & Co. commenced operations.

In 1882 the British Union Packing Co., afterwards known as the Harlock Packing Co., commenced packing salmon. The British-American cannery and J. H. Todd & Sons (Richmond cannery) also began operations.

Joseph Spratt started a floating cannery, known as "Spratt's Ark," in 1883; he retired at the end of two years. E. A. Wadhams also began operations in 1883. In 1887 the Holly cannery was built on Lulu Island opposite Deas Island. The high water of June, 1894, partially destroyed it and the site was abandoned.

The Anglo-British Columbia Packing Co. was formed in 1891, taking over the canneries formerly operated by the British Columbia Packing Co. (old Annieville plant), E. A. Wadhams, British-American Packing Co., Canoe Pass Canning Co., Duncan & Batchelor (Britannia cannery), and English & Co. (Phoenix cannery).

Three canneries were started in 1889, 2 in 1892, 6 in 1893, 4 in 1894, 4 in 1895, 7 in 1896, 9 in 1897, but only 1 in 1898. During the period 1899 to 1901, 7 were started.

Like the other canning sections, British Columbia suffered in 1901 from an oversupply of canned salmon, due to the large number of plants which had been erected and which were producing more salmon than market could be found for. At this juncture the British Columbia Packers Association was formed. It embraced 29 out of the 48 plants on the Fraser River and 12 of those situated in Northern British Columbia waters, including the following plants: Ewen & Co., Delta, Harlock, Wellington, Lulu Island, Terra Nova, Pacific Coast, Canadian Pacific, Short & Squair (Imperial cannery), Brunswick canneries at Steveston and Canoe Pass, Dinsmore Island, Sea Island, Fisherman's Packing Co., Reliance cannery, Atlas cannery, Boutiliar & Co., Hume & Co., Anglo-American, Provincial, Westham Island, Westminster Packing Co., Premier, Cleve, Welsh Bros., Currie, McWilliams & Fowler, Colonial, Greenwood, Wurzburg & Co., and the Acme Canning Co. In 1914 the corporation style was changed to the British Columbia Fishing & Packing Co. (Ltd.).

During the period from 1902 to 1918 a number of new canneries were started in this region. The blocking of Hell Gate Canyon in 1913 by a rock slide—together with the dumping of débris from a railroad being built through the canyon, described elsewhere in this report—was a great disaster to the salmon industry. The effects of this disaster, which were not observable until the season four years later, led to a tremendous decrease of the quadrennial big year—in one of which the blockade occurred—and this soon led to a corresponding decrease in the number of canneries operating. In 1928 the number had dropped to four.

In 1928 the British Columbia Packers (Ltd.)—an $8,000,000 corporation—was formed to take over the British Columbia Fishing & Packing Co. (Ltd.) and the Gosse Packing Co. (Ltd.) This gives the new company control of 39 active canneries, 5 reduction plants, and 3 cold-storage plants, making it the largest in British Columbia.

The last few years have witnessed considerable consolidation of plants, mainly through purchase of individually operated plants by companies with large capital. One of the most notable examples is that of the Canadian Fishing Co. (Ltd.) of Vancouver. By purchase of existing plants and the construction of new ones this company now (1928) owns and operates in the various sections of the Province, 17 salmon canneries, 3 salteries, 4 mild-cure stations, 6 cold-storage plants, and 3 reduction plants.

Skeena River.—The first cannery to be built on the Skeena River was in 1877, when a man named Neill built one at Inverness. In 1878 the Windsor Canning Co., consisting of Henry Saunders, W. H. Dempster, and John Wilson, of Victoria, established a cannery at Aberdeen.

There were no additions until in 1883, when the Balmoral cannery, the British-American, and Robert Cunningham canneries were started.

In 1889 the North Pacific was started and in 1890 the Standard. In 1891 the Anglo-British Columbia Packing Co. bought the British-American cannery and the North Pacific Canning Co. cannery. In 1892 the Claxton, and in 1895 the Carlisle, canneries were built. In 1899 the Claxton cannery was purchased by the Wallace Bros. Packing Co. The Peter Herman (afterwards the Skeena River Commercial Co.) and Turnbull canneries were built in 1900. The last named operated only four seasons.

In 1902 the British Columbia Packers Association acquired the Balmoral, Cunningham, and Standard canneries.

In 1903 the Cassiar cannery was built. The next year the Alexandria Packing Co. was started. It was later acquired by the British Columbia Packers Association, as was also the Dominion cannery, which was built in 1906.

In 1911 the Wallace Fisheries (Ltd.) purchased the Claxton cannery from the Wallace Bros. Packing Co., while in 1913 the Canadian Fish & Cold Storage Co. built a cannery at Tucks Inlet, where their supply of salmon is obtained from the Skeena fishermen.

In 1916 the Gosse-Millerd Packing Co. built their Sunnyside plant. In 1918 the Northern British Columbia Fisheries (Ltd.) purchased the Skeena River Commercial Co.'s plant at Port Essington and also erected a new cannery at Port Edward. In 1919 the Maritime Fisheries (Ltd.) built and operated a new plant at Haysport. From this time on, the number of canneries operated fluctuated considerably.

Rivers Inlet.—The first cannery to be built and operated on Rivers Inlet was in 1881 by Shotbolt & Draney, afterwards the British Columbia Canning Co. The Wannuck cannery was built in 1884, the Good Hope in 1895, the Brunswick in 1896, the Wadhams and the Vancouver in 1897.

There were no changes until 1902, when the British Columbia Packers Association acquired the Wadhams, Brunswick, Wannuck, and Vancouver, the two latter being dismantled and the two former enlarged correspondingly.

In 1906 the Beaver cannery was built by J. H. Todd & Sons, the Kildalla cannery by the Kildalla Packing Co., and the Strathcona cannery by Bain & Wilson, the latter afterwards being acquired by the Wallace Fisheries (Ltd.).

In 1911 the Strathcona Packing Co.'s plant was purchased by Wallace Fisheries (Ltd.). In 1917 the Provincial Canning Co. built a plant, and in 1918 the McTavish Canning Co. also built one.

Naas River.—The first cannery to be built on the Naas River was by Henry Croasdale in 1881, and it operated for four years. The Douglas Packing Co. built a cannery here in 1882 and operated it for two years. Both were then shut down owing to the fact that the locations were too far up the river for steamers to move the packs. In 1888 the plants were dismantled and removed to Naas Harbor and Mill Bay, respectively. In 1889 the Cascade Packing Co. commenced operations, but the plant was dismantled in 1893.

In 1903 the Pacific Northern cannery was built near the mouth of Observatory Inlet, and in 1905 it was purchased by John Wallace, who moved it to Arrandale. In the latter year the Port Nelson Canning & Salting Co. started. In 1908 the Mill Bay cannery was purchased by the Kincolith Packing Co. In 1911 the Arrandale and Port Nelson canneries were bought by the Anglo-British Columbia Packing Co., and in the following year the Naas Harbor cannery was bought by the British Columbia Packers Association.

The Wales Island cannery, which became Canadian property under the Alaska boundary award, was in 1911 purchased by M. Desbrisay & Co., by whom it has since been continuously operated.

In 1916 the Kincolith Packing Co.'s Mill Bay plant was purchased by the Kincolith Fisheries (Ltd.), while in 1918 the Northern British Columbia Fisheries (Ltd.) purchased the Mill Bay cannery from the Kincolith Fisheries (Ltd.) and built a new plant at Kumeon. The Western Salmon Packing Co. also built a new plant at Summerville the same year.

Queen Charlotte Islands.—In 1912 the British Columbia Fisheries (Ltd.), a concern promoted by Sir George Doughty, M. P., of Grimsby, England, built a cannery at Aliford Bay, Skidegate Inlet, and operated same for two seasons. The British Columbia Fisheries (Ltd.) then went into insolvency, and the plant remained idle until 1916, when it operated under lease to the Western Salmon Packing Co. In 1917 the cannery was purchased by the Maritime Fisheries (Ltd.), the present owners.

The Wallace Fisheries (Ltd.) built at Naden Harbor in 1912, and operated that and the following seasons. The cannery was not in commission during 1914 or 1915, but ran in the years 1916 to 1918, inclusive. It was found that Masset Inlet would be a more suitable location, and in 1919 the plant removed from Naden Harbor to a new site on the shores of the inlet.

A cannery was built at Lockeport in 1918 by the Lockeport Canning Co. The same year the Western Salmon Packing Co. (Ltd.) built a plant at Lagoon Bay.

Miscellaneous places.—A cannery was built at Metlakatla in 1882 by Rev. John Duncan for the Metlakatla Indians, fish being obtained from Skeena River. The plant was dismantled in 1886.

John Rood built the first cannery on Smiths Inlet, in Quachela Lagoon, in 1883. It was closed in 1884, and the plant moved to Wannuck, Rivers Inlet, to which place also the Smiths Inlet fish were subsequently transported for packing purposes. In 1902 the Wm. Hickey Canning Co. built a new plant on Smiths Inlet, selling same in 1912 to the Wallace Fisheries (Ltd.). The Western Packers (Ltd.) also built at Marguerite Bay in 1917.

A cannery was built at Lowe Inlet in 1890 by the Lowe Inlet Canning Co. It was sold to the British Columbia Packers Association in 1902.

In 1890 a cannery was built at Gardiner Canal by a man named Price and his associates. It ran until 1893, when it was dismantled and closed.

Robert Drancy built at Namu in 1893, selling out in 1912 to the Draney Fisheries (Ltd.), who in turn sold out to the Northern British Columbia Fisheries (Ltd.) in 1918.

Robert Draney built the Kimsquit cannery in 1901, and in 1907 the Kildalla Packing Co. built the Manitou cannery. The latter is still operating, but in 1912 the Draney Fisheries (Ltd.) purchased the Kimsquit cannery, and in 1918 sold it again to the Northern British Columbia Fisheries (Ltd.).

In 1900 the Bella Coola cannery was built by John Clayton and sold by him in 1902 to the British Columbia Packers Association, who have operated it ever since. In 1917 a new cannery was built by the Tallheo Fisheries (Ltd.) and sold by them in 1918 to the Northern British Columbia Fisheries (Ltd.).

Toms, Morris & Fraser built at China Hat in 1900 and sold to the British Columbia Packers Association in 1902. The latter dismantled and closed the plant in the fall of that year.

A cannery was built at Warke Island in 1911 by John Wallace, principally for packing Gardiner Canal fish. The plant was purchased in 1917 by the Western Packers (Ltd.).

A cannery was built at Bella Bella in 1912 by the East Bella Bella Canning Co. It was sold in 1915 to the Gosse-Millerd Packing Co., who operated it until December 30, 1923, when it burned.

The cannery built at Alert Bay in 1881 by S. A. Spencer was purchased in 1902 by the British Columbia Packers Association, who continued operating it.

Cannery was built at Clayoquot in 1895 by Earle & Magneson. It was purchased by the Clayoquot Sound Canning Co. in 1902, by whom it has since been operated.

A cannery was erected at Bute Inlet in 1890 by C. S. Windsor and George Hobson, but only operated the one season.

The West Coast Packing Co. was built and operated at Nootka Sound in 1896, but only secured 112 cases. The plant was dismantled and abandoned. In 1917 a new plant was erected by the Nootka Packing Co., who have since operated steadily.

Dawson & Buttimer built at Alberni Canal in 1903. They sold out to the Wallace Fisheries (Ltd.) in 1911.

Pidcock Bros. built a small cannery at Quathiaski Cove in 1904. They operated it that and the following year and then sold to T. E. Atkins in 1907. This plant was destroyed by fire in 1909, and the following year the Quathiaski Canning Co. built a new plant, which has operated steadily since.

A small cannery was built at Pender Harbor in 1906, by P. H. Alder. It operated for two seasons and was then closed down and dismantled.

J. H. Todd & Sons and the Capital City Canning Co. both built at Victoria in 1905 (the former at Esquimalt). Messrs. Todd & Son still operate, but the Capital City Canning Co. plant was closed and dismantled in 1914.

Capt. R. E. Gosse built at Knight Inlet in 1907 at Sargeants Passage, but moved the plant to Glendale Cove in 1910, and at the close of that season sold the cannery to the Anglo-British Columbia Packing Co., who have since operated it.

The Wallace Fisheries (Ltd.) built a cannery at Quatsino Sound in 1911, but dismantled it in 1914.

The Goletas Fish Co. built at Shushartis Bay in 1914, and after operating for three seasons sold the plant in 1917 to the Western Packers (Ltd.).

The Gilford Fish Co. built a cannery at Kingcombe Inlet in 1914. After operating it that season they sold to the Preston Packing Co.

The Jervis Inlet Canning Co., built a cannery at Jervis Inlet in 1912, operating it that and the following season. In the fall of 1913 it was destroyed by fire. In 1917 the C. L. Packing Co. erected a new plant at Green Bay, Jervis Inlet.

The Nanaimo Canning Co. started at Nanaimo in 1913 and operated until 1916, in which year the plant was acquired by the Nanaimo Canners & Packers (Ltd.).

The Quathiaski Canning Co. was built at Blind Cove in 1916; the Gulf Island Fish Co., at Lasqueti Island, in 1916; and the Sidney Canning Co., at Sidney, in 1916.

The Redonda Island Canning & Cold Storage Co. built a cannery at Redonda Island in 1917, while the Lummi Bay Packing Co., built a cannery at Nitnat in 1917.

In 1918 the Defiance Packing Co. built a cannery at Port Renfrew, while in 1919 the Gosse-Millerd Packing Co. built one at San Mateo.

In 1924 the Somerville Cannery Co. (Ltd.), installed a cannery on its vessel, the *Laurel Whalen*, which packed first at Massett, Queen Charlotte Island, and later moved to Quatsino, Vancouver Island. In 1925 an order in council was promulgated prohibiting any additional floating canneries being put into use and limiting the operations of the above-named plant to one location.

From the inception of the salmon fisheries in northern British Columbia streams salmon fishing was limited to boats operated by oars or sail. In 1924, however, this limitation was removed and operators were permitted to use power boats.

SALMON FISHING IN THE HEADWATERS

Considerable salmon fishing is carried on in the headwaters of certain of the larger rivers of the coast, of which no account appears in the data of the commercial fisheries. This is due to the fact that the fishing is usually of a desultory character, the fisheries are few in number and scattered widely, and while the catch in the aggregate is considerable it does not amount to much in any one spot.

The Columbia River is a typical example of such a stream. Commercial fishing is usually considered as ending at Celilo, about 150 miles from the mouth. As a matter of fact, salmon fishing for market or for home use is carried on to a considerable extent along the main river and also on the Snake and the Yakima, tributaries of the Columbia. In nearly all cases hook and line and spears are used alone, but on the Snake River, near Lewiston, in Idaho, are several rather important haul-seine fisheries. Fishing is carried on at these places in the spring for steelhead trout and in the fall for chinook and

silver salmon and steelhead trout. As many as 25 salmon have been taken at one time. While this may seem a small number to one habituated to the large catches farther down the river, in the aggregate it amounts to a considerable quantity.

Considerable local fishing is carried on along the various Oregon streams above the sections usually fished by commercial fishermen. Most of this is done by ranchers living along the streams, and while by far the greater part is for home consumption a small proportion is sold.

On the Yukon River and its tributaries considerable salmon fishing is prosecuted. Much of this is done by natives for the use of themselves and their dogs, but at places white fishermen operate for a portion of the year and sell their catches in near-by settlements or at the mining camps. No effort has ever been made to secure statistics of the extent of this fishery.

APPARATUS AND METHODS OF THE FISHERIES

GILL NETS

The gill net is the oldest and most popular form of apparatus in use in the salmon fisheries of the Pacific coast. There are two kinds, drift and set, these names clearly expressing the difference between them. Fine flax or linen twine is generally used in their manufacture, although in some places cotton twine is employed, and it has usually 12 threads and is laid slack. They are hung in the ordinary manner—to a rope with cork floats to support the upper portion of the gear, and to a line with lead sinkers attached, which keeps the net vertical in the water and all its meshes properly distended. The nets are tanned, usually several times each season.

Drift nets vary greatly in length and depth, depending upon the width of the fishing channels, the depth of water, etc. On the Sacramento River they average about 300 fathoms in length, are 45 meshes deep, and have a stretch mesh of from 7½ to 9½ inches. On the coastal rivers of Oregon these nets average about 125 fathoms in length, and are about 36 meshes in depth, the mesh varying with the species of salmon caught. On the Columbia River the nets average about 250 fathoms in length and have a stretch mesh for chinooks of 9 to 9½ inches. On the Willamette River, the principal tributary of the Columbia, they average about 75 fathoms in length, with meshes of 8 and 9½ inches. On Willapa Harbor drift gill nets run from 100 to 250 fathoms in length, are 30 meshes deep, with stretch meshes of 7 and 8½ inches. On Grays Harbor they average 100 fathoms in length, the chinook nets run from 24 to 45 meshes in depth, with a stretch mesh of 9 inches, while the silver or coho nets are 35 meshes in depth, with a stretch mesh of 7 inches. In northern British Columbia the nets average 150 fathoms in length with a stretch mesh of 5¾ inches. In the Puget Sound region the nets average 300 fathoms in length, with meshes suitable for the particular species sought. In Alaskan waters the nets vary greatly in length and depth, depending upon the places where fished.

Drift gill netting is prosecuted chiefly in the estuaries of the rivers in and near the channels. If the water is clear, the nets are set only at night, but should the water be muddy or discolored with glacial silt, fishing can be carried on either night or day. Night fish-

ing is most common in the States, while day fishing is most common in Alaska. When fishing in rivers, it is necessary to work in a straight stretch of water of fairly uniform depth and free from snags or sharp ledges, these being called "reaches."

In setting the net the boat puller rows slowly across the stream while the other man pays out the apparatus, to the first end of which a buoy has been attached. When about two-thirds of the gear is out, the boat is turned downstream at nearly right angles to her former course, so that the net, when set, approximates the shape of the letter L. The net is laid out at nearly right angles or diagonally to the river's course, so that it will intercept the salmon that are running in, and is usually put out about an hour before high-water slack and taken in about an hour after the turn of the tide. In Alaska the fishermen usually fish on both the high and low slack. The nets are allowed to drift for the time specified, the fishermen drifting along at one end, then the net is hauled into the boat over a wooden roller fixed in the stern, and the fish, which have become gilled in the meshes, are removed, stunned or killed by a blow on the head, and thrown into the bottom of the boat.

Set gill nets are made in the same way as drift nets, in many instances being fragments of the latter, and are usually operated in the upper reaches of the rivers. They vary in length from 10 to 100 fathoms, from 35 to 65 meshes in depth, and have the same sizes of meshes as the drift nets, the size varying, of course, with the species sought for. Sometimes these nets are staked, sometimes anchored, while occasionally only one end is tied to the shore or a stake set in the water.

On the flats off the mouth of the Stikine River, in southeast Alaska, a combination of the drift and set method is followed. A double set of stakes, about 6 feet apart, are set out from the shore for a distance of several hundred yards. An hour or two before slack water the fishermen pay out the net parallel to the line of stakes and about 50 feet from them. The tide drifts the net down until it is caught against the stakes, which retain it until slack water, when the fisherman takes it up and repeats from the opposite direction on the next turn of the tide.

HAUL SEINES

On the Columbia River, where this form of apparatus plays a prominent part in the fisheries, the nets vary in length from 100 to 400 fathoms; the shallowest end is from 35 to 40 meshes deep, but it rapidly increases in width and is from 120 to 140 meshes deep at the other wing. The "bunt," or bag, in the central part of the net is about 50 fathoms long. These nets are usually hauled on the numerous sand bars which are a very noticeable feature of the river at low tide. Buildings are erected on piles on these sand flats, in which the men and horses take refuge at high tide, when the bars are covered with water. Operations begin as soon as the beach or bar uncovers, so that the men can wade about. The net is placed in a large seine boat, with the shore end attached to a dory. At the signal, the seine boat is headed offshore, while the dory heads toward the bar. As the seine boat circles around against the current the net is paid out in the shape of a semicircle. The dory men hurry to the bar with the shore end of the net, the idea being to get that in as soon as possible in order to prevent the escape of the salmon in that direction. As

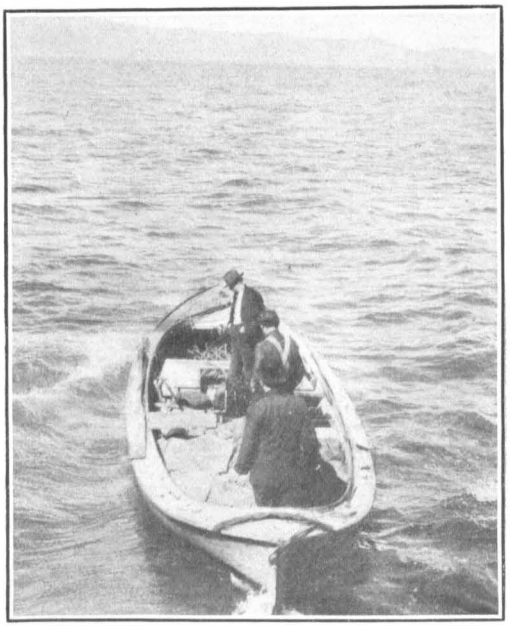

FIG. 8.—COLUMBIA RIVER POWER GILL NET BOAT

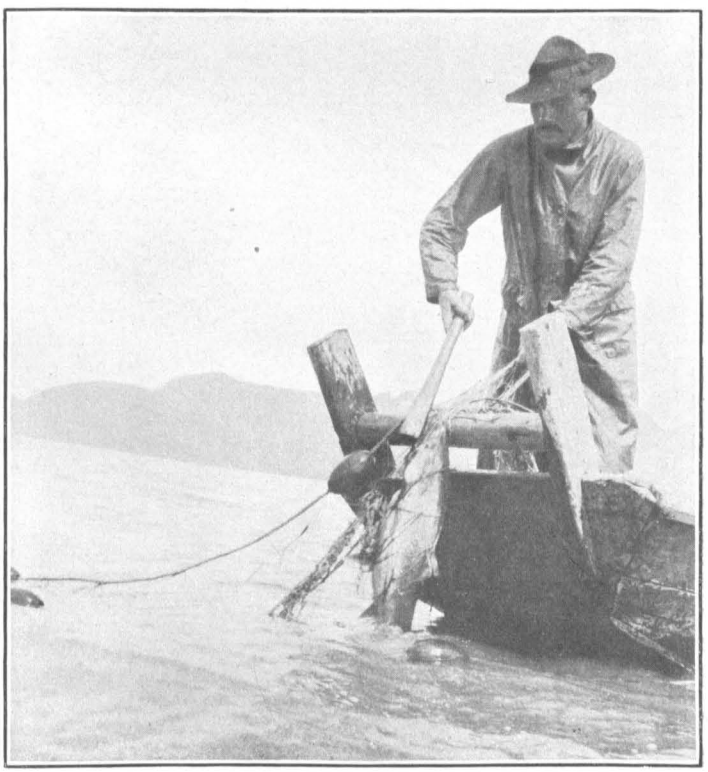

FIG. 9.—REMOVING THE SALMON FROM A GILL NET

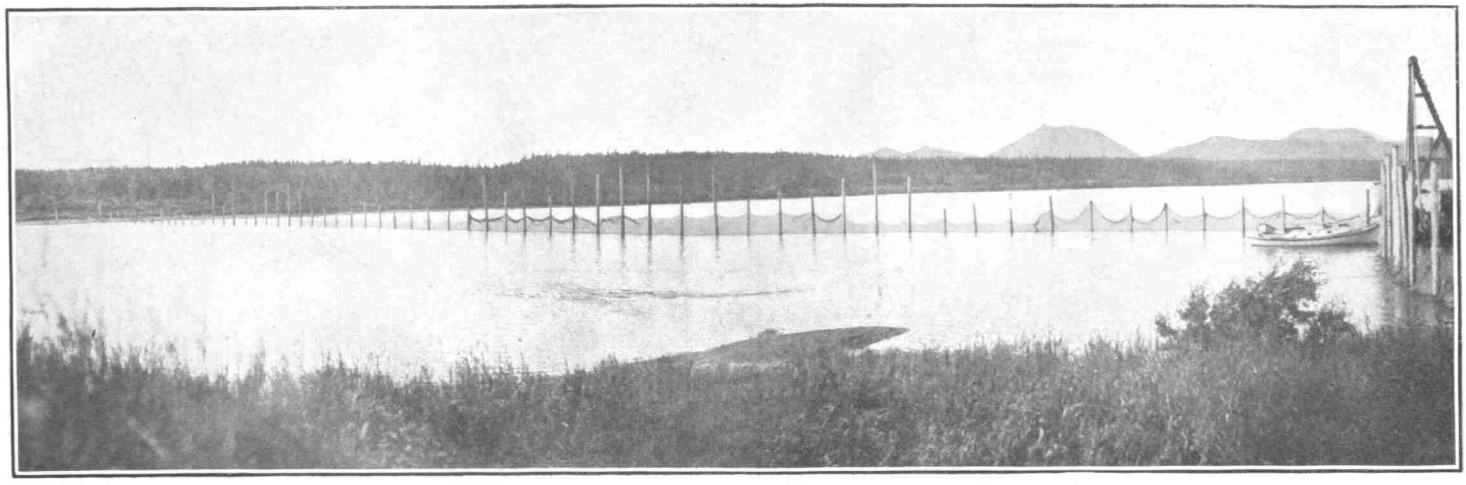

FIG. 10.—SALMON RACK ACROSS WOOD RIVER, ALASKA

soon as this has been accomplished, the outer shore line is brought to the bar, when several horses are hitched to the line and begin to haul in the net, care being taken by the men to work it against the current as much as practicable, and to get it in as speedily as they can in order to prevent the escape of salmon either by jumping over the cork line or finding some outlet below the footrope or lead line.

The only other place on the coast where haul seines are important is at Karluk, on Kodiak Island, in Alaska. Here the seines are hauled upon the narrow gravel spit dividing the lagoon from the strait, and practically the same method is followed as in the Columbia River.

DIVER NETS

These are in use in the Columbia River, mainly throughout the middle and upper portions of the river. They vary from 100 to 200 fathoms in length and are used almost exclusively for chinook salmon. In construction they somewhat resemble a trammel net. Two nets are attached together side by side. The outer one, or the one toward the oncoming fish, has a larger mesh than the other, so that if the fish manages to pass through the first, it will be caught in the smaller meshes of the second.

DIP NETS

These consist of an iron hoop secured to the end of a stout pole with a bag-shaped net fastened to the hoop. They are generally used at the cascades on the rivers, small platforms being erected upon which the operator stands while fishing. Indians formerly used them to a large extent, but, owing to the steady decline in the number of Indians, and the appropriation of favorable spots by the whites for other forms of apparatus, they are but little used now.

SQUAW NETS

This type is virtually a set net. It consists of an oblong sheet of gill netting, about 12 feet long and 8 feet deep, its lower edge weighted to keep it down, and its upper edge attached to a pole that floats at the surface, and is held by a line or lines to another projecting pole which is securely fastened to the shore, so that it will not swing around with the strain of the swift current on the net. A single block is attached to the pole, and through this passes a rope, thus making a tackle for the more convenient manipulation of the net. The dip-net fishermen of the Columbia River use this net, which derives its name from the fact that it used to be commonly operated by Indian squaws for taking salmon. But few are now in use, for the same reasons as given for the decline in the use of dip nets.

PURSE SEINES

This form of apparatus is in quite general use in Puget Sound and southeast Alaska, and has proved highly effective in these deep, swift waters. These seines are about 200 fathoms long, 25 fathoms in the bunt, and 20 fathoms in the wings, all with a 3¾-inch stretch mesh. The foot line is heavily leaded and the bridles are about 10 feet long. The purse line is made of 1½-inch hemp. The rings through which the purse line is rove measure about 5 inches in diameter and are made of galvanized iron.

Purse seining for salmon in Puget Sound and waters north of same is one of the most important methods in use in the fisheries. In the type of vessel used in this fishery there has probably been greater improvement than in any other branch of the fisheries of the coast. In the early days row scows were in use, but now vessels with power are used.

In 1903 the first gasoline-powered purse seine boat appeared on the Pacific coast salmon fishing grounds in Puget Sound. The vessel was named the *Pioneer* and she was equipped with a 5-horsepower engine. The first season she easily demonstrated her vast superiority over the other purse seiners in the quickness with which she could reach a school of fish after it was sighted and in surrounding it with her seine. The next year there were a few more built or equipped, and the number has steadily increased until at the present time practically all except a few in southeast Alaska are equipped with motor engines.

The first power seine boats were only about 30 feet in length and had small power. As they were few in numbers, there was virtually no competition, and high power and speed were not a necessity. As the boats increased in numbers, however, competition became keener, and the first types of boats with their small power were quickly thrown into the shade by the newer types, which averaged between 45 and 55 feet in length, with 45 to 75 horsepower engines.

When motive power was introduced in the vessels, it was natural that the fishermen should soon introduce winches for the purpose of hauling in the nets, as the whole work could then be done by the one engine.

The purse seine vessels are built with rounded sterns. On an elevated section of the stern is set a movable platform on a pivot. The after end of this platform has a long roller. The purse seine is stowed on this platform, the head rope with corks on one side and the foot line on the other, so that there will be no tangling when the seine is paid out.

When the lookout sights a school of fish the seiner is run down close to it and a rowboat launched. One man takes his place in this with the rope from one end of the seine and acts as a pivot, while the seiner circles around the school, the crew paying out the seine as she moves along. When it is all out, the vessel runs alongside the rowboat and takes aboard the other rope. Attaching this and the rope from the other end to the power winch, the circle around the fish is rapidly narrowed, and the slack of the seine as it comes in is stowed back on the platform. Around the bottom of the seine and through galvanized-iron rings about 5 inches in diameter runs the purse line. As this is hauled into the boat, the open space at the bottom is rapidly closed up just as a handbag would be through the drawing together of the pursing string at the top. During this operation the nonpower purse seiners have a man standing alongside the rail who throws a pole into the center in order to drive the fish away from the open section. He is so skillful in this work that almost invariably the pole comes back to his hand as the pressure of the waters forces it up again. When the bottom has been pursed up the fishermen hauling by hand can move more leisurely, but with the power winches in use the hauling in of the net is a comparatively easy matter, and the pole thrower is dispensed with.

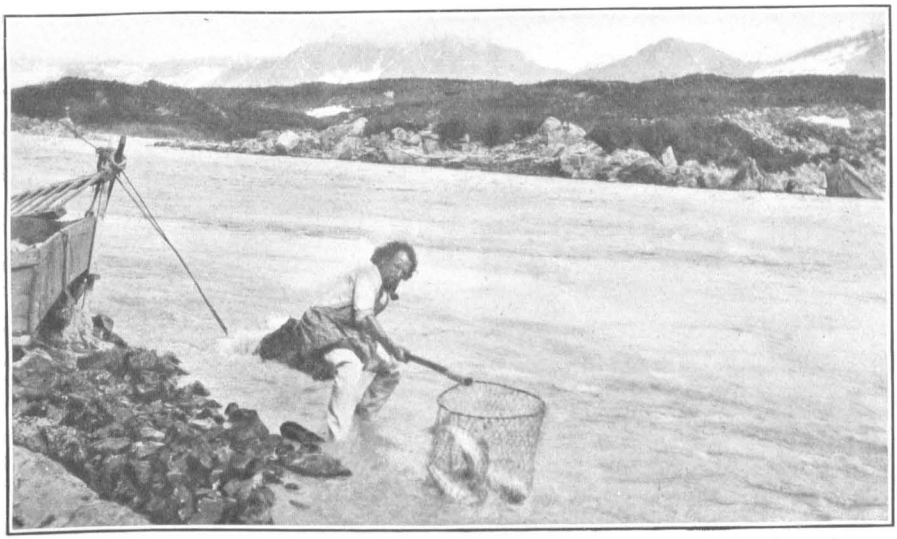

FIG. 11.—DIPPING SALMON FROM THE COPPER RIVER, ALASKA

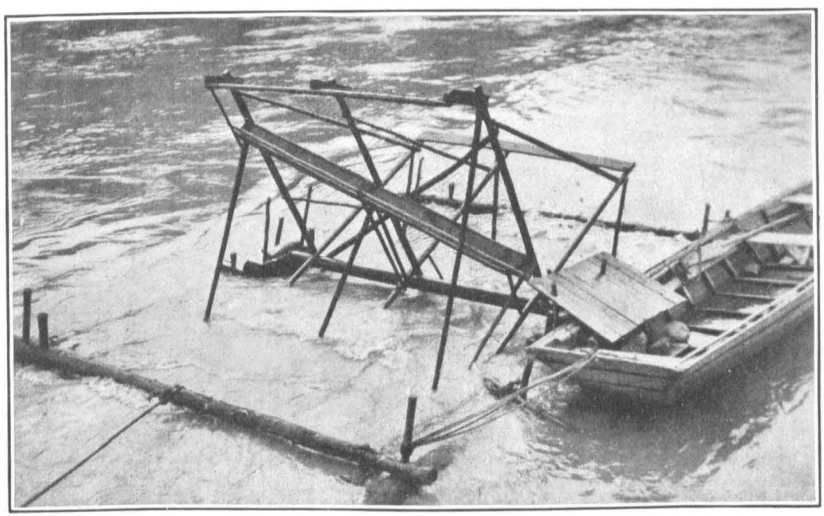

FIG. 12.—FISH WHEEL, YUKON RIVER, ALASKA

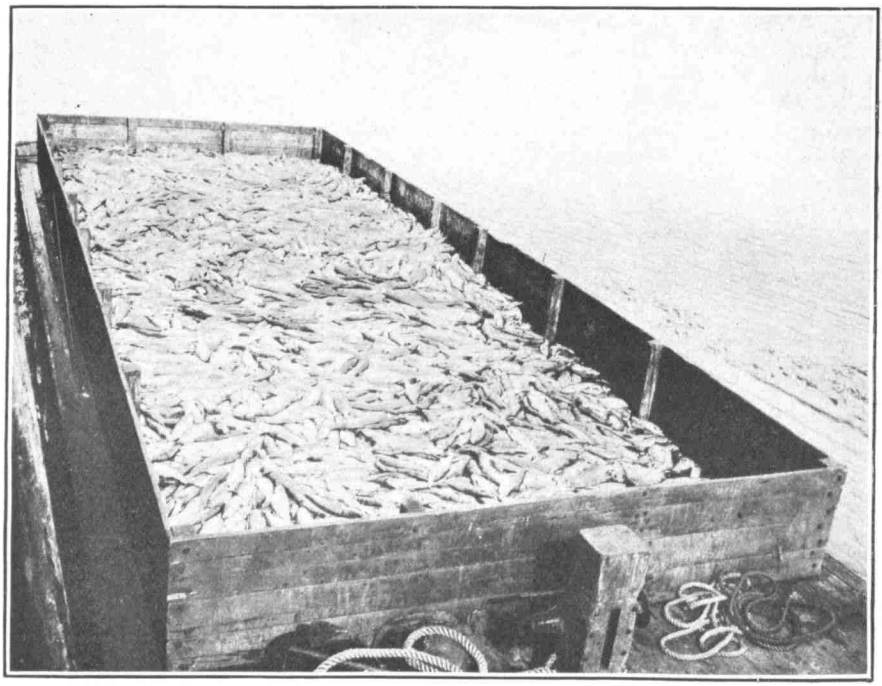

FIG. 13.—A SCOW LOAD OF SALMON

FIG. 14.—PURSE SEINE CREW DELIVERING FISH TO CANNERY TENDER

When all the fish are in the bunt and the latter alongside, the fish are generally dipped out by means of a dip net balanced on the end of a tackle. A fisherman lowers it into the seine, scoops up a load of salmon, and as the net is hauled up guides it over the vessel, and then trips it and dumps the fish into the hold.

The Puget Sound purse seiners meet the salmon off the entrance to the Strait of Juan de Fuca and follow the sockeyes till they have passed out of American waters, what are known as the Salmon Banks, off the lower end of San Juan Island, being the principal rendezvous during the run of sockeyes. After this run is over they go up the Sound and fish for chums and cohos, and later go to the head of the Sound and fish for chums, cohos, chinooks, and steelhead trout. In southeast Alaska they follow the fish all over the bays, straits, and sounds of that section. Purse seines are used in a few other places, but the fishery is secondary to those with other forms of apparatus.

This style of fishing is said to have been introduced on Puget Sound by the Chinese in 1886.

TRAPS OR POUND NETS

A trap is stationary and consists of webbing, or part webbing and part wire netting, held in place and position by driven piles. This piling usually is held together above water by a continuous line of wood stringers, also used to fasten webbing to or to walk on if necessary.

In building, the "lead" is first constructed. This runs at right angles, or very nearly so, to the shore, and consists of a straight line of stakes, to which wire or net webbing is hung from top of high water, or a little higher, to the bottom, making a straight solid wall.

At a little distance inshore of the outer end of the lead begin what are called the "hearts." These are V-shaped and turned toward the lead, beginning at a distance of 30 to 40 feet on either side of same and running in the same general direction, the "big heart" or outer heart first, the inner heart, supplementing the first, being smaller, and the end of the outer heart leading into it. Some traps have only one heart. The narrow end of the inner heart leads into the "pot" and forms what is known as the "tunnel." The tunnel ends in a long and narrow opening, running up and down the long way, and is held in position by ropes and rods. Below this is what is known as the "apron," a sheet of web stretched from the bottom of the heart upward to the pot, in order to lead the fish into the tunnel when swimming low in the water, and to obviate the necessity of building the pot clear to the bottom, which would be expensive, as the pots of the traps are usually in quite deep water. If the trap is intended to catch the fish coming from only one direction, the lead generally runs to and is attached to one side of the entrance to the outer heart on the side opposite to that from which the fish are expected.

Some traps have "jiggers" (a hook-shaped extension of the outer heart) on each side, and sometimes on only one side, which help to turn the fish in the required direction.

The "pot" is built out beyond the inner heart and immediately adjoining same. It is a square compartment, with web walls and bottom connected in the shape of a large square sack, fastened to piling on all sides. This pot is hauled up and down by means of ropes and tackles, either by hand or, as is most popular, by steam.

The "spiller" is another square compartment adjoining either end of the pot (sometimes there are two spillers, one at each end), and is simply a container for fish. A small tunnel leads the fish from the pot into the spiller, whence the fishermen lift them out. This is accomplished by closing the tunnel from the pot, after which the ropes holding the front of the spiller are loosened and the net wall allowed to drop almost to the level of the water. A steam or gasoline tug then pushes a scow alongside the spiller and takes position on the outside of this scow. From the deck of the tug a derrick is rigged with a running line from the steam capstan through the block at the top of the derrick. This line is attached to the far end of a net apron, called a "brailer," which is heavily weighted by having chains along each side and leaded crossways at several places. A small boat is run inside the spiller, and the men in this draw the brailer across the barge and let it sink in the spiller. The fish soon gather over it, when the steam capstan quickly reels it in, the net folding over as drawn in from its far side and spilling the fish out on the scow. Men on the scow pick out and throw overboard the undesirable fish. The apron is then drawn back across the pot and the operation repeated so long as any fish remain. In this manner a trap with many tons of salmon in it is quickly emptied.

Traps, like nearly all other fixed fishing appliances, are built on the theory that salmon, like most other fishes, have a tendency to follow a given course in the water, whether a natural shore line or an artificial obstruction resembling one; also that the fish very seldom turns in its own wake. The trap has taken advantage of these natural tendencies of the fish, and is arranged so that, although the salmon may turn, he will continually be led by the wall of net toward and into the trap.

If a trap is located in a place where fish play and where an eddy exists, and the fish run one way with the incoming tide and the opposite with the outgoing, it will fish from both directions; if located where the fish simply pass by, as for instance, on a point or reef, it will fish from one side only.

A variation of the trap, to be used in places where piles can not be driven, is the floating trap. An experimental trap of this variety was used at Uganik, on Kodiak Island, Alaska, as early as 1896. Its use was abandoned in 1897, not to be resumed until some years later. A number of floating traps (of the type invented by J. R. Heckman, of Ketchikan, Alaska) have been and are being used in southeast Alaska, the first having been installed in 1907. The design of this trap follows the shape of an ordinary Puget Sound driven trap. It is constructed of logs, 20 to 26 inches at the butt, bolted and braced together in one solid frame. Suspended from this frame through the logs are 2½-inch pipes extending down in the water 30 feet. Halfway down these pipes and also on the extreme lower ends are eyebolts, to which the web is drawn down and fastened. Thus the web is kept in place as well as if the pipes were driven piles. The lead is also a continuation of large piles or logs bolted firmly together with similarly suspended pipes and webbing.

The so-called wooden traps on the Columbia River are essentially weirs, being a modification of the brush weirs or traps used by the Indians for the capture of salmon long before the advent of the white men. They are built on shore, of piling and planks, the latter

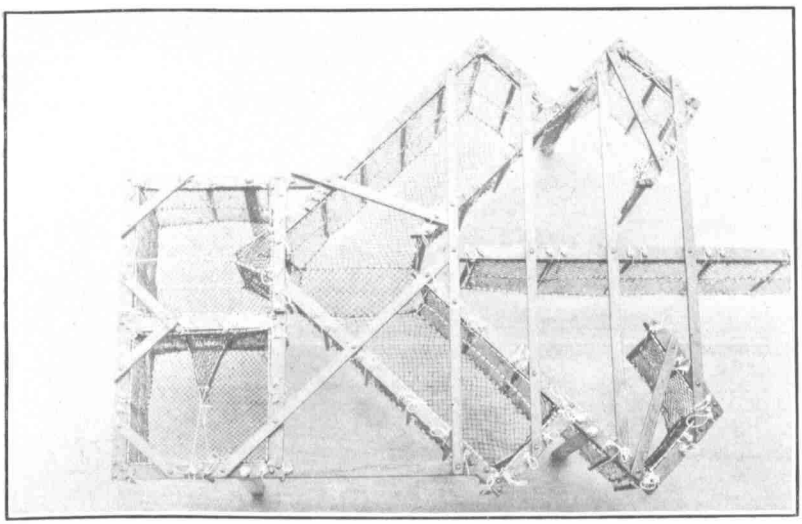

FIG. 15.—FLOATING TRAP

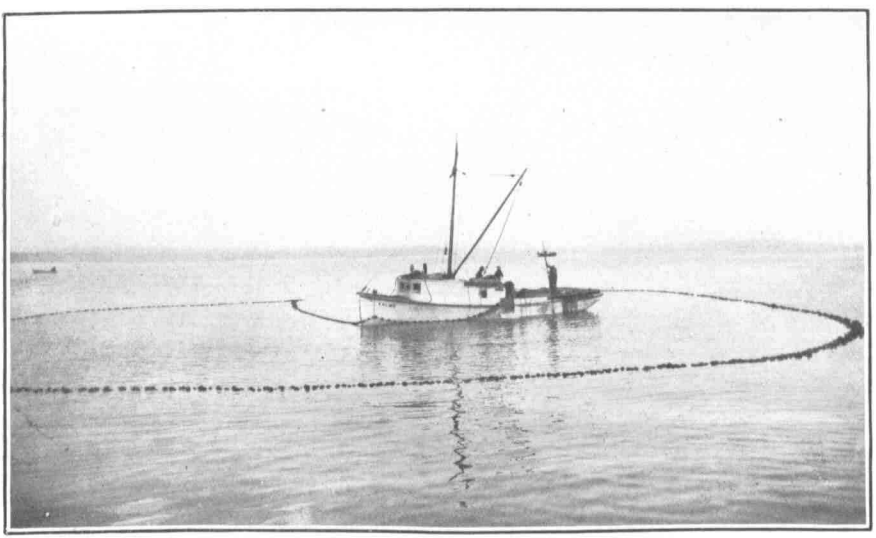

FIG. 16.—PURSE SEINER HAULING IN NET

FIG. 17.—DIPPING SALMON FROM A PURSE SEINE

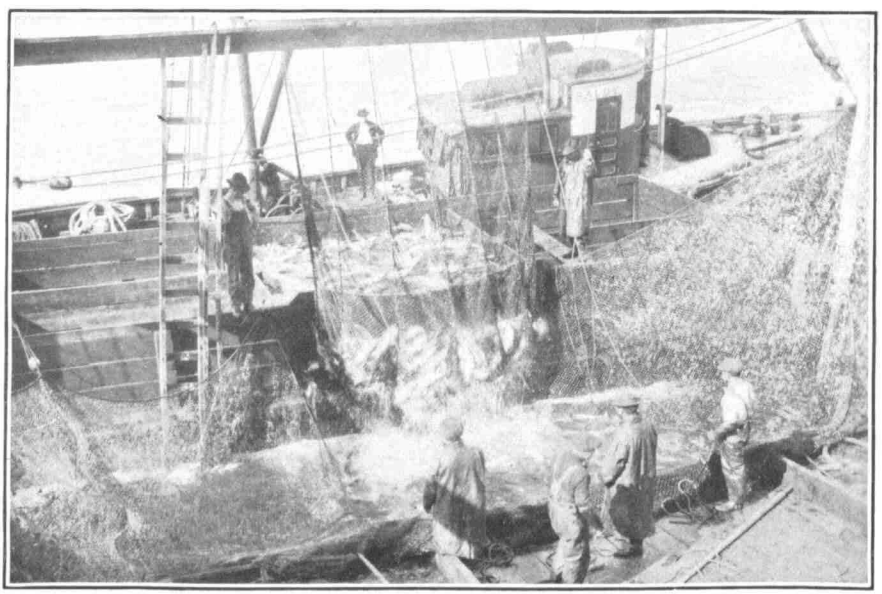

FIG. 18.—BRAILING SALMON FROM A TRAP

arranged like slats with spaces between. The bowl, or pot, is provided with a movable trapdoor that can be opened during the closed season and on Sundays, so that the fish can pass through and run upstream. These weirs, after being built, are launched into the river, placed in proper position near the shore, and then ballasted so that they sink to the bottom.

According to Collins,[24] "pound nets were introduced on the Columbia River in 1879. In May of that year O. P. Graham, formerly of Green Bay, Wis., built a pound net on the river similar to those used on the Great Lakes. The success of this venture led to the employment of more apparatus of this kind, and many fishermen went west to participate in the fishery."

The first trap on Puget Sound, it is said, was built by John Waller, about 1880, off Cannery Point, at the southeastern corner of Point Roberts.

According to Collins,[25] H. B. Kirby, who had previously fished on the Great Lakes, set a pound net in Puget Sound about 1883, but it was a complete failure. This was set off Point Roberts, near where the Waller trap was set. On March 15, 1888, he again set a pound net, which he had designed to meet the new conditions, at Birch Bay Head, in the Gulf of Georgia. It proved a complete success, and was the forerunner of the present large number which are set annually in these waters.

In Alaska the first trap was set in Cook Inlet about 1885. British Columbia refused to permit the use of pound nets in its waters until 1904, when their use was allowed within certain limited regions.

Some of these traps, especially on Puget Sound, have proved extremely valuable. The years 1898 and 1899 covered practically the high-water mark, as several desirable locations changed hands in those years at prices ranging from $20,000 to $90,000 for single traps, the original expense of which did not exceed $5,000. But few have brought such high prices since, however, owing to the decline in the run of salmon, and at the present time but few of them would fetch much at a sale.

INDIAN TRAPS

The natives, especially in Alaska, have various ingenious methods of catching salmon. In the Bering Sea rivers they catch them by means of wickerwork traps, made somewhat after the general style of a fyke net. These are composed of a series of cylindrical and conical baskets, fitting into each other, with a small opening in the end connecting one with the other and the series terminating in a tube with a removable bottom, through which the captive fish are extracted. Some of the baskets are from 15 to 25 feet in length and are secured with stakes driven into the river bottom, while the leader, composed of square sections of wickerwork, is held in place by stakes.

During the summer of 1910 the author found and destroyed an ingenious native trap set in Tamgas stream, Annette Island, southeast Alaska. This stream is a short and narrow one, draining a lake, about midway of which are a succession of cascades. In the narrowest part of the latter, and in the part up which the fish swim, a rack had been constructed of poles driven into the bottom and covered

[24] Report on the Fisheries of the Pacific Coast of the United States. By J. W. Collins. Report, U. S. Commissioner of Fish and Fisheries, 1888-89, p. 210. Washington. 1892.
[25] Collins: Op. cit., p. 257.

with wire netting, so as almost wholly to prevent salmon from passing up. Just below, and running parallel to the rack and at right angles to the shore, was placed a box flume with a flaring mouth at the outer end. At the shore end the flume turned sharply at right angles and discharged into a square box with slat bottom and covered over with boughs. The fish in ascending the stream would be stopped by the rack and in swimming around many of them would be carried by the current into and down the flume, eventually landing in the receiving box alongside the shore.

WHEELS

Fish wheels are of two kinds, the floating or scow wheel, which can be moved from point to point if need be, and the shore wheel, which is a fixed apparatus. They operate in exactly the same manner, however. The stationary wheel is located along the shore in a place where experience has shown that the salmon pass. Here an abutment is built of wood and stone, high enough to protect it from an ordinary rise in the river. To this is attached the necessary framework for holding the wheel. The latter is composed of three large scoop-shaped dip nets made of galvanized-iron wire netting with a mesh of 3½ to 4 inches. These nets are the buckets of the wheel and they are so arranged on a horizontal axis that the wheel is kept in constant motion by the current, and thus picks up any fish which come within its sweep. The nets are fixed at such an angle that as they revolve their contents fall into a box chute through which the fish slide into a large bin on the shore. The wheels range in size from 9 to 32 feet in diameter and from 5 to 15 feet in width, and cost from $1,500 to $8,000, the average being about $4,000. A number of them have long leaders of piling running out into the river, which aid in leading the salmon into the range of the wheel.

The scow wheel consists of a large square-ended scow that is usually decked at one end and open at the other. Several stanchions, some 8 to 10 feet high, support a framework upon which an awning is spread to protect the fish from the sun's rays and the crew from the elements. To one end of the scow are fastened two upright posts, which are guyed by wooden supports, while projecting from the same end is the framework which supports the wheel, the latter being constructed in the same way as the stationary wheel, but on a smaller scale. In operation the scow is anchored with the wheel end pointing downstream, and as the wheel is revolved by the current, the fish caught fall from the net into a box chute, through which they slide into the scow. As stationary wheels can be used only at certain stages of water, the scow wheel is a necessary substitute to be used at such times as the former can not be operated, or in places where it is not feasible to build a stationary wheel.

The above forms of wheels are used exclusively on the Columbia River.

An ingenious device is used by some of the wheel operators on the Columbia River in getting their catch to the canneries, a few miles farther down the river. The salmon are tied together in bunches, which are attached to air-tight casks and sent down the stream. At the canneries small balconies have been constructed at the water end of the building. A man armed with a pair of field glasses is stationed here, and as soon as he sights one of these casks he notifies a boatman

FIG. 19.—RACKS AND RUNWAYS FROM WHICH INDIANS GAFF SALMON, CHILKOOT RIVER, ALASKA

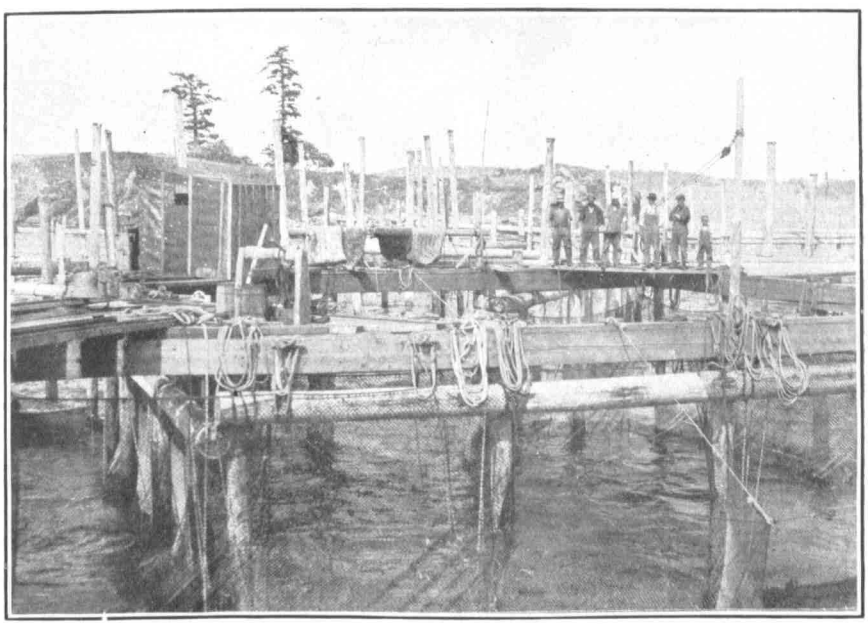

FIG. 20.—THE POT AND SPILLER OF A SALMON TRAP

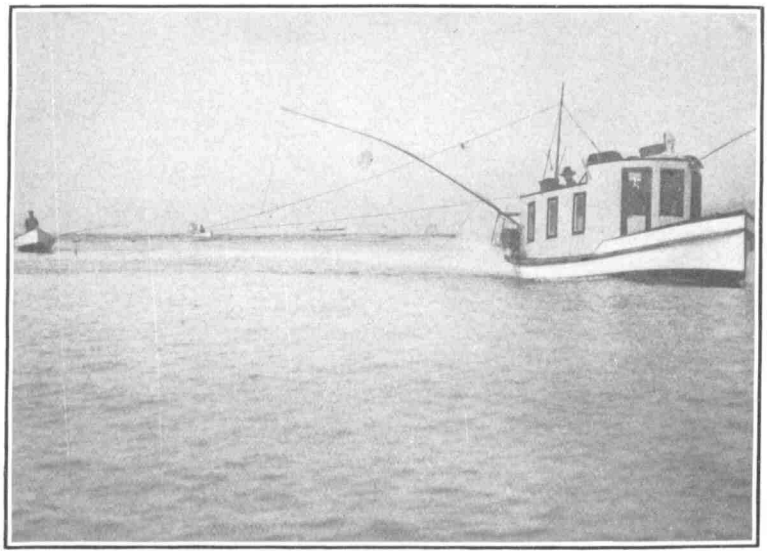

FIG. 21.—TROLLING FOR SALMON ON PUGET SOUND WITH POWER BOATS

FIG. 22.—PUGET SOUND PURSE SEINE BOATS AT RICHARDSON, WASH

who goes out and tows in the cask and salmon. About 800 pounds of salmon are attached to a keg, and a tag showing the wheel from which shipped is tied to the fish.

In 1908 the first fish wheel to be located in the coastal waters of Alaska was operated in the Taku River, in southeast Alaska. The wheel was set between two 4-foot scows, stationed parallel to each other, and each 40 feet in length. The wheel had two dips, each 22 feet in width and hung with netting. It could be moved from place to place, the same as the scow wheels on the Columbia River. It was operated throughout the king and red salmon runs, but caught almost no salmon, and was not set in the succeeding years.

For many years the natives of the interior of Alaska have been resorting to the banks of the Yukon and Kuskokwim Rivers and their tributaries in order to secure a sufficient supply of salmon to sustain them through the succeeding winter. The favorite apparatus of these natives at present is a type of fish wheel introduced by the whites about 1905. An oblong framework of timbers is constructed in the water and moored to the bank by ropes. A wheel, composed of two or three dips, is placed in this, the axle resting upon the framework. The current catches each dip in turn, thus causing the wheel to revolve, and the dip is of such shape that the salmon caught roll off it into a trough, down which they slide into a boat moored between the wheel and the shore or into a box fixed to the supporting framework on the side. Although crude in construction, these wheels are very effective and a large number of them are set each season.

The Columbia River fish wheel is a patented device. It was first used by the patentees, S. W. Williams & Bro., in 1879, and for several years they retained a monopoly in its use. A number are now operating on the river. The device was not new even when patented, as a similar "fishing machine," as it is called, had been in use prior to this time and is still used by white fishermen on the Roanoke River in North Carolina.

REEF NETS

When the whites first visited the Northwest they found the natives employing a number of ingenious devices for catching salmon, and one of the most effective of these was the reef net. J. A. Kerr, Esq.,[26] who has been engaged in the salmon fisheries of Puget Sound for a number of years, has written the following very interesting account of this native fishery:

The aborigines the world over have developed ingenuity solely along the lines of their necessities. The coast Indians of Alaska evolved the bidarky and the ingenious implements for taking the seal, the walrus, and the whale. The Siwash of Puget Sound developed a seaworthy dugout and appliances for taking salmon that marks the acme of Indian invention.

When Vancouver explored the waters of the Sound he found over 500 Indians encamped at Chiltenum, now Point Roberts. He relates in his log of the voyage that these Indians were engaged "in fishing for salmon with crude nets made of the bark of young willow." He described the racks upon the contiguous upland used by the Indians in curing the fish.

When Governor Stevens negotiated the treaty with the Indians of the lower Sound at Point Elliott, now Mukilteo, in 1855, I was informed by Colonel Shaw, the interpreter, that over 7,000 Indians attended, the session lasting for five days.

The Government sought to have the Indians confined to reservations, and the disposition of their ancient fisheries was a matter of great solicitude on their part. Salmon was the principal article of their diet.

[26] The Siwash Reef Net. By J. A. Kerr. Pacific Fisherman Yearbook, 1917, p. 60.

After protracted discussion the sixth clause of the treaty was made to provide that "the right to take fish at their usual and accustomed fishing grounds, together with the right to erect and maintain racks upon the contiguous upland for curing and drying the same, is hereby forever guaranteed to said Indians."

There were two of those ancient fisheries on the lower Sound—Point Roberts Reef and Village Point.

The original reef net of the Indians, as described by the first white settlers and by the Indians themselves, was constructed as follows:

The natives peeled the bark from the willow and with it spun a twine and tied a net about 25 feet in width and 40 feet in length, with a mesh substantially of the dimensions and shape of that used in the now familiar pound net.

They then went into the swamps and cut cedar withes. After heating rocks and placing them in pools of water they steamed these withes, after which they twisted them into substantial ropes.

Their reef net operations were confined to the shoal waters over the reefs. The reef net locations were of great value to the Indians, and were considered as property and handed down from father to son. As a rule the Indian families controlling these locations owned an inner and outer location. The reef at Point Roberts is over 1 mile in length.

Reef net fishing was confined to the flood tide. At the beginning of the flood the outer location was used; after the middle of the flood the nets were shifted to the inner locations.

The Indians assembled at the reefs in advance of the salmon run and prepared their appliances.

They first secured heavy boulders or blocks of sandstone from Chuckanut to be used as anchors. They then procured for each net two logs about the length of their canoes. To each end of these logs they tied one of their ropes, about 100 feet in length, the other end of which was fastened to the stone anchor. These logs were anchored over the top of the reef and about 20 feet apart. From the forward end of these logs there was run out at an angle of 45° other ropes to a distance of 50 feet, the outward end fastened to a bouy. To these ropes were fastened stalks of kelp, the ends weighted to the bottom with stones. Thus was constructed a lead operating to concentrate the approaching school of fish between the logs. Then from the front end of these logs there was dropped forward and to the bottom two ropes; from one of these ropes to the other, at intervals of 2 or 3 feet, were fastened cords of willow twine. This appliance was called by the Indians a ladder.

Now in operating the net itself two canoes were lashed on the inside of the logs. Three Indians occupied one canoe and four the other. The net was then suspended between the canoes. The Indians in the forward end of the canoes held the ropes fastened to the bottom of the net; those in the back end held the ropes fastened to the top of the net. The tide running against the net caused it to bag, or purse. The fourth Indian in one of the canoes was generally an elderly man and was called the watcher. He discovered the school of salmon as they were carried into the net and at his signal the Indians at the front of the canoes pulled the lower edge of the net, which was kept within 4 feet of the surface, above the water. The Indians at the middle of the canoe reached down and caught the sides of the net, lifting the sides above the surface. These Indians pulled against each other, the long ropes by which the logs were moored giving enough to allow the canoes to be pulled alongside each other. The fish were then dumped into one of the canoes, after which the net was loosened and lowered, and the boats fell back to their original position again. With these appliances the Indians would take up to 3,000 salmon on a single run of the tide.

This Indian appliance affords not only an interesting illustration of native ingenuity, but as a matter of fact was the forerunner of the pound net. John Waller, a Welshman, was one of the earliest settlers at Point Roberts. He observed the operations of the reef net and in the early 60's constructed at Point Roberts the first pound net ever driven on the Pacific coast. The leads duplicated that of the Indians, while he impounded the salmon by means of the tunnel leading into a web pot, instead of lifting them as impounded.

The reef net marks the humble Siwash as an inventor of some skill, and as a benefactor of some importance, and the apparatus would be in use to-day were it not for the large number of people required to operate it.

At one time this was a favorite device of the Puget Sound natives for catching sockeye salmon. Owing to the large number of men required to work them, and the fact that they can be worked only

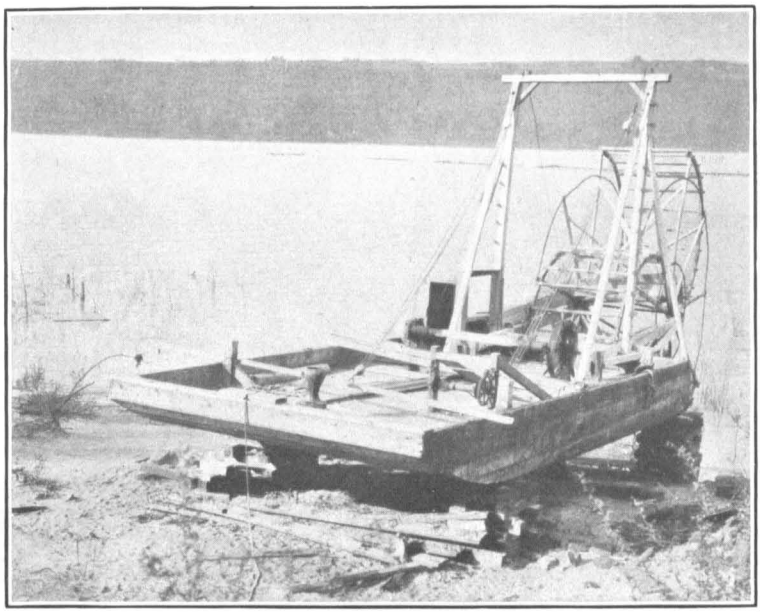

FIG. 23.—A COLUMBIA RIVER SCOW FISH WHEEL

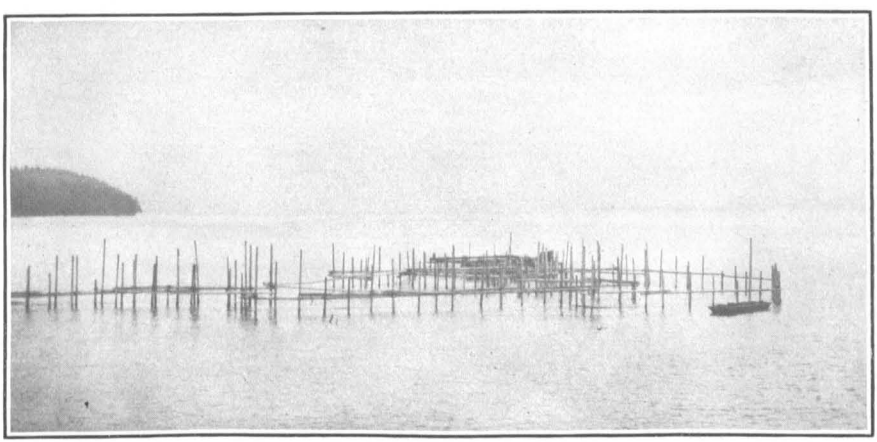

FIG. 24.—PUGET SOUND SALMON TRAP

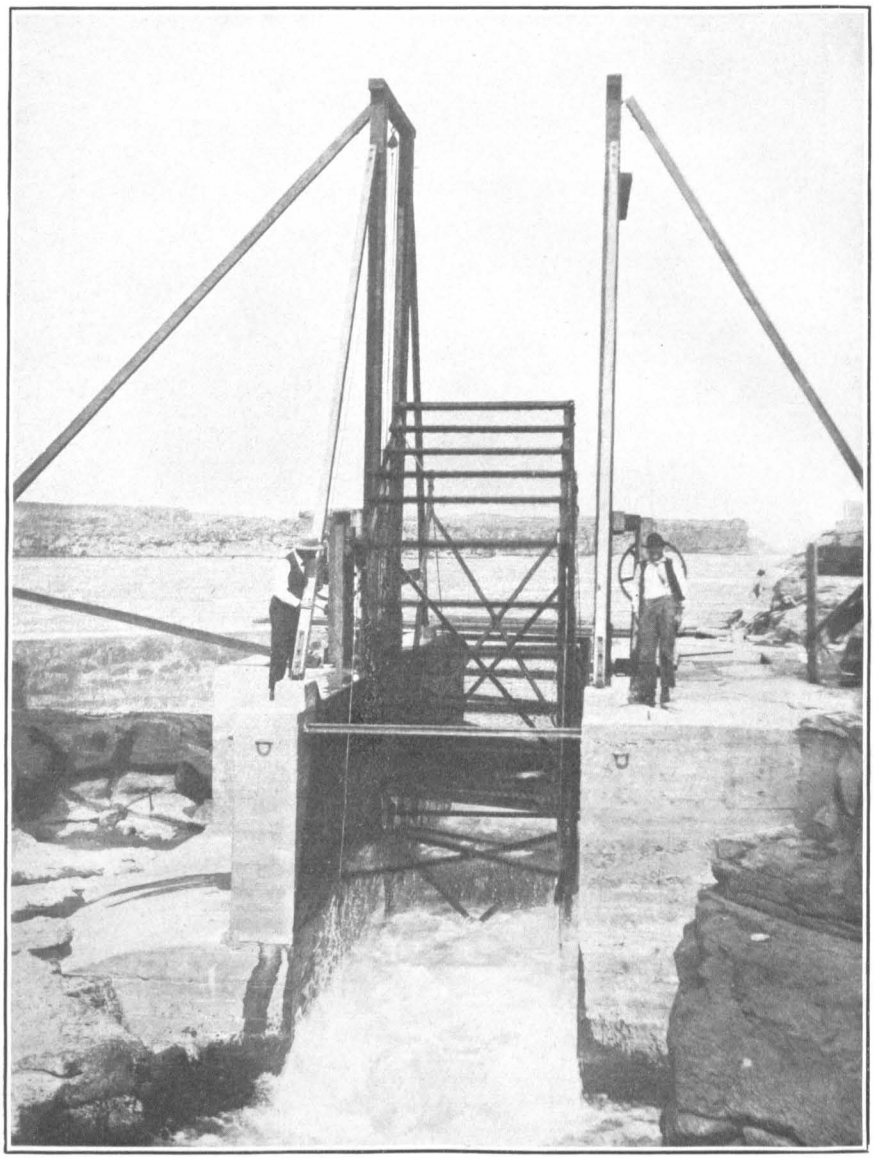

FIG. 25.—A COLUMBIA RIVER STATIONARY FISH WHEEL

at certain stages of tide and in favorable weather, these nets gradually have been supplanted by other devices. In 1909 but five were used, and these were operated off the shores of San Juan, Henry, Steuart, and Lummi Islands, and in the vicinity of Point Roberts. Practically none are used at present.

TROLLING

Each year the catching of salmon by trolling becomes of increasing importance commercially. Although begun a number of years ago the industry never attained prominence until the mild curers created such a persistent and profitable demand for king, or chinook, salmon that the fishermen, who had previously restricted their operations mainly to the use of nets during the annual spawning runs, which last but a small portion of the year, began to follow up the fish both before and after the spawning run and soon discovered that they were to be found in certain regions throughout nearly every month in the year.

Trolling has several advantages from the fisherman's point of view over seine, gill net, and trap fishing. To engage in it, one does not need any very expensive gear, a boat, hooks, and lines being all that are required. Then, there are no licenses to pay and no seasons to observe in many sections, as the fishing is done in many instances beyond the jurisdiction of State waters.

The fishermen comprise all nationalities. While the majority of them are professionals, men of all walks of life are to be found engaging in the business, some on account of their health, others because of reverses in business or lack of work, while still others engage in it from pure love of the outdoor life.

The Monterey Bay (Calif.) trollers use 48 cotton line generally. A few inches below the main lead an additional line is added, with a small sinker on it. This gives two lines and hooks, and as the main line has but the one lead, and that above the junction with the branch line, it floats somewhat above the latter, which is weighted down with a sinker. The main stem is about 20 fathoms in length, while the branch lines are about 5 fathoms each. These lines cost about $3.50 each. No spoon is used, but bait almost invariably. A few fishermen use a spread of stout steel wire, 4 feet long, with 5 or 6 feet of line on each end of the spread, two lines and hooks.

On the upper Sacramento River (mainly at Redding and Keswick) some fishing is done with hand lines. A small catch was made here in 1908, but none were so caught in 1909.

Even as early as 1895 trolling was carried on in the Siuslaw River, Oreg., for chinook and silver salmon.

About 1912 the fishermen living along the lower Columbia River discovered that salmon could be taken by trolling off the bar. A number of them went into the business regularly, while their numbers were greatly swelled by the addition of many of the net fishermen during the regular closed seasons on the river, these not applying to trollers. Some idea of the growth of this fishery off the Columbia River bar may be gained when it is stated that in September, 1915, about 500 boats were engaged in it. It is reported that in 1919 over 1,000 boats were engaged in trolling here.

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At Oregon City and other places on the Willamette River a number of chinook salmon are caught by means of trolling each year, mainly by sportsmen. A spoon is quite generally employed in place of bait. The fishermen claim that the salmon are not feeding at this time, as their stomachs are shriveled up.

For a number of years the Indians living at the reservation on Neah Bay, Wash., have annually caught large numbers of silver and chinook salmon in the Strait of Juan de Fuca. A large number of white fishermen also engage in this fishery at the present time in the same waters, while others troll for the same species, but more particularly silvers, in parts of Puget Sound proper. The ordinary trolling line, with a spoon instead of bait, is used.

Many of the trollers use power boats, and in this event four and sometimes six lines are used. One and sometimes two short poles are run out from each side of the boat (when two are used on a side, one is shorter than the other), the butt being dropped into a chock. Two lines are generally trailed from the stern. At the end of each pole is a very short line with a small tin can attached. A few pebbles are in the can, and as the launch moves slowly through the water with all her lines set, the troller knows when he has a bite by the rattling of the pebbles in the can. Each of the lines attached to a pole is also connected with the boat by a short line from the side to a point on the line about 20 feet from the tip of the latter. When a fish is hooked, the fisherman merely pulls in the line by means of the short piece and then can haul the fish in hand over hand.

The most remarkable trolling region is in southeast Alaska. For some years the Indians here had been catching king salmon for their own use during the spring months, and about the middle of January, 1905, king salmon were noticed in large numbers in the vicinity of Ketchikan. Observing the Indians catching these, several white fishermen decided to engage in the pursuit, shipping the product fresh to Puget Sound ports. They met with such success that 271,644 pounds, valued at $15,600, were shipped. The next year several of the mild-cure dealers established plants in this region, thus furnishing a convenient and profitable market for the catch, and as a result the fishery has grown until in 1928, 3,354,400 pounds of king salmon and 1,320,000 pounds of coho salmon were caught and marketed. The length of the fishing season has also lengthened until now the business is prosecuted vigorously during about seven months in the year, and in a desultory manner for two or three months more, only the severe winter weather preventing operations the rest of the year.

In southeast Alaska the fishermen generally use either the Hendryx Seattle trout-bait spoon No. 5 or the Hendryx Puget Sound No. 8. The former comes in nickel or brass or nickel and brass, the full nickel preferred. The Siwash hook No. 9/0, known as the Victoria hook in British Columbia, is in quite general use. As a rule, but one hook is used, and this hangs from a ring attached to a swivel just above the spoon, while the point of the hook comes a little below the bottom of the spoon. Occasionally double or treble hooks are used. Some fishermen use bait, and when this is done the herring, the bait almost universally employed, is so hooked through the body as, when placed in the water, to stretch out almost straight and face forward as in life.

There are a large number of power-boat trollers in this region. These trollers generally use one pole on a side and one at the stern. The rowboat trollers use but one line, which is attached to a thwart in the boat, handy to their reach when rowing, and trailing out from the stern of the boat.

The trollers usually have temporary camps where they congregate while the fish are to be found in that section, moving on to some more favorable spot when the fish begin to get scarce.

Reports from the trollers of southeast Alaska prove that all species of salmon will take the hook at some time or other in the salt waters of this region, an examination of their stomachs generally showing that they are either feeding or in a condition to feed.

A small commercial fishery is carried on in this region for coho salmon, mainly in August and September, in the neighborhood of Turnabout Island, in Frederick Sound. A Stewart spoon with two hooks on one ring is used, baited with herring in such a way that the fish is straightened out and faced toward the spoon. The sportsmen of Ketchikan also fish with rod and reel for this species in the neighborhood of Gravina Island, using a Hendryx spoon (kidney bait No. 6), which is silvery in color on one side and red on the other. Although much smaller than the king, the coho salmon is more gamey.

During the latter part of March the Gulf of Georgia, in British Columbia, is invaded by large schools of young coho salmon, locally called "bluebacks." They evidently come in from the sea by way of the Straits of Fuca, as their presence is at first apparent in the lower gulf, especially among the reefs and islands off Gabriola Pass. On their arrival these fish are only about a couple of pounds weight, but increase in size very rapidly, with correspondingly voracious appetites. They are to be found in the gulf throughout the spring and summer. By May the fish generally average close to three pounds each when dressed, while in July they are between four and six pounds in weight.

A number of fishermen with power and row boats engage in this fishery, the fish being either sold to the fresh markets or to the canneries.

Trolling lines and spoon baits of one form or another are used. In fishing from power boats the outer lines are attached to fish poles 15 to 18 feet long, rigged out on either side. Those poles are usually hinged at the foot of a short mast and lowered outboard by a halyard running through a block at the masthead, with the additional brace of a forward guy, which, with the drag of the lines aft, holds them in position. It has been customary to use from five to seven lines from each launch, the two outer lines leading from the ends of the poles; the next pair are attached to intermediate tips fastened halfway out on the main pole, while inboard lines are attached to smaller upright rods on either quarter.

The outer trolls are brought within reach (the poles being practically fixtures) by means of a short piece attached to each fishing line 15 or 20 feet from the point where it is fastened to the pole and leading inboard.

Recently, however, the Dominion authorities have decreed that a troller shall not use more than three lines from a boat when trolling for salmon. Should a man be alone in the boat three lines will keep him very busy if the fish are biting at all well.

Spoons are generally used. All shapes are employed, from the ordinary Siwash patterns to wobblers; brass or silver wobblers, of Nos. 4 and 5 sizes, are largely used by the fishermen. Spinners of 2 to 3 inches long are also popular. Copper, copper and silver, and brass spinners of the Siwash and Victoria patterns are very effective, while red beads, feathered hooks, or a piece of silvery salmon skin placed on the hook as an additional bait often add to the attraction of a spoon.

Quite generally the fishermen use single hooks on their spoons. Various lengths of line are used, but on the average about 60 feet for outside lines and 40 for inside are used. As fish can be landed much quicker with a short line, the fishermen generally shorten their lines to 20 or 30 feet when the fish are biting rapidly. Quite heavy lines are used from the pole to the sinker; from there extends a length of light line, and then a piece of wire, to which the spoon is attached. The sinker, which is usually between 2 and 3 pounds in weight when fishing from a power boat and about 1 pound when a rowboat is employed, is attached to the line about 18 feet from the spoon.

The best fishing times are in the early morning and evening, without regard to tidal conditions. The low slack water is always favorable to good fishing.

These fish are delicate flavored, but do not keep well, it being necessary to rush them to market if they are to be sold in a first-class condition.

Considerable numbers of these fish are taken by both American and Canadian fishermen on Swiftsure Banks, off Cape Flattery. As complaint had been made in 1914 that these fish were immature and were unfit for canning because of their appearance after being out of the water some hours, H. T. Graves, acting commissioner of agriculture for the State of Washington, which department is concerned with the wholesomeness of food products, made a thorough investigation of their fitness for food. In a letter to the Pacific Fisherman, Seattle, Wash., and published in that journal under date of August, 1914, he states, among other things, the following:

> The question, therefore, for us to determine was to ascertain their value as a food product. The condition of these fish arriving at the various canneries was carefully noted; samples were selected for bacteriological analysis.
>
> The fish when first taken from the water are very soft when compared with the other salmon. After they have been out of the water 12 hours the fish easily separates from the bony structures, and in the course of ordinary handling in the time which elapses between the hour of taking from the water until they are offered for packing at Sound canneries, which is anywhere from 12 to 48 hours, they become badly broken up and present a rather ugly and distasteful appearance, to say the least.
>
> We found that many different methods of handling were being experimented with by the fishermen and by Puget Sound canneries, but without any noticeable effect. While from a physical observation one would imagine these fish as received at the Sound canneries to be unwholesome, a bacteriological examination by Dr. E. P. Fick, State bacteriologist, indicated that putrefaction was not present, although some of the specimens did contain a rather high bacteria count.

BOW AND ARROW

On the Tanana River, a tributary of the Yukon River, in Alaska, the Indians hunt salmon in birch-bark canoes with bow and arrow. As the canoe is paddled along and the Indian sees the dorsal fin of the salmon cutting the surface of the muddy water he shoots it. The

tip of the arrow fits into a socket, and when struck the tip, which when loose is attached to the stock by a long string, comes out of the socket and the arrow floats, easily locating the fish for the fisherman.

SPEAR AND GAFF

Spears of varying shapes and styles have been in use by the Indians from time immemorial and are still employed on many rivers in which salmon run. With the exception of the Chilkoot and Chilkat Rivers of Alaska, practically all of the catch secured in this manner is consumed by the fishermen and their families. In the Chilkoot River the Indians have built numerous racks in the stream and on the banks, upon which they stand and hook the fish out with a gaff attached to a pole.

SPORT FISHING FOR SALMON

The number of sportsmen who improve the opportunity presented by the appearance of feeding springs and cohos is increasing yearly, and in time this promises to far excel the sport salmon fishing of the Atlantic coast.

On Puget Sound and lower British Columbia waters the anglers generally use ordinary trout fishing rods and tackle, with preferably a short trolling tip on the rod when out for coho. Small spinners of silver or copper, of about an inch in length, or else the small double Tacoma spoons, are very good. A strong gut leader or trace of fine piano wire is frequently used, as the fish's teeth would cut through an ordinary line. Where iron wire is used the salt water rusts it rapidly, and unless the precaution is taken to dry off the wire and oil it after using it can not be used for more than a couple of days. Sinkers of an ounce or two in weight are generally employed with fine line.

Many of the small spoons on the market have very cheap hooks, and these are apt to straighten out or break with the strain of a large fish. Hooks of the best steel will, however, stand up to this strain.

One of the favorite spots for anglers is at the falls on the Willamette River at Oregon City, Oreg. Another is on the Clackamas, a tributary which debouches into the Willamette near here. When the spring run of salmon appears in April, hundreds of anglers, many of them from far distant points, appear to participate in the sport during this month and in May. Many noted sportsmen have fished for salmon at these spots. Among them was Rudyard Kipling,[27] and his experiences were woven into a classic short story.

The fishing ground is spread over a mile's length of the river, from Clackamas rapids to the deadline at the falls. It is not an uncommon sight to see 500 boats, each containing from one to six fishermen and fisherwomen, dotting the river on favorable days during the season.

Two methods of fishing are followed. The most popular is to anchor at the head of the Clackamas rapids or in swift water near the falls and allow the rush of water to spin the trolling hook. In the longer lengths of quieter water the sportsmen troll in slow motor boats or rowboats.

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[27] It was in 1889 that Kipling fished here, and his story was reprinted in The American Angler, Vol. II, No. 2, December, 1917, pp. 415–420.

An inexperienced boatman is apt to find fishing in the rapids or near the falls somewhat dangerous, as the swift water may overturn his craft and carry him to his death before help can reach him.

There is a fishway in the dam, so that the fish can pass up this and into the river above the dam. No fishing is allowed closer than 100 feet of the mouth of this ladder. Up to 1915 there was a second deadline, 600 feet from the falls, beyond which no commercial fisherman could operate nets, but the Oregon Legislature in that year closed the Willamette to all net fishermen from the Clackamas rapids to the falls.

The salmon in the spring run on the Willamette will average about 25 pounds each, but examples weighing 50 pounds and over are not uncommon.

In 1914 the Salmon Club of Oregon was formed of anglers who desired to encourage the use of light tackle in the taking of large game fish, in place of the extremely heavy tackle heretofore used. The following rules were adopted:

The rods used may be made of any material except solid bamboo cane. They must not be less than 5 feet in length and weigh not over 6 ounces.

The line must not be heavier than the standard nine-thread linen line.

Any style of reel or spoon may be used and the wire leader must not exceed 3 feet in length.

The angler must reel in his fish, bring it to gaff unaided, and must do the gaffing himself. If a rod is broken at any time during the struggle with the fish it will disqualify the catch.

As a reward of merit the club awards bronze buttons to all anglers taking, on light tackle, salmon weighing 20 pounds or over; for a fish weighing over 30 pounds a silver button is given, and for any salmon over 40 pounds the lucky angler receives a gold button. Numerous additional prizes are also given by public-spirited citizens.

The season for light tackle on the Willamette River and all other inland streams of Oregon has been fixed by the club from January 1 to July 1.

In 1915 the first angler to win a gold button on the Willamette River did so on April 18, when he took a 42½-pound salmon. On the same day this same angler also won a silver button for a 32½-pound fish and a bronze button for a 26-pound fish.

The Seattle Rod and Gun Club, which has a handsome clubhouse on Seattle Harbor, decided to encourage the use of light tackle also, and for this purpose adopted the following regulations as to tackle, how the king or silver salmon may be caught, and offering buttons for fish above a certain size:

CHINOOK, SPRING OR KING SALMON AND SILVER OR COHO SALMON

Tackle.—The tackle recommended is the following: Rod of wood, with butt and tip, and not to be shorter than 6 feet overall; tip to be not less than 5 feet, and to weigh not more than 6 ounces.

A suitable line of linen (9-strand) with breaking strain of not over 25 pounds.

Leader may be of wire or such material as the angler desires, but shall not exceed 6 feet in length.

Only one hook allowed.

A loose sinker allowed.

Any style of reel or spoon may be used.

Rules.—The angler must reel in his fish, bring it to gaff unaided; and must do the gaffing himself, or if he uses a landing net the latter and the gaff hook should not have a handle longer than 2½ feet. No fish to be landed on the shore. If rod is broken at any time during the struggle with the fish it will disqualify the catch.

All fish entered for club buttons or prizes must be entered round and officially weighed by the club weigher and on scales approved by the club and must be weighed within 48 hours after being caught.

Protests as to weight or manner in which the fish was taken must be filed in writing with the club within 48 hours after the fish is weighed in.

Only fish taken within the waters of Puget Sound and the Straits of Juan de Fuca will be allowed for club competition.

Buttons and prizes.—As a reward of merit the club will award buttons to all members who catch chinook, spring or king salmon, and silver or coho salmon with the tackle as noted above and follow the rules established by the club: Chinook salmon weighing 20 pounds or over, a bronze button; chinook salmon weighing 25 pounds or over, a silver button; chinook salmon weighing 35 pounds or over, a gold button; silver salmon weighing 10 pounds or over, a bronze button; silver salmon weighing 12 pounds or over, a silver button; and silver salmon weighing 15 pounds or over, a gold button.

The Tyee Club of Campbell River, on Vancouver Island, British Columbia, which was organized in 1924, and whose members are limited to amateur anglers who have qualified by taking a salmon of 30 pounds or over by the use of rod, reel, and line unaided, is doing much in British Columbia to popularize sport fishing for salmon. Its regulations as to tackle which may be used are the same as those of the Seattle Rod and Gun Club. A bronze button is awarded for a fish of 30 pounds or over or a gold button for a fish of 50 pounds or over. One button only will be awarded a member, but a bronze button may be exchanged for a gold button when won. Only fish taken within the waters bounded by Cape Mudge and Seymour Narrows will be considered.

DANGERS TO THE INDUSTRY

Man is undoubtedly the greatest present menace to the perpetuation of the great salmon fisheries of the Pacific coast. When the enormous number of fishermen engaged and the immense quantity of gear employed is considered one sometimes wonders how any of the fish, in certain streams at least, escape. High water or low water, either of which will prevent certain forms of apparatus from fishing to any extent while such conditions prevail, storms which impede fishing, and the hundred and one small things which in the aggregate are of considerable importance, however, all aid in assisting the salmon in dodging the apparatus and reaching the spawning beds in safety, while, unless the stream is completely blocked by a tight barricade, an indeterminate number of salmon will escape all the pitfalls man and animals may set for them.

Effects of fish culture.—In some sections an almost idolatrous faith in the efficacy of artificial culture of fish for replenishing the ravages of man and animals is manifested, and nothing has done more harm than the prevalence of such an idea.

While it is an exceedingly difficult thing to prove, the consensus of opinion is that artificial culture does considerable good, yet the very fact that this can not be conclusively proved ought to be a warning to all concerned not to put blind faith in it alone.

When salmon are stripped by man, the eggs fertilized and retained in hatcheries until the young are born, and then planted as soon as the yolk sac has been absorbed, it is manifest that the only saving over the natural method is in reducing the loss in the egg stage. We know that many eggs, after being deposited naturally on the spawning beds, are devoured by other fishes, while sudden freshets

and occasional droughts also claim their toll of eggs. It is highly probable, although we have no positive data on this point, that these losses far exceed those experienced in artificial salmon culture, and whatever this difference is it represents the extent to which salmon hatcheries should be credited as preservers of the industry.

In the opinion of the author, the best way in which to conserve the fisheries of the coast is by enacting and enforcing laws under which a certain proportion of the runs will be enabled to reach the spawning beds and perform the final and most important function of their lives unmolested. If this is done, there can be no question of the perpetuation of the industry, and if it is then supplemented by the work of hatcheries, which would reduce the loss in the egg stage, assurance on this point would be made doubly sure.

If unrestricted fishing is to prevail, however, with a dependence upon hatcheries alone to repair the ravages of man, the industry will suffer seriously, for, from the very nature of things, less and less fish will annually escape through the fishing zone, resulting in a continually lessening quantity of eggs being obtained at the hatcheries, and finally the latter will have to close down from sheer lack of material upon which to work.

Should eggs be brought to the hatchery from other streams, it would merely be "robbing Peter to pay Paul," and in the end the same result would follow in those streams.

Fortunately these matters are becoming increasingly plain to the people of the various States, provinces, and territories concerned, and, while a few selfish persons in each are seeking solely their own enrichment by any means possible, the greater number of those interested in fishing operations want to see the industry perpetuated and are willing to do almost anything that will work to this end.

Immature salmon.—The rapid increase during recent years of salmon trolling and purse seining on the feeding banks off the mouth of the Columbia River and outside the Strait of Juan de Fuca and elsewhere on the coast has resulted in the taking of large quantities of small and immature salmon, and alarm is now felt lest the runs of chinooks and cohos be seriously depleted. Several thousands of large and small boats are being operated on these grounds from five to eight months of the year, and while, when prices were comparatively low, but few of these immature fish were marketed, the high prices which have prevailed during the last four years have caused such an intensity of fishing that many thousands are now caught each season.

Investigations [28] by experts off the mouth of the Columbia in 1918 show that a large proportion of the chinook salmon caught by trolling are 2 and 3 years old. These are generally sold to the canners, who separate them into two groups, those under 5 pounds and those over. Those under 5 pounds are called "graylings" by the fishermen, but a mere glance at them is sufficient to establish their real identity. The reports of one cannery during the period from May 11 to May 29 showed there had been received 4,061 pounds of these fish, none of which weighed 5 pounds. From May 30 to June 12 this same cannery received 548 of these fish having a total weight of 1,483 pounds. As the owner of this cannery was decidedly opposed to the purchase

[28] The Taking of Immature Salmon in the Waters of the State of Washington. By E. Victor Smith, State of Washington, Dept. of Fisheries. 44 pp., 8 pls. 1920.

of these fish, and only bought them because his regular fishermen would have gone to other cannerymen with their full-sized fish had he not taken the immature ones, it is probable that the cannerymen who were not opposed to the practice received a greater proportion of immature fish than he.

An idea of the smallness of these immature salmon may be gained when it is stated that the average weight of sexually mature chinook salmon running into the Columbia River is about 22 pounds.

These small chinooks are said to produce a very inferior quality of canned goods, being rated as second and third grade. The meat is of an ashy color, poor in fat content, and insipid in taste.

Off the Strait of Juan de Fuca the same condition of affairs existed as off the Columbia River, with the added complication that many immature cohos were also captured.

The immature feeding coho deteriorates when taken from the water even more rapidly than does the immature feeding chinook. Within 24 hours of being taken from the water the abdomens may be broken open, the ribs protrude freely, and the flesh begins to deteriorate. It was early found that it was impossible, except through the exercise of extraordinary precautions, to get these fish to the upsound canneries before it was too late, so that of recent years only canneries situated adjacent to the banks were enabled to use them.

The sale of young salmon in the fresh fish markets of Seattle and other Puget Sound cities has been common for years. They are marketed usually as "salmon trout." On the Columbia River they usually are called "grayling."

It is an economic crime to catch and kill these immature salmon, as but little money is obtained for them, while if they were allowed to attain maturity they would increase in weight, in the case of the chinook nearly 1,000 per cent on the average and in the case of the coho about 100 per cent in four or five months' time.

Another bad feature of trolling operations off the mouth of the Columbia River is that trollers, because they operated outside the 3-mile limit, were exempted from the observance of the regular closed season, operative in the river from August 25 to September 10. As a result of this, fishing was carried on continuously throughout the run; most of the gill netters who had to stop fishing in the river put their nets ashore and went outside and engaged in trolling, while canneries on the river bought and canned all the fish brought in. In 1917 the Washington Legislature enacted a law prohibiting possession within the State during the closed season, except for personal use, of salmon caught beyond the 3-mile limit outside the Columbia River. The State court, on trial, held this to be unconstitutional as being an interference with interstate and foreign commerce.

Oregon also adopted the same law as Washington, and on trial this was upheld as constitutional on October 3, 1919, by the Oregon circuit court. However, the law will be of no value if valid in only one State, as if enforced there the fishermen will sell their catches in the other State.

It is quite plain that the salmon runs entering the Columbia River and the Strait of Juan de Fuca can not long continue to exist under this terrific drain upon the immature and mature fish. In the latter section the sockeyes and humpbacks are rapidly being exterminated, and it is probable that the chinooks and cohos, the especial victims in this attack, will soon show signs of exhaustion.

The State authorities appear to be helpless in these matters, but an enactment by the Federal Government could be maintained, as the principle has been applied to fishery matters elsewhere, notably the spring mackerel closed season for five years and the sponge law relating to the landing of undersized sponges taken from the grounds off the Florida coast.

Pollution of streams.—Next to the fishing operations of man, the gravest danger to the salmon fisheries of the Pacific coast lies in the pollution of the rivers which the salmon ascend for spawning purposes. The salmon, both old and young, require pure cold water, and the immense runs which have annually ascended the streams for many years are doubtless due to the fact that such conditions have prevailed in them. The large increase in the population of the coast States within recent years, with the resulting increase of mills and factories, has greatly increased the amount of sewage from cities and towns and the waste of the manufacturing plants. Many of the latter have also constructed dams without adequate fishways, and these also wreak great havoc to the industry by cutting the fish off from the upper reaches of the rivers upon which constructed.

The emptying of sewage into streams ought to be made a crime. It is an exceedingly crude method of dealing with it, and, instead of disposing of the filth, merely transfers it from one place to another, making the water unfit for use at points farther downstream and spreading diseases and death amongst not only the finny but also human users of it.

In the present condition of sanitary science it is a comparatively easy matter to dispose of this filth by modern septic devices, and a number of cities are now disposing of their sewage in this manner.

The irrigation ditch, a comparatively new product on this coast, while of great benefit in developing the arid lands in certain sections, as at present operated is a considerable menace to the salmon fisheries. But few ditches have screens at their head, and as a result many thousands of young salmon slowly making their way to the ocean home pass into and down these to an early doom. Every owner of such a ditch should be compelled to place at its head a screen with fine enough mesh to prevent absolutely the passage through the same of even the tiniest baby salmon.

Animal enemies.—Next to man and his methods the trout is undoubtedly one of the greatest enemies of the salmon. The Dolly Varden follow the salmon from the sea to the spawning beds, and when the eggs are extruded devour countless thousands of them. Many and many a time the writer has seen on the spawning beds female red salmon swimming around with a cloud of trout spread out behind like a fan, following her every movement, eagerly waiting for the moment when the eggs shall appear.

In the summer, when the young are heading for the sea, the trout are lying in wait for them and again take their toll of countless thousands.

Much is said by certain people of the ravages amongst the salmon of certain animals, as the seal, sea lion, bear, eagle, kingfisher, crane, duck, loon, and hawk. While in the aggregate the ravages of these animals are considerable, they are not a drop in the bucket as compared with the direct or indirect ravages of man and his agencies.

FISHING SEASON IN ALASKA

There is much interest manifested in the beginning and end of the salmon-fishing season for the more important waters of the various regions of Alaska. The following table, extracted from United States Bureau of Fisheries Document No. 838, Alaska Fisheries and Fur Industries in 1916, pages 48 and 49, gives dates taken from the statistical reports made by the canning companies. The earliest one reported by any company doing much fishing has been accepted as an opening date, while the closing date was determined by taking the day nearest to which major operations ceased.

Fishing season in the canning industry for salmon caught in certain important waters in Alaska in 1916

Locality	Coho		Chum	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
Southeast Alaska:				
Chatham Strait	June 1	Sept. 27	June 1	Sept. 30
Prince of Wales Island, west side	June 15	Sept. 23	July 1	Do.
Cordova Bay	do	do	do	Do.
Clarence Strait—				
Southern section	June 10	Sept. 29	June 27	Sept. 29
Northern section	July 20	Sept. 30	Aug. 13	Oct. 17
Behm Canal	June 15	Oct. 20	June 15	Oct. 20
Revillagigedo Channel	June 27	Sept. 29	June 27	Sept. 29
Stephens Passage	July 4	Oct. 4	June 22	Oct. 3
Peril and Sumner Straits	June 24	Sept. 27	July 1	Sept. 30
Frederick Sound	June 22	Sept. 21	Sept. 14	Sept. 23
Icy Strait and Cross Sound	June 15	Sept. 20	May 29	Sept. 27
Lynn Canal	July 7	Oct. 1	July 7	Oct. 1
Baranof Island, west side	July 4	Sept. 20	June 20	Sept. 20
Chichagof Island, west side	Aug. 15	Sept. 15	Aug. 5	Sept. 15
Portland Canal	Aug. 16	Sept. 9	July 8	Sept. 3
Iphigenia Bay	June 8	do		
Yakutat Bay and vicinity	Aug. 25	Sept. 28		
Central Alaska:				
Bering River				
Martin River				
Copper River Delta	May 12	Sept. 24	May 12	Sept. 24
Copper River, lake and canyon	May 31	Sept. 16	May 31	Sept. 16
Controller Bay	Aug. 24	Sept. 25		
Cook Inlet	July 2	Aug. 27	June 24	Aug. 23
Prince William Sound—				
Eastern section	July 1	Sept. 30	June 23	Sept. 24
Western section			July 7	Aug. 4
Afognak streams—				
Western part				
Eastern part	Aug. 15	Oct. 20		
Karluk	June 3	Oct. 2	June 3	Oct. 2
Red River			June 8	July 21
Uganik	Aug. 15	Oct. 10		
Olga Bay	June 8	Sept. 1	June 8	Sept. 1
Chignik Bay	June 28	Sept. 9	June 12	Sept. 8
Ikatan Bay	May 22	July 25	May 22	July 25
Cold Bay, Thin Point, and King Cove	June 28	Aug. 15	June 28	Aug. 15
Morzhovoi Bay	June 9	Aug. 11	June 9	Aug. 11
Pavlof Bay				
Western Alaska:				
Kvichak Bay	June 11	Aug. 1	June 11	Aug. 1
Naknek, Egegik, and Ugashik Rivers			June 21	July 31
Nushagak Bay	June 11	Aug. 4	June 11	Aug. 4
Nushagak River	June 24	Aug. 6	June 23	Aug. 6
Port Moller	June 7	Aug. 9	June 7	Aug. 9
Nelson Lagoon			July 1	Aug. 7
Kotzebue Sound	July 20	Sept. 1		

Fishing season in the canning industry for salmon caught in certain important waters in Alaska in 1916—Continued

Locality	Humpback		King		Red	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
Southeast Alaska:						
Chatham Strait	June 1	Sept. 30	June 1	Sept. 22	June 1	Sept. 12
Prince of Wales Island, west side	July 1	do			June 15	Sept. 23
Cordova Bay	June 15	do			do	Do.
Clarence Strait—						
Southern section	June 27	Aug. 16			June 8	Sept. 29
Northern section	Aug. 13	Oct. 17	June 27	Aug. 30	July 13	Sept. 7
Behm Canal	June 15	Oct. 20			June 15	Oct. 16
Revillagigedo Channel	June 27	Sept. 29	June 16	July 16	June 27	Sept. 29
Stephens Passage	June 22	Sept. 21	May 9	July 12	June 21	Oct. 3
Peril and Sumner Straits	June 21	Sept. 30			June 27	Sept. 9
Frederick Sound					June 22	Sept. 21
Icy Strait and Cross Sound	June 1	Sept. 27	May 21	July 15	May 21	Sept. 15
Lynn Canal	July 7	Aug. 24			June 24	Oct. 1
Baranof Island, west side	June 20	Sept. 20			June 8	Sept. 20
Chichagof Island, west side	Aug. 1	Sept. 15			Aug. 1	Sept. 1
Portland Canal	July 8	Sept. 3			July 8	Aug. 18
Iphigenia Bay	June 8	Sept. 9			June 8	Sept. 9
Yakutat Bay and vicinity	July 15	Aug. 10	June 2	Aug. 4	June 2	Aug. 4
Central Alaska:						
Bering River			June 22	June 28	June 6	Aug. 7
Martin River			May 12	July 9	June 12	July 9
Copper River Delta	May 12	Sept. 24	do	do	May 12	Aug. 15
Copper River, lake and canyon	May 31	Sept. 16	May 31	Sept. 16	May 31	Sept. 16
Controller Bay	July 23	Aug. 8			May 27	Aug. 15
Cook Inlet	June 27	Aug. 27	May 27	Aug. 27	May 30	Aug. 27
Prince William Sound—						
Eastern section	June 28	Sept. 24			June 20	Sept. 24
Western section	July 9	Aug. 1			June 17	July 23
Afognak streams—						
Western part	June 20	Aug. 15			May 15	July 31
Eastern part	July 15	Sept. 16			June 1	Oct. 20
Karluk	June 3	Oct. 2	June 3	Oct. 2	June 3	Oct. 2
Red River	June 8	July 21			June 8	July 21
Uganik	June 5	Oct. 10			June 5	July 27
Olga Bay	June 8	Sept. 1	June 8	Sept. 1	June 8	Sept. 1
Chignik Bay	June 12	Aug. 31	June 12	Aug. 31	June 12	Sept. 9
Ikatan Bay	May 22	July 25	May 22	July 25	May 22	July 25
Cold Bay, Thin Point, and King Cove	June 28	Aug. 15			June 28	Aug. 15
Morzhovoi Bay	June 9	Aug. 11	June 9	Aug. 11	June 9	Aug. 11
Pavlof Bay	Aug. 7	Aug. 15				
Western Alaska:						
Kvichak Bay	June 11	Aug. 1	June 11	Aug. 1	June 11	Aug. 1
Naknek, Egegik, and Ugashik Rivers			June 21	July 31	June 21	July 31
Nushagak Bay	June 11	Aug. 4	June 11	Aug. 4	June 11	Aug. 4
Nushagak River	June 17	Aug. 6	June 8	July 28	June 13	Aug. 6
Port Moller	June 7	Aug. 9	June 7	Aug. 9	June 7	Aug. 7
Nelson Lagoon			do	July 21	do	Aug. 9
Kotzebue Sound						

FISHERMEN AND OTHER EMPLOYEES

FISHERMEN

White men do the greater part of the fishing for salmon, many nationalities being represented, but Scandinavians and Italians predominate almost everywhere. A number of Greeks are to be found fishing in the Sacramento, while Slavonians do most of the purse seining on Puget Sound. The native-born American is not often found actually engaged in fishing, but frequently is the owner of the gear or has a responsible position in the packing plants.

A number of Indians participate in the fisheries of Alaska and a few fish in Washington. The only Chinese engaged in fishing are in Monterey Bay. A number of Japanese also fish in this bay, which is the only place in American territory where they fish for salmon. A considerable number of Japanese engage in fishing in Canadian waters.

In many places on the coast, particularly in Alaska, fishing is a hazardous occupation. In Alaska most of it is done in the bays, sounds, and straits, where storms are frequent, and the annual loss of life is heavy. The records of the Alaska Fishermen's Union show for its members the following losses of life by drowning: 1905, 10 men; 1906, 5 men; 1907, 10 men; 1908, 17 men; and 1909, 17 men.

The fishermen early saw the advantages of organization, and nearly every river now has a union which is subordinate to the general organization. One of the most typical of these is the Alaska Fishermen's Union, which has active jurisdiction over all sections of Alaska except a portion of southeast Alaska. This organization enters into contracts with the salmon canneries and salteries, by which the rates of wages, duties, etc., of the fishermen are fixed in advance for a certain period—three years—up until 1918, when an agreement was made for only one year. The same was true in 1919. At present agreements are for 3-year periods. As a result of this mutual agreement upon terms but little trouble is experienced with the fishermen, who generally conform scrupulously to the terms of the contract, and strikes and bickerings, which were very common some years ago, are now almost entirely absent.

CANNERY LABOR

NATIONALITIES

In the early days canning was a haphazard business and workmen came and went as common laborers do in the wheat fields of the West. As the business increased in importance and the need of skilled labor became imperative, men were put to certain work and kept at it from season to season, with the result that in a few years a corps of highly skilled workers had been evolved, and this had much to do with the rapid extension of the industry.

For many years Chinese formed the greater part of the cannery employees, the superintendent, foreman, clerks, machinists, and watchmen alone being white. No other laborers have ever been found to do the work as well or with as little trouble as the Chinese. In times of heavy runs, when the cannery would have to operate almost day and night in order to take advantage of what might be the last run for the season of the sometimes erratic salmon, the Chinese were always willing, even eager, to do their utmost to fill the cans, and, if fed with the especial food they insisted upon having and due regard was had to certain racial susceptibilities, the cannery man could almost invariably depend upon the Chinese doing their utmost.

The Chinese-exclusion law cut off the supply of Chinese, and as the years went by and their ranks became decimated by death, disease, and the return of many to China, the contractors were compelled to fill up the rapidly depleting crews with Japanese, Filipinos, Mexicans, Porto Ricans, etc., with the result that to-day in many canneries special quarters have to be provided for certain of the races—more particularly the Chinese and Japanese—in order to prevent racial hatred from engendering brawls and disturbances.

In Alaska and at a few places in the States Indians are employed in the canneries. In Alaska more would be employed if they could be secured. They make fair work people, but are rather unreliable about remaining through the season.

CHINESE CONTRACT SYSTEM

Cannery labor is supplied largely through the contract system. In the large cities along the coast are agencies, mainly owned by Chinese, which make a specialty of furnishing labor for canning. In the agreement between the canning company and the contractor the company guarantees to pack a certain number of cases during the coming season, and the latter agrees to do all the work from the time the fish are delivered on the wharf until they are ready to ship at the end of the season for a certain fixed sum per case. Should the cannery pack more than the guaranteed number, which it usually does if possible, the excess has to be paid for at the rate per case already agreed upon, while if the pack for any reason should fall below the contract amount, the company must pay for the shortage the same as though they had been packed. The company transports the Chinese to the field of work and carries them to the home port at the end of the season. It provides them with a bunk house and furnishes fuel, water, and salt. The contractor sends along with each crew a "boss," who has charge of the crew and furnishes their food, the company transporting this free.

While this contract system met with favor from some of the cannery men because it relieved them from the annoyance and trouble involved in hiring, working, and feeding their cannery gangs, others, and these the most farsighted, from the early days of the industry viewed it with suspicion and distrust and in a few instances refused to have anything to do with it. While the plan apparently met with no objection from the Chinese when they were the only ones engaged in the work, as soon as other races began to be employed disputes became common, and it is probable that to-day it is the most unpopular feature of the industry from the common workers' standpoint, and mainly because of the abuses which have grown up in connection with it.

Since the beginning of the present century there has been a steady expansion of the salmon-canning industry, with a consequent heavy demand for cannery labor. As a result of the operation of the Chinese-exclusion act during this period the number of Chinese available has been steadily declining; in fact, most of the Chinese now employed are mainly men well along in life, as the few comprised in the rising generation do not wish to follow in their fathers' footsteps. As a result the oriental gang now comprises many nationalities.

The great increase in the number of canneries during the period noted, with the resulting demand for labor, led to the introduction of other nationalities, more notably the Japanese, into the ranks of the Chinese contractors. Many of these operated with very little or no capital and when a bad season occurred they usually passed their losses, in whole or in part, onto their workers, usually by absconding, and when the latter attempted to come back onto the owner of the plant the latter successfully pleaded the fact that he had made a contract with the contractor to do the work at a certain fixed sum per case, that the stipulated price had been paid him, and if he failed to settle with the men it was no concern of the canner.

The contractor, under his agreement with the canner, has the right to feed his employees from the time they leave the home port until they return, and this is a most prolific source of profit and graft

to him and of trouble to the canner. When the workers comprise orientals alone, the food question rarely troubles, as then rice, which is the staple food and is also as a rule quite cheap, meets with the approval of all. But since the gangs now comprise almost as many nonorientals as there are orientals, and the former find it impossible to exist, let alone thrive, on rice, much trouble results when the contractor furnishes them with an undue proportion of the latter in the daily menu. As a result of this condition of affairs, some of the more far-seeing companies now compel the contractor to furnish each nationality with food to which they are accustomed and in sufficient quantities. Eternal vigilance is required in this matter, however, as the wily oriental is always seeking an opportunity to increase his profits by cutting the quantity of food to the minimum and by forcing as much rice as possible upon the employees. Innumerable strikes in the canneries can be traced directly to dissatisfaction with the quantity, kind, and quality of food furnished to the men by the contractor's agent; and the resulting losses, which are sometimes very large, as the strikes generally occur when the cannery has plenty of fish, fall upon the cannery men.

Nearly all of the workers are ignorant men; in most cases they have but little knowledge of English, the language in which the contract is printed, and as no paternal Government watches over them to see that they understand thoroughly the terms of the contract and that it is fulfilled on the part of the employer, as is done in the case of the sailors and fishermen, some of them discover at the end of the season that their pay does not come up to the glowing promises of the agent who recruited them and also frequently discover that there are various fines provided for in the contract, which, while they do not work an injustice when the contractor is honest, yet in the hands of an unscrupulous and grasping contractor, frequently operate to the financial disadvantage of the worker.

Some of the dishonest contractors have developed other methods for fleecing their employees. Sometimes they will furnish to their contract workers, either directly or through some concern in which they have financial interests or which will pay them a commission, an outfit comprising clothing, blankets, shoes, etc., at a price two or three hundred times its real value. The worst feature of many of these outfits is that they are woefully inadequate for use in the climate to which the cannery ship is bound. Some unscrupulous contractors also sell goods to the workers at extortionate prices while at the cannery. The latter is usually not permitted by the canners, who generally operate a store of their own where the men can as a rule obtain goods as cheap as they can be bought in either San Francisco or Seattle.

Orientals are inveterate gamblers, and there are usually several sharpers with each cannery gang, generally with the connivance of the contractor's agent—although it is usually an impossibility to prove this legally—and they inveigle the green hands into all sorts of gambling games, and in this manner frequently succeed in winning all or part of their season's wages. That those in charge of the gang are well aware of what is going on is patent when it is stated that the men are not paid off until they return to the home port at the end of the season, and that no considerable claim on the wages due a worker can be paid unless the contractor or his agent knows what it is for.

Sometimes when dealing with a canner who is insistent upon seeing justice done to the members of the oriental gang, and the number of these is increasing rapidly, an effort is made to camouflage these gambling debts by charging them up on the books as clothing or goods furnished the worker.

As a result of these evils, a number of the cannerymen have discontinued the practice of making Chinese contracts and deal directly with their men. When this is done, it is but rare to hear of a strike due to food supplied, as the cannerymen, when the matter is put directly up to them, realize that the only way in which they can expect adequate work from their employees is by seeing that they are given the proper kind and quantity of food and that they operate under decent working and living conditions.

A few of the cannerymen who still retain the old system endeavor to eradicate so far as possible the evils of it by a close supervision over the food supplied the men and by having a representative present at the season's pay-off in order to see that no attempt is made to cheat the men out of their wages. Unfortunately, however, some of them feel that they have done their full duty when they have made a contract with someone, no matter what his financial responsibility may be, and have paid him the agreed upon sum at the end of the season, doubtless feeling that the rest is the concern alone of the men.

In a very few instances the members of the oriental gang are still shoved into inadequate and insanitary quarters aboard ships, and at the canneries are housed in quarters which are a disgrace to any modern packing plant, but, fortunately, these conditions, as stated, prevail now with but comparatively few of the companies. The old "China" house, in which was housed the whole oriental gang like rabbits in a warren, has been largely superseded by cottages, each housing from 8 to 16 men, and these are numerous enough to permit of the various nationalities flocking by themselves. Bathing facilities, with hot and cold water, are fairly common, and opportunities for washing clothing are frequent.

FISHERIES OF BOUNDARY WATERS

Waters which form the boundaries between States or between nations, and in which fishing is carried on by the citizens of both, have almost always proved bones of contention, and the Pacific coast has been no exception to the rule.

WASHINGTON AND OREGON

The Columbia River, which forms the boundary between Oregon and Washington, affords a typical example of the evils which can result from a division of responsibility between two States. For many years each State enacted laws regulating the fisheries of the river with very slight regard usually to laws already in force in the other State. As a result of this the fishermen transferred their residence for license purposes from State to State as the laws of one or the other best suited their particular purposes.

The fishermen and packers also were in apparently irreconcilable conflict as to the proper means to be taken to conserve the fisheries, and each session of the legislatures saw strong lobbies present to work for certain selfish ends, while the few earnest men who had the

real welfare of the fisheries of the river at heart had difficulty in making the slightest headway against the influence of these lobbies.

To further complicate the matter, in 1894 Oregon claimed that, under the provisions of the enabling act admitting it as a State, it had jurisdiction to the Washington shore, and proceeded to arrest Washington men who were fishing in what was the open season according to Washington law but the closed season under Oregon law.

In June, 1908, the voters of the State of Oregon had presented for their consideration two bills radically affecting the waters of Columbia River. One proposed closing the river east of the mouth of the Sandy River against all fishing of any kind except with hook and line, and was originated by gill-net fishermen of the lower river for the purpose of eliminating fish wheels in the upper waters. This bill was the first presented to the people, and when it appeared the upriver men retaliated by presenting a bill affecting the lower river to such an extent that it practically prohibited the net fishermen from operating.

Very much to the surprise of all concerned both bills were passed and became laws on July 1, to take effect, as provided, on August 25 and September 10, respectively. The Oregon master fish warden proceeded to enforce both laws, arresting all violators on both sides of the river, irrespective of whether or not they were operating under a Washington or Oregon license, and incidentally did the fisheries a great service by bringing prominently before the public the anomalous condition of affairs which was occasioned by the archaic system under which the fisheries of the Columbia were governed. The State of Washington appealed to the United States courts, which, after argument, issued an injunction preventing the warden from enforcing the laws so far as the Washington fishermen were concerned.

In the meantime the attention of the General Government had been drawn to the apparently irreconcilable conflict between the two States, and fearing that in the mêlée the interests of the fisheries would be lost sight of, President Roosevelt, in a message to Congress, after reciting briefly the lack of harmony in jurisdiction by the States, recommended that the General Government take over the control of the fisheries of the Columbia, as well as other interstate rivers.

This had the effect of bringing matters to a head, and negotiations were soon in progress looking to the preparation of a treaty between the two States by which uniform laws would be adopted, and thus each State have concurrent jurisdiction to the opposite shore of the river. The legislatures each appointed a committee of eight members to confer and frame joint legislation. The two committees met in Seattle, Wash., early in 1909, and agreed upon the following recommendations:

First. A spring closed season from March 1 to May 1.

Second. A fall closed season from August 25 to September 10.

Third. A Sunday closed season from 8 p. m. Saturday of each week to 6 p. m. the Sunday following between the 1st day of May and the 25th day of August.

Fourth. We suggest the mutual recognition by each State of the licenses issued to floating gear by the other State.

Fifth. That the State of Oregon repeal chapter 89 of the session laws of Oregon for the year 1907, relative to the operation of purse seines and other like gear on the Columbia River.

Sixth. We recommend the enactment of similar laws in both States carrying an appropriation of at least $2,500 in each State and providing for the destruction

of seals and sea lions and the granting of a bounty on the same, to be $2.50 for seals and $5 for sea lions.

Seventh. We recommend the repeal of both the fish bills passed under the provisions of the initiative and referendum in June, 1907, by the people of the State of Oregon, said bills being designated on the ballot as 318, 319, and 332, 333.

The recommendations were enacted into law by both States, and at the same time the State of Washington in its bill also prohibited fishing for salmon within 3 miles of the mouth of the Columbia between March 1 and May 1 and between August 25 and September 10, or salmon fishing on tributaries of the Columbia, except the Snake, between June 1 and September 15; and also prohibited fishing for salmon by any means save by hook and line in the Kalama, Lewis, Wind, Little White Salmon, Wenatchee, Methow, and Spokane Rivers and in the Columbia River 1 mile below the mouth of any of the rivers named. The agreement was subjected to a rather severe strain, however, when it was discovered that the Oregon Legislature had failed to provide the same closed periods for the tributaries that were enacted for the Columbia, thus leaving the Willamette, Clackamas, Lewis and Clark, and Youngs Rivers and Spikanon Creek open to fishing for 15 days in March and 15 days in April, while the Columbia was closed. The cry of bad faith was at once raised by the Washington fishermen, and for a short time it appeared that the agreement would be broken at the very beginning. The Oregon Board of Fish Commissioners took the matter up, however, and by order closed these streams to all fishing during the times of closed season on the Columbia, and thus restored peace once more.

This agreement continued in force until 1915, when the legislature of each State prepared for a thorough revision of its fishery code. In order to make this revision more effective, committees from both legislatures were appointed and held joint meetings in Portland, where they mutually agreed upon laws covering the fisheries of the Columbia River, and in order to make this agreement more binding the following chapter was inserted in the codes finally adopted:

All laws and regulations now existing, or which may be necessary for regulating, protecting, or preserving fish in the waters of the Columbia River, over which the States of Oregon and Washington have concurrent jurisdiction, or any other waters within either of said States, which would affect said concurrent jurisdiction, shall be made, changed, altered, and amended in whole or in part only with the mutual consent and approbation of both States.

As such an agreement between two States requires the approval of Congress, a bill ratifying the same was introduced in Congress on December 16, 1915, but was not finally ratified until April 1, 1918.

While the compact was pending in Congress, the Washington Legislature at its 1917 session made several changes in the existing fisheries law and contended they were effective because the compact agreement was not ratified by Congress until 1918, which then did not take recognition of the new regulations. When the matter came officially before the superior court of Pacific County, Wash., in 1919, the court held that the compact was valid, thus nullifying laws passed by the State of Washington affecting the Columbia River since 1915, and if this decision stands in the higher courts of both States all laws passed by either legislature since 1915, affecting the Columbia River fisheries, will fail unless they happen to be the same in both States.

WASHINGTON AND BRITISH COLUMBIA

The conditions which prevail in Puget Sound adjacent to the boundary between Washington and British Columbia have also been the cause of serious anxiety to those interested in the perpetuation of the salmon fisheries. The great schools of sockeye salmon which are on their way from the ocean to the spawning beds in the Fraser River pass through this section, and it is here that the greater part of the fishing is done. The Province of British Columbia and the State of Washington are vitally interested in the preservation of these fish.

The condition of affairs on Puget Sound and similar conditions in other boundary waters led the General Government to take up the matter, and on April 11, 1908, a convention was concluded between this country and Great Britain for the protection and preservation of the food fishes in international boundary waters of the United States and Canada. Both Governments appointed international commissioners—Dr. David Starr Jordan for the United States and S. T. Bastedo (who was succeeded later by Prof. Edward Ernest Prince) for Canada—whose duty it was to investigate conditions prevailing in these waters and to recommend a system of uniform and common international regulations. After an exhaustive investigation the commissioners submitted recommendations, which included the following affecting the boundary waters dividing the State of Washington and the Province of British Columbia, these waters being defined as the Strait of Juan de Fuca, and those parts of Washington Sound, the Gulf of Georgia, and Puget Sound lying between the parallels of 48° 10′ and 49° 20′:

GENERAL REGULATIONS

3. Disposition of prohibited catch.—In case any fish is unintentionally captured contrary to the prohibitions or restrictions contained in any of the following regulations, such fish shall, if possible, be immediately returned alive and uninjured to the water.

4. Dynamite, poisonous substances, etc.—No person shall place or use quicklime, dynamite, explosive, or poisonous substances, or electric device in treaty waters for the purpose of capturing or killing fish.

5. Pollution of waters.—No person shall place or pass, or allow to pass, into treaty waters any substance offensive to fishers, injurious to fish life, or destructive to fish fry or to the food of fish fry, unless permitted so to do under any law passed by the legislative authority having jurisdiction.

No person shall deposit dead fish, fish offal, or gurry in treaty waters, or on ice formed thereon, except in gurry grounds established by the duly constituted authorities.

6. Capture of fishes for propagation or for scientific purposes.—Nothing contained in these regulations shall prohibit or interfere with the taking of any fishes at any time for propagation or hatchery purposes, and obtaining at any time or by any method specimens of fishes for scientific purposes under authority granted for Canadian treaty waters by the duly constituted authorities in Canada and for United States treaty waters by the duly constituted authorities in the United States.

12. Capture of immature salmon prohibited.—No salmon or steelhead of less than 3 pounds in weight shall be fished for, killed, or captured in treaty waters.

13. Salmon weirs, etc., above tidal limits prohibited.—No salmon and no steelhead shall be fished for, killed, or captured by means of a net of any sort, any weir or any fish wheel, above tidal limits in any river in treaty waters.

14. Close season for sturgeon.—During the term of four years next following the date of the promulgation of these regulations no sturgeon shall be fished for, killed, or captured in treaty waters.

15. Capture of fish for fertilizer or oil prohibited.—Fishes useful for human food shall not be fished for, killed, or captured in treaty waters for use in the manufacture of fertilizer, or of oil other than oil for food or medicinal purposes.

16. Naked hooks and spears prohibited.—No spear, grappling hook, or naked hook, and no artificial bait with more than three hooks, or more than one burr of three hooks attached thereto, shall be used for the capture of fish in treaty waters. This regulation shall not prohibit the use of a gaff in hook-and-line fishing.

17. Torching prohibited.—No torch, flambeau, or other artificial light shall be used as a lure for fish in treaty waters.

The following regulations relate specifically to the waters named:

STRAIT OF JUAN DE FUCA AND ADJACENT WATERS

The following regulations (62 to 66, inclusive) shall apply to the Strait of Juan de Fuca, those parts of Washington Sound, the Gulf of Georgia, and Puget Sound lying between the parallels of 48° 10′ and 49° 20′ north latitude:

62. Close season for salmon.—From August 25 to September 15 in each year, both days inclusive, no salmon or steelhead shall be fished for, killed, or captured for commercial purposes in these treaty waters; provided, however, that in the waters to the westward of a line drawn southward from Gonzales Point to the shore of the State of Washington silver salmon, or coho salmon, may be fished for, killed, or captured from September 1 to September 15 in each year, both days inclusive.

63. Weekly close season for salmon and steelhead.—From 6 o'clock Saturday morning to 6 o'clock on the Monday morning next succeeding, no salmon or steelhead shall be fished for, killed, or captured in these treaty waters.

It is, however, provided that in the waters to the westward of a line drawn southward from Gonzales Point to the shore of the State of Washington the weekly close season shall begin 12 hours earlier, and shall end 12 hours earlier.

64. Construction of pound nets.—All pound nets or other stationary appliances for the capture of salmon or steelhead shall be so constructed that no fish whatever shall be taken during the weekly close season. The erection or addition to the pound net of a jigger is prohibited.

65. Location of pound nets.—All pound nets shall be limited to a length of 2,500 feet, with an end passageway of at least 600 feet between one pound net and the next in a linear series, such distance being measured in continuation of the line of direction of the leader of such net, and a lateral passageway of at least 2,400 feet between one pound net and the next.

On and after January 1, 1911, the mesh in pound nets shall be 4 inches in extension in the leader and not less than 3 inches in other parts of the net.

66. Nets other than pound nets.—No purse net shall be used within 3 miles of the mouth of any river and no seine within 1 mile of the mouth of any river in these treaty waters.

No gill net of more than 900 feet in length or of a greater depth than 60 meshes shall be used in these treaty waters.

The effort to enact these regulations into law by our Congress met with decided objections not only on the part of the Puget Sound operators, but also from operators in other waters affected, with the result that the bill was shelved and never acted upon finally. After waiting a while to see if any action would be taken by our Government, Canada finally repealed the act in which it had accepted the regulations.

DECREASE IN SOCKEYE SALMON RUN

In 1913 the matter of the Fraser River-Puget Sound sockeye salmon run came prominently to the fore through a rock slide in Hell Gate Canyon, on the Fraser River, caused by blasting operations of a construction gang building a railroad through there. This slide, it was asserted, cut off the greater part of the run to the upper river, and, it was feared, would have a very serious effect on future runs. By the time the run of 1914 arrived the greater part of the débris had been removed from the canyon, and the fish, it was alleged, could once more pass up. Reports of persons who visited these spawning grounds in 1913 and subsequent years were to the effect that but few spawners, as compared with earlier years, were to be found on them.

That the subsequent decrease in the runs was not to be attributed solely to the rock slide in Hell Gate Canyon is plainly evident by a glance at the pack figures in this area before and subsequent to 1913. The following statement shows the combined sockeye packs of the American and Canadian packers operating on the run going to the Fraser River:

	Cases		Cases
1909	[29] 1, 590, 555	1919	98, 409
1910	384, 869	1920	111, 053
1911	189, 767	1921	[29] 142, 598
1912	307, 775	1922	100, 398
1913	[29] 2, 401, 488	1923	79, 057
1914	534, 434	1924	109, 112
1915	155, 714	1925	[29] 147, 408
1916	105, 870	1926	130, 362
1917	[29] 559, 732	1927	158, 987
1918	70, 420		

Aside from the damage caused to the "big year" run by the rock slide, there can be only one explanation of such a progressive decline in the pack, and that is excessive fishing. The fishermen of both countries are to blame for this. On the American side traps, purse seines, and, in a slight degree, gill nets, have taken a heavy toll of the fish as they passed through our waters. After some had safely run this gantlet they met thousands of gill nets operated by Canadian fishermen in and around the mouth of the Fraser River and in the lower reaches of same, and it is a wonder that any of the schools ever got to the spawning beds. Several abortive attempts have been made by the authorities of Canada and British Columbia on the one side and the State of Washington on the other to arrive at some equitable method for protecting this sockeye run. The former especially have professed an earnest desire to do something along this line, and there is no reason to doubt their sincerity. On the American side a few people, and among these a few of the more intelligent canners, pleaded for the enactment of laws that would adequately protect the salmon, but they were overborne by the great bulk of the packers and fishermen who, disregarding all the warnings and teachings of experience, insisted upon going ruthlessly forward with the slaughter, and when reproached with their shortsightedness clamored for the establishment of more salmon hatcheries, as though the latter could accomplish the miracle of increasing the supply of fry from a steadily decreasing supply of eggs.

That this wanton destruction of one of our greatest natural resources should have been permitted to continue unchecked by the people of Washington and British Columbia is a most surprising thing, and indicates either a most remarkable ignorance of the condition, which should have been patent to everybody, or a criminal apathy.

AMERICAN-CANADIAN FISHERIES CONFERENCE

In 1917 a joint commission, known as the American-Canadian Fisheries Conference, was appointed to take evidence and see if it were possible to compose the fishery disputes which had affected the good relations of the two countries for over 150 years. The commission was composed, for America, of William C. Redfield, Secretary of Commerce; Edwin F. Sweet, Assistant Secretary of Commerce; and

[29] The big year, which comes every fourth year.

Dr. Hugh M. Smith, Commissioner of Fisheries; and for Canada, of J. Douglas Hazen, Chief Justice of New Brunswick, who had been for six years Minister of Marine and Fisheries for Canada; George G. Desbarats, Deputy Minister Naval Service; and William A. Found, Superintendent of Fisheries.

Hearings were held on the Atlantic coast in 1917 and on the Pacific coast in 1918, and in 1919 the commission agreed upon and presented to their respective Governments serveral treaties concerning these matters, the only one of special interest here being the treaty covering the sockeye fisheries of the Fraser River-Puget Sound, which was signed on September 2, 1919. Owing to its importance this treaty is reproduced entire below:

CONVENTION FOR THE PROTECTION, PRESERVATION, AND PROPAGATION OF SALMON

The United States of America, and His Majesty George V, of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, King, Emperor of India, equally recognizing the desirability of uniform and effective measures for the protection, preservation, and propagation of the salmon fisheries in the waters contiguous to the United States and the Dominion of Canada, and in the Fraser River System, have resolved to conclude a convention for this purpose, and have named as their Plenipotentiaries:

The President of the United States of America, the Honorable Robert Lansing, Secretary of State of the United States of America, and

His Britannic Majesty, the Honorable Ronald Lindsay, his charge d'affaires at Washington, and the Honorable Sir John Douglas Hazen, a Knight Commander of the Most Distinguished Order of St. Michael and St. George, Chief Justice of New Brunswick, and a member of his Privy Council for Canada.

Who, having exhibited their full powers, found to be in due form, have agreed to and signed the following articles:

Article I

The times, seasons, and methods of sockeye-salmon fishing in the waters specified in Article III of this Convention, and the nets, engines, gear, apparatus, and appliances which may be used therein, shall be limited to those which are specified in the regulations appended hereto, and/or which may be specified in revised, modified, or substituted regulations provided for in Article VI and promulgated in accordance with the terms of Article II.

Article II

The High Contracting Parties engage to put into operation and enforce by legislative and executive action, with as little delay as possible, the provisions of this convention and said regulations, and the date when the said regulations shall be put into operation, shall be fixed by concurrent proclamations of the President of the United States and of the Governor General of the Dominion of Canada in Council. Each of the High Contracting Parties may, by appropriate legislation, provide for the trial, conviction, and punishment within its jurisdiction of any person found there who has contravened any of the provisions of this convention, and/or said regulations within the jurisdiction of the other High Contracting Party and who has not been punished for such offence within the latter jurisidiction.

Article III

It is agreed that the provisions of this convention and of said regulations shall apply to the waters included within the following boundaries:

Beginning at Carmanagh Lighthouse on the southwest coast of Vancouver Island, thence in a straight line to a point three marine miles due west astronomic from Tatoosh Lighthouse, Washington, thence to said Tatoosh Lighthouse, thence to the nearest point of Cape Flattery, thence following the southerly shore of Juan de Fuca Strait to Point Wilson, on Quimper Peninsula, thence in a straight line to Point Partridge on Whidbey Island, thence following the western shore of the said Whidbey Island, to the entrance to Deception Pass, thence across said entrance to the southern side of Reservation Bay, on Fidalgo

Island, thence following the western and northern shore line of the said Fidalgo Island to Swinomish Slough, crossing the said Swinomish Slough in line with the track of the Great Northern Railway, thence northerly following the shore line of the mainland to Point Grey at the southern entrance to Burrard Inlet, British Columbia, thence in a straight line to the southern end of Gabriola Island, thence to the southern side of the entrance to Boat Harbor, Vancouver Island, thence following the eastern and southern shores of the said Vancouver Island to the starting point at Carmanagh Lighthouse, as shown on the United States Coast and Geodetic Survey Chart No. 6300, as corrected to July 20, 1918, and also the Fraser River and its tributaries.

The High Contracting Parties engage to have prepared, as soon as practicable, charts of the waters described in this article, with the international boundary line indicated thereon; and to establish such buoys and marks for the purposes of this convention as may be recommended by the commission referred to in Article IV.

Article IV

The High Contracting Parties agree to appoint, within two months after the exchange of ratifications of this convention, a commission to be known as the International Fisheries Commission, consisting of four persons, two to be named by each party. This commission shall continue to exist so long as this convention shall be in force. Each party shall have the power to fill, and shall fill, from time to time, any vacancy which may occur in its representation on the commission. Each party shall pay its own commissioners, and any joint expenses shall be paid by the two High Contracting Parties in equal moieties.

Article V

The International Fisheries Commission shall conduct investigations into the ife history of the salmon, hatchery methods, spawning-ground conditions, and other related matters, and shall observe the operation of the said regulations appended hereto, and shall recommend to their respective Governments any modifications of, additions to, or substitutions for the appended regulations which may be found desirable.

Article VI

The regulations appended to this convention shall remain in force for a period of eight years from the date of their promulgation, as provided in Article II, and thereafter until one year from the date when either of the High Contracting Parties shall give notice to the other of its desire for their revision, or until the termination of this convention, whichever shall first occur. Immediately upon such notice being given, the International Fisheries Commission shall proceed to make a revision of said regulations, which revised regulations shall be incorporated in a special agreement between the High Contracting Parties. It is understood that such special agreement shall on the part of the United States be made by the President of the United States, by and with the advice and consent of the Senate thereof. Such special agreement shall be binding only when confirmed by the two Governments by an exchange of notes. Such special agreement shall be promulgated as provided in Article II hereof, and shall remain in force for a period of five years and thereafter until one year from the date when a further notice of revision is given as above provided in this article, or until the termination of this convention, whichever shall first occur.

It shall, however, at any time, be in the power of the High Contracting Parties by special agreement upon the recommendation of the International Fisheries Commission, to make modifications of, additions to, or substitutions for any of the regulations in force, and (or) to make the provisions of this convention, and any regulations promulgated in accordance with the terms thereof, operative in the waters specified in Article III of this convention, as to any or all of the other species of salmon, including steelhead. It is understood that such special agreement shall on the part of the United States be made by the President of the United States, by and with the advice and consent of the Senate thereof. Such special agreement shall be binding only when confirmed by the two Governments by an exchange of notes. Such special agreement shall be promulgated as provided in Article II hereof.

Article VII

This convention shall remain in force for a period of fifteen years, and thereafter until two years from the date when either of the High Contracting Parties shall give notice to the other of its desire to terminate this convention.

ARTICLE VIII

The present convention shall be duly ratified by the President of the United States, by and with the advice and consent of the Senate thereof, and by His Britannic Majesty, and the ratifications shall be exchanged at Washington as soon as practicable.

IN FAITH WHEREOF, the respective plenipotentiaries have signed the present convention in duplicate and thereunto affixed their seals.

Done at the City of Washington this second day of September, in the year one thousand nine hundred and nineteen.

ROBERT LANSING, (Seal)
R. C. LINDSAY, (Seal)
J. D. HAZEN. (Seal)

APPENDIX

INTERNATIONAL REGULATIONS FOR THE PROTECTION AND PRESERVATION OF THE SOCKEYE SALMON FISHERIES OF THE FRASER RIVER SYSTEM

SECTION 1

The following regulations shall apply to the waters described in Article III of the convention of September 2, 1919, between the United States and Great Britain, to which these regulations are appended, to-wit:

(Here is inserted the description of the waters affected, as already set forth in Article III above.)

SECTION 2

DEFINITIONS

"Drift net" shall mean a floating gill net that is neither anchored nor staked, but that floats freely with the tide or current.

"Trap net" shall include a pound net.

"Commission" shall mean the International Fisheries Commission appointed under the convention to which these regulations are appended.

"Treaty waters" shall mean all waters described in Article III of the convention to which these regulations are appended.

SECTION 3

(*a*) Fishing for sockeye salmon in the treaty waters within the territorial limits of the State of Washington, shall not be permissible except under license from such state, and in the treaty waters of Canada except under license under the provisions of the fisheries act of Canada.

(*b*) No greater number of licenses for any class of fishing appliance shall be authorized in any year in the treaty waters within the territorial limits of the State of Washington than were issued for such class for the season of 1918, up to August 31st, inclusive thereof, and in the treaty waters of Canada the number of gill nets that may be licensed in any year shall not exceed 1,800.

(*c*) No license shall be granted to any person or partnership in the State of Washington unless such person or each member of such partnership shall be an American citizen, resident in said State, and no license shall be granted to any joint-stock company or corporation in said State, unless the officers, directors and the holders of a majority of the stock thereof, are American citizens, or unless it is authorized to do business in the said State; and no license shall be granted to any person, company or firm in the Province of British Columbia unless such person is a British subject resident in the said Province, or unless such company or firm is a Canadian company or firm, or is authorized by the Provincial Government to do business in the said Province of British Columbia.

(*d*) No one other than a British subject who owns or leases land on either side of the Fraser River above New Westminster Bridge, and who actually permanently resides on, and is cultivating such land, shall be eligible for a license to fish for sockeye salmon between New Westminster Bridge and Mission Bridge, but fishing under such license shall not be carried on below New Westminster Bridge.

SECTION 4

The use of nets other than drift nets, purse seines, and trap nets shall not be permitted in treaty waters for the capture of sockeye salmon.

SECTION 5

No net fishing or fishing of any kind, other than with hook and line, except for hatchery purposes, or scientific purposes, shall be permissible in the Fraser River above the down river side of Mission Bridge.

SECTION 6

During the years 1920 to 1927, both years inclusive, no one shall fish for, catch or kill any salmon from the 20th day of July to the 31st day of July in each year, both days inclusive; and during this close time, no nets or appliances of any kind that will capture salmon may be used in these treaty waters; *Provided, however,* That salmon fishing for hatchery or scientific purposes may be authorized during this period.

SECTION 7

The weekly close time for salmon fishing shall be from six o'clock a. m. Saturday to six o'clock p. m. Sunday, in Canadian waters, excepting in that portion of the Fraser River between New Westminster Bridge and Mission Bridge, where the weekly close time shall be from six o'clock a. m. Saturday to six o'clock p. m. on the following Monday, and in the treaty waters of the United States from Friday at four o'clock p. m. to Sunday at four o'clock a. m. and during this close time no salmon fishing of any kind other than for hatchery or scientific purposes shall be permissible, and during the full period of each weekly close time or annual close season, each trap net shall be closed by an apron across the outer entrance to the heart of the trap, which apron shall extend from the surface to the bottom of the water and shall be securely connected to the piles on either side of the heart of the trap net, fastened by rings not more than two feet apart on taut wires stretched from the top to the bottom of the piles, and such apron, or the appliance by which it is raised and lowered, shall be provided with a signal or flag, which shall disclose whether the trap net is closed, and which shall be of the form and character approved by the commission: *Provided,* that in addition to the foregoing requirement, such trap net shall be equipped with a V-shaped opening, to the satisfaction of the commission, and in the lead of such trap net next to the entrance to the heart and immediately adjacent to the apron, of at least ten feet in width at the top and extending below the surface at least four feet below low water, which V-shaped opening shall remain open and unobstructed during the full period of each weekly close time or annual close season. For the purposes of assuring full compliance with this regulation, the owner or operator of each trap net shall constantly maintain during the weekly and annual close time a watchman, whose duty it shall be to cause each trap net to be kept closed and the lead to be kept open, as above provided.

SECTION 8

All salmon trap nets shall be limited to a total length of twenty-five hundred feet, with an end passageway of at least six hundred feet between one trap net and the next in linear series, such distances being measured in continuation of the line of direction of the leader of such trap net, but in no instance shall more than two-thirds of the width of any passageway at any point be closed by trap nets. There shall also be a lateral distance of at least twenty-four hundred feet between one trap net and the next.

SECTION 9

A salmon purse seine shall not exceed nineteen hundred linear feet in length, including the lead and attachment, measured on the cork line when wet.

SECTION 10

(*a*) No purse seine shall be cast or placed in the water for fishing purposes within twenty-four hundred feet of any trap net.

(*b*) The use of purse seines for the capture of sockeye salmon shall be confined to the treaty waters southward and westward of a straight line drawn from the lighthouse on Trial Island, British Columbia, to the northwest point of Whidbey Island, State of Washington.

SECTION 11

A salmon drift net shall not exceed nine hundred linear feet in length, and the vertical breadth thereof shall not exceed sixty meshes, and the size of the mesh shall not be less than five and three-fourths inches, extension measure, when in use.

Had such a treaty been adopted and rigidly enforced 10 or 12 years ago,[30] it might have had a beneficial effect on the Fraser River-Puget Sound sockeye run, but the destruction of the run has progressed to such an alarming extent during the past 7 years that only a total cessation of all fishing for sockeyes in this section for a term of years could have the slightest beneficial effect. The proposed regulations provide that "during the years 1920 to 1927, both years inclusive, no one shall fish for, catch, or kill any salmon from the 20th day of July to the 31st day of July in each year, both days inclusive; and during this close time no nets or appliances of any kind that will capture salmon may be used in these treaty waters * * *." This closed period runs concurrently on both sides of the line, and while it would have but a very slight effect if the salmon were able to reach the spawning grounds in this short period, it certainly can have none if the Canadian gill netters are enabled to start fishing just about the time the salmon have reached the mouth of the Fraser.

The only hope of rehabilitating the sockeye run—and some well-informed observers have grave doubts whether anything will ever accomplish this desirable result—is to close the waters of Puget Sound through which the sockeyes pass and the Fraser River during the months of July and August or such other period as may be necessary to protect the sockeyes from the time they appear off the capes until they have passed beyond the fishermen on the Fraser River to all salmon fishing for a period of 8 or 12 years. As the sockeyes are 4-year fish—i. e., are born and live in fresh water for about a year, then go to sea, and are not observed again until they return in the fourth year after birth (a small proportion live to 5 years, and a vastly smaller proportion to 6 years), spawn on the breeding grounds of the Fraser and then die—a closed period of less than 4 years could have no appreciable effect, as it would not be a complete cycle in the animal's life, while 8 or 12 years, representing two or three cycles of their life, might possibly have a beneficial effect, although the experiences of the past show clearly that it is much easier to destroy a school of fish than it is to restore a much depleted one.

NEW TREATY PROPOSED

On April 18, 1929, a convention between the United States and Great Britain, looking to the protection, preservation, and extension of the sockeye-salmon fisheries in the Fraser River system, signed at Washington on March 27, 1929, was transmitted by President Hoover to the United States Senate for its action. The convention reads as follows:

PRESERVATION AND EXTENSION OF THE SOCKEYE SALMON FISHERIES IN THE FRASER RIVER SYSTEM

The President of the United States of America and His Majesty the King of Great Britain, Ireland and the British Dominions beyond the Seas, Emperor of India, recognizing that the protection, preservation and extension of the sockeye salmon fisheries in the Fraser River system are of common concern to the United States of America and the Dominion of Canada; that the supply of this fish in recent years has been gravely depleted and that it is of the utmost importance in the mutual interest of both countries that this source of wealth should be restored and maintained, have resolved to conclude a convention and to that end have named as their respective plenipotentiaries;

The President of the United States of America:

[30] This and the succeeding paragraph were written in 1919 and the need for such action is even more imperative to-day (1929).

Mr. Frank B. Kellogg, Secretary of State of the United States of America; and His Majesty, for the Dominion of Canada:

The Honourable Charles Vincent Massey, P. C., His Envoy Extraordinary and Minister Plenipotentiary for Canada at Washington;

Who, after having communicated to each other their full powers, found in good and due form, have agreed upon the following Articles:

ARTICLE I

The provisions of this Convention and the regulations issued pursuant thereto shall apply to the Fraser River and the streams and lakes tributary thereto and to all waters frequented by sockeye salmon included within the following boundaries:

Beginning at Carmanah Lighthouse on the southwest coast of Vancouver Island, thence in a straight line to a point three marine miles due west astronomic from Tatoosh Lighthouse, Washington, thence to said Tatoosh Lighthouse, thence to the nearest point of Cape Flattery, thence following the southerly shore of Juan de Fuca Strait to Point Wilson, on Quimper Peninsula, thence in a straight line to Point Partridge on Whidbey Island, thence following the western shore of the said Whidbey Island, to the entrance to Deception Pass, thence across said entrance to the southern side of Reservation Bay, on Fidalgo Island, thence following the western and northern shore line of the said Fidalgo Island to Swinomish Slough, crossing the said Swinomish Slough, in line with the track of the Great Northern Railway, thence northerly following the shore line of the mainland to Atkinson Point at the northerly entrance to Burrard Inlet, British Columbia, thence in a straight line to the southern end of Bowen Island, thence westerly following the southern shore of Bowen Island to Cape Roger Curtis, thence in a straight line to Gower Point, thence westerly following the shore line to Welcome Point on Seechelt Peninsula, thence in a straight line to Point Young on Lasqueti Island, thence in a straight line to Dorcas Point on Vancouver Island, thence following the eastern and southern shores of the said Vancouver Island to the starting point at Carmanah Lighthouse as shown on the United States Coast and Geodetic Survey Chart Number 6300, as corrected to October 20, 1924, and on the British Admiralty Chart Number 579.

The High Contracting Parties engage to have prepared as soon as practicable charts of the waters described in this Article, with the above described boundaries and the International boundary line indicated thereon. They further agree to establish within the territory of the United States and the territory of the Dominion of Canada such buoys and marks for the purposes of this Convention as may be recommended by the Commission hereinafter authorized to be established, and to refer such of these recommendations as relate to points on the boundary to the International Boundary Commission, United States-Alaska and Canada, for action pursuant to the provisions of the Treaty respecting the boundary between the United States and Canada signed February 24, 1925.

ARTICLE II

The High Contracting Parties agree to establish and maintain a Commission to be known as the International Pacific Salmon Fisheries Commission, hereinafter called the Commission, consisting of six members, three on the part of the United States of America, and three on the part of the Dominion of Canada.

The Commissioners on the part of the United States shall be appointed by the President of the United States, and the Commissioner of Fisheries of the United States shall be one of them. The Commissioners on the part of the Dominion of Canada shall be appointed by His Majesty on the recommendation of the Governor-General-in-Council.

The Commission shall continue in existence so long as this Convention shall continue in force, and each High Contracting Party shall have power to fill and shall fill from time to time vacancies which may occur in its representation on the Commission in the same manner as the original appointments are made. Each High Contracting Party shall pay the salaries and expenses of its own Commissioners, and the joint expenses incurred by the Commission shall be paid by the two High Contracting Parties in equal moieties.

ARTICLE III

The Commission shall make a thorough investigation into the natural history of the Fraser River sockeye salmon, into hatchery methods, spawning ground conditions and other related matters. It shall conduct the sockeye salmon fish

cultural operations in the area described in Article I, and to that end it shall have power to improve spawning grounds, acquire, construct and maintain hatcheries, rearing ponds and other such facilities as it may determine to be necessary for the propagation of sockeye salmon in the water covered by this Convention, and to stock the waters with sockeye salmon by such methods as it may determine to be most advisable. The Commission shall also have authority to recommend to the two Governments the removal of obstructions to the ascent of sockeye salmon in the waters covered by this Convention, that may now exist or may from time to time occur, and to improve conditions for the ascent of sockeye salmon, where investigation may show such to be desirable. The Commission shall report annually to the two Governments what it has accomplished and the results of its investigations.

The cost of all such work shall be borne equally by the two Governments, and the said Governments agree to appropriate annually such money as each may deem desirable for such work in the light of the reports of the Commission.

Article IV

The International Salmon Fisheries Commission established pursuant to Article II of this Convention is hereby empowered, between the first day of June and the twentieth day of August in any year, for the whole or any part of the aforesaid period, to limit or prohibit the taking of sockeye salmon in respect of all the waters described in Article I of this Convention, or in respect of waters of the United States and Canadian waters separately, provided, that when any order is adopted by the Commission limiting or prohibiting the taking of sockeye salmon in regard to waters of the United States or Canadian waters separately, it shall extend to all of the waters of the United States or Canadian waters to which this Convention applies, and Provided further, that no order limiting or prohibiting the taking of sockeye salmon adopted by the International Salmon Fisheries Commission shall be construed to suspend or otherwise affect the requirements of the laws of the State of Washington or of the Dominion of Canada as to the procuring of a license to fish in the waters on their respective sides of the boundary line. Any order adopted by the Commission limiting or prohibiting the taking of sockeye salmon in said waters during said period, or any part thereof, shall remain in full force and effect unless and until the same be modified or set aside by the Commission. The taking of sockeye salmon in said waters during said period in violation of the orders of the Commission adopted from time to time is hereby prohibited.

Article V

In order to secure a proper escapement of sockeye salmon during the spring or chinook salmon fishing season, the International Salmon Fisheries Commission may prescribe the size of the meshes in all fishing gear and appliances operated in the waters described in Article I of this Convention which are frequented by sockeye salmon.

Whenever the taking of sockeye salmon in said waters during said period between the first of June and the twentieth of August in any year is permitted under the orders adopted by the Commission in respect of waters of the United States, any fishing appliance legally authorized by the State of Washington may be used in such waters by any person thereunto authorized by that State, and whenever the taking of sockeye salmon in said waters during said period is permitted under the orders adopted by the Commission in respect of Canadian waters any fishing appliances authorized by the laws of the Dominion of Canada may be used in such waters by any person thereunto legally authorized.

Article VI

No action taken by the Commission under the authority of Articles IV and V of this Convention shall be effective unless it is affirmatively voted for by at least two of the Commissioners from each country.

Article VII

Inasmuch as the purpose of this Convention is to establish for the High Contracting Parties, by their joint effort and expense, a fishery that is now largely nonexistent, each of the High Contracting Parties should share equally in the fishery. The Commission shall, consequently, in regulating the fishery do so with the object of enabling, as nearly as they can, an equal portion of the fish that is allowed to be caught each year to be taken by the fishermen of each High Contracting Party.

Article VIII

Each High Contracting Party shall be responsible for the enforcement of the regulations provided by the Commission in the portion of their respective waters covered by the Convention, and to this end they agree to enact and enforce such legislation as may be necessary to make effective the provisions of this Convention, with appropriate penalties for violations thereof.

Article IX

The present Convention shall be ratified by the President of the United States of America, by and with the advice and consent of the Senate thereof, and by His Majesty in accordance with constitutional practice, and it shall become effective upon the date of the exchange of ratifications which shall take place at Washington as soon as possible and shall continue in force for a period of sixteen years, and thereafter until one year from the day on which either of the High Contracting Parties shall give notice to the other of its desire to terminate it.

In witness whereof, the respective plenipotentiaries have signed the present Convention, and have affixed their seals thereto.

Done in duplicate at Washington, the twenty-seventh day of March, one thousand nine hundred and twenty-nine.

[SEAL] FRANK B. KELLOGG
[SEAL] VINCENT MASSEY

PACKS BY CANADIAN AND AMERICAN CANNERS

Many people on both sides of the boundary line have been under the impression that the American fishermen on Puget Sound have been by far the greatest offenders in so far as the quantity of sockeye salmon taken has been concerned, but a table [31] prepared by Mr. J. P. Babcock, assistant to the Commissioner of Fisheries of British Columbia, for the years 1891 to 1919 and by the author, from various sources, for 1920 to 1927, does not bear this out entirely. Previous to 1891 most of the fishing was done by British Columbia fishermen. The table follows:

Year	Canadian waters	American waters	Total	Year	Canadian waters	American waters	Total
	Cases	*Cases*	*Cases*		*Cases*	*Cases*	*Cases*
1891	176,954	5,538	182,492	1910	150,432	234,437	384,869
1892	79,715	2,954	82,669	1911	62,817	126,950	189,767
1893	457,797	47,852	505,649	1912	123,879	183,896	307,775
1894	363,967	41,791	405,758	1913	736,661	1,664,827	2,401,488
1895	395,984	65,143	461,127	1914	198,188	336,251	534,434
1896	356,984	72,979	429,963	1915	91,130	64,584	155,714
1897	860,459	312,048	1,172,507	1916	27,394	78,476	105,870
1898	256,101	252,000	508,101	1917	148,164	411,538	559,702
1899	480,485	499,646	980,131	1918	19,697	50,723	70,420
1900	229,800	228,704	458,504	1919	34,063	64,346	98,409
1901	928,669	1,105,096	2,033,765	1920	48,399	62,654	111,053
1902	293,477	339,556	633,033	1921	39,631	102,967	142,598
1903	204,809	167,211	372,020	1922	51,832	48,566	100,398
1904	72,688	123,419	196,107	1923	31,655	47,402	79,057
1905	837,489	847,122	1,684,611	1924	39,743	69,369	109,112
1906	183,007	182,241	365,248	1925	35,385	112,023	147,408
1907	62,617	96,974	159,591	1926	85,689	44,673	130,362
1908	74,574	155,218	229,792	1927	61,393	97,594	158,987
1909	585,435	1,005,120	1,590,555				

[31] Fraser River Salmon Situation: A Reclamation Project. By John Pease Babcock. Appendix V, Report, British Columbia Commissioner of Fisheries for the year ending Dec. 31, 1919, p. 3. Victoria, British Columbia, 1920.

METHODS OF PREPARING SALMON

CANNING

EARLY DAYS OF THE INDUSTRY

In the salmon industry canning is and has been almost from the time of the discovery of a feasible method of so preserving the fish, the principal branch. The first canning of salmon on the Pacific coast was on the Sacramento River in 1864, when G. W. and William Hume and Andrew S. Hapgood, operating under the firm name of Hapgood, Hume & Co., started the work on a scow at Washington, Yolo County, Calif. The Hume brothers, who came from Maine originally, had been fishing for salmon in the Sacramento River for some years before the idea of canning the fish had entered their minds, while Mr. Hapgood had previously been engaged in canning lobsters in Maine, and was induced by the Humes to participate in order that they might have the benefit of his knowledge of canning methods. The late R. D. Hume, who worked in the original cannery and later became one of the best-known canners on the coast, thus describes the plant and the methods employed: [32]

Before the arrival of Mr. Hapgood (from Maine) the Hume brothers had purchased a large scow, on which they proposed to do the canning of salmon, and had added an extension to the cabin 18 by 24 feet in area, to be used as a can-making shop. This had a shed on the side next to the river for holding any cans that might be made in advance of the packing season. A few days after the arrival of Mr. Hapgood (March 23, 1864), the tools and machinery were packed and put in position. Mr. Hapgood made some stovepipe and two or three sheet-iron fire pots, and in a short time was ready for can making. The following list of tools and machinery will show how primitive our facilities were as compared with present methods: 1 screw hand press, 1 set cast-iron top dies, 1 set cast-iron bottom dies, 1 pair squaring shears, 1 pair rotary shears, 1 pair bench shears, 1 pair hand shears or snips, 1 pair 24-inch rolls, 1 anvil (weight 50 pounds), 1 forging hammer, 1 tinner's hammer, 1 set punches for making stovepipe, 1 rivet set, 1 grooving set, 2 iron slabs grooved on one side to mold strips of solder, 1 iron clamp to hold bodies of cans while soldering the seams, 1 triangular piece of cast iron about three-eighths of an inch in thickness and 6 inches in length, with a wooden handle attached to the apex, also used for holding can bodies in place while being seamed.

The process of canning was as follows: The bodies of the cans were first cut to proper size by the squaring shears, a line was then scribed with a gauge about three-sixteenths of an inch from one edge, and they were next formed into cylindrical shape by the rolls. They were then taken to the soldering bench and one edge lapped by the other until the edge met the line that had been scribed and fastened there by being soldered a small part of the length to hold them in place for the further purpose of seaming. They were then placed either in the iron clamp, which had a piece of wood attached to its underside, and held firmly, the clamp being closed by the operation of a treadle, or were slipped on a piece of wood, which was bolted to the bench, while being held in place by the triangular hand seamer, which was pressed down on the lap of the seam by the left hand of the operator. When this had been done a piece of solder, which had been prepared by shaking in a can together with rosin, was placed on the seam and melted and rubbed lengthwise of the seam. After cooling the bodies were ready for the end or bottom, which operation was brought about by first cutting out circular blanks with the rotary shears, and then placing them in the cast-iron die and bringing the handle of the screw press around with a swing with force enough to form up the end or bottom. In this operation there were many difficulties, as the ends or bottoms would many times stick to the upper part of the die and refuse to come off, and finger nails were pretty short in those days. To get the ends out of the lower part of the die was not so bad,

[32] The First Salmon Cannery. By R. D. Hume. Pacific Fisherman, Vol. II, No. 1, January, 1904, pp. 19-21.

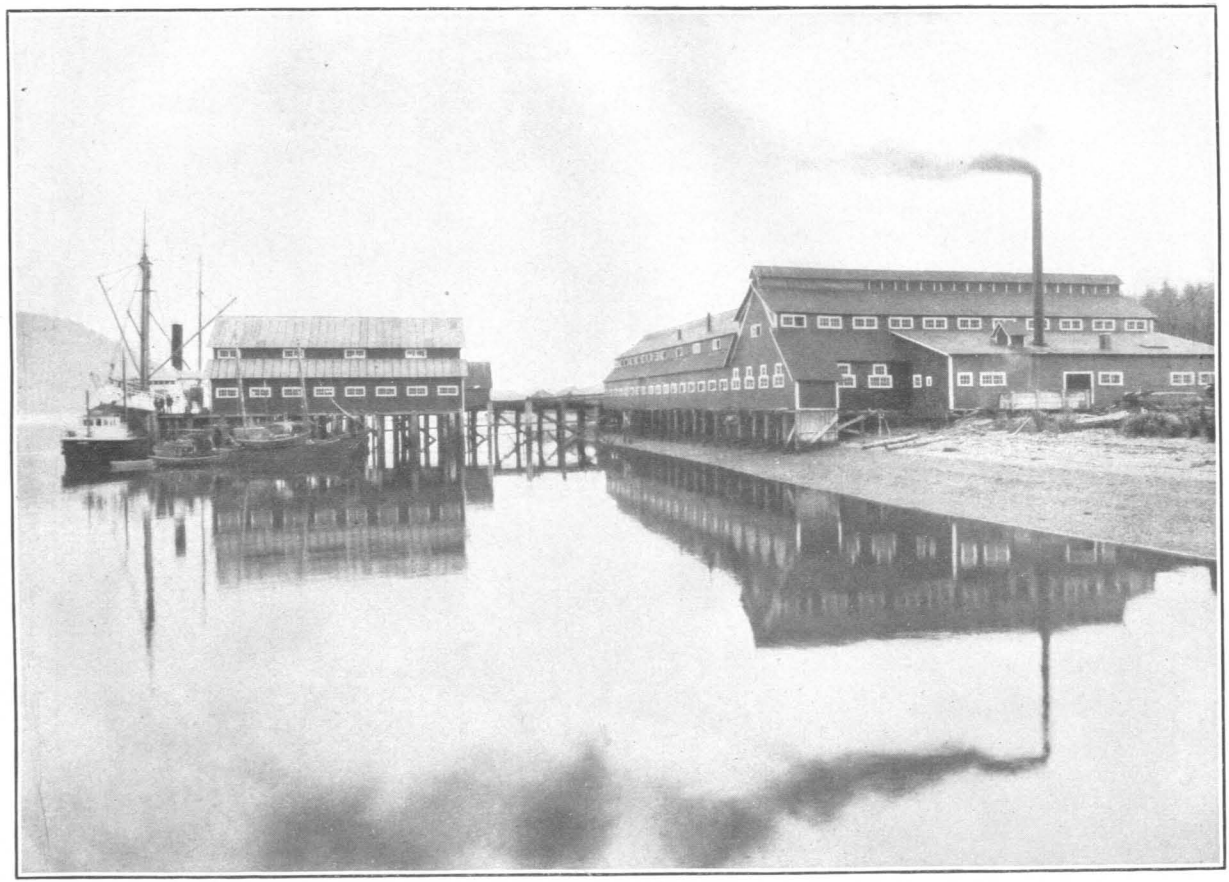


FIG. 26.—SALMON CANNERY AT HOONAH, ALASKA

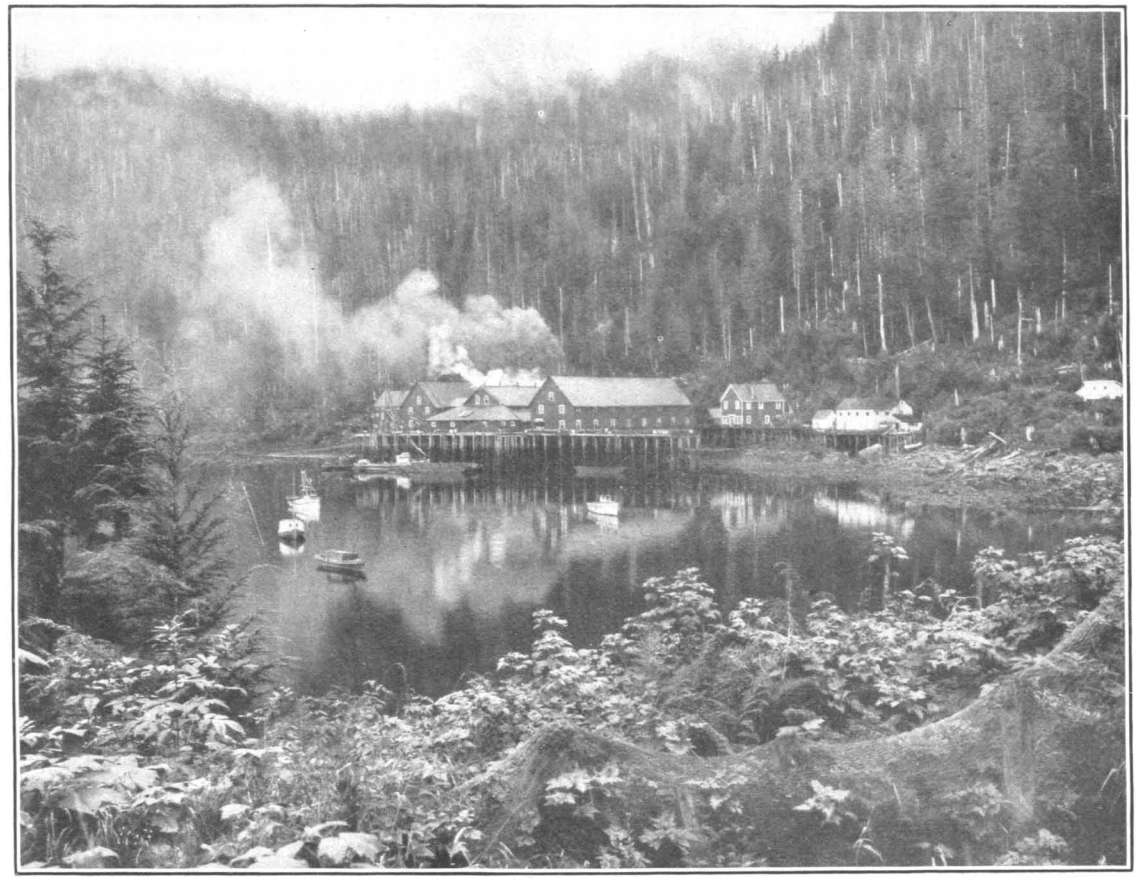


FIG. 27.—SALMON CANNERY AT SANTA ANA, ALASKA

as a wooden plunger operated by a treadle knocked them out, but sometimes they were in pretty bad shape. When the bottoms or ends were ready they were slipped on the bodies and the edge of the bottom rolled about in a pan of powdered rosin until the seam was well dusted. A piece of solder similar in size and preparation as used for the side seam was placed in the can. They were then placed on the smooth side of the cast-iron slabs, and the operator, with a hot soldering copper shaped to fit the circle of the can, melted the solder and by turning the can rapidly soldered the full circumference. The output of this can factory was very imperfect, as at least one-half of the seams burst, owing to the lack of experience of the manager or want of good judgment.

When the can making was well underway Mr. Hapgood then turned his attention to getting the apparatus for canning on board the house-boat. This in the cooking department consisted of a kettle made of boiler iron about 36 inches in diameter and 5 feet in depth, set in a brick furnace and fired from underneath. Alongside was a round-bottom, cast-iron pot holding about 60 gallons of water and heated in the same manner. These kettles, with a dozen coolers or circular sheet-iron pans with ropes attached and with holes cut in the bottoms for drainage, a set of 5-inch blocks and tackle, with a sheet-iron fire pot and a scratch awl, completed the bathroom outfit. The can filling and soldering room was furnished with a table through the center, where cutting the salmon in pieces to suit and the filling of the cans was done. On each side of the room there was a bench running the full length, on the end of one of which the cans were placed to receive the pickle, which was used at that time instead of the small quantity of salt that is placed in the cans during the operations of these later days. After the salmon had been cleaned by removing the entrails and washing them outside the covered portion of the scow, they were brought inside and placed on the table, and a man with a butcher knife in one hand and a stick in the other, which had a mark showing the length of the pieces desired, cut gashes in the side of the salmon as a guide and then cut the fish into sections corresponding to the length of the mark on the stick. He then proceeded to cut the sections in pieces to suit the cans. Then three or four operators placed the salmons in the cans and shoved them along the table to where a boy wiped the top edge and passed them along to two others who placed tops which fitted inside of the rim. The cans were then taken in wooden trays to the bench opposite the starting point, which was fitted with four sheet-iron pots, and at the one nearest the entrance to the house on the scow a man put a soldering flux on the top edge, which was made by adding zinc to muriatic acid, and then with a pointed soldering copper and a stick of solder melted the solder until a small portion could be drawn around the groove formed by the edge of the can and the bevel of the top. From there the cans were taken to the other parts of the bench, where two men finished soldering the head in, and then taken to the third man, who soldered, or, as it was called, buttoned, the end of the seam lap. The cooking department or bathroom, as it was called, was separated from the filling and soldering room by a partition. The cans were shoved through a hole in the partition.

At this time the process was a secret. Mr. Hapgood did the cooking and all the work done inside, no one but a member of the firm being allowed to go in. This privacy was continued until the firm moved to the Columbia River, and, the labor becoming too arduous for Mr. Hapgood to perform alone, a boy by the name of Charlie Taylor was taken in as an assistant. * * *

But to return to the original proposition: When the filled cans had been soldered and entered the bathroom they were put in the coolers and lowered into the cast-iron pot, one cooler of cans being cooked at a time. The cooler was lowered into the boiling fresh water until the cans were submerged to within 1 inch of the top ends and left to cook for one hour; then they were hoisted out and the vent holes in the center of the top soldered up, after which they were dumped into the boiler-iron kettle, which held a solution of salt and water of density sufficient to produce, when boiling, a heat of 228° to 230° F. They were cooked in this solution for one hour and then taken out of the kettle with an iron scoop shaped like a dip net, with a wooden handle about 6 feet in length. They were dumped into a tank of water on the other side of the partition which separated the bathroom from the packing room through an opening in the partition, receiving many a bump and bruise in the operation. Then they were washed with soap and rag to remove the dirt and grease, each can being handled separately. When this was done they were piled on the floor of the packing room and in a few days were painted with a mixture of red lead, turpentine, and linseed oil, for at that time buyers would have no canned salmon, no matter how good the quality, unless the cans were painted red.

When packs of 10,000 to 15,000 cases were made in a season only the absolutely essential machinery was used, the rest of the work, such as cutting and cleaning the fish and placing them in the cans, being done by hand. When larger canneries were constructed, especially in Alaska, where labor is expensive and difficult to obtain, the greater part of the workmen having to be brought up from the States, machinery to do as much as possible of the work became absolutely essential. The inventive genius of the country came to the rescue and one by one machines for cutting, sliming, and cleaning the fish, filling the cans, putting the tops on, and washing them were invented and put into use, while automatic weighing machines were produced and extensive improvements and alterations were made in the machines previously in use. There are to-day many large manufacturing establishments which devote all or the greater part of their facilities to furnishing machinery and supplies to this giant branch of the salmon industry.

When salmon canning was in its infancy, a pack of from 150 to 200 cases was considered a good day's work. Now it is not an uncommon occurrence for a cannery to turn out from 2,500 to 4,000 cases in one day, and there are a number which have even greater capacity.

The usual method of figuring the capacity of a salmon cannery is by the number of lines or units employed. The machinery arranged so that the fish pass through all the operations from filling to double seaming is known as a line, and the capacity is based upon the number of these lines in use in the plant.

During the height of the salmon run, a cannery is an exceedingly busy and interesting place, and a description of the methods used at the present time will show the giant strides the industry has made since the days of Hapgood, Hume & Co.

HANDLING THE SALMON

At convenient spots near the fishing grounds large scows and lighters are anchored and the fishing crews deliver their catches aboard these, the tallyman on each scow keeping a record and giving the crew a receipt. Men fishing near the cannery deliver their catch alongside. Steamers and launches are used to tow out empty scows and bring in those filled. In the old days the fish were pitched by hand into bins on the wharves, but this laborious method has been superseded by the use of an elevator, which extends from a short distance above the top of the wharf to the water's edge, provision being made for raising or lowering the lower end according to the stage of the tide. This elevator is slanting, and is made of an endless chain operating in a shallow trough. About every 2 feet there is attached to the chain a crosspiece of wood. At the top of the elevator are chutes which deliver the fish at various convenient spots on the cutting-room floor.

A comparatively recent invention is the unloading scow. This is a scow divided by kid boards into compartments. On the side is an opening which, when not in use, is closed by planks dropped into grooves. The filled scow is run alongside an elevator with a flaring mouth box at the lower end. A chute is placed between the scow, opposite the door, and the elevator, the door opened, and the fish allowed to slide by gravity into the box, then up the elevator to the fish floor. As one compartment is emptied another is attacked by

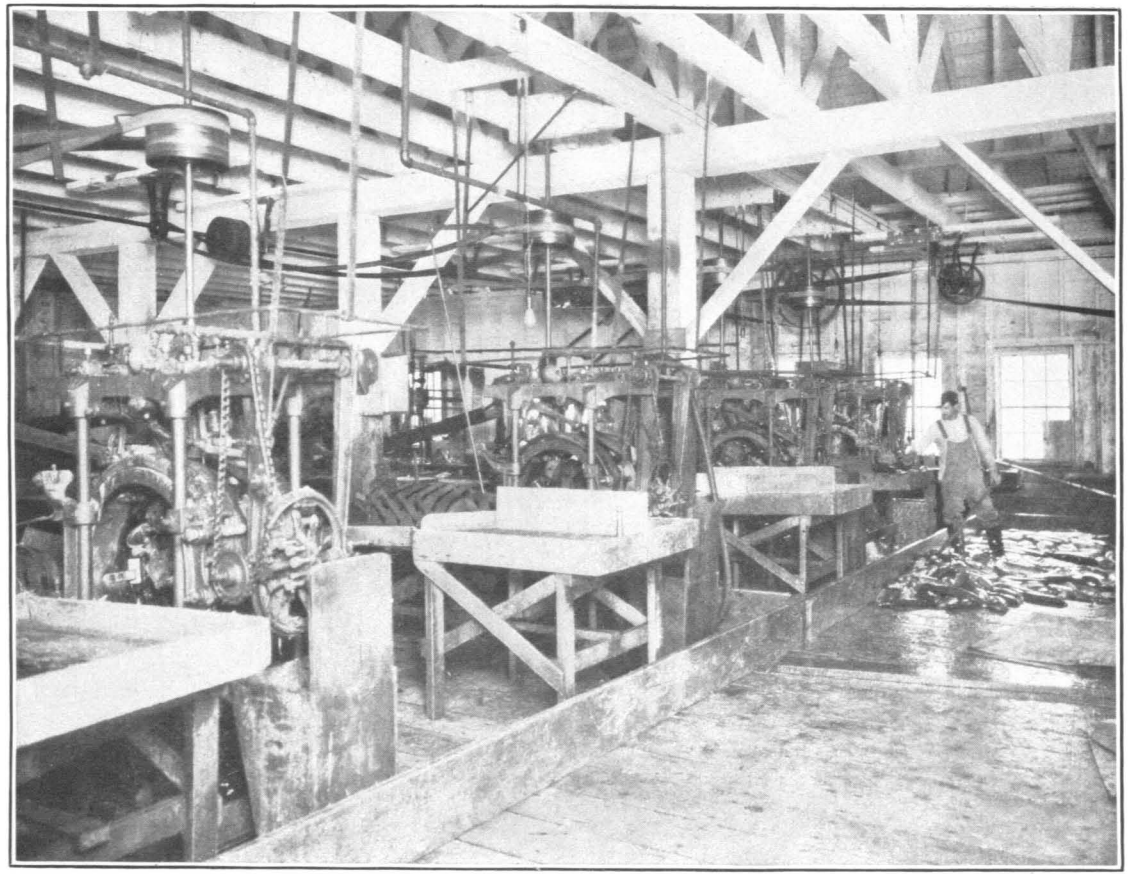


FIG. 28.—A BATTERY OF "IRON CHINKS"

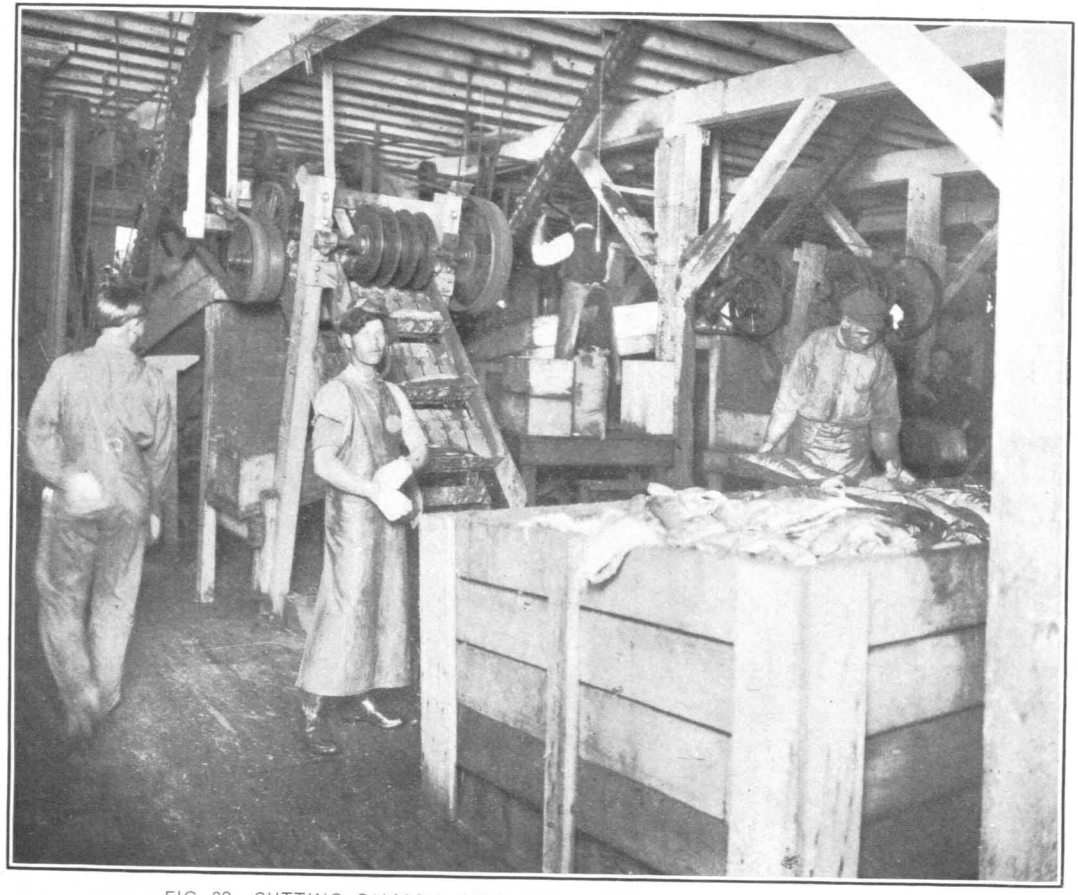


FIG. 29.—CUTTING SALMON INTO PIECES OF A SIZE TO FIT THE CAN

removing the partition boards, and so on until the scow is empty. Should the fish stick, a hose with running water is run a foot or more down into the pile, which loosens the fish and causes them to move freely. By the use of these scows the fish are unloaded in a very short time, with but little labor, and are not marked by pew holes, as under the old method.

If the salmon have been in the scows for from 20 to 24 hours they are used as soon as possible after being delivered at the cannery; otherwise that length of time is usually allowed to elapse, the cannerymen claiming that if not allowed to shrink the fish will be in such condition that when packed much juice will be formed, and lightweight cans will be produced. The danger of canning fish that are too fresh, however, is of minor importance as compared with the tendency in the other direction.

Before dressing the fish a stream of water is kept playing over them in order to remove the dirt and slime, after which men with pews separate the different species into piles.

DRESSING

A number of the small canneries still use the old hand method of dressing the fish, and in such places the selection of the butchering or dressing gangs is of prime importance. Two men constitute a "butcher's gang," and the number of these gangs is dependent upon the output of the plant. Boys place the fish, with the head out, upon the cutting tables. One man cuts off the heads, and is followed by another who removes the fins, tails, and viscera. The offal is thrown into a chute, whence it passes to the reduction plant, from which it shortly emerges in the form of oil suitable for food or soap, dry fish meal for cattle and poultry food, and fertilizer, while the dressed fish is transferred to a tank of water, to be scaled, washed, and scraped. It is then passed to another tank of water, where it receives a second washing, scraping, and final brushing with a whisk-like broom, which removes any offal, blood, and scales that were overlooked in the first washing, after which it is removed to large bins on either side of the cutting machine.

The most useful cannery inventions in recent years have been of machines for doing the work of the dressing gangs. The one commonly known as the "Iron Chink," now in general use in canneries where such machines are employed, was first used in 1903 at Fairhaven (now Bellingham), Wash. It removes the head, tail, and fins and opens and thoroughly cleans the fish ready to cut into pieces for the cans. By the use of these machines the dressing gang is almost entirely done away with, dispensing with 15 to 20 men. This same machine is now so arranged that the fish after dressing are also "slimed;" i. e., the thick mucus covering the skin removed, and the inside of the fish cleaned.

CUTTING

The usual method of cutting the salmon is by a machine. This is generally a large wooden cylindrical carrier, elliptical in shape, thus having a larger carrying capacity. Ledges or rests on the outside the length of the carrier are wide enough to hold the fish, and are slit in cross section through the ledges and outer casing to receive

the gang knives. The latter are circular, fixed on an axle at the proper distances apart, and revolve at the highest point reached by the carrier and independently of the latter. The carrier and gang knives are set in motion, each revolving on its own shaft. As a rest on the carrier comes to a horizontal position, men stationed at the fish bins lay a fish on each ledge as it passes. Thence it is conveyed to the revolving gang knives and, after being divided, passes through on the downward course, sliding off the rest into the filling chute. The knives in these machines are so arranged as to cut the fish transversely in sections the exact length of the cans to be filled.

The rotary cutter shunts the tail pieces to one side, and these are carried by means of a chute to baskets. The tail pieces are generally canned separately. As the tail portion is much smaller, with less meat, it can not be placed in the cans with the middle and head sections without detracting from their value, but if packed under a distinct and separate label, as is now done, there is no reason why the tails should not supply the demand for a cheap grade of fish.

In some of the smaller canneries, especially in those packing flat cans, the gang knives are worked by hand. In this case, the knives are not circular, but elongated or semicircular in shape, tapering at the outer ends. They are mounted on an axle having a large iron lever at one end, and when this lever is raised the ends of the gang knives are thrown up and back. The fish is then placed in position under them and the lever pulled forward, the knives, with a scimitar-like movement, dividing the fish.

The original method of cutting was by means of a long knife wielded by a Chinaman who stood at a regular butcher's block. Although his strokes were incredibly quick, the rotary cutting machine is a vast improvement over the old way.

SALTING

Every can of salmon is seasoned with one-fourth of an ounce of salt, which, to insure uniformity, is added by mechanical means. A table is used, in the top of which are holes equal distances apart. On the underside of the top is a sheet-iron plate, with an equal number of holes, which slides in a groove at the sides, and is worked either by a hand or foot lever. Just below is an open space large enough to accommodate a tray holding 36 or 48 cans. A workman stands in front of the table and slides a tray of cans into the open space. He then throws a quantity of salt upon the table and immediately scrapes this off with a thin piece of wood, each hole being filled in the operation, and the salt being prevented from falling through by the iron plate underneath. The lever is then pressed, the iron plate moves forward until the holes in it are directly under the holes in the table top, when the salt drops through into the cans. This operation can be repeated four or five times in a minute. Most canneries now use a small salter attached to the filling machine and this deposits the required amount in the can as it is passing by on its way to be filled.

FILLING THE CANS

Most canneries now use filling machines for all sizes of cans, although a few, more particularly those packing flat and odd-sized cans, still fill by hand.

The filling machine consists of a chute with a belt to which are attached wire racks about 4 inches apart, set at an angle to prevent the salt from spilling out, into which the salted cans are fed from the floor above and pass into the machine. At the same time the divided sections of salmon pass down another chute into the mouth of what looks like a hand coffee mill. They pass through here down a smaller chute and are forced by two dogs into a receptacle through which the plunger, or filler, passes. Here the plunger comes opposite the open mouth of the empty can, which when it reaches this point is caught by a clasp or hook and held in front of the plunger, which is immediately thrust forward through a chamber filled with salmon, cutting the fish longitudinally and at the same time filling the can. The next movement forces the can out upon a table. When running at full speed, one of these machines will fill about 80 cans a minute.

On being released by the clamp and rolling upon the table they are righted by a workman and pushed onto an endless belt, upon which they pass into the weighing machine. If of the proper weight, they pass through this machine, but if below the required weight the cans are shunted to one side, where workers add the quantity of fish needed, a supply of small bits being kept at hand for this purpose. Generally the cans overrun in weight, frequently as much as 2 or 3 ounces. Occasionally a can is weighed on a small balance scales in order to see that the machine is in perfect adjustment.

After passing the weighing machine any bones and scraps of flesh which may be sticking up out of the can are clipped away by workers armed with scissors.

In the hand method the fillers stand on each side of a long table with a trough running down the middle from end to end. This is filled with the cut pieces of salmon, and the fillers, usually women and children, put large pieces into the cans at first and then smaller pieces to occupy the vacant spaces.

From the weighing machine the cans pass to the clinching machine, which attaches the top of the can loosely to the body in such a way that it allows the air in the can to escape, yet prevents the fish from coming in direct contact with the steam of the exhaust box. Also the water resulting from the condensation of steam, which accumulates in the exhaust box, is kept from entering the can and thus bleaching the flesh.

In many plants the cans are washed by jets of water or steam directed against them in a closed box as they are passing from the clincher to the exhaust box.

The cans then pass into a steam exhauster, consisting in one type of a box about 30 feet in length, in which are three endless-chain belts running side by side. Under and over each belt are steam coils, and under each of the lower coils are single pipes, which through small holes throw jets of live steam upon the coils, creating an intense heat. The cans pass along the first belt, are then transferred to the second belt, on which they return to the entrance of the box, whence they pass to the third belt, and continuing along this to the end pass out to the double seamer, the whole operation occupying from 5 to 15 minutes, preferably 15. One style of exhauster has 10 ovals formed by the pipe, and the cans pass along these from side to side of the exhauster until discharged at the far end. Another type is formed of a long tube through which the cans pass and are heated by per-

forated steam pipes. Upright exhausters, in which the cans travel along a spiral, are also in use. By this means the contents of the can are heated and the greater part of the air exhausted, which is the object of the first cooking in the retort under the method formerly in general use. In Alaska, where 1-pound tall cans form the bulk of the pack, the cans are exhausted at a temperature from 206° to 212° F., 210° being the favorite.

A recent invention, which the inventor claims will do away with the steam exhaust box, and thus save a large amount of valuable floor space in the canning "line," is the power vacuum pump, known as vacuum exhausting machine, by means of which air is exhausted from the cans, accomplishing the same purpose as the steam exhaust box. Some of these machines have been in active use for several seasons, with most satisfactory results. Double seamers in which a vacuum is created in the can before the top is sealed on are now rapidly superseding other types, incidentally doing away with the steam exhauster, thus greatly reducing the amount of space required and doing away with the unpleasantly damp steam which leaked from the steam exhauster.

Leaving the exhauster, the cans pass to the double seamer, which fastens the cover on tightly with a double seam or crimp. It should be stated that no solder is used in attaching the top on the can, the curled flanges of the cover being coated around the outer edge with cement or other sealing fluid to take its place. Solder, however, is used in joining the side seam of the can, this being done when the can is manufactured. The cans then leave the machine on an endless conveyer, pass through a machine which washes the outside of the cans, and thence to the men who transfer them to the coolers, which are immediately placed upon the trucks and run into the retort for the one cooking they are to receive. By the use of these cans the soldering machine used in the old-style method is done away with. It also does away with the first cooking and the subsequent venting and soldering, a saving both in labor and time consumed.

COOKING

The processing time varies in each district and sometimes for each species. In Alaska 1-pound tall reds, cohos, chums, and pinks are generally cooked from 90 to 120 minutes, at 12 to 18 pounds pressure and at a temperature of 242° to 248° F. One-pound flats and half-pound cans are generally cooked about 10 minutes less time. Owing to their larger bones, king salmon are generally cooked from 10 to 20 minutes longer than the other species; steelhead trout also.

On Puget Sound 1-pound tall sockeyes, cohos, and pinks are generally cooked for 90 minutes at a pressure of 10 pounds and at a temperature of 240° F. Halves and 1-pound flats are generally cooked at the same temperature but for only 80 minutes. Chum talls are generally cooked for 105 minutes at a pressure of 10 pounds and at a temperature of 240°; while spring or king salmon are cooked for 120 minutes at a pressure of 10 pounds and at a temperature of 240°.

It is the custom at all canneries, no matter what the system, to allow about 5 minutes at the beginning of the cooking to work up the required heat of the retort, and when cooking is completed there is

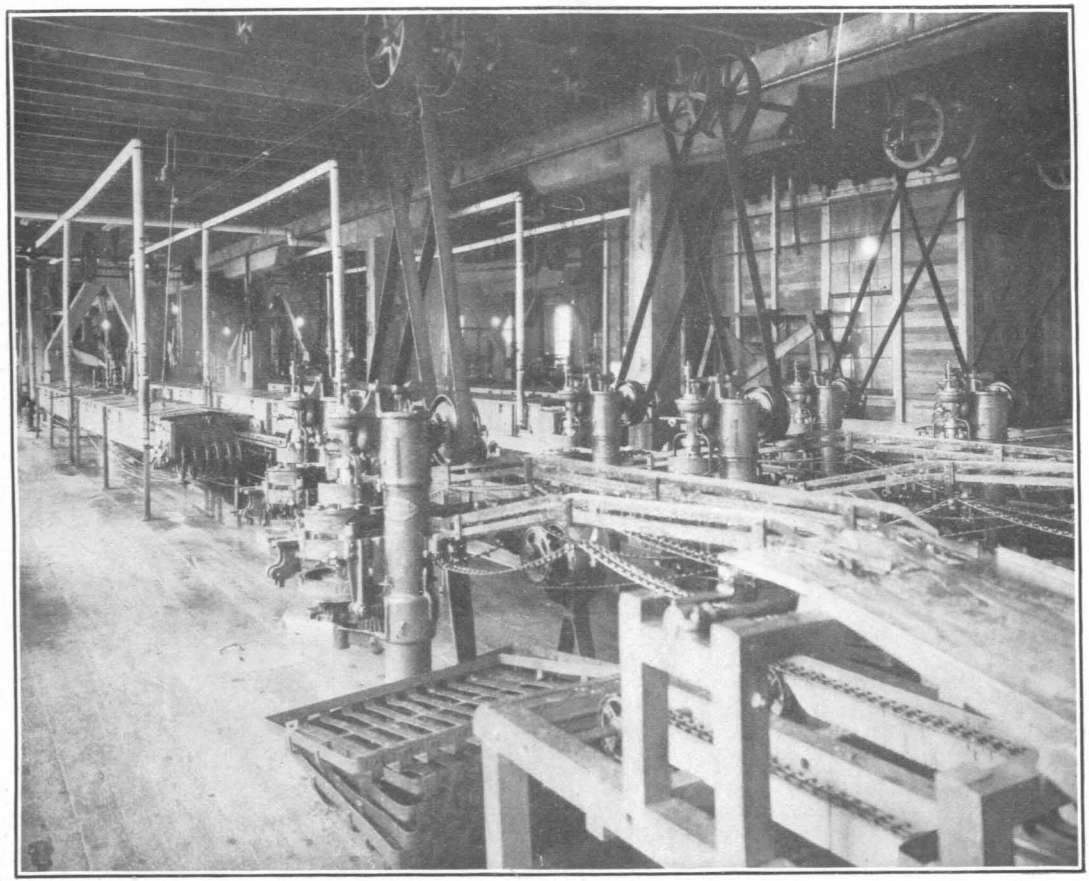


FIG. 30.—EXHAUST BOXES AND THE DOUBLE SEAMERS

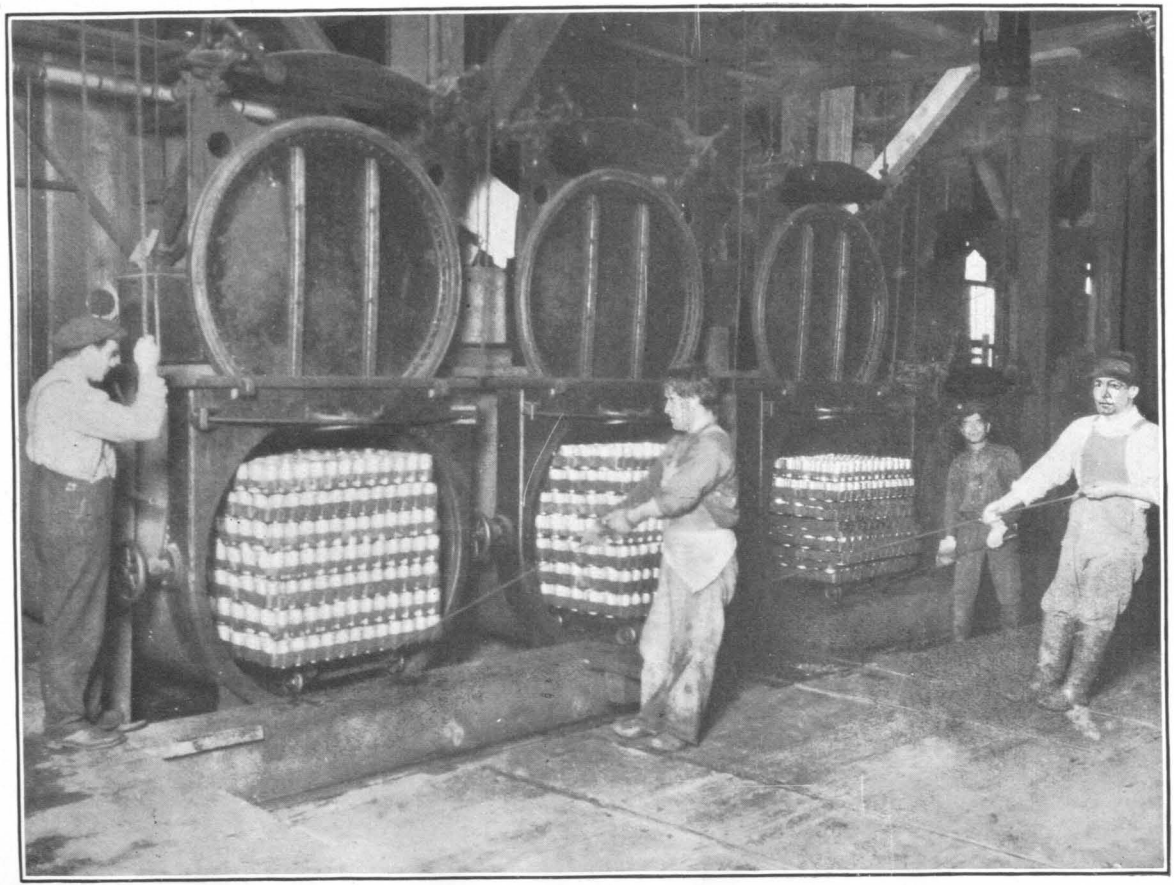


FIG. 31.—COOKING THE SALMON IN RETORTS

a like period for reducing the temperature and pressure before opening the doors. The cooking times given above are exclusive of the two 5-minute periods noted here.

It should be distinctly understood that the processing times noted are only approximate. The condition of the fish, the weather—whether hot or cold, rainy or dry—etc., all must be taken into account. The canner can not go far astray, however, if he keeps generally within the narrow margins noted above. In the early days much secrecy and mystery was thrown about the cooking, and the work was carried on in a separate room, known as the "bathroom," under lock and key. The first cooking was done in common tubs. The early retorts were made of wood. Later, round iron kettles were substituted, nearly one-half consisting of cover, and round crates were used for holding the cans. At the present time only rectangular horizontal iron or steel retorts are used, and access to these is had by means of miniature railroad tracks.

For many years cannery men believed that the double cooking of salmon was absolutely necessary, but in 1898 F. A. Seufert, at his cannery on the Columbia River, at Seuferts, Oreg., a short distance above The Dalles, discarded this idea, and has since used a one-cooking method. By the new process the cans are tested for leaks after the center hole in the top is soldered up, as before, and are left in the retort 70 minutes at 245° F. and 12 pounds steam pressure. According to its originator, this method saves more than one-half the labor in the bathroom, saves nearly one-half the labor in washing the cans after cooking, and also better retains the color of the fish.

REPAIRING CANS

Imperfect cans which are discovered after cooking and are repaired at once and whose contents are recooked are still very good, the only difficulty being that by blowing or venting them a second time they lose weight. The above goods generally go in with the regular pack of their kind and are not classed as regular "do-overs." The latter were generally defective cans, which, owing to pressure of other work, could not be repaired until considerable time had elapsed, by which time decomposition had set in. The cans which can not be repaired immediately are now thrown onto the cannery dump.

On coming from the retort the coolers are lowered into a bath of lye, or, as in some canneries, the cans are run through such a bath on an endless belt, which, with the aid of a slight rinsing and a few rubs with a brush over the top, removes from the can all the grease and other material. The belt then passes them into another bath where the lye is washed off in hot fresh water. The cans then go to the cooling room, where a stream of water is played upon them, or during rainy weather are placed out of doors upon the wharf, and there allowed to cool, in order to stop the heat inside the can from continuing to cook the fish. In some canneries the lye bath before cooling is dispensed with, as the earlier washings are supposed to have cleaned the cans.

The top and bottom of the cans contract in cooling, and for several hours a sharp popping noise is heard. Here, as in nearly every process through which they pass, the cans are again tested, this time by tapping the tops with a small piece of iron about 6 inches long, or,

sometimes, a 12-penny nail. The sound conveys to the ear of the tester an unmistakable meaning as to the condition of the can, and the faulty cans that escape notice during the other tests are almost invariably found in this one.

LACQUERING

A common custom in the salmon-canning industry, but one that is not common in the canning of vegetables, fruits, etc., is that of lacquering the cans. This idea of protecting the can on the outside has been followed from the very beginning for two reasons: (1) That the English market which, at that time especially, absorbed the greater part of these goods insisted on their shipments being finished in this way, and (2) from the fact, as these canners speedily found out, that if they did not protect their cans in some way enormous losses through rust would ensue.

The first experiment of this nature was to paint the cans by hand with red paint, treating each singly. Next a composition of logwood extract and alcohol was tried, which, however, did not produce satisfactory results for a very plain reason—the can was dyed instead of being lacquered. The next attempt was to varnish the cans with a japan varnish reduced with alcohol, but this was found to dry too slowly for speedy handling. After extended experimentation the quick-drying brown lacquer of the present time was evolved, which carries asphaltum in the form of an asphalt varnish as its base, this being supplanted in some cases by gilsonite. This lacquer can be procured in either a heavy or light body, is generally reduced with benzene or gasoline, and is applied according to the requirements of the market, which in some localities demands a heavy coating and in others a much lighter finish, the latter giving a rich golden brown color. Some experiments have also been made in using brighter colored lacquers for this work. Several of these, made to give a bright golden, copper, or other color, are extremely attractive in appearance, while at the same time protecting the tin against rust quite as well as the brown.

The industry soon outgrew the hand method of lacquering, and the process which for a number of years was universal in the trade and is still used by some canneries succeeded it. For this there are a number of rectangular box vats about 40 by 80 inches and 18 inches in depth, the number varying with the capacity of the cannery. These are usually lined with galvanized metal and provided with a gridiron-shaped iron frame, hung from a windlass or other tackle for lifting or lowering from top to bottom of the vat. The cans are loaded on this gridiron, being placed in an inclined position to allow the draining of the lacquer, and are lowered in the vat sufficiently to submerge them in the lacquer with which the vat is charged to a depth of 7 to 10 inches. The loaded gridiron is then raised to the top of the vat and the cans allowed to drain and dry before piling. This method, while being more effective in regard to the volume of work, was still of necessity a very slow and tedious operation. In damp or rainy weather, especially when it is not possible to open warehouse doors and windows, the gas arising from a number of these vats makes effective drying almost impossible.

Another principal objection to this method of lacquering, which applied also to all earlier attempts, was the impossibility of obtaining

FIG. 32.—COOKED SALMON CANS COOLING

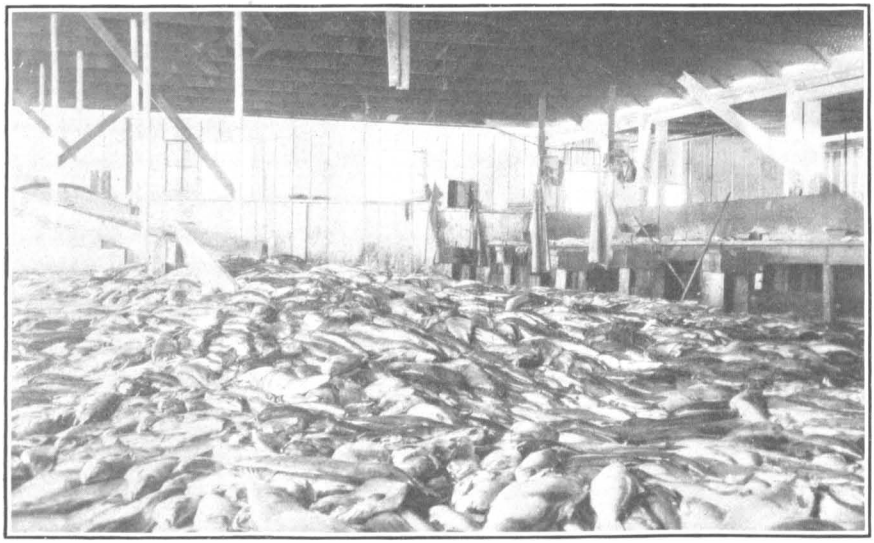
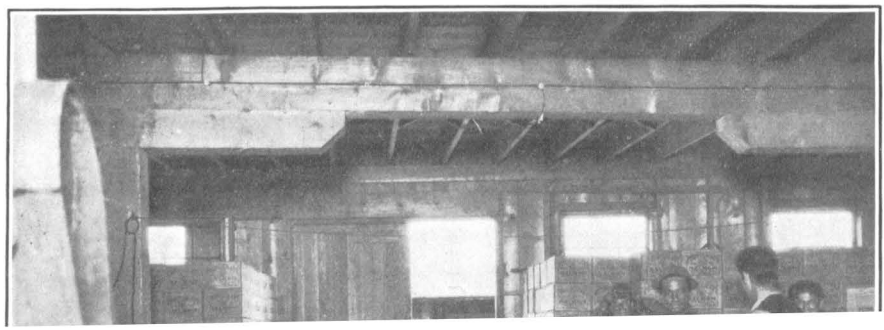


FIG. 33.—SALMON ON THE FLOOR OF THE FISH HOUSE



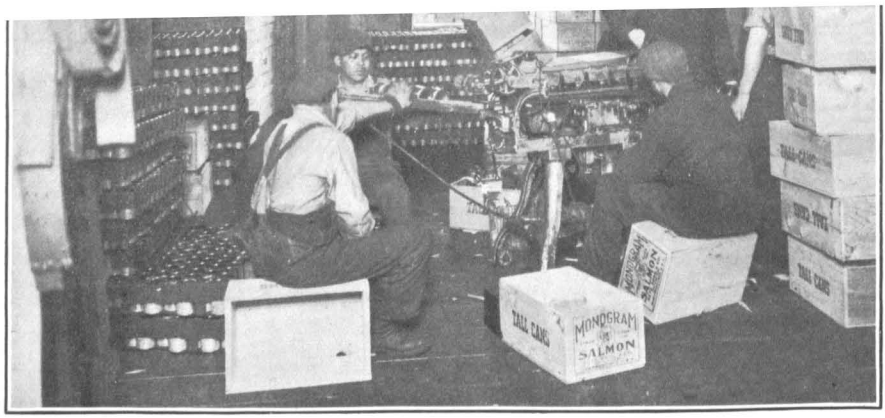


FIG. 34.—SALMON CAN-LABELING MACHINE

an even coat of lacquer when the can was allowed to dry in any stationary position. There was also a large waste by evaporation.

Notwithstanding repeated efforts at invention, however, it was not until 1901 that an effective machine for handling this difficult work was put on the market. The apparatus now in use by a number of canneries receives the cans on a revolving wheel fitted with rests for holding them while passing through the lacquer bath. From here they roll upon an endless chain which revolves the cans as they pass through a long box in which a hot blast dries them before they reach the end of the machine. The rotating or rolling motion given to the can after the lacquer bath, preventing the lacquer from draining to and consequently accumulating on any part of its surface, also has the effect of distributing the lacquer evenly and results in a clean and neatly finished can. The air blast facilitates the work of drying to such an extent that it requires only about two minutes after being deposited on the drying bed of the machine for the cans to be ready for handling, while the quantity of cans which can be handled in a day is vastly greater than by the old method.

A few flat and oval cans are not lacquered, but are protected from rust by wrapping in tissue paper, over which the label is placed.

Several of the largest operators have stopped lacquering the sides of the cans, depending upon the label to protect this portion from rust. Enameled ends are used, and, as these are bought from can makers, these operators are thus enabled to get away entirely from the dangers of lacquering.

LABELING

While machines have been made for this purpose, and some of them are in use, the work is usually done by hand. A number of men or women seat themselves about 4 feet apart in front of the pile of cans. Each man has in front of him a package of several hundred labels, and by bunching them on a slant so that successive margins protrude beyond each preceding, he can apply paste to the entire number with one stroke of the brush. A can is placed on the label, is quickly rolled, and the label is on much quicker than one can tell it. Each man places to his right the cans he labels, forming a pile of length and width equal to his unlabeled pile, and when the entire lot has been labeled it has been shifted only about 4 feet. Cans of fancy brands of salmon put up on the Columbia River and in the Puget Sound region are wrapped in colored tissue paper before the label is put on. Cartons similar to those used by the sardine packers would make good containers for fancy brands and would be much cheaper than the present method.

Some of the canners now have their labels lithographed directly on the tin, and the whole covered with a transparent lacquer.

Several attempts have been made to popularize salmon packed in glass and porcelain jars, and while these have met with some favor, it was not sufficient to warrant a continuance of the practice for any length of time. But few are being so packed at the present time.

BRANDS

A very important feature of the canning industry is the selection of appropriate brands or labels for the various grades of salmon. Each company has a number of these, which it has acquired either

by designing them or by absorbing another company which owned them. A well-known brand has a value in itself and sometimes is a very important asset. A company will sometimes market a considerable part of its product in one section, and here, where the consumer has become familiar with the brand and pleased with the contents of the can, he will ask for and accept no other, despite the fact that the latter might be, and probably is, the equal of the product he has been using.

For many years but few salmon canners appreciated the value of a can label, and it has taken some bitter experiences to drive home to the rest that a properly designed label placed upon good goods and the owner protected in its use by the law has real value, just as much as boats, nets, buildings, machinery, or the thousand and one material things required to carry on the business.

A free trade definition of a label would be that it is an artistic representation or intellectual production, stamped directly upon an article of manufacture, or upon a slip or piece of paper or other material, to be attached in any manner to manufactured articles, to bottles, boxes, and packages containing them, to indicate the contents of the package, the name of the manufacturer, or the place of manufacture, the quality and quantity of the goods, directions for use, etc.

Labels are subject to the copyright law and should be registered before use or publication. If not registered, there is no protection in law against infringement. The continued use of a label, however, will give the person so using a certain proprietary right in it, which can be enforced in a court of equity and may be defended by injunctions, which will generally be granted. Such proceedings are expensive, annoying to a busy man, and at best will protect one only after at least a certain amount of damage has been done, and it is far safer to avoid this by registering the label at the time of issue, which will give one the further advantage in that a description of the character and quality of the article labeled can be set forth, which will, to a certain extent at least, be protected with the label.

The commercial value of a label and name is represented by the more or less general demand for the goods protected by it. In the canned-salmon industry, as in that of other food-packing industries, certain labels, through the good quality of the goods marketed under them and the publicity created for them, have become of very considerable value to the owners. A case in point is the label Royal Crown, owned by the late R. D. Hume. This was one of the earliest brands marketed in England, and some years later a certain Liverpool firm of salmon handlers paid Mr. Hume the sum of $10,000 for the exclusive right to its use in England.

In designing a label there are several things which should be borne in mind. It should bear an easily remembered name and design; a name difficult of pronunciation should be avoided at all costs. For many years glaring red labels have been popular, but the success met with by those using more subdued and artistic designs and coloring indicates that the public appreciate them more than they do the older and coarser types. The design should be as simple as possible, as experience has demonstrated that a simple form—so simple that it can be fully understood by a mere glance—will gain by regular repetition, while a more complicated design will lose in this process.

A good many now in the business still remember the small label that was used on salmon cans before 1870. Labels about 3 by 5

inches in size, printed in one color, on white or colored newspaper, served merely the purpose of distinguishing cans, telling contents and manufacturer, and were without commercial value. About the year 1870 a few canners commenced to import from the East and Europe full-sized labels, i. e., labels that went all around the can. These were called by some "Pennington" labels, as a firm of that name supplied quite a number of them.

For some years they were used for the best grades only. They were printed in four and five colors, the design showing invariably a number of panels of different shapes and sizes. The lettering was not always plain and sometimes even intentionally irregular and puzzling. The colors were placed side by side, in boldest contrast, without any attempt to harmonize them.

It was soon discovered that the highly colored panels, while striking, lost all effect when massed on the retailer's shelves, and the different brands looked so much alike that the individual designs could not well be remembered by the customer, the only really distinctive feature being the name, and that was generally printed so small and indistinct that it could not be readily seen at a distance.

To remedy these defects, the designers soon reduced the number of panels and subdivisions, increasing meanwhile the size of the remaining ones and filling them with distinctive designs, still colored as simply as before, with no attempt at blending of colors. The background, at first perfectly plain, commenced to show patterns more or less complicated, and at times quite pretentious, so as to take away from the design proper.

Gradually the panel design disappeared. In place of it some showed one continuous picture on the label, which was very unsatisfactory and soon disappeared, as only a fraction of the picture could be seen at one time. Others had two subdivisions, one showing the name of the brand with its illustrations, occasionally used as a trade-mark, the other showing the article packed in the can, both named and illustrated. Unfortunately, these subdivisions were so large that the roundness of the can prevented one from seeing the picture as a whole, but this was soon remedied by making the subdivisions narrower and filling in between with directions, weight of contents, etc.

From this point on the general plan of labels underwent few changes except that the work, both of the artist and pressman, improved wonderfully, some of the labels now designed and printed being real works of art.

Up to a few years ago one of the most serious evils in the trade was the use of misleading and lying brands. The high-grade product would almost invariably be correctly and fully branded, but "chums" and "pinks" were usually branded as "Fresh salmon," "Choice salmon," etc., which would deceive all persons but those well acquainted with the industry. "Do-overs," and very poor fish, were usually marketed under a brand which bore the name of a fictitious company or of no company at all.

The passage of State laws of varying degrees of efficiency governing the branding of salmon helped slightly to remedy this condition of affairs, but it was not until the pure food and drugs act, approved June 30, 1906, was put into force by the Government that any radical improvement was noticeable. At the present time but few misleading brands are in use.

BOXING OR CASING

A case of salmon generally contains 48 one-pound cans or their equivalent, i. e., 24 two-pound cans or 96 half-pound cans. Some canneries pack their half-pound cans in cases of 48. These cases are usually made of wood and cost from 9 to 11 cents each knocked down.

CAN MAKING

Some of the canneries in the coast States and Alaska purchase their cans ready-made, but the usual method is to purchase the sheet tin and make up the cans in the canneries. This is especially necessary in Alaska, as it would be impossible to find room on the cannery ships for such a bulk as they would make in addition to the other supplies necessary. Furthermore, the making of cans provides work for a large part of the crew, otherwise unemployed while the rest are getting ready the other necessary paraphernalia. The work is done by machinery and occupies several weeks' time.

Of recent years the objection to the great amount of space occupied by the cans when shipped by freight has been overcome by making the body of the can, pressing it flat, and shipping it in this compact shape along with the ends. At the cannery is a machine for rimming the flattened body into a round shape once more, when the end can be put on with the regular double seamer.

CANNING SMOKED SALMON

A number of ventures in the line of canning smoked salmon have been made on this coast, but most of the pioneers were not content or able to invest the amount of capital needed and wait the time required to create a demand for such products, and soon quit.

One of the leading British Columbia packers, H. Bell-Irving & Co., some years ago put up in cans some pink salmon which had been treated to an artificial smoke in a vat, and these are said to have made a favorable impression in Australia. Another canner operating on the Fraser River smoked pink salmon, and then, cutting them to the proper length, packed them dry in half-pound cans.

In 1908 the Columbia Canning Co. put up at its cannery on Chilkoot Inlet, Alaska, some smoked salmon which had been shaved into thin strips like dried beef. These, called "Flaxamo," were packed in oil and were very good, especially in making sandwiches.

In 1915 two companies began in Seattle the smoking, slicing, and canning of coho and king salmon. These were put up in oblong flat cans of various sizes, similar to sardine cans, 2¼, 4½, and 7½ ounces, respectively, while for a special trade a 7½-pound can was also packed. These fish were cut quite thin, about 40 to 50 slices to the pound, and were packed in hermetically sealed cans with cottonseed oil. The fish were all hard smoked before slicing and canning. The business was abandoned the next year but was resumed by another company in 1928.

The same companies are also putting up kippered salmon in cans.

Salmon loaf, made by mixing salmon with flour and various other ingredients, thus producing a paste, is also being canned by several packers.

A straight salmon paste, made solely from the flesh of the salmon, and mixed with oil and spices, is being manufactured by one of the leading packers.

FIG. 35.—MAKING SALMON CANS

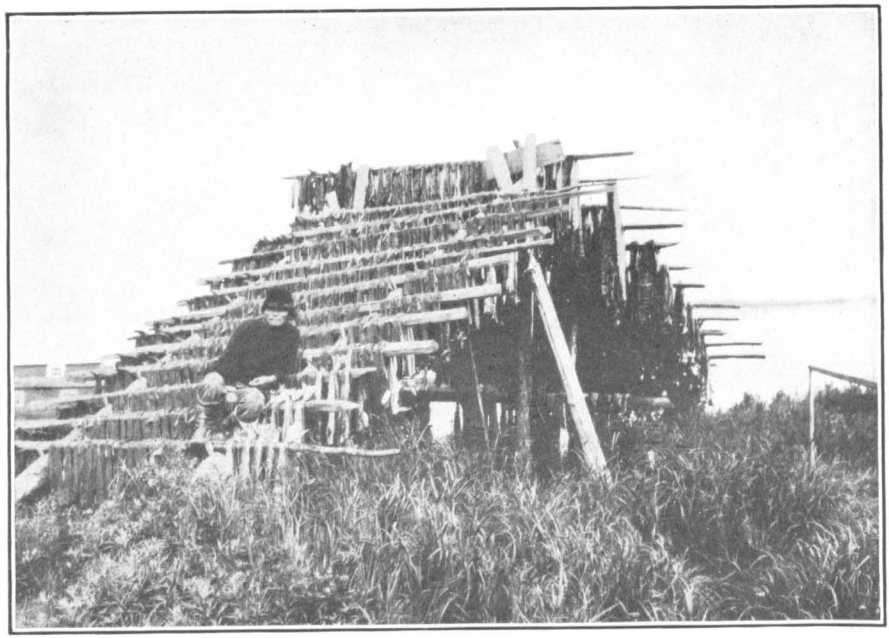


FIG. 36.—AN INDIAN SALMON DRYING RACK, BERING SEA, ALASKA

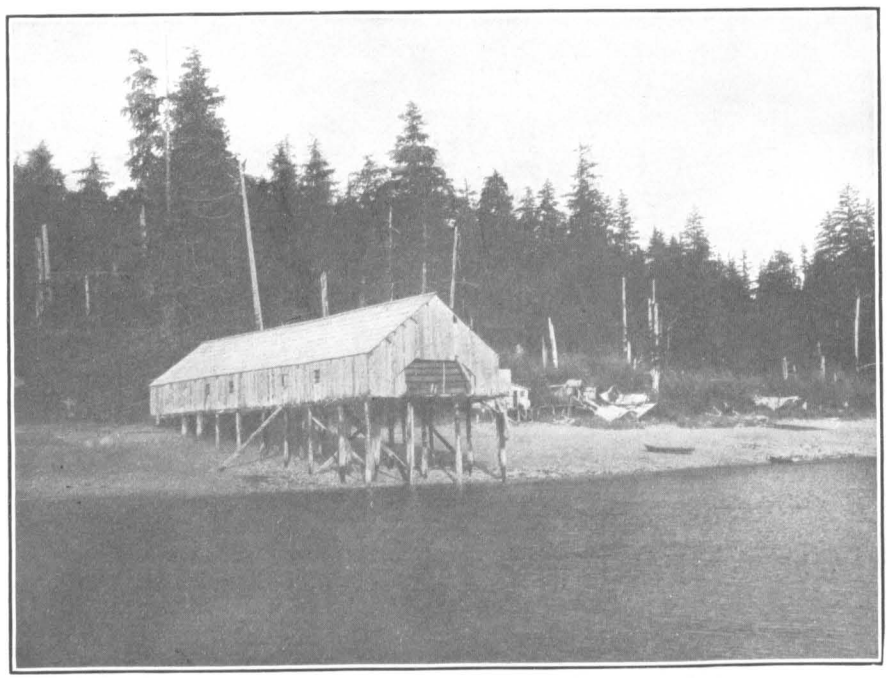


FIG. 37.—THE BARONOVICH SALMON SALTERY; THE OLDEST SALTERY IN ALASKA

HOME CANNING

At a number of places along the coast it has become the custom for the thrifty housewives to do a little home canning of salmon for winter use when the fish are abundant and cheap, and they find canning salmon as easy as canning vegetables and fruit. The fish are dressed, skinned, and the backbone removed. It is then cut into transverse strips of a size to fit either a pint or a quart glass jar, whichever is to be used. The jars are then filled with the pieces, salted to taste, the rubber ring put on, after which the can cover is put on loosely so that the steam may escape. Strips of thin wood are placed at the bottom of a kettle or wash boiler and the cans set down on them. Enough cold water is then poured into the kettle to bring it up to within about 2 inches of the top of the cans. The kettle is then put on the stove and, after it comes to a boil, note is made of the time, and the cans are cooked from one and one-half to three hours. There seems to be a great variation in the time of cooking on the part of the operators. Some even cook only one hour, but these generally use a preservaline. About three hours seems to be the best time, as the bones are then quite soft. At the end of the cooking period the tops are tightened, the kettle removed from the stove, and the water and cans allowed to cool in the kettle.

Portable retorts and hand double seamers are now available for household use, and as a result many are using tin cans as containers. A recent improvement on the double seamer permits of the use of a tin container three times, thus materially reducing the heavy expense for cans.

INSPECTION OF PLANTS PACKING CANNED SALMON

For some years there has been a desire on the part of a majority of the salmon canners for some form of inspection of the plants and of the pack made. The widespread suspicion that the salmon pack of 1918 was considerably below standard, which suspicion resulted in heavy monetary loss to the packers, gave a great impetus to this desire. The National Canners Association, an organization composed of the majority of the canners of the United States, a few years before, at the request of the sardine canners of Maine, organized them into the sardine section of the association, and by an assessment of a small sum per case raised sufficient funds to provide an inspection service to see that the plants were put into and kept in a satisfactory sanitary condition and also to inspect the goods packed and, if they were up to the standards fixed in advance, to affix to the cans suitable certificates attesting this.

At its annual convention in 1919 the association decided to extend a similar service to any other section willing to assess itself to pay the necessary expense. In explanation of its plan the association issued the following circular shortly after the convention had adjourned:

1. This service is installed by the National Canners Association, with which a direct contract is made by each canner.
2. It runs for a term of three years and is applied in States or local territories where similar conditions are to be met.
3. The cost of the inspection is paid by the canners in the territory named through an assessment which, in the past, has been collected by the can companies with which each canner deals. This cost is added to the can invoice, and is remitted by the can companies to the treasurer of the National Canners Association each month.

4. In order to meet the preliminary expenses of the inspection before the regular fund becomes available, each canner who signs a contract will pay into the treasury of the National Canners Association, within 30 days after signing the contract, an assessment of one-half cent per case on his pack of 1918, on the commodities to be inspected. Should the total sum raised during the season be greater than the expenses of inspection during the season, a refund of all or a portion of the one-half cent per case will be made after a small sum is reserved to maintain a consistent surplus.

5. The treasurer of the National Canners Association distributes this money to the local sections where the money is to be spent.

6. The National Canners Association has no profit in this inspection—its only requirement being that each canner under inspection is a member of the association, and pays the membership and general dues.

7. A director or supervisor of inspection is appointed by the National Canners Association who in turn appoints his assistants. The salaries of the director or supervisor and his assistants are fixed by the National Canners Association which works in harmony with the judgment of the advisory board. The director or supervisor must be a man of superior ability, preferably one with scientific training. He must also be a good executive.

8. The director or supervisor acts in conjunction with the advisory board which may consist of five, seven, or nine members. This advisory board is elected by the canners in the States or Territories covered. The duties of this board are what its name implies, "advisors." In point of actual experience, it is found this advisory board is able to settle all practical disputes and misunderstandings which may arise under this method of inspection. There is always a final appeal to the executive committee of the National Canners Association.

9. The National Canners Association does not promise or guarantee to issue certificates of inspection, but in territories where inspection has existed, the certificates have been issued on products which merit the same. It should be distinctly understood, however, that this does not form any part of the contract.

10. The cost in territories where inspection has been applied has been 1¼ to 2 cents per case. It is impossible to advise in advance definitely what the cost will be, as the local conditions differ. It should be borne in mind that there must always be a sufficient number of inspectors to protect the inspection, and if canners are widely scattered, this, as a matter of course, will increase the number numerically—not in proportion to the pack.

11. The inspection covers sanitation in plants, quarters for employees, and sanitation of the product. It is also proposed, as the work progresses, to apply inspection to the character of the raw product, and grading of the same. This grading on staples will be worked out on recommendation from the advisory board, which will be harmonized so as to give a uniform grade to each product through the entire country.

12. In localities where inspection has been installed, local laboratories purchased and financed by the funds for inspection, have been found most useful. These laboratories furnish prompt facilities for canners for testing their product and working out manufacturing problems which come up during the activities of the canning season. These laboratories are established and work in harmony with the research laboratories of the National Canners Association, Washington, D. C.

13. This inspection can well be made the basis of a consistent publicity advertising campaign, should the industry adopt it generally, in time to guarantee its working satisfactorily during the canning season of 1919. The present plan, however, does not include this publicity campaign, as this is a matter which must necessarily be passed upon later by the canners themselves.

14. Copy of contract with each canner is herewith inclosed, for information.

On February 17, 1919, the matter of adopting this inspection system was submitted to the salmon canners of the Pacific coast and accepted by a large majority. A chief inspector and a number of assistants were appointed, who carried on a sanitary inspection of the various canneries for several seasons. As the results obtained did not seem to justify the outlay required it was finally abandoned. It had been hoped to expand the work to include the quality of the pack itself, but it was soon seen, however, that only a stamp of approval of quality from the Government itself would carry sufficient weight to make it worth while.

One excellent result of the agreement with the National Canners Association was the installation of a northwest branch laboratory at Seattle in 1919, where a staff of scientists have since been at work on the many problems which beset the salmon canner. A number of these have been carried to a successful conclusion and the results published; and due to this the quality of the annual pack has been wonderfully enhanced with a corresponding financial return to the individual packer.

INVESTIGATION OF CANNED SALMON INDUSTRY

In 1917 and 1918 an investigation of the canned salmon industry was made by the Federal Trade Commission and many valuable statistical data were gathered and published.[33]

The following table shows, with other data, the average number of fish per case of each grade packed in the different geographical sections.

Number of fish canned and purchased, number of cases packed, and average number of fish per case [1]

1916

District	Grade of fish	Number of companies reporting	Number of fish canned	Number of fish purchased	Percentage of fish canned which were purchased	Number of cases packed	Average number of fish per case
West Alaska	Kings	7	111,381	27,175	24.39	26,008	4.28
Central Alaska	do	6	25,483	11,602	45.52	5,854	4.35
Southeast Alaska	do	20	148,286	136,597	92.12	34,344	4.31
Puget Sound	do	15	180,580	80,574	44.62	25,606	7.05
Columbia River	do	9	865,392	842,127	97.31	265,376	3.26
Outside rivers [2]	do	7	60,656	60,143	99.15	18,607	3.25
Totals and averages		64	1,391,778	1,158,218	83.66	375,790	3.73
West Alaska	Reds	8	16,564,413	1,017,042	6.13	1,223,950	13.52
Central Alaska	do	6	1,387,647	547,261	39.43	118,891	11.67
Southeast Alaska	do	29	1,609,978	784,503	48.70	123,767	13.00
Puget Sound	do	17	2,593,240	168,584	6.50	198,205	13.04
Columbia River	do	8	775,382	439,900	56.73	67,334	11.52
Outside rivers [2]	do	1	59,352	59,352	100.00	4,645	12.78
Totals and averages		69	22,990,012	3,016,642	13.28	1,736,792	13.24
West Alaska	Medium reds	4	394,048	46,619	11.83	36,078	10.92
Central Alaska	do	6	305,246	131,998	43.22	37,275	8.19
Southeast Alaska	do	29	1,018,014	505,937	49.67	117,422	8.69
Puget Sound	do	17	1,099,374	677,485	61.62	110,658	9.93
Columbia River	do	10	346,597	310,216	89.50	42,782	8.10
Outside rivers [2]	do	8	349,053	349,348	100.09	34,937	9.99
Totals and averages		74	3,512,332	2,331,819	66.38	379,152	9.26
West Alaska	Pinks	3	4,153,353	540,248	13.00	214,482	19.36
Central Alaska	do	6	4,102,775	1,821,558	44.39	212,169	19.33
Southeast Alaska	do	27	12,266,379	4,772,128	38.89	879,953	13.93
Puget Sound	do	8	1,800,875	607	.....	70,979	25.37
Totals and averages		44	22,323,382	7,134,541	31.99	1,377,583	16.19
West Alaska	Chums	7	1,144,595	289,663	25.30	97,526	11.74
Central Alaska	do	6	331,423	160,465	48.41	37,870	8.75
Southeast Alaska	do	28	3,661,176	2,296,478	62.72	344,213	10.63
Puget Sound	do	15	2,981,678	1,887,278	63.29	387,373	7.70
Columbia River	do	8	374,370	358,255	95.69	62,043	6.34
Outside rivers [2]	do	5	110,809	106,973	96.53	16,896	6.56
Totals and averages		69	8,604,051	5,099,112	59.26	945,923	9.10
Columbia River	Steelheads	7	103,774	102,117	98.40	16,991	6.10
Totals and averages		7	103,774	102,117	98.40	16,991	6.10

[1] Report of the Federal Trade Commission: Op. cit., pp. 15, 16.
[2] Coastal streams in Washington, Oregon, and California.

[33] Report of the Federal Trade Commission on Canned Foods. Canned salmon. December, 1918. 83 pp. Washington, 1919.

Number of fish canned and purchased, number of cases packed, and average number of fish per case—Continued

1917

District	Grade of fish	Number of companies reporting	Number of fish canned	Number of fish purchased	Percentage of fish canned which were purchased	Number of cases packed	Average number of fish per case
West Alaska	Kings	8	107,590	18,407	17.10	21,398	5.03
Central Alaska	do	9	34,158	19,872	58.19	6,675	5.11
Southeast Alaska	do	22	283,643	202,693	71.46	45,674	6.21
Puget Sound	do	18	209,360	105,731	50.54	53,485	3.91
Columbia River	do	10	959,846	643,063	6.99	273,291	3.51
Outside rivers [2]	do	9	45,378	43,468	95.75	12,940	2.30
Totals and averages		76	1,639,975	1,033,234	63.00	413,463	3.96
West Alaska	Reds	9	21,449,913	1,192,000	5.56	1,433,780	14.90
Central Alaska	do	9	2,271,989	974,653	42.89	189,921	11.96
Southeast Alaska	do	33	1,964,993	1,074,658	54.95	158,582	12.03
Puget Sound	do	27	4,731,861	1,233,489	26.00	372,467	12.73
Columbia River	do	7	1,213,887	688,637	56.72	98,076	12.36
Outside rivers [2]	do	2	21,868	21,868	100.00	1,769	12.36
Totals and averages		87	31,654,511	5,185,305	16.40	2,254,595	14.13
West Alaska	Medium reds	3	145,837	18,385	12.60	13,406	10.87
Central Alaska	do	9	238,572	141,424	59.29	30,430	7.84
Southeast Alaska	do	33	1,033,339	419,946	40.55	98,324	10.51
Puget Sound	do	27	813,269	501,857	73.90	91,991	8.84
Columbia River	do	10	728,221	587,879	80.72	47,861	15.11
Outside rivers [2]	do	10	394,779	376,224	95.29	34,417	11.48
Totals and averages		92	3,349,017	2,044,815	61.05	316,429	10.58
West Alaska	Pinks	2	3,958,391	1,175,748	29.70	219,508	18.03
Central Alaska	do	10	5,221,887	2,172,476	41.62	324,230	16.11
Southeast Alaska	do	33	24,166,834	10,473,748	43.30	1,362,187	17.26
Puget Sound	do	26	11,805,693	6,361,891	53.80	858,396	13.68
Columbia River	do	1	77,081	14,635	18.98	4,761	16.21
Outside rivers [2]	do	1	62,892	62,892	100.00	4,222	14.89
Totals and averages		73	45,292,778	20,261,390	44.90	2,773,304	16.29
West Alaska	Chums	9	527,982	194,962	36.92	54,215	9.74
Central Alaska	do	33	728,514	418,419	57.43	79,208	9.20
Southeast Alaska	do	26	4,087,578	2,554,968	62.49	480,895	8.50
Puget Sound	do	27	2,547,457	1,852,350	72.71	249,390	10.22
Columbia River	do	8	277,836	123,436	44.42	28,085	9.89
Outside rivers [2]	do	7	88,736	84,413	95.12	11,655	7.61
Totals and averages		119	8,258,103	5,228,548	63.31	903,448	9.14
Puget Sound	Steelheads	1	33	33	100.00	5	6.60
Columbia River	do	10	138,421	145,581	105.01	22,234	6.71
Outside rivers [2]	do	1	787	787	100.00	126	6.24
Totals and averages		12	139,241	146,401	105.00	22,365	6.22

[2] Coastal streams in Washington, Oregon, and California.

MILD CURING

The beginning of the business of mild-curing salmon, or "sweet pickling," as it is sometimes called, is of comparatively recent date.

In 1889 a German dealer came to the Columbia River and tried to interest some of the cannery men in the business. J. O. Hanthorn, M. J. Kinney, and J. W. Cook were persuaded to prepare some, and the plant of the Northwest Cold Storage Co., at Portland, was used to keep the fish at a low temperature during repacking and preparation for shipment. These fish were shipped to Germany, but the shippers received no financial returns, word coming back that the fish were not satisfactory.

Owing to this lack of success from the first effort, no further attempt was made until 1894, when Mueller & Loring, of Chicago, put up a carload of mild-cured salmon at Kalama, Wash., and shipped it to Germany. In 1896 Charles Ruckles and Wallace Bros., of Kalama, packed several carloads for the German market. It was not until 1898 that the business was permanently established on the Columbia, the Trescott Packing Co. and S. Schmidt & Sons putting up plants at Warrenton and Astoria, respectively.

In 1900 the Trescott Packing Co. began packing the spring and fall runs, and the Sacramento River Packers' Association packed the fall run, on the Sacramento River, the business being carried on here every year since.

In 1901 the Sacramento River Packers' Association began at Monterey the mild curing of the spring salmon that were taken with hook and line in the open ocean.

S. Elmore & Co. started the industry in 1902 at Tillamook, and the business began on Puget Sound in 1901, when the San Juan Fishing & Packing Co. and the Seattle Fish Co. took it up. The Pacific Cold Storage Co. began the next year at Anacortes.

Prior to 1906 several of the Alaska cannery men put up each season a few tierces of mild-cured salmon, but it was not until this time that the industry really began as such. In that year J. Lindenberger (Inc.) started packing at Ketchikan, Alaska. The following year several other plants were started, and in 1910 almost all of the king salmon taken in southeast Alaska were mild cured. The same is true to-day.

For mild curing the fresh fish must be given greater care in handling than is the case with any other process. Care must be exercised to see that the flesh of the fish is not bruised or broken, and in order to make sure of this the handlers usually pack several fish in one box, with cracked ice over and around them if the weather is warm. As soon as a box is filled, it is put in the hold, where the boxes are stacked one upon another, but prevent more weight than is represented inside one box coming upon any one fish.

In dressing, the head is removed, care being taken to leave as much of the bony structure of the head as possible to assist in holding the side of the hooks when it is being smoked later on; the fish is then split down the belly to the vent, the entrails removed, when a cut is made on either side of the blood clot in the back, and the fish passed to the "washer," who holds the fish on its back in a slot on the table under a spray of water, and removes the membrane of skin which covers the inside of the backbone and inside of which a good deal of thick blood lies, by means of a large spoon or some similar form of scraper. A knife should not be employed. Some curers do not remove the fins at this stage, while others do.

The body is then scored along the sides with a small knife, care being used to cut the skin only; this allows the salt to penetrate more freely and thus assist the process of cure. A specially prepared eccentric wheel is sometimes used for this purpose, which makes a series of small cuts varying from half an inch at the tail to 1½ inches long at the shoulder, and from 2 to 3 inches apart.

The fish is now ready for the splitter, who turns it on its back with the open belly toward him and forces the shoulder down on a sharp-pointed nail, so the fish will not slip during the operation. A cross-cut is first made across the root of the tail to the bone, but no deeper.

Then the knife is entered at the vent, immediately above the bone, and a cut, which should go no farther back than the middle of the backbone, is drawn down to the crosscut already made. Then raising the lug with his left hand, the splitter enters the knife at the shoulder above the bone, and with one sweep from head to tail, separates the entire side. This is the more easily done if the fins have been previously removed. If the work is perfect, there will be no flesh left on the bone, but a line of fat will show down the center of the side. This improves the appearance of the fish and adds to its value.

In order to remove the bone from the remaining half of the fish, the splitter inserts the knife under the bone, about the vent, and draws down toward the tail, but care must be taken, as before, not to go farther back than the spine. The splitter now takes the fish off the nail, holding it by the lug, his left thumb resting on the upper, or inside of the fish, and his fingers on the lower, or skin side. The tail is now pointing away from the splitter, who enters his knife carefully under the backbone, and with one dexterous outward sweep separates the bone from the fish right down to the root of the tail. When abreast of the crosscut, however, he turns the knife sharply downward, and cuts off the fish the same as on the other side. As with the first half, no flesh should be left adhering to the bone, and the line of fat should show down the center. In other words, the two sides should be exactly alike.

The sides are dipped into cold water in the dress tank, and are then laid, skin side down, on the table with the thin or belly edge toward the front. A man then removes any blood remaining in the veins on the inside of the fish, by pressing it away from him toward the back of the fish, either with his fingers or with a spoon. If the blood is not squeezed out in this way the salt will harden it during the process of curing, and the flesh will become dark in color. The sides are then dipped in a tank of weak brine and crushed ice to give them a final wash, but should on no account be left to soak in the brine. Upon removal, they are again scraped to insure the removal of all the blood from the veins.

Great care must be used in handling the newly split sides, as they are very tender and may be easily broken or bruised. In lifting them by the lug or collar bone, the curer should have his fingers to the inside and his thumb to the outer or skin side; otherwise the skin may be broken.

The sides are then taken to the salter, who lays them, skin side down, on a salting table, on which has been dumped a quantity of dairy salt, and gently rubs the flesh with the salt, lifts it up with only such salt as will adhere to it, and places it in the tierce.

The tierces in which the salmon sides are packed are stout casks made of fir or spruce, bound with six strong galvanized hoops. They contain about 800 pounds of fish, but when full of pickle the gross weight of cask and content is between 1,100 and 1,200 pounds. A plug hole is bored in the head of the tierce.

Two or three handfuls of salt are thrown over the bottom of the tierce, then a layer of salmon sides, skin down, and two or three handfuls of salt are sprinkled over them. In packing two sides of fish, crossed head and tail are packed close to opposite sides of the tierce, the back or thick part of each side being placed close up against

the side of the tierce. Other sides of fish are packed from the sides toward the center of the tierce, napes and tails alternately, the back of each side being drawn halfway up and resting on the side already laid. When complete, the layer should be perfectly level, and this depends a good deal on how the last or center piece is laid. Salt is sprinkled between each layer in the manner and quantity noted above and the process continued until the tierce is full. The tiers should be crossed in packing. The top layer should be placed with the skin up and have extra salt put on. From 85 to 100 pounds of salt are used to 800 pounds of fish.

The tierce is then headed up, after which pickle is poured in until the tierce is quite full. This pickle may be made with the same salt as is used for rousing and sprinkling the fish. Perfectly clear water should be provided and broken ice should be added in liberal quantities, if the weather is warm. Before using, the pickle should be strained through a fine sieve or a clean cloth, to remove froth and sediment. A centigrade saltmeter is used by most mild curers. The pickle is made to a strength of at least 90°, but it usually weakens to about 70° during the first 10 days of cure, whereas after repacking it should not readily come below 85°, and it should retain that strength for a long time.

When tierces have been filled with pickle they are rolled inside a cold-storage room, with a temperature of 35 to 38° F., where they may be tiered two tiers high. Very little variation in the temperature is allowable, as it would start the oil or fat in the flesh, allowing it to escape into the brine.

Unless the tierces are kept quite full of pickle the sides of fish are apt to be broken when the cask is rolled about. The tierces must be examined frequently to see that they are full of brine, as there are always small leaks, while the staves absorb more or less moisture. Furthermore, if the tierces were allowed to leak, ugly yellow spots would show on the parts of the fish that were left dry. Thus it is of the utmost importance, both during the two or three weeks allowed for pining and also after repacking, to see that they are kept full of pickle. Several gallons of pickle may be absorbed by each cask during the first two or three weeks of cure.

The actual shrinkage during the two or three weeks in which the fish lie in the first packing may be reckoned at 30 per cent. Fat, well-conditioned fish, especially those which are caught in the ocean, shrink less, but poor fish, especially those caught when well on their way to the spawning grounds, shrink more—sometimes up to 35 per cent.

After holding the fish in storage for at least 20 and not more than 90 days they are taken out of the tierces. Each side of fish should be lifted out carefully, as described above, and sponged with a large sponge until all salt and slime are entirely removed, leaving only a clean, red side of fish. Either pure ice water or ice pickle may be used for this washing, but it will depend entirely on the quality and condition of the fish. Soft, poor fish would require pickle, but good firm fish may be washed in clean ice water.

The sides are then weighed and graded accordingly, 6 to 8 pounds, 8 to 10 pounds, and so on, being the grades. Sides of 11 pounds and over are called *large* fish, and "L" is marked on the side of the

tierce. Some curers grade their sides from 9 to 11 pounds and class them as *medium* and mark them "M;" smaller sides are termed *small* and are marked "S."

After the sides have been graded they should be counted and repacked, the defective sides, such as thin-bellied, torn or broken, being put by themselves. Fish which are considered perfect are called No. 1; those which do not come up to that standard are termed No. 2, and are marked accordingly; while fish that have any taint of sourness are marked "T." In repacking, the sides of fish should be replaced as nearly as possible in their original position, those curved in shape being placed against the sides of the cask and straight pieces laid in the center of the tier. No salt is used in repacking, but as soon as the tierce is filled, the head put in, and the air test applied it is laid on its bilge and filled up with ice-cold pickle made to a strength of 90° salometer (90 per cent saturation) that can be made from fresh or salt water, whichever is handiest and cleanest, half-ground salt being used. There will be about 830 pounds of fish on an average in the tierce after repacking, and some 14 gallons of pickle may be required to fill the cask up. They are then put back into cold storage and pickled at the bilge daily for at least a week. If kept for any length of time, they would, of course, have to be tested, regularly—a tap with a hammer would do—and any leakage promptly rectified. If properly cured, the fish should keep in good condition for months in cold storage, provided the casks are sound and kept full of pickle.

On the head of each tierce are put the following marks: Initials of packer or packers; initials of place where packed; number of tierce (consecutive); number of sides in tierce, the tare, and the gross weight (weight of pickle not counted); quality of fish (I, II, or T); and size of fish (L, M, or S).

If of first quality, no mark is necessary, but second-quality and tainted fish have to be noted.

In the early days of the industry different preparations, which included salicylic and boracic acids, were used to help preserve the fish. This caused much complaint from the Germans, and finally their Government subjected our product to a rigid inspection, with most salutary results, as now it is one of the purest and best products put up on this coast, the use of acids being done away with entirely.

The king salmon is almost invariably the species mild cured, being the only one large enough to answer the requirements of the trade. In 1907 a Ketchikan (Alaska) packer put up a quantity of coho, chum, and humpback salmon, but he found so much difficulty in disposing of the product that he abandoned further efforts in this line. A few cohos are put up each year.

The principal consumers of the mild-cured salmon are the smokers, who take them from the tierce, wash and soak them for a few minutes, and then have a practically fresh fish to smoke, and not, as in the days when hard-pickled salmon were used, one that had lost most of its oil and flavor through the excessive amount of salt needed to preserve it.

The greater part of the product put up on this coast goes to Europe, Germany being the principal consumer, but considerable quantities are sold in Norway, Sweden, and other countries, while the smokers of the cities east of the Rocky Mountains use large quantities every year.

In Germany, the principal market for mild-cured salmon, nearly all of the fish are smoked. One of the most popular ways of using the smoked salmon is in the making of sandwiches, and probably the greater portion of these are used in the beer halls and the automatic restaurants in that country.

PICKLING

The earliest method of preserving salmon on the coast was by pickling. At times this industry attained to large proportions, but during the last 10 years it has been declining, largely because the canners are able to pay more for the raw fish than the salters. All species of salmon are pickled, but the most popular is the red salmon.

In dressing salmon for pickling the head is removed, the fish split along the back, the cut ending with a downward curve on the tail. The viscera and two-thirds of the backbone are removed, and the blood, gurry, and black stomach membrane scraped away. The fish are then thoroughly scrubbed and washed in cold water. They are next placed in pickling butts with about 15 pounds of half-ground salt to every 100 pounds of fish. The fish should be laid in a tier, flesh side up, and the salt well sprinkled over it, repeating until the tank is full. Several boards are then laid across the fish and these are weighted down with large stones in order to keep the fish submerged in the pickle which will form. The fish remain here about one week, the brine being held at about 90°. They are then removed, rubbed clean with a scrub brush, and repacked in market barrels, one sack of salt being used to every three barrels of 200 pounds each. About 40 to 52 red salmon, 25 to 35 coho salmon, 70 to 80 humpback salmon, 10 to 14 king salmon, and 25 to 30 chum salmon are required in packing a barrel of pickled salmon.

A few salteries also pack "bellies." This product is merely the belly of the fish, which is the fattest portion, and as most of the packers threw away the rest of the fish, thus causing a very large waste of choice food, this method has come under the ban of the law in some of the coast States and in Alaska. As a result, but few "bellies" are packed now, and most of these only when some economic use is made of the remainder. Humpback salmon furnish the major part of the "belly" pack.

In preparing salmon bellies, the operator first cuts off the two pectoral fins, and then removes the head, care being taken to follow the curve of the body until the backbone is reached, which should then be severed straight across. With the smaller salmon the fish is then turned on its back, and the operator inserts his knife in the body just above the backbone and cuts down through the body, the knife coming out just in front of the vent. If properly done, the cut will come close to the upper wall of the stomach. With large king salmon it is sometimes necessary to make the cut first on one side, then turn the fish over and make the cut on the other side. The belly is then laid flat on the cutting table and the membrane at one end cut so the belly will lie flat. The bellies are then washed and salted the same as hard-salted salmon.

When bellies are cut, the backs are saved and either dried in the open air, without salt, or else pickled.

With large kings, the operator, after the belly has been cut out, scrapes the inside of the remainder of the carcass. The knife is then

inserted under the backbone at the end nearest the tail, and it is cut away with as little flesh as possible adhering to it. The blood is then scraped off, the fish thoroughly washed, and then salted the same as the whole fish.

Some of the old-time fishermen save parts of the salmon heads as food. In this event, the head is split lengthwise clear to the bony covering which protects the top of the head. The gill rakers are then removed from each side of the split head, leaving the nutritious parts intact. The cleaned heads are then salted down the same as whole salmon.

DRY SALTING

During the progress of the Russian-Japanese War the preparation of dry-salted chum salmon became an important industry, but as soon as the Japanese fishermen resumed their former occupations the demand fell off so much that the industry was virtually abandoned in the United States, although a number of Japanese continue it in British Columbia. The fish, after being dressed, were packed in boxes, in salt, these boxes holding about 560 pounds of fish, and were shipped in this condition to Japan.

At a number of places in Alaska the bellies of red and coho salmon are cut out and salted, after which the backs are dried in the sun and, thus cured, are used for fox food at the numerous fox ranches. This product is called "ukalu."

SMOKING

The smoking of salmon is virtually a continuation of the pickling, as the fish must be pickled before being smoked, the main purpose of the pickling being to preserve them until the time arrives for smoking, which may be weeks or months after the fish are caught. For smoking the salmon are taken out of the barrel and soaked until as much of the salt as possible is removed. They are then put into the smokehouse and subjected to the heat and smoke of a fairly hot fire for about two days in order that they may be thoroughly dried and hardened. Exposure to a smoldering fire (alder wood is a favorite fuel) for about three days completes the process.

For shipment smoked salmon are packed in wooden boxes, oil paper being placed between the fish.

In the manufacture of smoked salmon, the mild-cured product is most in demand. The necessary quantity of sides is taken from the cold-storage and placed in large tanks filled with fresh water. In these they are soaked over night, the water being changed several times, depending upon the salinity of the fish, the variation of which depends upon the length of time the product has been held in storage, those held longest absorbing the most salt.

After soaking, the sides are taken from the tanks, piled on tables, and allowed to drain as much as possible. They are then taken one at a time, laid flesh side down, and a bacon hanger, which is made of wire and has six or more points bent at right angles to the frame, terminating at the top in a hook, is pressed firmly into the flesh on the skin side and at the upper end of the side. They are then hung upon a round stick, which latter is then set in position in the smokehouse, each end resting upon supports on the side. The fish are placed so that no two of them will touch. When the smokehouse is full, a small fire of any nonresinous wood is then built under-

neath to dry them, the ventilator in the top being left open so the moist air can escape. The fires should not be allowed to become too hot; the object is to give the fish smoke rather than heat, as in the latter case they would become partially cooked. For a mild cure, for ready consumption, from 8 to 10 hours, according to the condition of the fish, should be sufficient. If immediate sale should not be possible the fish must be kept in a cold-storage room with a temperature of about 24° F.

In sections where the products move more slowly into consumption, a harder smoking is wanted. In this event, they are held over the fire until dried, which would depend upon climatic conditions, but probably around two days. After the fish have dried sufficiently, the fire is smothered with sawdust, which produces a dense smoke, giving the sides their color. During the latter period the ventilator is partly closed, but must be watched to prevent the fish from sweating.

When thoroughly smoked the sides are removed from the smokehouse, taken off the hanger, and each side wrapped in paper, then packed in wooden boxes holding each 30 pounds.

Kippered salmon.—On the Pacific coast practically all of the kippered salmon is prepared from frozen white-meated king salmon, which on account of the color of the flesh is not in much demand. It is, however, fully the equal, in both flavor and food value, of the red-meated kings. It is not absolutely essential that the fish be first frozen, as the fresh fish may be kippered after dressing, but the latter is always a little soft when so prepared, owing to an excess of moisture, which is largely removed in freezing. Fresh salmon is available only part of the year, so it is found most convenient to freeze and store the stock and work it up when needed throughout the year.

Before freezing, the fish have been dressed, so, when thawed in cold-running water, it is only necessary to split and cut them into pieces of a pound or less, these being about 6 inches long, or perhaps 3 inches broad, depending upon the part of the fish the piece is taken from, and place them in a tank of strong brine to season for several hours. They are then dipped in a harmless vegetable coloring, similar to that used by the butchers for coloring sausage; this gives the outside of the product a red color, a concession to popular prejudice.

From the coloring tank, the pieces are placed on a tray with wood frame and bottom of one-half inch square meshed wire; care is taken that the pieces do not touch each other.

The tray is then slipped into a rack which will hold a number of these, placed one above the other, and this rack is then run on a track into the smokehouse.

A medium fire is then kindled which dries and slightly smokes the pieces from 16 to 18 hours.

When they reach a proper stage the fire is enlarged, but great care must be exercised in order to prevent their being overheated, and this is done by means of the damper at the bottom of the smokehouse and the ventilator at the top. The fish are baked in this manner from 25 to 35 minutes, the thermometer showing from 250 to 275° of heat.

When the cooking is completed the cars are pulled out and the fish allowed to cool, after which each piece is wrapped in a square

of parchment paper and packed in a box or basket which holds 10 pounds.

The product is quite perishable, and if it can not be used at once, when of course it is at its best, must be placed in cold storage. The packer endeavors to turn out daily only the amount he can market that day.

Beleke.—A smoked product, known locally as "beleke," is put up at Kodiak, Alaska, from red and coho salmons. Steelhead trout are the best for this purpose, but are not often utilized owing to their scarcity in this region. In preparing "beleke" only the backs of the fish are used, the belly part being cut out and pickled separately. The backs are divided into three grades, according to size, viz, "small," "medium," and "large." They are first put into a brine, the "large" being put in first, followed by the "medium" and "small" at intervals of one hour each, so that all will be cured at about the same time. The coho backs, being the largest, are kept in the brine from 19 to 20 hours, while the red salmon backs, which are smaller, remain in the brine only about 16 hours. After being thoroughly salted the backs are removed from the brine and rinsed in fresh water, then hung in the air for about 24 hours to dry and to allow a thin skin to form on the outside. They are then hung in the smokehouse, in the presence of a little fire of cottonwood or alder. On dry days the gable windows are thrown open and the wind allowed to pass through while the smoking is going on. The smoking must be done slowly, two weeks being devoted to it.

There is a good demand for this product locally, the fish selling for from 15 to 20 cents a pair, but little effort has been made to extend its sale outside of central Alaska.

FREEZING

The process of preserving fish by freezing was first introduced in 1888. Previous to this the comparatively ancient method of packing with ice, or in rare instances letting the fish freeze naturally during the winter months, was followed. Packing with ice is in quite general use to-day for shipments of fish which are to be preserved for short periods of time. Cooling with ice never results in a temperature lower than 32° F., which, of course, does not freeze the fish.

The freezing of salmon and steelhead trout began on the Sacramento and Columbia Rivers in the late eighties. It was taken up in a small way on Puget Sound in 1892. That year Wallace Bros. and Ainsworth & Dunn froze a small lot, the work being done for them by the Seattle Ice Co. (now the Ice Delivery Co.), and the venture was so successful that the next year nearly all of the wholesale dealers on the Sound took up the business. The Crescent Creamery, of Tacoma, also engaged in the business for the fish dealers for a year or two shortly thereafter. In 1902 the British Columbia Packers Association bought a large cold-storage plant at New Westminster, British Columbia, at that time the only large and modern plant in the Province, and began the active freezing of fish. Since then a number of excellent plants have been built and operated. In Alaska the preparing of frozen salmon began in 1902. The San Juan Fishing & Packing Co., soon to be succeeded by the Pacific Cold Storage Co., put up a cannery and cold-storage plant at Taku Harbor, in southeast Alaska, in 1901, though it did not operate the cold-

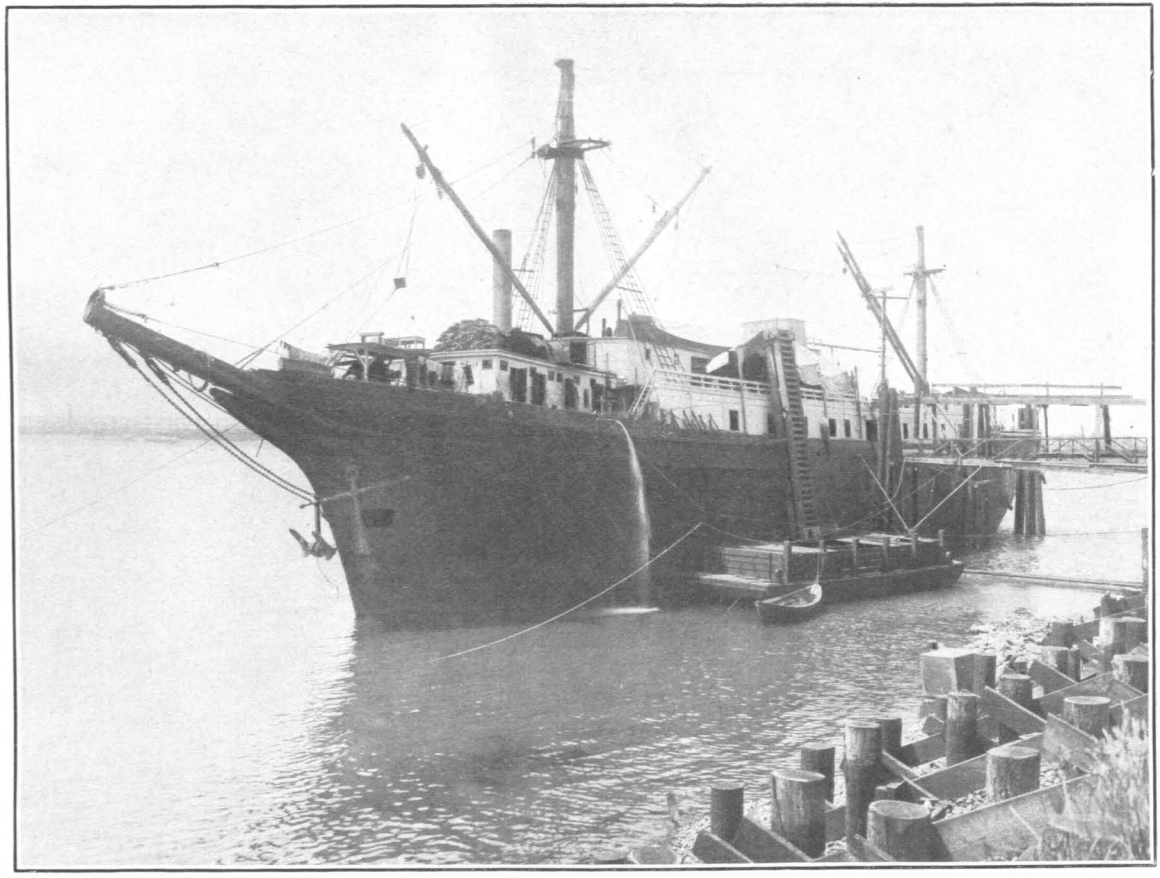


FIG. 38.—SHIP, "WM. H. SMITH," FLOATING CANNERY AND COLD-STORAGE PLANT

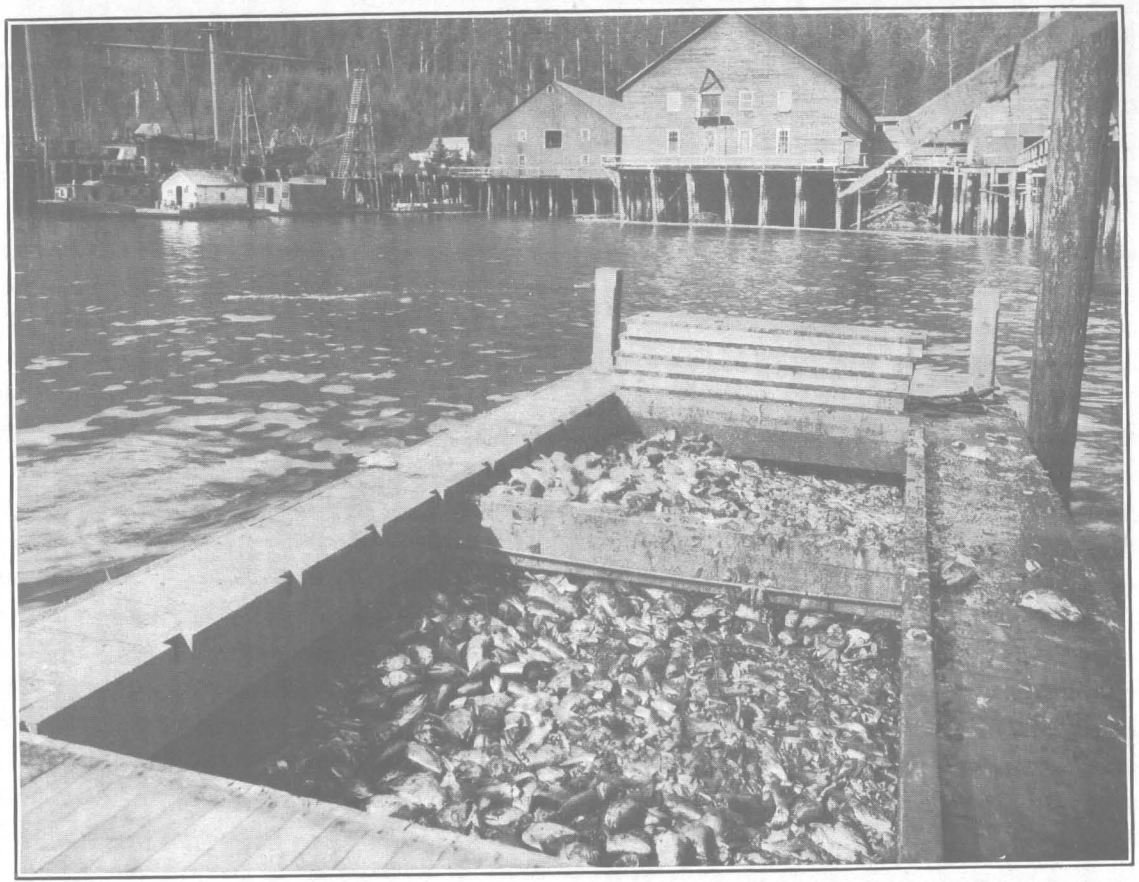


FIG. 39.—SALMON OFFAL READY FOR DELIVERY TO THE FERTILIZER AND FISH-MEAL PLANTS

storage portion until 1902. The Taku Harbor Canning & Cold Storage Co. later on succeeded to the ownership and operation of this plant. This is the only plant which was operated in Alaska until the New England Fish Co. erected in 1909 a large plant at Ketchikan for the freezing of halibut primarily, but considerable quantities of salmon have been frozen also.

In 1911 the schooner *Metha Nelson* was fitted up as a floating freezer by the Alaska Packers Association and sent to Kodiak Island. As the vessel arrived in San Francisco shortly before the State's closed season on salmon began, and it was a difficult matter to dispose of the catch before then, the business was abandoned.

In 1912 J. Lindenberger (Inc.) opened a freezing plant at Craig, on Fish Egg Island, Alaska, while the ship *William H. Smith* was outfitted as a floating cannery and freezer by the Weiding & Independent Fisheries Co., at Saginaw Bay, Alaska. The latter operated only one season.

The year 1913 saw quite a development in the industry. The Columbia & Northern Fishing & Packing Co., at Wrangell, the Juneau Cold Storage Co., at Juneau, the Booth Fisheries Co., at Sitka, and the floating cold-storage ship *Glory of the Seas*, by the Glacier Fish Co., at Idaho Inlet, were all started this year.

In 1914 the Ketchikan Cold Storage Co. opened a freezer for the general commercial freezing of fish.

In 1917 the San Juan Fishing & Packing Co. built and operated a cold-storage plant at Seward.

In 1918 Henry Goemaere operated for the first time a plant at Washington Bay; while the National Independent Fisheries Co. and the Trout Fisheries Co. froze salmon at Ketchikan. All the other freezers operated as usual, the only change being the purchase by Libby, McNeill & Libby of the cold-storage plant and cannery of the Taku Harbor Canning & Cold Storage Co. at Taku Harbor.

The freezing of salmon is almost invariably carried on in connection with other methods of handling and preserving, and the purpose is usually to secure the fish when numerous and cheap, freeze them, and then hold them until the runs are over and the fish are once more in good demand at high prices. The business proved so profitable, however, that the dealers began to look for wider markets for their product. Europe, more especially Germany, was prospected and a profitable market soon developed, with the result that to-day frozen Pacific salmon can be secured in nearly every town of any size in western Europe, while large quantities are marketed all over our own country.

There are four important features in packing and using frozen salmon: (1) To get fresh fish; (2) to keep them cold (about 15° above zero) after they are frozen; (3) to keep a coat of ice on them; and (4) to allow them to thaw slowly in cold water or in the air before cooking.

In selecting salmon for freezing, only the finest and freshest of each species are used. The current belief that freezing destroys the flavor of the fish is erroneous, the flavor depending entirely upon the condition before freezing, and the quicker they are frozen after being caught the better will the natural flavor of the fish be preserved. Frozen salmon are just as wholesome as fresh, and their chemical constituents are almost identical. The danger lies in the

temptation to freeze the fish after decomposition has set in, but, fortunately, this is now very rarely practiced in the salmon industry.

The coho, or silver, and the chum, or keta, salmon are the choicest of the salmons for freezing. The other species, except the red, or sockeye, which is too oily and rarely frozen, are also frozen in varying quantities. The steelhead trout, which is ranked by the Pacific coast dealers among the salmon, is considered the choicest fish of all for freezing.

Some of the most modern plants in the country are on this coast. These have numerous freezers, generally, in which a temperature of from 25° to 30° F. below zero can be maintained if desired, although a temperature of more than 10° below zero is rarely ever required. All freezing is by direct expansion and each freezer is piped with about 2 feet of 1¼-inch pipe per cubic foot of freezing space. The bunkers in the freezers are in pairs, generally nine pipes wide, spaced 10 inches apart. This leaves about a 3½-foot passage through the center of each freezer opposite the swing doors. The salmon are laid on metal sheets, which are placed on the tiers of pipes.

After freezing the salmon are passed through openings in the rear of the freezers into the glazing room, which has a temperature of about 20° F., where they are dipped into water, and when removed are covered with a thin glaze of ice, which may be thickened by repeated dippings. This is an extra precaution to exclude the air from the fish.

After being thoroughly frozen and glazed, each fish is covered first with a parchment, like rolls of butter, and then with a piece of heavy brown paper. They are then packed in boxes holding about 250 pounds each, placed in cold-storage cars and shipped.

UTILIZING SALMON EGGS AND MILT

Every year immense quantities of salmon eggs are thrown away in the fisheries of the west coast, though there is but little doubt that, if properly prepared, a market could in time be found for this now waste part of the fish. In France there is a good market for a product known as "rogue," which is the spawn of cod, haddock, hake, and pollock, salted in casks, and which is used as bait in the sardine fisheries. Salmon spawn is the choicest and most successful bait used on this coast, and if properly prepared would undoubtedly answer the purpose as well as the regular "rogue" if not better, owing to its oiliness and attractive color. The roes should be soaked for some days in old brine and then packed in strong casks holding about 25 gallons each. It might also prove to be a good bait for tolling mackerel on the Atlantic coast.

In 1910 a considerable quantity of salmon roe was prepared in Siberia and sold in competition with caviar, which is prepared from sturgeon eggs. The product met with favor in Europe and now large quantities are prepared each season.

In this country Miss Ida Tuholski, of San Francisco, who had been engaged in the preparation of sturgeon caviar for some years, put up a number of sample lots of salmon caviar which are fully the equal of the best sturgeon caviar. Capital has been chary, however, about engaging in the business, although undoubtedly it will be an important industry some day. During the last five years several firms, notably the Neptune Fish Products Co., of Seattle, have successfully taken up the business of caviar making.

For making caviar the eggs should be as fresh as possible, and in order to make sure of this the salmon are taken alive, if possible, shortly after coming from the water, killed and bled, the belly opened up and the roe taken out. This work can best be done on work and living scows anchored close to the fishing camps. The roe is placed upon a stand, the top of which is formed of a small-meshed galvanized iron wire screen. On the underside is arranged a zinc-lined trough. The operator gently rubs the mass of eggs back and forth over the screen, the mesh of which is just large enough to let the eggs drop through, and, as they are separated from the membrane by the rubbing, they fall through into the trough and are thence drawn off into tubs by means of a sliding door at the end of the trough.

After all the roe has been separated the tub is removed and a certain proportion of salt (the sturgeon caviar makers employ the best Luneburg, Germany, salt in this work, while some of the Siberian makers of salmon caviar use No. 2 Berkshire salt from England) is added to the roe, after which the mass is mixed with the hands. The most delicate part of the whole operation is in the manner of mixing. No direct rule can be given for doing this portion of the work, as the condition of the roe regulates the time consumed and the manner of handling. It requires practical experience to become proficient, but this should be an easy matter for one used to handling salted products. The sturgeon caviar makers use about 11 pounds of salt in preparing a keg of caviar.

After the salt has been added the mass of eggs first dries up, but in a few minutes the strength of the salt draws from the eggs their watery constituents and a copious brine is formed, which can be poured off when the tub becomes too full. In Siberia the caviar makers put the eggs into a brine solution of 19 to 22 per cent Baumé strength immediately after they come from the trough. The salted eggs are then poured into very fine-meshed sieves which hold about 10 pounds each. In the caviar house are arranged long, sloping boards with narrow strips nailed on each side. On these the sieves are placed and left here from 8 to 20 hours in order to thoroughly drain.

The Siberian caviar makers hasten the operation by putting the eggs into a brine solution as noted above, leave them there for from 25 to 45 minutes, then place them in bags and subject them to heavy pressure, after which they are packed. While this method occupies less time, it is not thought the resulting product is as good as that prepared by the slower method outlined above.

The eggs are then transferred to small casks (holding about 135 pounds). The sturgeon caviar makers use oak or pine casks, but some of the Siberian makers say that oak casks turn the salmon caviar black. The casks are steamed before use in order to prevent any possible leakage. It is especially necessary that the kegs or barrels used be air-tight, as otherwise the product will spoil. Barrels such as used in packing salt salmon are rarely ever tight enough to hold caviar. The casks are covered and allowed to stand until the gas escapes and the eggs settle. The vacant space caused by the settling is then filled, the cask headed up and put in a cool place until ready for shipment.

The Siberian salmon caviar makers use a small quantity of "preservaline" in each keg for the purpose of aiding in preserving them,

as cold-storage facilities are quite primitive as yet in that country, and it is the addition of this powder which forms the mysterious part to the uninitiated. No preservative would be needed in Alaska, however, as the kegs could be shipped in cold storage along with the mild-cured salmon.

A number of establishments are putting up these eggs in jars and hermetically sealed cans for use as bait in sport fishing.

In 1916 one of the companies operating in Alaska put up some salmon milt in cans. No difficulty was experienced in canning this product and it met with considerable favor from those who tried it, but nothing has been done with it since.

Recently a Seattle company has been obtaining and preserving the eggs of silver and chum salmon and selling them to fish-cultural establishments to be used in feeding the young fish. As these are usually too large for feeding to the young fry, a method for dehydrating them was worked out in the laboratory of the College of Fisheries, University of Washington. When dehydrated the eggs could be fed directly to all sizes of hatchery-reared fishes; when intended for young fry the dehydrated eggs would be crushed up to a coarse powder which the fish found no trouble in swallowing. Experiments covering some months showed that the fry and others thrived on salmon eggs as food prepared in any of the ways noted in this paragraph.

MISCELLANEOUS PRODUCTS

A few years ago a company on the Columbia River put up what was known as "fish pudding." In preparing this the salmon was ground fine, mixed with milk and eggs, and then packed in tin cans. The preparation was soon abandoned.

In 1903 one of the Point Roberts canneries packed a new product which was called "salmon paste." For this the fish was ground up, cooked, seasoned with spices, etc., and made into fish balls, a very palatable dish when warmed over.

In 1905 a Seattle concern began the manufacture of wienerwurst sausages from halibut and salmon.

A Columbia River plant has also recently begun the preservation as food of the livers of the salmon.

The Indians in the Bristol Bay region of Alaska occasionally dress the skins of salmon and make of them leather for the tops of boots, also bags and other small articles.

A product, which was first made in Norway, is prepared by means of an invention which quickly dries and pulverizes the flesh of fresh fish. The resulting powder, called "fish flour," is easy to transport from one place to another and has great nutritive value. It is probable that the tailpieces of the fish, which are at present thrown away, and the cheaper grades of salmon might be prepared in this way and thus furnish another market for salmon.

MEAL, FERTILIZER, AND OIL

As early as 1888 there was a small plant at Astoria, Oreg., where the refuse of the canneries was utilized for the manufacture of oil and fertilizer. In that year 8,000 gallons of oil (chiefly from salmon heads) and 90 tons of fertilizer were prepared. The oil was worth 22½ cents per gallon and the fertilizer had a market value of $20

per ton. Most of the refuse was dumped into the river, however. In 1898 a similar plant was established in the Puget Sound district of Washington. In 1929 the Alaska Packers Association at Blaine, the Marine Products Corporation at Everett, the Neptune Fish Products Co. (Inc.) at Seattle, the Robinson Fisheries Co. at Anacortes, the Sea Products Co. at Seattle, and the United States Sea Products Co. on Lummi Island operated on waste from Puget Sound salmon canneries.

In 1882 the Alaska Oil & Guano Co. established a fertilizer plant at Killisnoo, Alaska, for the extraction of oil and fertilizer from herring and the plant has been operated continuously ever since. In some years large quantities of whole salmon have been handled at this plant, and the resulting product was found to sell as well as that from herring.

In Alaska the Fish Canners By-Products (Ltd.) in 1914 built a large plant at Ward Cove, near Ketchikan, where salmon offal was used in the preparation of fertilizer, meal, and oil. Later the company experimented in the preparation of various chemical products from the raw material. The plant has not been operated since 1920.

Probably the most serious evil in the salmon industry to-day is the enormous wastage which annually occurs. About one-fourth of the total weight of each fish handled at the various packing plants is thrown away. With the exception of the tailpiece, which is discarded at some canneries owing to the excessive amount of bone which would be in the product if canned, this waste material could not be utilized as food, comprising as it does the head, viscera, fins, and tail. When not conveniently near the very few fertilizer plants at present in operation this product is either allowed to pass through chutes into the water under the cannery or is dumped into scows and towed to the ocean or the deeper waters of the sounds and there thrown overboard. This procedure is not only exceedingly wasteful, but is also far from beneficial to the waters where deposited.

A great impetus has been given to the industry during recent years, owing to the big demand which has come from the farmers and poultrymen for fish meal or scrap, which, after it has been mixed with other ingredients, can be fed to cattle, hogs, and poultry. Experiments carried out at various agricultural experiment stations, both here and in Europe, show conclusively that this class of food increases the appetite of the animal, and consequently the weight, while it does not affect the flavor of the flesh of the animals.

As a result of this profitable demand a number of salmon canneries have installed small reduction outfits at their plants, where all of the hitherto wasted products are handled and the oil and meal obtained. It will probably be only a few years now before all of the canneries are so equipped.

SHIPPING FRESH SALMON DIRECT TO CONSUMER

A feature in the salmon industry is the shipping of individual salmon direct to consumers by express, or, for certain short distances, by parcel post, for a certain fixed sum, which includes the fish itself and the cost of delivering same to the buyer.

This business began in Tacoma, Wash., in 1914, and those who originated it advertised throughout the country that they would ship a fresh salmon to any express office in the United States (except

Southern Express), express prepaid, for $1.25, weight 7 to 8 pounds. In 1915 the cost, delivered east of the Mississippi River, was raised to $1.50 each, the old rate of $1.25 still being in force for shipments west of the Mississippi River. The price has since been increased. The business is now carried on from a number of places in Washington, Oregon, and California.

In shipping an individual fish, it is packed in a box containing 20 pounds of cracked ice. These boxes are collected by the express companies and are generally sent out in their own regular cars attached to trains leaving in the evening. About every 15 to 20 hours the box is opened and from 5 to 7 pounds, depending upon the weather, of cracked ice added to the box to make up the loss through melting.

As the Post Office Department will not accept packages in which ice is used for preserving fish, the use of the parcel post for shipments of individual fish is limited to the first postal zone (up to 50 miles from the initial point), except in winter, when the postmasters are authorized, in their discretion, to accept shipments for the second zone (50 to 100 miles from the initial point). In making fresh-fish shipments by parcel post, frozen fish are generally used.

Most of the orders come from the Middle West, where fresh fish are not abundant, but orders are received from all sections of the country.

The success met with in shipping fresh salmon led to a considerable expansion of the industry, with the result that now one can obtain not only a fresh salmon, but also may purchase salt, smoked, and kippered salmon, salt codfish, and fresh halibut, smelt, crabs, and other sea food in their season.

NUTRITIVE QUALITIES OF SALMON

More and more attention is being paid by the consuming public to the nutritive qualities of the food products offered them, and this is especially true as regards fishery products.

The proper functions of food are twofold, first, to furnish protein for building and repairing the body, and, second, to supply energy for heat and muscular work. Foods which supply an abundance of both at a reasonable price are of the greatest importance from an economical standpoint.

ANALYSES OF CANNED AND FRESH PACIFIC SALMON

Despite the great prominence of the salmon industry, but little time has been devoted to it by the chemist.

Prof. W. O. Atwater was the first American investigator to devote any portion of his energies to the analysis of Pacific salmon. In Principles of Nutrition and Nutritive Value of Food (Farmers Bulletin No. 142, United States Department of Agriculture, 1901), he gives the following analysis of canned Pacific coast salmon:

Water, 63.5 per cent; protein, 21.8 per cent; fat, 12.1 per cent; ash, 2.6 per cent; fuel value per pound, 915 calories.[34]

C. F. Langworthy, in Fish as Food (Farmers Bulletin No. 85, United States Department of Agriculture, 1898), gives the following analyses of fresh and canned Pacific coast salmon:

[34] The unit used to show the fuel value is the "calorie," which is the amount of heat required to raise the temperature of about 1 pound of water 4° F.

Fresh salmon, California (sections): Refuse (bone, skin, etc.), 5.2 per cent; water, 60.3 per cent; protein, 16.5 per cent; fat, 17 per cent; mineral matter, 1 per cent; total nutrients, 34.5 per cent; fuel value per pound, 1,025 calories.

Canned salmon: Refuse (bone, skin, etc.), 3.9 per cent; salt, 1 per cent; water, 59.3 per cent; protein, 19.3 per cent; fat, 15.3 per cent; mineral, 1.2 per cent; total nutrients, 35.8 per cent; fuel value per pound, 1,005 calories.

Dr. Harvey W. Wiley gives the following as the composition of a Pacific coast salmon (species not given):[35]

Fresh—Water, 63.61 per cent; protein, 17.46 per cent; fat, 17.87 per cent; ash, 1.06 per cent. Dry—Protein, 52.31 per cent; fat, 49.05 per cent; ash, 2.92 per cent.

On page 137 of the same work Doctor Wiley gives the following as the mean of three samples of Pacific coast canned salmon:

Composition of canned salmon.—Mean of three samples. Water-free substance: Protein, 53.52 per cent; fat, 40.52 per cent; ash, 6.24 per cent.

Professor Knisely,[36] of the Oregon State Agricultural College at Corvallis, Oreg., analyzed canned salmon packed at the Funter Bay (Alaska) cannery of the Thlinket Packing Co., with the following results:

Species	Moisture	Protein	Fat	Ash
	Per cent	*Per cent*	*Per cent*	*Per cent*
Sockeye or red	64.74	24.19	9.11	2.06
Coho or medium red	68.22	26.56	3.61	1.66
Humpback or pink	69.43	24.00	4.86	1.68
Keta or chum	67.08	25.06	6.59	1.26

H. M. Loomis, formerly chief of the Seattle food and drug inspection laboratory, Bureau of Chemistry, United States Department of Agriculture, reports as follows on analyses of both canned and fresh Pacific salmon made at this laboratory.[37]

CANNED SALMON (1911 PACK) [a]

Sample	Water	Ethyl ether extract [b]	Protein (N×6.25)	Total ash	NaCl. [c]	Ammoniacal nitrogen	
						Richardson method	Alcohol vapor method
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
No. 1. Puget Sound sockeye	62.44	15.17	20.25	2.50	0.79	0.0403	0.0348
No. 2. Puget Sound sockeye	61.84	13.74	21.77	2.73	1.10	.0437	.0410
No. 3. Alaska medium red	69.97	7.81	20.40	2.58	1.09	.04965	--------
No. 4. Alaska chum	73.48	2.88	21.33	2.57	.83	.0563	.0557
No. 5. Alaska pink or humpback	74.12	4.75	19.75	1.98	.50	.0404	--------
No. 6. Alaska red	70.88	5.26	21.79	2.35	.64	.0455	--------
FRESH SALMON (CAUGHT MAY 7, 1912), EDIBLE PORTIONS							
Puget Sound sockeye	67.48	8.86	22.24	1.36	--------	0.0121	0.0205
Puget Sound steelhead or salmon trout	67.89	9.39	21.80	1.35	--------	.0135	.0218

[a] Each sample is average of two or more cans. All samples, except No. 2, are old form 1-pound tall cans. No. 2 is ½-pound flat cans.
[b] Represents the fat.
[c] Represents the salt.

[35] Foods and their Adulteration, etc., p. 135. By Harvey W. Wiley. 8°, Philadelphia, 1907.
[36] Pacific Fisherman, Vol. VI, No. 1, January, 1908, p. 21.
[37] Salmon Canning Industry of North America. By H. M. Loomis. Original communications. Eighth International Congress of Applied Chemistry, Washington and New York, Sept. 4 to 13, 1912. Vol. XVIII, pp. 239–245. The Rumford Press, Concord, N. H.

The composition of the flesh of the five species of salmon differs somewhat. The following table from Bureau of Fisheries Document No. 1000 entitled "Nutritive value of fish and shellfish," Washington, D. C. (1926), gives the average of many analyses, together with analyses of steelhead trout and Atlantic salmon for comparison:

Composition of canned salmon

	Total solids	Fat	Protein (N×6.2)	Ash (inorganic matter)	Food value per pound
Pacific salmon:	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
Sockeye	35.22	11.22	20.80	1.23	860
Chinook	36.83	15.72	17.67	1.21	991
Coho	32.51	8.49	21.08	1.24	750
Pink	30.20	6.99	21.40	.76	696
Chum	29.96	6.69	20.67	1.02	514
Pacific steelhead trout	33.16	8.95	21.32	1.21	792
Atlantic salmon	35.70	12.49	21.14	1.22	920

NOTE.—For certain reasons the backbone and as much as possible of the rib bone were removed from these cans before analyzing, but ordinarily they are eaten and thus increase the valuable mineral constituents in the food.

ANALYSES OF CANNED SALMON BY SOUTH DAKOTA AUTHORITIES

In 1916 the South Dakota Food and Drug Department analyzed a considerable number of samples of canned salmon for the purpose of determining, if possible, whether inferior grades of the fish were substituted for the better grades, and for the further purpose of discovering some means of identifying the different types of salmon by chemical analysis.

Thirty-three samples of commercial canned salmon, including 30 different brands, were analyzed. Thirteen of these were labeled as belonging to the sockeye class, five to the coho, six to the humpback, and one to the chum. Five samples were not labeled as to variety. One sample was labeled "Salmon Steaks" and two samples were labeled "Fresh Alaska." The last eight samples, because they were not labeled to show the common name of the fish contained in the can, were in violation of the F. I. D. No. 105 referred to above.

All of the cans but one were labeled to show the net weight of fish in the can. Sixteen per cent of them contained less than the declared amount of contents, but the greatest shortage was but 3.1 per cent of the declared weight, while the greatest excess in weight was 18.7 per cent of the declared weight. The weight is usually stated considerably under the actual amount of the contents.

The amount of liquid in the cans is an important factor to consider in computing the value of the contents. The free liquor in the cans examined varied widely from 3.95 per cent in sample number 15–209, labeled "Salmon Steaks" to 26.54 per cent in sample number 15–63, which was not labeled as to variety. As a rule, the largest amount of free liquor is found in the lower priced grades, but there are exceptions, notably number 15–70, which contained 24.14 per cent of free liquor.

It will be noticed from the results given in the table that the amount of total moisture varies inversely as the amount of fat (called ether extract in the table). That is, salmon containing an excessive amount of moisture contains little fat, but those samples which contain the lower amounts of moisture contain the largest amounts of fat. The protein content seems to be fairly constant in all samples, the average amount being 19.34 per cent, while the minimum found is 15.66 per cent and the maximum 22.45 per cent. The total phosphoric acid varies from 4.2 per cent to 9.8 per cent, the average being 6.6 per cent.

As would be expected, the samples containing the larger proportions of fat liberate the larger quantities of heat units, or calories, per pound, and it will be noted that the price is not in all cases an accurate measure of value, some of the higher priced varieties being in reality much lower in actual cost, when their food value is taken into consideration, than some of the cheaper varieties.[38]

[38] Bulletin, South Dakota Food and Drug Department, Vol. IV, Nos. 2 and 3, October–December, 1916, pp. 8–11.

The table below has been condensed from that shown in the report. The brand, name of the jobber, and the data about these samples, where the species is not shown on the label, have been eliminated, as they were not essential to our purpose. All of the other data have been reproduced exactly as they appeared in the original report. Not a single one of the samples apparently bore the packer's label, all being jobber's labels.

Laboratory No.	Variety	Total moisture	Ether extract	Protein	Ash	
					Soluble	Insoluble
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
15-56	Red	52.32	17.68	19.50	2.15	0.81
15-210	Fancy sockeye	59.29	16.83	18.28	1.63	.88
15-209	Salmon steaks	60.45	17.96	17.31	1.47	.33
15-60	Fancy red	60.46	15.40	18.22	1.33	2.89
15-72	Sockeye	60.80	18.19	19.15	.81	.78
15-65	do	60.95	15.94	18.56	1.50	1.11
15-59	Red sockeye	61.60	15.48	16.89	1.99	.57
15-64	do	62.18	13.10	19.13	1.45	.65
15-204	Red Alaska	65.44	10.57	20.31	2.15	.51
15-58	Coho salmon	65.65	9.62	17.32	1.61	1.33
15-220	Red Alaska	66.12	8.63	21.22	1.73	.62
15-64	Coho salmon	67.18	9.59	17.60	1.18	1.20
15-222	Pink salmon	69.53	6.62	20.48	1.85	.78
15-219	Red salmon	69.87	6.36	20.38	2.24	.57
15-207	Pink salmon	70.45	7.28	17.66	1.53	.90
15-221	Chum	70.52	4.57	19.73	.80	.72
15-205	Red salmon	70.86	4.04	21.11	1.60	1.13
15-70	do	71.45	4.47	20.75	2.15	1.60
15-61	Pink salmon	71.64	4.35	18.31	1.56	1.01
15-208	Gorbouscha [1]	73.17	5.33	17.35	1.27	.45
15-206	Alaska salmon [2]	73.30	2.43	21.22	1.45	.96
15-214	do	73.76	3.98	18.31	1.62	.54
15-57	Pink Alaska	74.08	3.90	15.66	1.50	1.02

Laboratory No.	Variety	Phosphoric acid [3]		Sodium chloride	Calories per lb.	Price per lb.
		Soluble	Insoluble			
		Per cent	*Per cent*	*Per cent*	*Number*	*Value*
15-56	Red	4.2	3.5	1.45	1,110	$0.31
15-210	Fancy sockeye	4.2	4.0	.81	1,050	.30
15-209	Salmon steaks	3.7	1.5	.51	1,080	.36
15-60	Fancy red	2.8	3.8	.53	990	.29
15-72	Sockeye	3.1	3.7	.14	1,125	.25
15-65	do	2.2	5.3	.68	1,020	.29
15-59	Red sockeye	3.6	2.6	1.10	965	----------
15-64	do	3.2	3.5	.60	910	.30
15-204	Red Alaska	4.0	2.3	1.15	825	----------
15-58	Coho salmon	2.5	5.7	1.02	730	.25
15-220	Red Alaska	1.9	2.8	.82	760	----------
15-64	Coho salmon	2.4	5.9	.53	730	.21
15-222	Pink salmon	1.8	3.6	.90	660	----------
15-219	Red salmon	2.0	2.7	1.26	545	----------
15-207	Pink salmon	3.4	4.1	.74	635	.15
15-221	Chum	1.0	4.1	Trace.	565	----------
15-205	Red salmon	3.3	3.2	.65	560	.30
15-70	do	2.7	3.1	1.17	575	.30
15-61	Pink salmon	2.4	4.7	.84	525	.15
15-208	Gorbouscha [1]	2.9	2.1	.45	550	----------
15-206	Alaska salmon [2]	2.7	4.4	.66	500	.15
15-214	do	1.7	2.5	.75	510	.15
15-57	Pink Alaska	2.0	4.5	.85	455	.25

[1] Probably pink salmon (author). [2] Probably chum salmon (author). [3] Mgm. of P_2O_5 per gram.

ANALYSIS OF SALTED SALMON

Falkenburg & Co., of Seattle, have recently made an analysis of the food value of salted salmon, as follows: [39]

Regarding the salmon recently inspected and analyzed for you by ourselves with the following results:

Protein	21. 97 per cent
Fat	4. 34 per cent
Salt	19. 08 per cent
Ash	. 84 per cent
Moisture	54. 35 per cent
Calories per pound	592

If this salmon were freshened, as is the custom in preparing it for the table, removing all but about 2 per cent of the salt, the fish would then have the following analysis:

Protein	27. 13 per cent
Fat	5. 36 per cent
Salt	2. 47 per cent
Moisture	65. 11 per cent
Ash	1. 03 per cent
Calories per pound	734

Bulletin No. 28 of the United States Department of Agriculture, "Chemical Composition of American Food Products" gives on page 51 the food value of the average canned salmon as purchased as follows:

Refuse	14. 2 per cent
Protein	19. 5 per cent
Fat	7. 5 per cent
Ash	2. 0 per cent
Moisture	56. 8 per cent
Calories per pound	680

SALMON IN RELATION TO THE PREVENTION OF GOITER

Goiter is a deficiency disease of man and animal manifested as an enlargement of the thyroid gland—the large gland in front of the neck. There are two types of goiter, one form being easily recognized as a striking enlargement of the thyroid, often accompanied by "pop-eyes." This type of the disease is known as exophthalmic goiter. The second and most important type in regard to incidence is marked only by a slight swelling at the base of the neck.

It is a disease world-wide in distribution, but is most prevalent in the Temperate Zone. The goiter zone of North America stretches from coast to coast and includes southern Canada and the northern States of the United States, particularly the mountain and Great Lake regions.

Goiter has its greatest incidence among children. The rate of incidence increases as the age of puberty is approached, then falls off rather rapidly. Fifty per cent of the school children are affected in some localities. Women are particularly susceptible to goiter. In certain regions the goiter rate among women is six times greater than that of men. Statistics on the presence of goiter among its students have been collected at the University of Washington since 1908. During that time an average of 35 per cent of the women students have showed the presence of goiter. The percentage has been steadily reducing for some time past owing to the adoption of prophylactic and remedial measures. If it were not for this the average percentage would probably be higher.

[39] Pacific Fisherman, Seattle, Wash., Vol. XVII, No. 4, April, 1919, p. 76.

Goiter affects other animals as well as man. Horses, cattle, sheep, and pigs are affected by thyroid diseases in districts where goiter is prevalent in man. It is a serious economic problem. Before the cause was well known the majority of young farm stock born in certain goitrous regions died from this disease. The mortality has averaged as high as 90 per cent. It has been found that a goitrous condition in livestock could be prevented by feeding fish meal made from salmon and herring offal, or other sea fish containing a good deal of iodine.

A prophylactic treatment is effective in the treatment of goiter. Graphic illustration to prove the point is afforded by an article in the Canadian Medical Journal for May, 1924. Dr. W. D. Keith, the author, says:

Situated at the lower end of the valley at the junction of these two rivers is an Indian reserve peopled by about 150 Indians whose forbears have lived in the same place as far back as the knowledge of man goes. In the Indian village no sanitation has been attempted and amongst these Indians there is no goiter nor has there ever been a case recorded. Only on rare occasions has a litter of myxœdematous pigs been born on the reserve.

Whilst considering the lack of goiter amongst these Indians I would like to draw attention to the fact that they eat a great deal of salmon. The fish come up the Birkenhead to spawn, and many millions of eggs are secured at the Govern-

sential difference between the iodine content of fresh and canned salmon. One hundred and fifty-two different samples of fresh and canned salmon were analyzed for iodine content.

The results of this investigation, summarized briefly, are that salmon has an iodine content from twenty to fifty times that of fruit, vegetables, and milk, and that all canned salmon is a valuable source of iodine.

A variation in iodine content between species is indicated, the average of all analyses giving red salmon an iodine content of 0.405 milligrams per kilo (moist basis); chinook or king, 0.364; coho or medium red, 0.206; pink or humpback, 0.264 milligrams per kilo. The average iodine content of all species of salmon in all districts is 0.296 milligrams per kilo.

The iodine content apparently varies with the species and within the species, according to the district where the salmon is caught. It is also interesting to note that different parts of the same salmon vary in iodine content, the parts of the flesh richest in fat apparently having the most iodine. The roe has been found to have a particularly high iodine content, as much as 1.113 milligrams per kilo.

Attention has already been called to the observations of W. D. Keith on the freedom from goiter of a group of Indians in a particularly goitrous district, and his suggestion that this was possibly due to the fact that their diet included a large amount of salmon. This salmon, caught in a spawning condition, is far inferior to the article of commerce, taken at its prime.

In regard to this, Jarvis, Clough, and Clark, in an article published in the Journal of the American Medical Association, say:

> Salmon has at least equal grounds for consideration with milk products, fruits and leafy vegetables—the materials used in these experiments and found of value in the prophylaxis of goiter. Our results indicate a much higher iodine content in salmon than Fellenberg found in milk products, eggs, leafy vegetables, or fruits. A considerable part of the iodine in fruits is contained in such inedible portions as the rind and seeds. Canned salmon consists only of the edible portion, in which all the iodine may be utilized.
>
> It appears that the systematic use of sea foods which are rich in iodine would be of considerable benefit in the treatment of simple goiter or for its prevention in goitrous regions. Canned salmon, on account of its cheapness and availability, is particularly suitable and should be included in the diet for patients.

An estimate of the amount of salmon necessary in a diet for the prevention of goiter has also been made. The general average iodine content for all species in all districts may be given as 0.300 milligrams per kilo, or 300 parts per billion. The daily iodine requirement of the thyroid has been stated at approximately 0.01 milligrams. This amount of iodine is contained in 33 grams of salmon, if 300 parts per billion is taken as the average. An average sized portion of salmon or other sea food eaten three or four times a week should go far in helping to prevent goiter.

STATISTICS OF THE SALMON OUTPUT

CANNING INDUSTRY, 1864 TO 1928

SUMMARY OF CANNING INDUSTRY

From the beginning of the canning of salmon on this coast it has been the most important branch of the industry, and the following table shows in condensed form the number of cases packed in each year on the Pacific coast of North America from the beginning of the industry in 1864 to 1928, both inclusive.

As British Columbia is a Province of the Dominion of Canada, it does not come strictly within the scope of this report, but in order to show the pack of canned salmon on the North American shores of the Pacific Ocean, which would be incomplete without that of the Province, it has been included also.

Pack of canned salmon on the Pacific coast, by years and waters

Year	Puget Sound	Coastal streams of Washington	Grays Harbor	Willapa Harbor	Columbia River	Coastal streams of Oregon	Smith River, Calif.
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
1866					4,000		
1867					18,000		
1868					28,000		
1869					100,000		
1870					150,000		
1871					200,000		
1872					250,000		
1873					250,000		
1874					350,000		
1875					375,000		
1876					450,000		
1877	5,500				380,000	7,804	
1878	238		5,420		460,000	26,934	4,277
1879	1,300				480,000	8,571	
1880	5,100				530,000	7,772	7,500
1881	8,500				550,000	12,320	
1882	7,900				541,300	19,186	
1883	1,500				629,400	23,156	
1884	5,500				620,000	27,876	5,500
1885	12,000		8,200		553,800	33,410	1,550
1886	17,000		18,700	13,600	448,500	77,547	
1887	22,000				356,000	73,996	
1888	21,975		37,000	22,500	372,477	92,863	2,347
1889	11,674				309,885	98,800	
1890	8,000				435,774	47,009	
1891	20,529		500	8,000	398,953	24,500	
1892	26,426		16,500	14,500	487,338	83,600	
1893	89,774		22,000	16,195	415,876	52,778	2,000
1894	95,400		21,400	15,100	490,100	54,815	2,000
1895	179,968		11,449	22,600	634,696	77,878	2,250
1896	195,664		21,274	24,941	481,697	91,860	
1897	494,026		13,300	20,600	552,721	68,683	
1898	400,200		12,100	21,420	487,944	83,209	
1899	919,611		24,240	21,314	332,774	82,041	
1900	469,450		30,800	26,300	358,772	12,237	
1901	1,380,590		41,500	34,000	390,183	58,618	
1902	581,659		31,500	39,492	317,143	44,236	
1903	478,488			5,890	339,577	54,861	
1904	291,488		27,559	26,400	395,104	98,874	
1905	1,018,641		22,050	14,950	397,273	89,055	
1906	430,602		22,000	14,440	394,898	107,332	
1907	698,080		14,000	13,382	324,171	79,712	
1908	448,765		14,000	20,457	277,719	83,994	
1909	1,678,737		21,436	12,024	274,196	58,169	
1910	567,883		55,480	11,508	391,415	104,617	
1911	1,551,028	18,431	75,941	25,497	553,331	138,146	
1912	416,119	19,914	47,287	28,148	286,026	84,074	
1913	2,583,463	13,124	19,895	12,050	266,479	38,492	
1914	817,354	21,459	32,434	16,837	454,621	106,617	3,000

Pack of canned salmon on the Pacific coast, by years and waters—Continued

Year	Puget Sound	Coastal streams of Washington	Grays Harbor	Willapa Harbor	Columbia River	Coastal streams of Oregon	Smith River, Calif.
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
1920	168, 334	1, 156	372	62	481, 545	20, 422	228
1921	589, 847	2, 956	5, 544	5, 166	322, 120	15, 754	3, 000
1922	257, 282	25, 445	14, 186	5, 062	392, 174	26, 287	----------
1923	757, 564	21, 957	26, 989	7, 466	480, 925	47, 411	----------
1924	321, 821	10, 589	29, 991	23, 833	501, 465	61, 403	3, 390
1925	906, 993	7, 805	29, 684	33, 071	540, 536	55, 686	7, 700
1926	307, 690	4, 153	8, 534	11, 371	479, 723	31, 001	500
1927	892, 244	6, 680	12, 839	21, 793	519, 809	45, 035	2, 300
1928	325, 374	2, 000	15, 953	9, 487	446, 650	19, 047	----------
Total	26, 720, 020	235, 179	1, 037, 349	690, 261	25, 541, 240	3, 073, 045	68, 399

Year	Klamath River, Calif.	Eel River, Calif.	Noyo River, Calif.	Sacramento River	Alaska	British Columbia	Total
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases* [1]
1864	----------	----------	----------	2, 000	----------	----------	2, 000
1865	----------	----------	----------	2, 000	----------	----------	2, 000
1866	----------	----------	----------	----------	----------	----------	4, 000
1867	----------	----------	----------	----------	----------	----------	18, 000
1868	----------	----------	----------	----------	----------	----------	28, 000
1869	----------	----------	----------	----------	----------	----------	100, 000
1870	----------	----------	----------	----------	----------	----------	150, 000
1871	----------	----------	----------	----------	----------	----------	200, 000
1872	----------	----------	----------	----------	----------	----------	250, 000
1873	----------	----------	----------	----------	----------	----------	250, 000
1874	----------	----------	----------	2, 500	----------	----------	352, 500
1875	----------	----------	----------	3, 000	----------	----------	378, 000
1876	----------	----------	----------	10, 000	----------	7, 247	467, 247
1877	----------	8, 500	----------	21, 500	----------	58, 387	481, 691
1878	----------	10, 500	----------	34, 017	8, 159	89, 946	639, 491
1879	----------	----------	----------	13, 855	12, 530	61, 093	577, 349
1880	----------	6, 250	----------	62, 000	6, 539	61, 849	687, 010
1881	----------	----------	----------	181, 200	8, 977	169, 576	930, 573
1882	----------	----------	----------	200, 000	21, 745	240, 461	1, 030, 592
1883	----------	15, 000	----------	123, 000	48, 337	163, 438	1, 003, 831
1884	----------	8, 200	----------	81, 450	64, 886	123, 706	937, 118
1885	----------	5, 750	----------	90, 000	83, 415	108, 517	896, 642
1886	----------	12, 500	----------	39, 300	142, 065	152, 964	922, 176
1887	----------	----------	----------	36, 500	206, 677	204, 083	899, 256
1888	4, 400	----------	----------	68, 075	412, 115	184, 040	1, 217, 792
1889	----------	----------	----------	57, 300	719, 196	417, 211	1, 614, 066
1890	----------	----------	----------	25, 065	682, 591	411, 257	1, 609, 696
1891	----------	----------	----------	10, 353	801, 400	314, 511	1, 578, 746
1892	1, 047	----------	----------	2, 281	474, 717	248, 721	1, 355, 130
1893	1, 600	----------	----------	23, 336	643, 654	610, 202	1, 877, 415
1894	1, 700	----------	----------	28, 463	686, 440	492, 232	1, 887, 650
1895	1, 600	----------	----------	25, 185	626, 530	587, 692	2, 169, 848
1896	----------	----------	----------	13, 387	966, 707	617, 782	2, 413, 312
1897	----------	----------	----------	38, 543	909, 078	1, 027, 183	3, 133, 134
1898	----------	----------	----------	29, 731	965, 097	492, 551	2, 492, 252
1899	1, 600	----------	----------	32, 580	1, 078, 146	765, 519	3, 257, 825
1900	----------	----------	----------	39, 304	1, 548, 139	606, 540	3, 091, 542
1901	----------	----------	----------	17, 500	2, 016, 804	1, 247, 212	5, 186, 407
1902	2, 500	----------	----------	14, 043	2, 536, 824	627, 161	4, 194, 558
1903	----------	----------	----------	8, 200	2, 246, 210	473, 674	3, 606, 900
1904	3, 400	----------	----------	14, 407	1, 953, 756	465, 894	3, 276, 882
1905	----------	----------	----------	2, 780	1, 887, 801	1, 167, 460	4, 600, 010
1906	----------	----------	----------	----------	2, 219, 044	629, 460	3, 817, 776
1907	----------	----------	----------	----------	2, 169, 873	547, 459	3, 846, 677
1908	----------	----------	----------	----------	2, 606, 973	542, 689	3, 994, 597
1909	5, 633	----------	----------	----------	2, 395, 477	967, 920	5, 413, 592
1910	8, 016	6, 000	----------	----------	2, 413, 054	762, 201	4, 320, 174
1911	7, 604	8, 400	----------	4, 142	2, 823, 817	948, 965	6, 155, 302
1912	18, 000	11, 000	----------	----------	4, 054, 641	996, 576	5, 961, 785
1913	6, 376	----------	----------	950	3, 739, 185	1, 353, 901	8, 033, 915
1914	11, 000	----------	----------	17, 315	4, 056, 653	1, 111, 039	6, 648, 329
1915	12, 900	----------	----------	[2] 6, 179	4, 500, 293	1, 133, 381	7, 649, 594
1916	8, 884	----------	----------	[3] 19, 445	4, 900, 627	995, 065	7, 703, 894

Pack of canned salmon on the Pacific coast, by years and waters—Continued

Year	Klamath River, Calif.	Eel River, Calif.	Noyo River, Calif.	Sacramento River	Alaska	British Columbia	Total
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
1920	11,927	8,472			4,429,463	1,187,616	6,309,597
1921	7,376				2,596,826	603,548	4,152,137
1922	9,700				4,501,652	1,290,326	6,522,114
1923	6,000				5,035,697	1,341,677	7,725,686
1924	9,546				5,294,915	1,745,313	8,002,266
1925	14,639				4,459,937	1,719,282	7,775,333
1926	11,037				6,652,882	2,065,190	9,572,081
1927	13,285				3,572,128	1,357,697	6,443,910
1928	4,237				6,083,903	2,035,629	8,944,780
Total	209,968	100,572	9,500	1,419,534	117,402,384	40,099,841	216,607,292

CANNING INDUSTRY, BY SPECIES AND WATERS

The tables which follow show separately, by waters and as far as possible by species, the salmon canned on the Pacific coast from the beginning of the industry until 1928. It is only within recent years that the published statistics have shown the pack of the different species separately. In the early years of canning the chinook, or quinnat, salmon was used exclusively, the other species not being utilized until the chinook had begun to decrease in abundance, or a demand had arisen for a cheaper product. There is a very great difference in the selling value of the highest and lowest grades, and it is necessary to have complete statistical data now in order intelligently to comprehend the trend of the industry. While every effort has been made to make these tables complete, there are, unfortunately, some gaps which it was found impossible to fill. Such ellipses indicate that either the canneries did not operate or that no data were available for such periods.

Although there are only five species of salmon found on the Pacific coast, each bears several common names which are in general use in one or more of the many fishing districts. Trade names of each species as known in each district follow:

Districts	1	2	3	4	5
Alaska	Red	King	Coho Medium Red. Silver.	Pink	Chum.
British Columbia	Sockeye	Spring	Coho	Humpback	Keta.
Puget Sound	do	Tyee Spring	do	do	Chum.
Columbia River	Blueback	Chinook	Silverside	(None packed)	Do.
Outside rivers	Quinault	Quinnat	do	do	Do.

Pack of canned salmon on Puget Sound in specified years

Year	Canneries operated	Chinook		Sockeye		Medium red or silver	
		Cases	Value	Cases	Value	Cases	Value
1877	1					5,000	
1878	1					238	
1879	1					1,300	$5,690
1880	1						
1881	1						
1882	1						
1883	1						
1884	1						
1888	4						
1889	2	240	$1,200			7,480	37,400
1890	1	1,000	5,000			3,000	15,000
1891	2	382	2,101	5,538	$24,921	5,869	19,308
1892	2	86	473	2,954	11,816	7,206	24,500
1893	3	1,200	6,480	47,852	103,371	11,812	59,000
1894	3			41,781	188,014	22,418	89,672
1895	7	1,542	7,325	65,143	273,108	50,865	154,218
1896	11	13,495	67,475	72,979	350,299	82,640	264,448
1897	12	9,500	39,045	312,048	1,248,192	91,900	282,133
1898	18	11,200	50,624	252,000	1,058,400	98,600	335,240
1899	19	24,364	103,180	499,646	2,368,334	111,387	418,176
1900	19	22,350	134,100	229,800	1,149,000	128,200	512,800
1901				1,220,000			
1902	21	30,049	150,245	372,301	2,047,655	85,817	429,085
1903	22	14,500	72,500	167,211	1,003,260	103,450	413,800
1904	13	14,441	69,352	109,264	653,871	118,127	447,851
1905	24	1,804	9,922	825,453	4,052,718	79,335	337,174
1906	16	8,139	48,834	178,748	1,251,236	94,497	472,485
1907	14	1,814	16,326	93,122	698,416	119,472	476,288
1908	11	95,210	666,470	170,951	1,196,657	128,922	644,922
1909	24	13,019	72,604	1,097,904	6,183,300	143,133	630,446
1910	15	10,064	60,324	248,014	1,673,095	162,755	895,153
1911	21	21,823	172,582	127,769	1,168,145	256,123	1,711,178
1912	21	20,252	101,706	184,680	1,660,173	149,727	761,200
1913	32	1,234	5,247	1,673,099	10,871,178	61,019	235,372
1914	22	27,140	179,532	339,787	2,751,832	158,933	715,995
1915	40	28,466	145,555	64,584	676,769	180,783	902,335
1916	32	45,072	270,432	90,866	817,790	208,967	1,044,835
1917	45	70,918	638,262	454,336	4,543,360	115,860	926,880
1918	33	62,821	565,385	52,587	736,225	235,795	2,004,258
1919	39	71,190	640,710	67,087	764,792	201,697	1,815,269
1920	19	27,482	274,820	62,751	1,211,094	25,321	164,587
1921	32	25,662	205,376	95,667	1,599,529	65,303	375,928
1922	21	21,911	214,910	50,235	850,416	115,405	674,928
1923	18	16,103	147,594	50,003	817,882	120,908	730,214
1924	12	16,319	208,718	70,749	1,072,083	84,850	660,411
1925	23	29,983	310,480	104,973	1,604,501	172,007	1,615,538
1926	14	27,780	305,930	44,568	720,786	120,950	1,020,429
1927	22	41,716	587,258	97,594	2,115,410	135,802	1,358,020
1928	14	23,153	291,493	60,081	1,207,981	89,923	777,472

Pack of canned salmon on Puget Sound in specified years—Continued

Year	Canneries operated	Chum		Pink		Steelhead		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1877	1			500				5,500	
1878	1							238	
1879	1							1,300	$5,690
1880	1							5,100	
1881	1							8,500	
1882	1							7,900	
1883	1							1,500	
1884	1							5,500	
1885								12,000	
1886								17,000	
1887								22,000	
1888	4							21,975	126,356
1889	2	1,145	$3,435	2,809	$7,584			11,674	49,619
1890	1	4,000	12,000					8,000	32,000
1891	2	3,093	10,825	5,647	15,246			20,529	72,461
1892	2	16,180	56,630					26,426	93,419
1893	3	11,380	31,295	17,530	47,331			89,774	247,537
1894	3	22,152	60,918	9,049	24,432			95,400	363,036
1895	7	38,785	94,741	23,633	62,556			179,968	591,948
1896	11	26,550	73,013					195,664	755,235
1897	12	23,310	64,103	57,268	171,804			494,026	1,805,277
1898	18	38,400	105,600					400,200	1,549,864
1899	19	31,481	86,427	252,733	734,241			919,611	3,710,358
1900	19	89,100	245,025					469,450	1,940,925
1901								1,390,590	
1902	21	93,492	467,460					581,659	3,094,445
1903	22	12,001	30,002	181,326	407,984			478,488	1,927,546
1904	13	49,656	124,254					291,488	1,295,328
1905	24	41,057	102,643	70,992	212,976			1,018,641	5,615,433
1906	16	149,218	708,781					430,602	2,481,336
1907	14	50,249	150,847	433,423	1,300,269			698,080	2,642,146
1908	11	47,007	142,821	6,075	18,225			448,765	2,669,095
1909	24	53,688	128,916	370,993	902,342			1,678,737	7,917,608
1910	15	146,942	514,297	108	388			567,883	3,143,256
1911	21	98,321	391,123	1,046,992	4,302,344			1,551,028	7,745,372
1912	21	60,760	154,193	700	2,185			416,119	2,679,457
1913	32	56,225	124,970	791,886	2,092,401			2,583,463	13,329,168
1914	22	290,477	903,675	1,017	4,615			817,354	4,555,649
1915	40	411,724	1,155,474	583,649	1,795,285			1,269,206	4,675,418
1916	32	564,194	2,031,098	143,804	575,216	14	$84	[1] 1,052,917	4,739,455
1917	45	218,977	1,270,067	1,130,163	6,780,978	4	36	1,990,288	14,159,583
1918	33	264,922	1,669,009	6,607	42,946			622,732	5,017,823
1919	39	529,967	3,179,802	437,731	3,392,411	62	620	1,307,734	9,793,604
1920	19	47,831	179,306	4,921	23,621	28	168	168,334	1,853,656
1921	32	27,315	98,485	375,900	1,394,494			589,847	3,673,812
1922	21	66,746	297,874	2,985	18,645			257,282	2,056,773
1923	18	100,652	477,283	469,869	2,310,681	29	174	757,564	4,483,828
1924	12	143,074	663,426	6,699	35,359	130	729	321,821	2,640,726
1925	23	42,715	139,911	557,086	2,893,984	229	1,786	906,993	6,566,200
1926	14	112,201	550,405	2,128	11,901	63	719	307,690	2,610,170
1927	22	38,129	225,654	578,973	3,669,941	80	1,056	892,244	7,957,339
1928	14	146,356	833,114	5,597	41,091	266	2,873	325,376	3,154,024

[1] The totals include large quantities of salmon brought to the sound canneries from other waters, principally in British Columbia, and packed here, these when prepared for market comprising approximately 141,917 cases of humpbacks or pinks, valued at $566,952; 136,316 cases of chums, valued at $538,937, and 53,135 cases of silvers, valued at $87,185; a grand total of 331,368 cases and $1,193,074.

Pack of canned salmon on Soleduck River, Wash., in specified years [1]

Year	Canneries operated	Chinook		Sockeye		Silverside	
		Cases	Value	Cases	Value	Cases	Value
1912	1	414	$2,484	15	$156	940	$4,324
1913	1	206	1,442			1,040	3,536
1914	1	237	1,185			1,439	5,574
1915	1	388	1,940			1,320	6,072

Year	Canneries operated	Pink [2]		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value
1912	1	103	$268	76	$182	1,548	$7,414
1913	1			28	61	1,27	5,039
1914	1	189	567	103	291	1,968	7,617
1915	1	826	2,478	192	538	2,726	11,028

[1] None packed since 1915. [2] These are virtually all light-colored chinooks.

Pack of canned salmon on Hoh River, Wash., in specified years [1]

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1917	1	372	$3,348	204	$1,665	110	$715	686	$5,728
1918	1	60	540	294	2,499	17	108	371	3,147
1919	1	18	216	233	2,796	332	2,125	583	5,137
1920	1	524	6,288	370	2,627	27	85	921	9,000
1921	1	366	3,682					366	3,682

[1] None packed since 1921.

Pack of canned salmon on Queets River, Wash., in specified years [1]

Year	Canneries operated	Chinook		Sockeye		Silverside	
		Cases	Value	Cases	Value	Cases	Value
1912	1	750	$4,500	200	$2,080	2,500	$11,500
1913	1	1,082	7,574	220	1,848	1,680	5,712
1914	1	1,175	5,875	200	2,134	1,800	6,966
1915	1			1,512	9,072		
1916	1	1,506	9,036			617	3,085
1917	1	713	6,417			1,196	9,759
1918	1	381	3,429	20	280	1,138	9,673
1919	1	450	5,400	100	1,600	1,025	12,300
1922	1			750	11,930		
1923	1	100	406	463	5,389	976	4,821
1924	1	127	814	257	4,166	1,314	8,541
1925	1	1,745	11,185	338	5,479	765	4,972
1926	1	592	3,242	146	2,380	1,311	9,832
1927	1	1,420	11,360	275	5,500		

Year	Canneries operated	Chum		Steelhead		Total	
		Cases	Value	Cases	Value	Cases	Value
1912	1	1,000	$2,400			4,450	$20,480
1913	1	670	1,461	600	$3,300	4,252	19,895
1914	1	1,020	2,887	500	2,750	4,695	20,612
1915	1					1,512	9,072
1916	1	415	1,245			2,538	13,366
1917	1	47	306	129	1,161	2,085	17,643
1918	1			[2] 87	870	1,626	14,252
1919	1	50	320			1,625	19,620
1922	1					750	11,930
1923	1	478	1,979	1,500	11,250	3,517	23,845
1924	1	675	2,902			2,373	16,423
1925	1	867	3,728			3,715	25,364
1926	1	579	2,695			2,570	18,149
1927	1					1,695	16,860

[1] No operations in 1920, 1921, and 1928. [2] 68 cases of these were smoked.

Pack of canned salmon on Quinault River, Wash., in specified years

Year	Canneries operated	Chinook		Sockeye		Silverside	
		Cases	Value	Cases	Value	Cases	Value
1911 [1]	1	5,000	$35,000	2,031	$16,000	6,000	$42,000
1912	2			4,500	40,500	3,916	18,014
1913	1			492	4,133	7,106	24,160
1914	2	51	255	12,074	120,740	1,623	6,281
1915	2	1,144	6,864	22,972	239,989	1,388	6,807
1916	2	1,365	8,190	10,315	92,835	1,093	5,465
1917	2	309	2,781	4,608	55,296	2,609	21,289
1918	2	1,497	13,473	2,470	30,869	6,086	51,731
1919	2	165	2,063	1,144	18,304	775	9,300
1920	1			235	4,230		
1921	2			2,590	41,440		
1922	5	150	644	18,463	290,238	1,852	5,302
1923	2	612	2,485	9,991	116,295	1,081	5,340
1924	3			8,216	123,988		
1925	3	450	2,885	2,975	48,225	475	3,087
1926	2			1,583	25,803		
1927	4			4,985	99,700		
1928	4			2,000	40,000		

Year	Canneries operated	Chum		Total	
		Cases	Value	Cases	Value
1911 [1]	1	5,400	$27,000	18,431	$120,000
1912	2	5,500	13,200	13,916	71,714
1913	1			7,598	28,293
1914	2	1,048	2,966	14,796	130,242
1915	2	1,993	5,580	27,497	259,240
1916	2	466	1,398	13,239	107,888
1917	2	1,821	11,836	[2] 10,553	98,438
1918	2	1,682	10,874	11,735	106,947
1919	2	650	4,160	2,734	33,827
1920	1			235	4,230
1921	2			2,590	41,440
1922	5	4,230	17,081	24,695	313,265
1923	2	6,756	27,970	18,440	152,090
1924	3			8,216	123,988
1925	3	190	817	4,090	55,014
1926	2			1,583	25,803
1927	4			4,985	99,700
1928	4			2,000	40,000

[1] Previous to this date the fish were transported to the Aberdeen and Hoquiam canneries and prepared there.
[2] Includes 1,206 cases of humpbacks, valued at $7,236.

Pack of canned salmon on Grays Harbor in specified years

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1878	1							5,420	$29,268
1879	1								
1885								8,200	
1886								18,700	
1888	4							37,000	212,750
1891	1			500	$1,500			500	1,500
1892	1	4,500	$15,390	9,000	30,780	3,000	$9,415	16,500	55,585
1893	1	4,500	22,500	12,000	48,000	5,500	14,850	22,000	85,350
1894	1	12,300	61,500	4,100	16,400	5,000	13,500	21,400	91,400
1895	1	56	202	8,876	28,403	2,517	6,922	11,449	35,527
1896	2	7,816	36,806	9,278	29,689	4,180	11,495	21,274	57,990
1897	1	3,100	11,741	8,300	23,481	1,900	5,000	13,300	40,222
1898	2	5,100	23,052	4,800	16,320	2,200	6,050	12,100	45,422
1899	1	5,000	21,250	15,740	59,025	3,500	8,750	24,240	89,025
1900	2	6,700	33,500	12,900	51,600	11,200	30,800	30,800	115,900
1901								41,500	
1902	1	4,000	20,000	10,000	45,000	17,500	70,000	31,500	135,000
1904	2	4,339	20,163	14,904	51,854	8,316	21,022	27,559	93,039
1905	2	2,050	9,225	13,000	52,000	7,000	18,200	22,050	79,425
1906	2	2,500	10,000	11,500	43,900	8,000	21,500	22,000	75,400
1907	1	1,000	7,000	9,500	47,500	3,500	11,500	14,000	66,000
1908	1	1,000	7,000	9,500	47,500	3,500	11,500	14,000	66,000
1909	1	5,721	20,819	9,019	38,146	5,047	11,608	[1] 21,436	79,624
1910	3	15,495	90,718	21,768	108,840	13,867	48,534	[2] 55,480	272,017
1911	4	15,773	110,411	28,991	202,937	[3] 31,177	155,885	75,941	469,233
1912	5	9,060	54,360	26,162	120,345	12,065	28,956	47,287	203,661
1913	4	1,253	8,771	5,723	19,458	12,919	28,163	19,895	56,392
1914	4	11,899	59,495	9,156	35,434	11,379	32,203	32,434	127,132
1915	4	4,219	20,089	14,036	61,707	22,737	63,678	40,992	145,474
1916	5	12,400	74,403	11,580	57,898	32,560	117,744	[4] 60,336	265,229
1917	9	12,124	109,116	9,589	51,246	10,910	70,915	[5] 42,696	291,715
1918	6	8,731	99,912	21,994	201,705	5,247	37,915	35,972	339,532
1919	6	4,370	54,626	12,214	146,608	28,712	183,757	45,296	384,991
1920	1	337	4,044	35	249			372	4,293
1921	2	942	9,476	2,834	13,079	2,746	9,270	5,544	31,825
1922	3	57	244	4,052	18,558	10,077	40,106	14,186	58,908
1923	4	3,076	12,489	3,085	15,240	20,828	86,228	26,989	113,957
1924	4	35	215	3,513	19,813	26,435	111,820	29,991	131,848
1925	4	992	6,359	6,411	41,671	22,281	95,808	29,684	143,838
1926	3			556	3,047	7,978	37,098	8,534	40,145
1927	3	338	2,076	324	1,944	12,177	73,136	12,839	77,156
1928	4			77	462	15,876	79,380	15,953	79,842

[1] Includes 1,649 cases, valued at $9,051, packed with sockeyes brought from Puget Sound.
[2] Includes 4,350 cases of "quinault," or sockeye, salmon, valued at $23,925.
[3] Includes 6,730 cases of humpbacks.
[4] Includes 3,796 cases of humpbacks, valued at $15,184.
[5] Includes 10,073 cases of humpbacks, valued at $60,438.

Pack of canned salmon on Willapa Harbor in specified years

Year	Canneries operated	Chinook		Silverside		Chum		Humpback		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value
1886										13,600	
1887	4										
1888	3									22,500	$129,375
1891	1			8,000	$24,000					8,000	24,000
1892	1	3,000	$10,260	9,000	30,780	2,500	$7,745			14,500	48,785
1893	1	1,700	9,180	7,895	31,580	6,600	18,150			16,195	58,910
1894	1	2,700	14,580	5,600	22,400	6,800	18,700			15,100	55,680
1895	2	4,636	23,180	13,047	41,150	4,917	13,222			22,600	77,552
1896	2	4,551	22,755	11,940	38,208	8,450	21,238			24,941	82,201
1897	1	8,100	33,291	14,600	44,822	6,900	18,975			29,600	97,088
1898	2	5,865	26,510	9,809	33,351	5,746	15,802			21,420	75,663
1899	3	5,650	25,425	10,675	40,031	4,989	13,720			21,314	79,176
1900	3	6,700	33,500	12,400	49,600	7,200	19,800			26,300	102,900
1901										34,000	
1902	2	5,836	29,186	9,128	41,076	24,528	97,112			39,492	167,368
1903	1	2,300	13,800	2,390	10,755	1,200	3,300			5,890	27,855
1904	2	3,000	12,000	7,400	28,440	16,000	38,700			26,400	79,140
1905	2	4,650	20,925	4,300	17,200	6,000	15,000			14,950	53,125
1906	2	4,000	16,000	5,340	21,360	5,100	13,260			14,440	50,620
1907	2	3,530	15,354	9,228	36,682	624	2,496			13,382	54,532
1908	2	4,017	20,585	5,923	23,692	10,517	36,809			20,457	81,086
1909	1	1,455	5,869	4,822	17,359	5,747	13,163			12,024	36,391
1910	1	2,923	15,077	5,096	25,480	3,489	22,711			11,508	63,268
1911	2	5,717	40,019	9,298	65,086	10,482	52,410			25,497	157,515
1912	3	6,123	36,738	8,030	36,938	9,533	22,879	4,462	$11,601	28,148	108,156
1913	2	67	469	3,111	10,577	8,872	19,368			12,050	30,414
1914	3	2,924	14,431	7,179	27,749	6,734	19,077			16,837	61,256
1915	2	3,148	19,380	4,008	18,437	5,686	15,921			12,842	53,738
1916	2	5,115	30,690	3,365	16,825	10,073	36,262			18,553	83,777
1917	2	1,720	18,920	2,143	19,287	4,516	30,708			8,379	68,915
1918	2	921	10,131	5,249	50,390	2,657	18,599			8,827	79,120
1919	2	1,152	12,672	1,491	14,910	9,301	65,107	1,688	8,440	13,632	101,129
1920		62	837							62	837
1921	1	623	4,673	1,683	6,732	2,719	9,788	141	536	5,166	21,729
1922	3	1,168	6,168	1,549	10,260	2,289	8,579	56	224	5,062	25,231
1923 [1]	1	375	3,525	45	225	6,402	36,142			7,466	46,203
1924	4	168	1,275	602	4,455	21,959	70,582	1,104	5,400	23,833	81,712
1925	3	13,500	67,500	10	72	19,561	58,740			33,071	126,312
1926	4	1,491	13,517	1,400	8,240	8,205	34,320	275	1,375	11,371	57,452
1927	5	2,668	21,342	1,731	12,133	17,394	80,682			21,793	114,157
1928	4	502	4,518	338	2,028	8,647	43,235			9,487	49,781

[1] In 1923 there were 644 cases of steelheads packed, valued at $6,311.

Pack of canned salmon on the Columbia River from the inception of the industry to 1928

Year	Canneries operated	Chinook		Blueback		Silverside	
		Cases	Value	Cases	Value	Cases	Value
1866	1	4,000	$64,000				
1867	1	18,000	288,000				
1868	2	28,000	392,000				
1869		100,000	1,350,000				
1870		150,000	1,800,000				
1871		200,000	2,100,000				
1872		250,000	2,325,000				
1873		250,000	2,250,000				
1874	13	350,000	2,625,000				
1875	13	375,000	2,250,000				
1876	17	450,000	2,475,000				
1877		380,000	2,052,000				
1878	30	460,000	2,300,000				
1879	30	480,000	2,640,000				
1880	35	530,000	2,650,000				
1881	35	550,000	2,475,000				
1882		541,300	2,600,000				
1883		629,400	3,147,000				
1884		620,000	2,915,000				
1885		553,800	2,500,000				
1886	39	448,500	2,135,000				
1887		356,000	2,124,000				
1888	28	372,477	2,327,981				
1889	21	266,697	1,600,182	17,797	$101,051		
1890	21	335,604	1,946,087	57,345	290,069		
1891	22	353,907	2,038,566	15,482	284,242		
1892	24	344,267	1,996,388	66,547	372,909	4,176	$20,880
1893	24	288,773	1,559,374	30,459	152,295	29,107	116,428
1894	24	351,106	1,895,976	43,814	224,430	42,758	171,032
1895	24	444,909	2,428,658	18,015	86,523	99,601	329,683
1896	24	370,943	1,840,511	16,983	81,518	44,108	141,145
1897	22	432,753	1,804,221	12,972	51,888	60,850	197,762
1898	23	329,566	1,490,394	66,670	300,015	65,431	222,465
1899	17	255,824	1,458,175	23,969	134,723	29,608	112,055
1900	16	262,392	1,821,258	13,162	92,184	44,925	202,163
1902	14	270,580	1,428,743	17,037	86,465	10,532	44,732
1903	16	301,762	1,610,614	8,383	42,867	12,181	49,869
1904	20	320,378	1,944,690	12,911	78,048	31,254	118,357
1905	19	327,106	1,962,636	7,768	46,608	26,826	114,011
1906	19	311,334	1,868,007	7,816	54,712	41,446	124,338
1907	19	258,433		5,504		31,757	
1908	14	210,096		8,581		31,432	
1909	15	162,131	1,203,546	[1] 27,908	214,561	42,178	185,070
1910	15	244,285	1,882,137	6,234	34,287	68,922	363,688
1911	15	405,862	2,204,185	5,968	47,904	79,416	549,478
1912	15	220,317	1,988,526	8,210	85,384	31,842	177,248
1913	15	192,116	1,664,670	11,152	93,677	40,969	175,412
1914	17	289,464	2,573,502	35,311	376,924	69,769	380,666
1915	19	406,486	3,694,361	5,459	56,707	33,336	173,234
1916	20	395,166	3,572,203	3,790	27,288	52,084	335,114
1917	20	403,637	5,023,529	7,968	111,552	64,299	700,680
1918	20	400,952	5,222,983	37,833	605,328	98,145	1,072,843
1919	21	392,125	5,031,207	7,268	73,116	90,728	1,052,767
1920	22	420,467	6,286,403	2,617	41,872	27,024	189,168
1921	21	267,852	3,643,282	6,045	89,820	34,381	239,613
1922	23	237,230	3,257,244	30,743	442,466	90,437	605,942
1923	23	289,586	4,638,956	38,309	518,724	101,554	630,543
1924	22	293,716	3,991,588	7,366	118,587	112,308	742,445
1925	21	350,809	4,869,950	5,650	103,182	113,544	1,196,749
1926	21	295,302	4,140,271	21,736	388,621	97,142	981,217
1927	22	339,446	5,569,222	6,887	147,378	74,879	585,816
1928	24	251,404	4,355,218	4,818	100,131	49,136	478,355

[1] Of these, 2,846 cases, valued at $23,203, were packed with sockeyes brought from Puget Sound.

Pack of canned salmon on the Columbia River from the inception of the industry to 1928—Continued

Year	Canneries operated	Humpback		Chum		Steelhead trout		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1866	1							4,000	$64,000
1867	1							18,000	288,000
1868	2							28,000	392,000
1869								100,000	1,350,000
1870								150,000	1,800,000
1871								200,000	2,100,000
1872								250,000	2,325,000
1873								250,000	2,250,000
1874	13							350,000	2,625,000
1875	13							375,000	2,250,000
1876								450,000	2,475,000
1877								380,000	2,052,000
1878	30							460,000	2,300,000
1879	30							480,000	2,640,000
1880	29							530,000	2,650,000
1881	35							550,000	2,475,000
1882								541,300	2,600,000
1883								629,400	3,147,000
1884								620,000	2,915,000
1885								553,800	2,500,000
1886	39							448,500	2,135,000
1887								356,000	2,124,000
1888	28							372,477	2,327,981
1889	21					25,391	$108,587	309,885	1,809,820
1890	21					42,825	171,300	435,774	2,407,456
1891	22					29,564	118,156	398,953	2,440,964
1892	24					72,348	288,892	487,338	2,679,069
1893	24			2,311	$6,933	65,226	260,904	415,876	2,095,934
1894	24					52,422	209,688	490,100	2,501,126
1895	24			22,493	62,591	49,678	203,542	634,696	3,110,997
1896	24					49,663	198,652	481,697	2,261,826
1897	22					46,146	165,440	552,721	2,219,311
1898	23					26,277	60,352	487,944	2,073,226
1899	17			11,379	33,836	11,994	39,186	332,774	1,777,975
1900	16			17,696	63,706	20,597	102,985	358,772	2,282,296
1901								390,183	1,942,660
1902	14			10,401	41,604	8,593	42,965	317,143	1,644,509
1903	16			10,000	37,500	7,251	36,255	339,577	1,777,105
1904	20			20,693	52,691	9,868	48,892	395,104	2,242,678
1905	19			25,751	65,206	9,822	49,110	397,273	2,237,571
1906	19			27,802	69,505	6,500	32,500	394,898	2,149,062
1907	19			22,556		5,921		324,171	1,763,490
1908	14			16,884		10,726		277,719	1,380,708
1909	15	[1] 55	$132	24,542	57,115	17,382	99,796	274,196	1,760,220
1910	15			66,538	232,883	5,436	31,203	391,415	2,544,198
1911	15			53,471	203,198	8,594	47,399	553,331	3,052,164
1912	15			18,699	46,590	6,958	22,108	286,026	2,319,856
1913	15			13,303	29,486	8,939	49,142	266,479	2,012,387
1914	17			49,285	305,541	10,792	59,356	454,621	3,695,989
1915	19			86,530	251,632	26,723	129,358	558,534	4,305,292
1916	20	56	224	77,766	307,483	18,999	118,987	547,861	4,361,299
1917	20			53,659	386,596	23,783	292,583	553,346	6,514,940
1918	20			29,846	215,669	24,605	350,071	591,381	7,466,894
1919	21			75,493	441,989	14,414	144,140	580,028	6,743,219
1920	22			18,792	60,134	12,645	151,740	481,545	6,729,317
1921	21			3,700	10,174	10,142	110,618	322,120	4,093,507
1922	23			8,844	47,640	24,920	223,566	392,174	4,576,858
1923	23			25,508	110,638	25,968	269,765	480,925	6,168,626
1924	22	593	2,709	57,748	257,502	29,734	273,581	501,465	5,386,412
1925	21	84	278	55,812	246,010	14,637	205,204	540,536	6,621,373
1926	21			32,853	141,926	32,690	352,744	479,723	6,004,779
1927	22			68,449	425,240	30,148	311,070	519,809	7,028,726
1928	24			124,953	747,619	16,339	222,139	446,650	5,903,467

[1] Packed with humpbacks brought from Puget Sound.

Pack of canned salmon on the Columbia River, by States, 1917–1928

States and species	1917		1918		1919		1920	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Washington:								
Blueback	2,801	$33,612	19,450	$245,070	2,329	$18,632	1,297	$20,752
Chinook	146,140	1,753,680	145,511	1,715,874	[1] 130,185	1,671,007	[2] 140,319	2,098,190
Chum	14,539	93,050	12,173	85,211	39,279	235,674	4,911	15,715
Silverside	15,989	183,874	35,746	343,162	34,927	349,270	7,398	51,786
Steelhead	6,053	66,583	8,699	104,388	7,148	71,480	4,977	59,724
Total	185,522	2,130,799	221,579	2,493,705	213,868	2,346,063	158,902	2,246,167
Oregon:								
Blueback	5,167	77,940	18,383	360,258	4,939	54,484	1,320	21,120
Chinook	257,497	3,269,849	255,441	3,507,109	261,940	3,360,200	280,148	4,188,213
Chum	39,120	293,546	17,673	130,458	36,214	206,315	13,881	44,419
Silverside	48,310	516,806	62,399	729,681	55,801	703,497	19,626	137,382
Steelhead	17,730	225,955	15,906	245,683	7,266	72,660	7,668	92,016
Total	367,824	4,384,096	369,802	4,973,189	366,160	4,397,156	322,643	4,483,150
Grand total	553,346	6,514,895	591,381	7,466,894	580,028	6,743,219	481,545	6,729,317

States and species	1921		1922		1923		1924	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Washington:								
Blueback	2,674	$39,727	17,568	$252,878	19,084	$258,417	2,591	$41,709
Chinook	104,349	1,419,641	99,096	1,360,664	94,821	1,518,821	110,872	1,506,738
Chum	641	1,762	7,609	40,983	16,401	71,114	13,899	61,935
Humpback							593	2,709
Silverside	8,454	58,902	28,580	191,500	27,918	173,263	22,965	151,888
Steelhead	8,955	97,668	8,047	72,215	13,103	136,098	9,617	88,505
Total	125,073	1,617,700	160,900	1,918,240	171,327	2,157,713	160,537	1,853,484
Oregon:								
Blueback	3,371	50,093	13,175	189,588	19,225	260,307	4,775	76,878
Chinook	163,503	2,223,641	138,134	1,896,580	194,765	3,120,135	182,844	2,484,850
Chum	3,059	8,412	1,235	6,657	9,107	39,524	43,849	195,567
Silverside	25,927	180,711	61,857	414,442	73,636	457,280	89,343	590,557
Steelhead	1,187	12,950	16,873	151,351	12,865	133,667	20,117	185,076
Total	197,047	2,475,807	231,274	2,658,618	309,598	4,010,913	340,928	3,532,928
Grand total	322,120	4,093,507	392,174	4,576,858	480,925	6,168,626	501,465	5,386,412

States and species	1925		1926		1927		1928	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Washington:								
Blueback	2,900	$52,967	9,392	$167,910	3,170	$67,521	3,307	$66,140
Chinook	170,181	2,362,833	105,791	1,483,327	141,377	2,588,187	143,841	2,445,297
Chum	30,228	133,185	6,738	29,109	15,409	95,536	51,593	309,558
Humpback	84	278						
Silverside	20,732	218,511	17,103	172,823	34,619	269,228	23,242	217,772
Steelhead	3,396	47,605	7,148	77,146	6,021	62,016	9,988	134,838
Total	227,521	2,815,379	146,172	1,930,315	200,596	3,082,488	231,971	3,173,605
Oregon:								
Blueback	2,750	50,215	12,314	220,711	3,717	79,857	1,511	33,991
Chinook	180,628	2,507,117	189,511	2,656,944	198,069	2,971,035	107,563	1,909,921
Chum	25,584	112,825	26,115	112,817	53,040	329,704	73,360	438,061
Silverside	92,812	978,238	80,039	808,394	40,260	316,588	25,894	260,583
Steelhead	11,241	157,599	25,542	275,598	24,127	249,054	6,351	87,301
Total	313,015	3,805,994	333,551	4,074,464	319,213	3,946,238	214,679	2,729,857
Grand total	540,536	6,621,373	479,723	6,004,779	519,809	7,028,726	446,650	5,903,462

[1] Includes 106,328 cases spring chinooks, valued at $1,382,264; 21,740 cases fall chinooks, valued at $273,924; and 2,117 cases light-colored chinooks, valued at $14,819.

[2] Includes 138,258 cases spring chinooks, valued at $2,073,870; and 2,061 cases fall chinooks, valued at $24,310.

Pack of canned salmon in specified years

NEHALEM RIVER, OREG.

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1887	1							5,000	$30,000
1889								6,000	32,000
1890								9,000	45,500
1891	1							3,500	14,000
1892	1			10,000	$40,000			10,000	40,000
1893	1	1,692	$6,768	5,031	20,124			6,723	26,892
1894	1	1,627	6,508	4,866	19,464			6,493	25,972
1895	1	1,752	7,008	5,152	16,486			6,904	23,494
1896	1	2,828	8,484	5,218	15,654			8,046	24,138
1897	2	3,384	10,152	8,366	25,098			11,750	35,250
1898	1	3,808	9,891	5,700	19,380			9,508	29,271
1899	1	1,384	5,536	7,405	26,658	1,288	$3,864	10,077	36,058
1900	1								
1901	1	268	1,139	3,273	13,092	2,069	7,206	6,210	21,437
1902	1	271	1,431	3,169	13,468	2,570	10,280	6,010	25,179
1903	1	686	3,670	4,615	19,614			5,301	22,284
1904	1	500	2,500	5,000	20,000	6,000	12,000	11,500	34,500
1905	1	2,700	16,200	2,900	12,325	6,000	15,000	11,600	43,525
1906	1	3,987	23,922	4,976	14,928	2,057	5,143	11,020	42,993
1907	1	4,000	28,000	6,600	19,800	2,000	6,000	12,600	53,800
1908	1	5,000	35,000	6,100	18,300	2,016	6,048	13,116	59,348
1909	1	1,985	10,542	4,554	20,253	909	2,091	7,448	32,886
1910	1	3,500	24,500	5,400	29,700	1,500	4,500	10,400	58,700
1911	2	5,821	46,568	14,878	81,829	3,439	13,048	24,138	141,445
1912	2			13,331	73,321	1,571	3,927	14,902	77,248
1913	1	300	1,500	764	3,056	5	11	1,069	4,567
1914	2	4,841	33,887	11,800	63,720	1,668	4,150	18,309	101,777
1915	2	400	2,400	5,400	24,840	2,260	6,328	8,060	33,568
1916	2	2,700	21,656	3,474	17,370	833	2,499	7,007	41,525
1917	2	783	7,047	851	6,808	472	3,304	2,106	17,159
1918	2	1,685	18,535	9,200	88,320	519	3,633	11,404	110,488
1919	2	500	6,250	8,124	97,488	1,183	7,571	9,807	111,309
1922 [1]	1			2,000	9,160			2,000	9,160

TILLAMOOK BAY, OREG.[2]

1884								4,500	
1885								9,800	
1886	2							37,000	
1887	2							21,000	$115,500
1888	2							14,633	84,140
1889								9,500	52,250
1890								14,009	79,049
1891	1								
1892	1			18,000	$72,000			18,000	72,000
1893	1	497	$1,988	4,000	16,000	6,919	$17,297	11,416	35,285
1894	1	700	2,800	7,763	31,052	700	1,750	9,163	35,602
1895	1			6,514	20,845	7,001	19,253	13,515	40,098
1896	1	2,200	6,600	4,860	14,580			7,060	21,180
1897	1	2,000	6,000	9,000	27,000			11,000	33,000
1898	1	5,000	13,000	10,342	35,162			15,342	48,162
1899	1	2,180	8,720	3,889	14,036	5,121	15,363	11,190	38,119
1900	1								
1901	1	848	4,240	2,133	9,598	3,901	10,728	6,882	24,566
1902	1	215	1,135	2,287	9,720	4,093	16,372	6,595	27,227
1903	1			2,727	11,590	2,620	10,480	5,347	22,070
1904	1			4,400	17,600	6,500	13,000	10,900	30,600
1905	1	1,100	6,600	1,700	7,650	8,800	22,000	11,600	36,250
1906	1	1,870	11,220	2,364	7,092	1,270	3,175	5,504	21,487
1907	1	2,000	14,000	3,410	10,230	2,314	6,942	7,724	31,172
1908	1	2,300	16,100	6,000	21,000	4,000	12,000	12,300	49,100
1909	1	2,615	15,663	5,029	21,809	3,712	8,538	11,356	46,010
1910	1	2,900	20,300	4,500	24,750	2,000	6,000	9,400	51,050
1911	2	8,433	67,464	12,663	69,647	5,277	20,053	26,373	157,164
1912	2	3,811	26,677	6,418	32,090	4,550	11,375	14,779	70,142
1913	1	2,600	15,600	1,000	4,000	1,000	2,200	4,600	21,800
1914	2	4,734	33,138	4,131	22,307	6,707	16,867	15,572	72,312
1915	3	5,675	34,300	4,549	20,925	9,099	25,477	19,323	70,702
1916	3	9,465	75,720	4,333	21,665	7,530	22,590	21,328	119,975
1917	3	8,822	79,398	5,522	44,176	6,941	48,587	21,285	172,161
1918	1	107	1,177	3,461	33,226	1,567	10,969	5,135	45,372
1919	2	1,500	18,750	7,150	85,800	4,350	27,840	13,000	132,390
1922	1					2,248	8,947	2,248	8,947
1923	2					14,000	57,960	14,000	57,960
1924	2	155	952	2,290	12,916	14,072	59,525	16,517	73,393
1925	3	1,568	10,051	2,562	16,653	13,614	58,540	17,744	85,244
1926	1					4,838	22,497	4,838	22,497
1927	2					13,970	69,850	13,970	69,850
1928	1					5,500	27,500	5,500	27,500

[1] None packed in 1920 and 1921 nor since 1922.
[2] None packed in 1920 and 1921.

Pack of canned salmon in specified years—Continued

NESTUGGA RIVER, OREG.[3]

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1887	1							4,300	$23,650
1888	1							5,000	28,750
1889								6,700	36,850
1891	1								
1899	1	1,109	$4,436	3,034	$10,922	513	$1,539	4,656	16,897
1900	1								
1901	1	279	1,116	3,553	13,323	396	1,089	4,228	15,528
1905	1	3,000	18,000	1,000	4,250	400	1,000	4,400	23,250
1906	1	2,622	15,732	2,468	7,404	165	413	5,255	23,549
1907	1	2,100	14,700	3,540	10,620	150	450	5,790	25,770
1908	1	2,000	14,000	3,000	10,500	100	300	5,100	24,800
1910	1	2,000	14,000	3,300	18,150	140	420	5,440	32,570
1911	1	3,562	28,496	7,124	39,182	641	2,436	11,327	70,114
1912	1	3,090	18,540	6,180	30,900	708	1,770	9,978	51,210
1913	1	126	756	243	972			369	1,728
1914	1	3,542	24,794	5,730	30,942	265	662	9,537	56,308
1915	1	200	1,300	3,930	18,078	800	2,240	4,930	21,618
1916	1	2,400	19,200	4,056	20,280	200	600	6,656	40,800
1917	1	2,000	18,000	3,800	30,400	260	1,820	6,060	50,220
1918	1	3,000	33,000	3,206	30,778	215	1,505	6,421	65,283
1919	1	1,900	23,750	2,400	28,800	450	2,880	4,750	55,430
1926	1	600	4,200	550	3,014			1,150	7,214

SILETZ RIVER, OREG.[4]

1896	1	2,500	$7,500	1,900	$5,700			4,400	$13,200
1897	1	3,510	10,530	5,015	15,045			8,525	25,575
1898	1	3,200	8,360	4,330	14,722			7,530	23,082
1899	1	2,200	9,900	2,319	8,696	200	$550	4,719	19,146
1900	1								
1901	1	876	4,380	3,740	16,830	360	1,260	4,976	22,470
1902	1	600	3,168	1,917	8,147	500	2,000	3,017	13,315
1904	1	1,000	5,000	3,300	13,200	1,000	2,000	5,300	20,200
1905	1	1,500	9,000	1,700	7,225	900	2,250	4,100	18,475
1906	1	2,635	15,810	3,192	9,576	167	418	5,994	25,804
1907	1	2,333	16,331	4,300	12,900	200	600	6,833	29,831
1908	1	2,100	14,700	4,700	16,450	300	900	7,100	32,050
1910	1	2,200	15,400	4,600	25,300	250	750	7,050	41,450
1911	1	3,584	28,672	7,164	39,402	237	901	10,985	68,975
1912	1	3,277	19,662	6,554	32,770	283	707	10,114	53,139
1913	1	15	75	354	1,416	17	37	386	1,528
1914	1	3,356	23,492	6,712	36,245	196	490	10,264	60,227
1915	1	100	600	3,000	13,800	100	280	3,200	14,680
1916	1	1,000	8,000	3,000	15,000	210	630	4,210	23,630
1917	1	1,800	16,200	3,400	28,200	222	1,554	5,422	45,954
1918	2	4,304	47,344	7,789	74,774	384	2,688	12,477	124,806
1919	2	1,393	17,413	5,892	70,704	472	3,021	7,757	91,138
1920	1	2,002	24,024	463	3,292			2,465	27,316
1921	1	3,136	31,546	122	564			3,258	32,112
1922	1	1,702	7,285	5,024	23,010			6,726	30,295
1923	1	1,000	4,060	1,400	6,916			2,400	10,976
1924	1	1,910	11,727	2,551	14,388	437	1,849	4,898	27,964
1925	1	203	1,301	3,036	19,734	660	2,838	3,899	23,873
1926	1	3,028	21,196	1,650	9,042			4,678	30,238
1927	1	2,000	15,000	4,504	31,528	181	905	6,685	47,433

[3] Cannery not operated from 1920 to 1925, inclusive, nor since 1926.
[4] Cannery not operated in 1928.

Pack of canned salmon in specified years—Continued

YAQUINA BAY AND RIVER, OREG.[5]

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1887	2								
1888	3							5,088	$29,256
1889								5,000	27,500
1891	1								
1896	1	1,714	$5,142	615	$1,845			2,329	6,987
1898	1	170	442	1,530	5,202			1,700	5,644
1899	2	316	1,422	3,234	12,127	1,300	$3,575	4,850	17,124
1900	1								
1901	1	96	480	2,848	12,816	549	1,647	3,493	14,943
1903	1			1,238	5,262	315	787	1,553	6,049
1904	1	50	200	2,600	8,840	450	1,080	3,100	10,120
1905	1	200	1,200	2,050	8,613	62	155	2,312	9,968
1906	1	500	3,000	3,100	9,300	60	150	3,660	12,450
1907	1	834	5,838	1,000	3,000	49	147	1,883	8,985
1908	1			4,000	14,000			4,000	14,000
1909	1			1,139	4,556	33	76	1,172	4,632
1910	1			2,669	13,345			2,669	13,345
1911	1			1,009	5,549	51	289	1,060	5,838

ALSEA RIVER AND BAY, OREG.[6]

1886	1								
1887	2							11,180	$64,285
1888	3							9,620	55,315
1889								10,000	55,000
1891	1								
1892	1			3,600	$14,400			3,600	14,400
1893	1	1,260	$6,300	3,240	12,960			4,500	19,260
1894	1	440	2,200	4,160	16,640			4,600	18,840
1895	1	1,700	6,375	3,280	11,808			4,980	18,183
1896	1	3,500	10,500	3,400	10,200			6,900	20,700
1897	1	1,800	5,400	3,200	9,600			5,000	15,000
1898	1	4,296	11,170	2,170	7,378			6,466	18,548
1899	1	2,150	9,138	5,010	19,038			7,160	28,176
1900	1								
1901	1	695	3,475	4,629	18,790	891	$3,118	6,215	25,383
1902	1	701	3,702	4,530	19,253	670	2,680	5,901	25,635
1903	1	1,031	5,516	4,242	18,029	44	88	5,317	23,633
1904	1	1,000	5,000	6,500	26,000	300	600	7,800	31,600
1905	1	2,500	15,000	1,800	7,650	700	1,750	5,000	24,400
1906	1	3,702	22,212	3,843	11,529			7,545	33,741
1907	1	800	5,600	5,100	15,300	350	1,050	6,250	21,950
1908	1	1,200	8,400	6,000	21,000	400	1,200	7,600	30,600
1909	1	1,119	6,714	5,486	24,027	80	184	6,685	30,925
1910	1	2,500	17,500	5,900	31,950	100	300	8,500	49,750
1911	2	4,161	33,288	9,329	51,309	688	2,614	14,178	87,211
1912	2	3,731	22,386	8,286	41,430	524	1,310	12,541	65,126
1913	2	1,607	8,035	4,304	17,216	160	352	6,071	25,603
1914	2	4,546	31,822	6,728	36,331	73	183	11,347	68,336
1915	2	1,668	10,763	6,966	32,044	178	498	8,812	43,305
1916	2	2,624	20,992	3,864	19,320	292	876	6,780	41,188
1917	2	2,727	24,543	6,621	52,968	418	2,926	9,766	80,437
1918	2	2,000	22,000	7,215	69,264	312	2,178	[7] 10,068	99,934
1919	2	2,512	31,400	2,607	31,200	535	3,718	5,654	66,318
1920	1	3,367	40,404	982	6,982			4,349	47,386
1923	1			2,458	12,143	279	1,155	2,737	13,298
1924	1	466	2,861	4,156	23,440	94	398	4,716	26,699
1925	1	1,411	9,045	950	6,175	136	585	2,497	15,805
1926	1	34	238	707	3,874			741	4,112

[5] Cannery not operated from 1912 to 1916, both years inclusive. In 1917 it was consolidated with Waldport cannery owned by same party. No canning since.
[6] None canned in 1920 and 1922 nor since 1926.
[7] Includes 541 cases of bluebacks, valued at $6,492.

Pack of canned salmon in specified years—Continued

SIUSLAW RIVER, OREG.

Year	Canneries operated	Chinook		Silverside		Chum		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1878	2							10,300	$55,620
1879	2								
1886	1							1,500	
1888	3							11,960	68,770
1889	1							12,000	66,000
1891	2								
1892	2			18,000	$72,000			18,000	72,000
1893	2	1,471	$7,355	11,830	47,320			13,301	54,675
1894	2	1,871	9,355	14,987	59,948			16,858	69,303
1895	2	1,637	6,139	10,465	35,274			12,102	41,413
1896	1	2,700	8,100	9,000	27,000			11,700	35,100
1897	1	1,100	3,300	3,900	11,700			5,000	15,000
1898	1	850	2,210	10,000	34,000			10,850	36,210
1899	1	1,162	4,648	71,323	26,363	115	$345	8,600	31,356
1900	2								
1901	1	1,735	8,675	7,488	29,952			9,223	38,627
1902	1	1,288	6,800	4,320	18,260			5,608	25,060
1903	1	1,519	8,127	6,842	29,079			8,361	37,206
1904	1	500	2,500	6,500	26,000			7,000	28,500
1905	1								
1906	2	4,500	27,000	15,000	45,000	1,500	3,750	21,000	75,750
1907	1			15,773	47,319			15,773	47,319
1908	1			8,600	30,100			8,600	30,100
1909	2	632	3,792	7,436	32,956			8,068	36,748
1910	2	856	5,992	12,800	70,400	8,502	25,506	22,158	101,898
1911	2	1,120	8,960	10,266	56,463	5,000	19,000	16,386	84,423
1912	2			6,108	30,540			6,108	30,540
1913	[8] 1			4,281	17,124			4,281	17,124
1914	1			9,266	50,036			9,266	50,036
1915	1			1,755	8,073			1,755	8,073
1916	1	875	7,000	3,021	15,105			3,896	22,105
1917	1			350	2,800			350	2,800
1918	1			3,000	29,800			3,000	28,800
1919	[9] 1			3,760	43,120			3,760	43,120

UMPQUA RIVER, OREG.[10]

1878	2							8,100	$43,740
1879	2								
1884	2							3,700	
1885	1							10,500	
1886	1							18,600	
1887	1							4,000	22,000
1888	1							9,000	51,750
1889	1							12,000	66,000
1891	1								
1892	1			10,000	$40,000			10,000	40,000
1893	1	809	$4,045	3,204	12,816			4,013	16,861
1894	1	235	1,175	6,875	27,500			7,110	28,675
1895	1	992	3,720	7,697	28,863			8,689	32,583
1896	1	1,300	3,900	8,000	24,000			9,300	27,900
1899	2	925	3,860	7,576	27,006	115	$345	8,616	31,211
1900	2								
1903	1	23	123	6,733	28,615			6,756	28,738
1904	1	500	2,500	9,500	38,000	500	1,000	10,500	41,500
1905	1	6,100	36,600	10,500	44,625			16,600	81,225
1906	1	1,143	6,858	5,613	16,839			6,756	23,697
1909	1	500	3,000	7,753	31,012			8,253	34,012
1910	1	2,000	14,000	11,000	60,500			13,000	74,500
1911	1	300	2,400	6,118	33,649			6,418	36,049
1912	1	30	210	3,759	18,795			3,789	19,005
1914	1	1,000	8,000	2,000	10,000			3,000	18,000
1915	2			5,100	23,460			5,100	23,460
1916	2			2,900	14,500			2,900	14,500
1917	1			5,366	42,928	47	329	5,413	43,257
1918	1	1,703	18,733	3,409	32,726	1	7	5,113	51,466
1919	1			7,500	90,000			7,500	90,000
1923	1			8,400	41,496			8,400	41,496
1924	1	1,630	10,008	15,204	85,751			16,834	95,759
1925	1	5,148	32,999	10,668	69,342			15,816	102,341
1926	1	3,183	22,281	4,067	22,287			7,250	44,568
1927	1	2,563	19,223	8,586	60,102	38	152	11,187	79,477

[8] The two canneries combined and operated one plant.
[9] Not operated since.
[10] No canning in 1913, 1920, 1921, 1922, and 1928.

Pack of canned salmon in specified years—Continued

COOS BAY AND RIVER, OREG.

Year	Canneries operated	Chinook		Silverside		Total	
		Cases	Value	Cases	Value	Cases	Value
1887	2					11,300	$62,150
1888	1					5,500	31,625
1889	1					7,000	38,500
1891	2	3					
1893	1			3,125	$12,500	3,125	12,500
1894	1	163	$815	8,428	33,712	8,591	34,527
1895	1	5,110	19,163	2,332	8,934	7,442	28,097
1896	1	13,000	39,000	2,000	6,000	15,000	45,000
1897	1	6,200	18,600	2,200	6,600	8,400	25,200
1898	2	3,142	8,169	7,180	24,412	10,322	32,581
1899	2	1,273	5,092	5,174	18,626	6,447	23,718
1900	2						
1901	1	1,215	6,075	4,082	16,328	5,297	22,403
1902	1	412	2,175	2,640	11,220	3,052	13,395
1904	1	2,033	7,725	7,200	24,480	9,233	32,205
1906	1	2,043	12,258	1,755	5,265	3,798	17,523
1909	1	275	1,475	3,959	17,927	4,234	19,402
1910	1	500	3,500	5,500	30,250	6,000	33,750
1911	2	2,630	21,040	7,260	39,930	9,890	60,970
1912	2	1,457	10,199	3,989	19,945	5,446	30,144
1913	2			7,383	29,532	7,383	29,532
1914	1			9,300	50,220	9,300	50,220
1915	1			3,500	16,100	3,500	16,100
1916	1			2,485	12,425	2,485	12,425
1917	1						
1918 [11]	1			3,800	36,480	3,800	36,480

COQUILLE RIVER, OREG.

1883	1					7,000	
1884	1					7,300	
1885	1					3,800	
1886	2					8,300	
1887	3						
1888	2					11,000	$63,250
1889						8,600	47,300
1891	1						
1892	1			5,000	$20,000	5,000	20,000
1893	1			6,500	26,000	6,500	26,000
1894	[12] 1			2,000	8,000	2,000	8,000
1895	2	760	$2,887	8,724	32,615	9,484	35,502
1896	2	1,225	3,675	7,800	23,400	9,025	27,075
1898	2	541	1,407	7,485	25,499	8,026	26,906
1899	2	950	3,800	7,550	28,500	8,500	32,300
1900	1	2,636	13,180	9,601	38,404	12,237	51,584
1901	1	133	665	5,096	20,384	5,229	21,049
1902	1	286	1,510	5,877	24,927	6,163	26,437
1903	1	331	1,771	8,685	36,911	9,016	38,682
1904	2	600	2,400	13,686	54,744	14,286	57,144
1905	2	2,100	12,600	11,343	48,208	13,443	60,808
1906	2	821	4,926	17,979	53,937	18,800	58,863
1907	2	306	2,142	13,220	39,660	13,526	41,802
1908	2			19,174	67,109	19,174	67,109
1909	2	250	1,255	9,818	42,687	10,068	43,942
1910	2	420	2,940	16,637	91,504	17,057	94,444
1911	2	715	5,720	16,676	91,718	17,391	97,438
1912	2	377	2,639	6,040	30,200	6,417	32,839
1913	2			8,910	35,640	8,910	35,640
1914	2			12,097	65,324	12,097	65,324
1915	2	1,079	6,474	5,131	25,515	6,210	31,989
1916	2	869	6,952	2,652	13,260	3,521	20,212
1917	2	694	6,246	8,005	64,040	[13] 8,706	70,355
1918	2	1,318	14,498	10,096	96,922	[14] 11,650	113,129
1919	2	1,027	12,837	5,010	60,120	[15] 6,082	72,957
1920	1	541	6,492	2,862	20,349	3,403	26,841
1922	1			4,745	21,732	4,745	21,732
1923	2	228	926	10,348	51,119	10,576	52,045
1924	2	310	1,903	5,741	32,379	6,051	34,282
1925 [16]	2			1,529	9,939	1,529	9,939

[11] No canning since.
[12] Burned.
[13] Includes 7 cases of chums, valued at $49.
[14] Includes 217 cases of chums, valued at $1,519, and 19 cases of steelheads, valued at $190.
[15] Includes 45 cases of chums.
[16] No canning in 1921, nor since 1925.

Pack of canned salmon in specified years—Continued

ROGUE RIVER, OREG.[17]

Year	Canneries operated	Chinook		Silverside		Total	
		Cases	Value	Cases	Value	Cases	Value
1877	1					7,804	
1878	1					8,534	
1879	1					8,571	
1880	1					7,772	
1881	1					12,320	
1882	1					19,186	
1883	1					16,156	
1884	1					12,376	
1885	1					9,310	
1886	1					12,147	
1887	1					17,216	
1888	1					21,062	$121,107
1889	1					22,000	132,000
1890	1					24,000	120,000
1891	1					21,000	105,000
1892	1	10,000	$59,000	9,000	$36,000	19,000	95,000
1893	[18] 1	3,200	16,000			3,200	16,000
1895	1	10,377	41,508	4,385	15,347	14,762	56,855
1896	1	15,000	75,000	3,000	9,000	18,000	84,000
1897	1	15,355	61,420	3,653	10,959	19,008	72,379
1898	1	12,964	51,550	501	1,303	13,465	52,853
1899	1	5,481	30,145	1,745	6,980	7,226	37,125
1900	1						
1901	1	2,681	13,405	4,184	17,736	6,865	31,141
1902	1	3,799	20,058	4,091	17,387	7,890	37,445
1903	1	8,418	45,036	4,792	20,366	13,210	65,402
1904	1	16,000	64,000	3,255	11,392	19,255	75,392
1905	1	18,500	111,000	1,500	6,375	20,000	117,375
1906	1	12,000	72,000	6,000	18,000	18,000	90,000
1907	1	7,537	56,528	1,796	8,980	9,333	65,508
1908	1	4,354	32,655	2,650	13,250	7,004	45,905
1909	1	186	1,300	699	2,977	885	4,277
1910	1	232	1,786	2,711	16,266	2,943	18,052
1913	1	3,020	27,160	2,403	11,857	5,423	39,017
1914	1	6,938	62,060	987	5,453	7,925	67,513
1915	2	19,094	135,301	515	2,369	19,609	137,670
1916	2	22,640	181,120	501	2,505	23,141	183,625
1917	2	24,707	271,777	660	5,280	25,367	277,057
1918	2	20,469	225,159	2,704	24,336	23,173	249,495
1919	3	17,237	215,463	671	8,052	17,908	223,515
1920	3	10,205	152,565			10,205	152,565
1921	1	12,496	169,946			12,496	169,946
1922	1	10,568	145,099			10,568	145,099
1923	1	9,298	148,954			9,298	148,954
1924	1	11,880	161,449	507	2,859	12,387	164,308
1925	1	14,074	195,347	127	826	14,201	196,173
1926	1	12,285	172,236	59	323	12,344	172,559
1927	2	12,893	173,000	300	2,100	13,193	175,100
1928	2	5,411	54,110	8,136	56,942	13,547	111,052

SMITH RIVER, CALIF.[19]

Year	Canneries operated	Quinnat		Silverside		Total	
		Cases	Value	Cases	Value	Cases	Value
1878	1	4,277	$23,096			4,277	$23,096
1880	1	7,500	41,250			7,500	41,250
1884	1	5,500	33,000			5,500	33,000
1885	1	1,550	9,300			1,550	9,300
1888	1	2,347	14,082			2,347	14,082
1893	1	1,500	7,500	500	$1,500	2,000	9,000
1894	1	1,500	7,500	500	1,500	2,000	9,000
1895	1	2,250	9,990			2,250	9,990
1914	1			3,000	18,000	3,000	18,000
1915	1	1,955	13,685	1,078	6,220	3,033	19,905
1916	1	1,515	12,120	990	4,950	2,505	17,070
1917	1	6,300	69,300			6,300	69,300
1918	1	4,041	44,451	612	5,508	4,653	49,959
1919	1	4,366	56,758			4,366	56,758
1920	1	228	2,736			228	2,736
1921	1	3,000	30,180			3,000	30,180
1924	1	3,390	20,815			3,390	20,815
1925	1	6,950	44,550	750	4,875	7,700	49,425
1926	1	500	3,500			500	3,500
1927	1	2,300	17,250			2,300	17,250

[17] Shut down in 1911 and 1912 through the closing of the river to all fishing.
[18] Burned down during season. Not opened the next year.
[19] No canning in 1922, 1923, and 1928.

Pack of canned salmon in specified years—Continued

KLAMATH RIVER, CALIF.

Year	Canneries operated	Quinnat		Silverside		Total	
		Cases	Value	Cases	Value	Cases	Value
1888	1	4,400	$26,400			4,400	$26,400
1892	1	1,047	4,188			1,047	
1893	1	1,600	6,400			1,600	6,400
1894	1	1,700	6,800			1,700	6,800
1895	1	1,200	5,321	400	$1,500	1,600	6,821
1899	1	1,600	8,800			1,600	8,800
1902	1	2,500	13,500			2,500	13,500
1904	1	3,400	20,800			3,400	20,800
1909	1	5,633	33,000			5,633	33,000
1910	1	8,016	52,000			8,016	52,000
1911	1	7,400	46,000	204	816	7,604	48,816
1912	2	18,000	117,000			18,000	177,000
1913	2	6,376	40,500			6,376	40,500
1914	1	7,500	48,500	3,500	14,000	11,000	62,500
1915	1	10,400	72,800	2,500	13,000	12,900	85,800
1916	1	6,484	51,872	2,400	12,000	8,884	63,872
1917	1	5,130	56,430	2,900	23,200	8,030	79,630
1918	1	5,555	61,105	4,292	38,628	[30] 10,200	102,557
1919	1	6,291	81,783	1,145	13,740	[31] 7,731	95,523
1920	1	11,341	136,092			[32] 11,927	139,608
1921	1	7,376	74,203			7,376	74,203
1922	1	9,700	41,516			9,700	41,516
1923	1	6,000	24,360			6,000	24,360
1924	1	9,546	58,612			9,546	58,612
1925	1	14,639	93,836			14,639	93,836
1926	2	11,037	77,259			11,037	77,259
1927	2	13,285	99,638			13,285	99,638
1928	1	4,237	40,237			4,237	40,237

EEL RIVER, CALIF.[33]

Year	Canneries operated	Quinnat		Year	Canneries operated	Quinnat	
		Cases	Value			Cases	Value
1877	1	8,500	$51,000	1885	1	5,750	
1878	1	10,500	56,700	1886	1	12,500	$75,000
1880	1	6,250		1910	1	6,000	42,000
1883	1	15,000		1911	1	8,400	52,500
1884	1	8,200		1912	1	11,000	71,500

NOYO RIVER, CALIF.[34]

Year	Canneries operated	Quinnat		Silverside		Chinook		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value
1918	1	2,000	$22,000					2,000	$22,000
1919	1	7,500	97,500					7,500	97,500
1920	1	4,472	53,664	2,801	$19,915	1,200	$14,400	8,473	87,979

[30] Includes 353 cases of steelheads, valued at $2,824.
[31] Includes 295 cases of steelheads.
[32] Includes 586 cases of steelheads, valued at $3,516.
[33] Shut down since 1912.
[34] Cannery not operated since 1920.

Pack of canned salmon in specified years—Continued

SACRAMENTO RIVER, CALIF.[34]

Year	Canneries operated	Quinnat		Year	Canneries operated	Quinnat	
		Cases	Value			Cases	Value
1864	1	2,000		1894	2	28,463	
1865	1	2,000		1895	3	25,185	$111,821
1874		2,500		1896		13,387	
1875		3,000		1897		38,543	
1876	2	10,000		1898		29,731	
1877		21,500		1899		32,580	150,688
1878	6	34,017	$183,692	1900		39,304	
1879	4	13,855	59,577	1901		17,500	
1880	9	62,000		1902		14,043	
1881	20	181,200		1903		8,200	
1882	19	200,000		1904	2	14,407	66,936
1883	21	123,000		1905	1	2,780	
1884		81,450		1911	1	4,142	28,994
1885	6	90,000		1913	1	950	6,850
1886	9	39,300		1914	2	17,315	95,232
1887		36,500		1915	2	5,229	35,453
1888	6	68,075	423,750	1916	1	6,636	53,088
1889	3	57,300		1917	3	9,443	94,430
1890		25,065		1918	2	4,036	44,396
1891		10,353		1919	2	1,169	15,197
1892		2,281		1920	1	427	5,124
1893	3	23,336					

MONTEREY BAY, CALIF.[35]

1915	1	950	$7,300	1918			
1916	1	12,809	102,472	1919	1	2,000	$26,000
1917	1	2,000	20,000				

[34] Cannery not operated since 1920.
[35] Cannery not operated since 1919.

Pack of canned salmon in Alaska, by districts, since the inception of the industry

Year	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Canneries operated	Pack	Canneries operated	Pack	Canneries operated	Pack	Canneries operated	Pack
		Cases		*Cases*		*Cases*		*Cases*
1878	2	8,159					2	8,159
1879	2	12,530					2	12,530
1880	1	6,539					1	6,539
1881	1	8,977					1	8,977
1882	1	11,501	2	10,244			3	21,745
1883	4	20,040	2	28,297			6	48,337
1884	4	22,189	2	42,297	1	[1] 400	7	64,886
1885	3	16,728	2	52,687	1	14,000	6	83,415
1886	4	18,660	2	74,583	3	48,822	9	142,065
1887	5	31,462	2	102,515	3	72,700	10	206,677
1888	6	81,128	6	241,101	4	89,886	16	412,115
1889	12	141,760	21	461,451	4	115,985	37	719,196
1890	12	142,901	19	421,300	4	118,390	35	682,591
1891	11	156,615	14	511,367	5	133,418	30	801,400
1892	7	115,722	6	295,496	2	63,499	15	474,717
1893	8	136,053	11	399,815	3	107,786	22	643,654
1894	7	142,544	10	435,052	4	108,844	21	686,440
1895	7	148,476	10	327,919	6	150,135	23	626,530
1896	9	262,381	12	485,990	8	218,336	29	966,707
1897	9	271,867	13	382,899	7	254,312	29	909,078
1898	9	251,385	14	395,009	7	318,703	30	965,097
1899	9	310,219	14	356,095	9	411,832	32	1,078,146
1900	16	456,639	14	492,223	12	599,277	42	1,548,139
1901	21	735,449	13	562,142	21	719,213	55	2,016,804

[1] Experimental pack.

Pack of canned salmon in Alaska, by districts, since the inception of the industry—Continued

Year	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Canneries operated	Pack	Canneries operated	Pack	Canneries operated	Pack	Canneries operated	Pack
		Cases		*Cases*		*Cases*		*Cases*
1902	26	906, 676	12	583, 690	26	1, 046, 458	64	2, 536, 824
1903	21	642, 305	12	417, 175	27	1, 186, 730	60	2, 246, 210
1904	12	569, 003	11	499, 485	32	885, 268	55	1, 953, 756
1905	13	426, 892	9	371, 755	25	1, 089, 154	47	1, 887, 801
1906	20	767, 285	8	473, 024	19	978, 735	47	2, 219, 044
1907	22	887, 500	8	522, 836	18	759, 534	48	2, 169, 870
1908	23	1, 011, 648	8	425, 721	19	1, 169, 604	50	2, 606, 973
1909	19	852, 870	8	391, 054	18	1, 151, 553	45	2, 395, 477
1910	23	1, 066, 398	10	432, 517	19	914, 138	52	2, 413, 053
1911	32	1, 580, 868	11	499, 743	21	743, 206	64	2, 823, 817
1912	51	2, 033, 648	14	625, 062	22	1, 395, 931	87	4, 054, 641
1913	42	1, 782, 898	14	447, 249	23	1, 509, 038	79	3, 739, 185
1914	44	1, 776, 075	14	658, 791	23	1, 621, 787	81	4, 056, 653
1915	46	2, 549, 212	17	632, 848	24	1, 318, 233	87	4, 500, 293
1916	54	2, 214, 280	19	1, 075, 913	27	1, 610, 434	100	4, 900, 627
1917	62	3, 294, 845	27	1, 017, 206	29	1, 035, 235	118	5, 947, 286
1918	76	3, 375, 445	29	1, 391, 951	30	1, 838, 439	135	6, 605, 835
1919	76	3, 119, 260	30	771, 907	28	692, 521	134	4, 583, 688
1920	82	2, 225, 011	36	1, 337, 448	28	867, 004	146	4, 429, 463
1921	30	803, 071	25	643, 099	28	1, 150, 656	83	2, 596, 826
1922	57	2, 018, 743	36	988, 143	30	1, 494, 766	123	4, 501, 652
1923	65	3, 007, 119	37	743, 640	28	1, 284, 938	130	5, 035, 697
1924	65	2, 787, 789	37	1, 605, 107	28	902, 019	130	5, 294, 915
1925	62	2, 802, 414	37	1, 052, 593	30	604, 930	129	4, 459, 937
1926	61	3, 058, 055	43	2, 146, 485	28	1, 448, 342	132	6, 652, 882
1927	62	1, 052, 193	44	1, 571, 103	29	948, 832	135	3, 572, 128
1928	61	2, 971, 147	62	1, 639, 155	30	1, 473, 601	153	6, 083, 903
Total	-------	53, 092, 574	-------	29, 043, 182	-------	35, 266, 624	-------	117, 402, 380

Pack of canned salmon in Alaska from 1898 to 1928, by species

Year	Coho, or silver		Chum, or keta		Humpback, or pink	
	Cases	Value	Cases	Value	Cases	Value
1898	54, 711	----------	5, 184	----------	109, 399	----------
1899	39, 402	----------	1, 931	----------	149, 159	----------
1900	50, 984	----------	30, 012	----------	232, 022	----------
1901	65, 509	----------	47, 464	----------	541, 427	----------
1902	82, 723	----------	159, 849	----------	549, 602	----------
1903	120, 506	----------	35, 052	----------	355, 799	----------
1904	85, 741	----------	21, 178	----------	299, 333	----------
1905	67, 136	$215, 875	41, 972	$113, 056	168, 597	$498, 194
1906	109, 141	382, 109	254, 812	730, 235	348, 297	1, 046, 951
1907	85, 190	337, 384	184, 173	547, 757	561, 973	1, 799, 280
1908	68, 828	274, 089	218, 513	554, 197	644, 133	1, 733, 379
1909	56, 556	231, 029	120, 712	274, 110	464, 873	1, 114, 839
1910	114, 026	559, 666	254, 218	773, 409	554, 322	1, 764, 055
1911	133, 908	762, 647	323, 795	1, 199, 563	1, 005, 278	3, 972, 706
1912	166, 198	741, 377	664, 633	1, 584, 130	1, 280, 138	3, 296, 598
1913	75, 779	261, 654	290, 918	643, 948	1, 372, 881	3, 550, 587
1914	157, 063	690, 086	663, 859	2, 240, 705	986, 049	3, 459, 116
1915	124, 268	536, 124	479, 946	1, 243, 321	1, 875, 516	5, 217, 203
1916	261, 909	1, 399, 491	724, 115	2, 420, 600	1, 737, 793	6, 330, 185
1917	193, 231	1, 682, 745	906, 747	5, 572, 047	2, 296, 976	14, 794, 062
1918	218, 958	2, 004, 979	1, 364, 960	8, 562, 872	2, 438, 954	16, 068, 456
1919	232, 870	2, 624, 826	1, 365, 563	9, 320, 456	1, 611, 608	13, 469, 046
1920	192, 085	1, 753, 870	1, 033, 517	4, 336, 651	1, 593, 120	8, 719, 050
1921	106, 555	600, 140	255, 495	942, 525	423, 984	1, 788, 778
1922	175, 993	962, 790	565, 918	2, 251, 540	1, 658, 423	7, 189, 494
1923	164, 107	943, 318	525, 622	2, 447, 671	2, 448, 129	11, 899, 956
1924	183, 601	1, 254, 551	1, 028, 488	4, 812, 297	2, 601, 283	12, 837, 346
1925	161, 010	1, 565, 759	1, 078, 680	4, 787, 030	2, 110, 593	11, 137, 102
1926	202, 527	1, 700, 563	902, 443	4, 518, 929	3, 338, 349	17, 987, 527
1927	253, 044	2, 153, 956	507, 723	2, 777, 480	1, 420, 775	8, 338, 690
1928	298, 623	2, 125, 289	995, 785	6, 036, 466	2, 787, 242	18, 285, 530

Pack of canned salmon in Alaska from 1898 to 1928, by species—Continued

Year	King, or spring		Red, or sockeye		Total	
	Cases	Value	Cases	Value	Cases	Value
1898	12,862		782,941		965,097	
1899	23,400		864,254		1,078,146	
1900	37,715		1,197,406		1,548,139	
1901	43,069		1,319,335		2,016,804	
1902	59,104		1,685,546		2,536,824	
1903	47,609		1,687,244		2,246,210	
1904	41,956		1,505,548		1,953,756	
1905	42,125	$141,999	1,567,971	$5,335,547	1,887,801	$6,304,671
1906	30,834	116,222	1,475,960	5,620,875	2,219,044	7,896,392
1907	43,424	181,718	1,295,113	5,915,227	2,169,873	8,781,366
1908	23,729	99,867	1,651,770	7,524,251	2,606,973	10,185,783
1909	48,034	207,624	1,705,302	7,610,550	2,395,477	9,438,152
1910	40,221	214,802	1,450,267	7,774,390	2,413,054	11,086,322
1911	45,518	295,088	1,315,318	8,363,233	2,823,817	14,593,237
1912	43,317	243,331	1,900,355	10,426,481	4,054,641	16,291,917
1913	34,370	139,053	1,965,237	8,936,362	3,739,185	13,531,604
1914	48,039	241,105	2,201,643	12,289,517	4,056,653	18,920,589
1915	88,251	408,266	1,932,312	11,248,101	4,500,293	18,653,015
1916	65,873	353,420	2,110,937	12,765,733	4,900,627	23,269,429
1917	61,951	644,447	2,488,381	23,610,789	5,947,286	46,304,090
1918	49,226	485,295	2,533,737	23,920,347	6,605,835	51,041,949
1919	95,986	1,261,057	1,277,661	16,589,964	4,583,668	43,265,349
1920	110,003	1,207,228	1,500,738	19,586,001	4,429,463	35,602,800
1921	44,994	459,897	1,765,798	15,841,404	2,596,826	19,632,744
1922	30,660	247,673	2,070,658	19,135,696	4,501,652	29,787,193
1923	38,343	328,270	1,859,496	17,253,792	5,035,697	32,873,007
1924	33,648	299,009	1,447,895	13,803,932	5,294,915	33,007,135
1925	49,978	595,041	1,059,676	13,904,599	4,459,937	31,989,531
1926	52,476	544,246	2,157,087	21,328,739	6,652,882	46,080,004
1927	70,391	791,653	1,320,195	15,954,485	3,572,128	30,016,264
1928	54,159	602,808	1,948,094	18,333,792	6,083,903	45,383,885

Pack of canned salmon in Alaska, by districts and species 1896 to 1928

SOUTHEAST ALASKA

Year	Canneries operated	Coho		Chum		Humpback		King		Red		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value
1896	9	28, 135	$95, 659	452	$904	91, 215	$218, 916	3, 787	$7, 574	138, 792	$527, 410	262, 381	$850, 463
1897	9	26, 769	91, 015	1, 396	2, 792	140, 506	337, 214	5, 973	11, 946	97, 223	369, 447	271, 867	812, 414
1898	9	38, 011	(1)	4, 622	(1)	89, 718	(1)	2, 110	(1)	116, 924	(1)	251, 947	(1)
1899	9	28, 587	(1)	1, 000	(1)	138, 329	(1)	7, 551	(1)	134, 752	(1)	310, 219	(1)
1900	16	36, 743	(1)	22, 061	(1)	217, 231	(1)	12, 817	(1)	167, 787	(1)	456, 639	(1)
1901	21	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	735, 449	(1)
1902	26	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	906, 676	(1)
1903	21	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	642, 305	(1)
1904	12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	569, 003	(1)
1905	13	40, 821	132, 790	37, 685	102, 207	142, 008	420, 614	5, 460	21, 733	200, 918	723, 937	426, 892	1, 401, 281
1906	20	82, 540	292, 150	131, 405	362, 291	325, 243	979, 488	2, 301	8, 314	225, 796	908, 986	767, 285	2, 551, 229
1907	22	58, 148	233, 804	140, 147	407, 369	533, 473	1, 708, 441	1, 275	5, 353	154, 457	779, 265	887, 500	3, 134, 232
1908	23	48, 858	194, 213	180, 204	452, 678	592, 638	1, 589, 412	2, 490	10, 356	187, 458	874, 475	1, 011, 648	3, 121, 134
1909	19	39, 920	160, 974	83, 001	186, 454	455, 999	1, 092, 389	857	3, 598	273, 093	1, 094, 423	852, 870	2, 537, 838
1910	23	82, 457	404, 907	231, 735	703, 555	491, 176	1, 565, 358	348	1, 998	260, 682	1, 466, 918	1, 066, 398	4, 142, 736
1911	32	99, 587	573, 163	287, 558	1, 059, 326	973, 494	3, 846, 002	1, 495	8, 494	218, 824	1, 416, 241	1, 580, 868	6, 903, 226
1912	51	131, 781	586, 435	596, 912	1, 416, 417	1, 047, 446	2, 699, 843	7, 204	48, 885	250, 305	1, 427, 255	2, 033, 648	6, 178, 835
1913	42	56, 496	196, 846	257, 644	563, 354	1, 289, 737	3, 338, 206	1, 210	5, 399	177, 811	881, 757	1, 782, 898	4, 985, 562
1914	44	111, 336	486, 887	597, 411	1, 943, 305	761, 300	2, 663, 592	12, 031	61, 363	293, 997	1, 716, 598	1, 776, 075	6, 871, 745
1915	45	90, 299	386, 366	373, 329	967, 314	1, 820, 191	5, 074, 616	27, 443	124, 025	237, 950	1, 441, 516	2, 549, 212	7, 993, 837
1916	54	179, 040	972, 979	506, 619	1, 693, 304	1, 330, 824	4, 852, 227	18, 231	104, 002	179, 566	1, 215, 840	2, 214, 280	8, 838, 352
1917	62	151, 868	1, 328, 759	764, 902	4, 673, 034	2, 149, 570	13, 914, 771	23, 710	282, 680	204, 795	2, 136, 791	3, 294, 845	22, 336, 035
1918	76	147, 324	1, 360, 170	960, 516	6, 006, 668	2, 035, 383	13, 395, 485	16, 356	161, 104	215, 866	2, 210, 897	3, 375, 445	23, 134, 324
1919	76	169, 514	1, 920, 278	1, 145, 725	7, 739, 865	1, 524, 522	12, 765, 454	30, 281	368, 482	249, 218	3, 428, 989	3, 119, 260	26, 223, 068
1920	82	111, 948	1, 003, 435	837, 115	3, 453, 137	1, 007, 637	5, 582, 508	46, 130	444, 429	222, 181	2, 901, 458	2, 225, 011	13, 384, 967
1921	30	90, 802	515, 222	181, 447	653, 317	416, 781	1, 759, 517	9, 109	95, 686	104, 932	1, 140, 708	803, 071	4, 164, 450
1922	57	122, 647	677, 546	424, 266	1, 687, 056	1, 332, 552	5, 793, 757	6, 133	57, 297	133, 145	1, 481, 369	2, 018, 743	9, 697, 025
1923	65	130, 351	750, 236	433, 376	2, 037, 246	2, 252, 019	10, 965, 674	13, 048	123, 765	178, 325	1, 813, 035	3, 007, 119	15, 689, 956
1924	65	109, 989	763, 546	799, 557	3, 727, 344	1, 677, 454	8, 282, 584	8, 282	74, 693	192, 507	1, 863, 675	2, 787, 789	14, 711, 842
1925	62	91, 352	912, 744	847, 913	3, 725, 218	1, 707, 456	9, 064, 709	12, 005	146, 279	143, 688	1, 902, 264	2, 802, 414	15, 751, 204
1926	61	96, 389	838, 389	618, 397	3, 087, 201	2, 158, 699	11, 671, 108	10, 679	117, 279	173, 891	1, 928, 789	3, 058, 055	17, 642, 766
1927	62	114, 970	969, 570	224, 433	1, 245, 306	588, 291	3, 599, 256	8, 031	90, 727	116, 468	1, 535, 049	1, 052, 193	7, 439, 908
1928	61	145, 770	1, 056, 234	570, 219	3, 300, 381	2, 142, 838	14, 037, 451	5, 522	53, 605	106, 798	1, 136, 414	2, 971, 147	19, 584, 085

[1] Figures not available.

Pack of canned salmon in Alaska, by districts and species 1896 to 1928—Continued

CENTRAL ALASKA

Year	Canneries operated	Coho		Chum		Humpback		King		Red		Total	
		Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value
1896	12	8,882	$30,199			20,771	$49,850	7,455	$14,910	448,882	$1,705,752	485,990	$1,800,711
1897	13	6,669	22,675			14,082	33,797	5,720	11,440	356,428	1,354,426	382,899	1,422,338
1898	14	13,495	(1)	85	(1)	19,681	(1)	5,891	(1)	355,857	(1)	395,009	(1)
1899	14	10,489	(1)			10,830	(1)	7,068	(1)	327,708	(1)	356,095	(1)
1900	14	11,427	(1)	132	(1)	12,314	(1)	11,746	(1)	456,604	(1)	492,223	(1)
1901	13	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	562,142	(1)
1902	12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	583,690	(1)
1903	12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	417,175	(1)
1904	11	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	499,485	(1)
1905	9	16,518	51,543			3,235	9,058	6,427	20,567	345,575	1,174,615	371,755	1,255,783
1906	8	10,316	35,075			3,188	9,564	7,861	28,300	451,659	1,711,952	473,024	1,784,891
1907	8	15,258	57,980			10,255	32,458	14,355	60,291	482,968	2,191,994	522,836	2,342,723
1908	8	11,543	46,172			30,661	85,673	6,416	27,040	377,101	1,720,857	425,721	1,879,742
1909	8	10,275	43,155			5,581	13,394	16,913	74,418	358,285	1,640,910	391,054	1,771,877
1910	10	19,928	99,103	131	$403	31,797	101,380	15,786	85,235	364,875	1,959,539	432,517	2,245,660
1911	11	18,759	107,278	9,078	34,470	25,062	99,816	15,988	105,628	430,856	2,743,740	499,743	3,090,932
1912	14	19,722	89,264	29,456	72,583	137,884	355,438	14,358	79,904	423,642	2,380,302	625,062	2,977,491
1913	14	13,244	44,582	5,038	11,118	49,309	126,360	15,393	61,882	364,265	1,671,712	447,249	1,915,654
1914	14	36,863	163,887	17,723	139,618	196,368	695,015	11,168	50,711	396,669	2,256,009	658,791	3,305,240
1915	17	23,564	104,047	39,406	102,350	46,479	119,649	23,165	102,079	500,234	2,959,209	632,848	3,387,334
1916	19	53,697	282,793	64,396	204,429	370,052	1,345,957	22,013	119,405	565,755	3,522,303	1,075,913	5,474,887
1917	27	35,922	308,592	90,626	563,602	145,285	866,529	19,287	180,903	726,086	6,950,106	1,017,206	8,869,732
1918	29	59,834	535,272	300,494	1,900,437	376,222	2,484,623	15,043	145,169	640,358	6,117,657	1,391,951	11,183,158
1919	30	55,741	612,136	160,222	1,084,132	86,644	700,048	12,343	160,956	456,957	5,790,059	771,907	8,347,331
1920	36	67,241	624,417	143,300	627,983	516,977	2,749,902	22,578	213,054	587,352	7,747,031	1,377,448	11,962,387
1921	25	9,710	50,939	34,571	127,508	7,147	29,018	8,629	80,271	583,042	5,294,513	643,099	5,582,249
1922	36	40,434	217,278	91,239	362,440	312,968	1,340,799	10,165	87,047	533,337	5,319,626	988,143	7,327,190
1923	37	32,931	188,455	72,564	321,892	196,110	934,282	10,703	96,464	431,332	4,225,095	743,640	5,766,188
1924	37	69,180	464,096	192,934	912,255	892,413	4,412,557	10,531	105,018	440,049	4,173,676	1,605,107	10,067,602
1925	37	68,289	638,874	200,274	924,166	402,992	2,071,715	19,300	229,410	361,738	4,803,302	1,052,593	8,667,467
1926	43	104,309	848,128	243,808	1,233,347	1,144,180	6,141,363	23,683	254,815	630,505	6,440,686	2,146,485	14,918,339
1927	44	138,034	1,184,035	253,197	1,368,663	817,538	4,663,911	43,470	510,992	318,864	3,948,262	1,571,103	11,675,863
1928	62	152,360	1,065,619	377,857	2,446,149	643,330	4,241,394	35,036	438,385	430,572	4,290,510	1,639,155	12,482,057

WESTERN ALASKA

1896	8	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	218,336	(1)
1897	7	10,119	34,405	----------	----------	3,123	7,495	6,140	12,280	234,930	892,734	254,312	946,914
1898	7	3,205	(1)	477	(1)	----------	----------	4,861	(1)	310,160	(1)	318,703	(1)
1899	9	326	(1)	931	(1)	----------	----------	8,781	(1)	401,794	(1)	411,832	(1)
1900	12	2,814	(1)	7,819	(1)	2,477	(1)	13,152	(1)	573,015	(1)	599,277	(1)
1901	21	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	719,213	(1)
1902	26	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,046,458	(1)
1903	27	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,186,730	(1)
1904	32	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	885,268	(1)
1905	25	9,797	31,542	4,287	10,849	23,354	68,522	30,238	99,699	1,021,478	3,436,995	1,089,154	3,647,607
1906	19	16,278	54,884	123,407	367,944	19,866	57,899	20,680	79,608	798,504	2,999,937	978,735	3,560,272
1907	18	11,784	45,600	44,025	140,388	18,244	58,381	27,794	116,074	657,687	2,943,968	759,534	3,304,411
1908	19	8,426	33,704	38,309	101,519	20,834	58,294	14,824	62,471	1,087,211	4,928,919	1,169,604	5,184,907
1909	18	6,361	26,900	37,711	87,656	3,293	9,056	30,264	129,608	1,073,924	4,875,217	1,151,553	5,128,437
1910	19	11,641	55,656	22,352	69,451	31,348	97,317	24,087	127,569	824,710	4,347,933	914,138	4,697,926
1911	21	15,562	82,206	27,159	105,767	6,722	26,888	28,125	180,966	665,638	4,203,252	743,206	4,599,079
1912	22	14,635	65,678	38,265	95,130	94,808	241,317	21,755	114,542	1,226,408	6,618,924	1,395,931	7,135,591
1913	23	6,039	20,226	28,236	69,476	33,835	86,021	17,767	71,772	1,423,161	6,382,893	1,509,038	6,630,388
1914	23	8,864	39,312	48,725	157,842	28,381	100,509	24,840	129,031	1,510,977	8,316,910	1,621,787	8,743,604
1915	23	10,405	45,711	67,211	173,657	8,846	22,938	37,643	182,162	1,194,128	6,847,376	1,318,233	7,271,844
1916	27	29,172	143,719	153,100	522,867	36,917	132,001	25,629	130,013	1,365,616	8,027,590	1,610,434	8,956,190
1917	29	5,441	45,394	51,219	335,411	2,121	12,762	18,954	180,864	1,557,500	14,523,892	1,635,235	15,098,323
1918	30	11,800	109,537	103,950	655,767	27,349	188,348	17,827	179,022	1,677,513	15,591,793	1,838,439	16,724,467
1919	29	7,615	92,412	59,616	496,459	442	3,544	53,362	731,619	571,486	7,370,916	692,521	8,694,950
1920	28	12,896	126,018	53,102	255,531	68,506	386,640	41,295	549,775	691,205	8,937,512	867,004	10,255,446
1921	28	6,043	33,979	39,477	161,700	56	243	27,256	283,940	1,077,824	9,406,183	1,150,656	9,886,045
1922	30	12,912	67,966	50,413	202,044	12,903	54,938	14,362	103,329	1,404,176	12,334,701	1,494,766	12,762,978
1923	28	825	4,627	19,682	88,533	----------	----------	14,592	108,041	1,249,839	11,215,662	1,284,938	11,416,863
1924	28	4,432	26,909	35,997	172,698	31,416	142,205	14,835	119,298	815,339	7,766,581	902,019	8,227,691
1925	30	1,369	14,141	30,493	137,646	145	678	18,673	219,352	554,250	7,199,043	604,930	7,570,860
1926	28	1,829	14,046	40,238	198,381	35,470	175,056	18,114	172,152	1,352,691	12,959,264	1,448,342	13,518,899
1927	29	40	351	30,093	163,511	14,946	75,523	18,890	189,934	884,863	10,471,174	948,832	10,900,493
1928	30	493	3,436	47,709	289,936	1,074	6,685	13,601	110,818	1,410,724	12,906,868	1,473,601	13,317,743

[1] Figures not available.

Output of canned salmon in Alaska, 1913 to 1928 [1]

Product	1913	1914	1915	1916	1917	1918	1919	1920
Coho, or silver:	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
½-pound flat	3,587	4,579	2,050	13,145	30,412	26,238	9,719	8,915
1-pound flat	266	285	2,338	8,191	362	12,786	10,438	10,746
1-pound tall	71,926	152,199	119,880	240,573	162,457	179,934	212,713	172,424
Total	75,779	157,063	124,268	261,909	193,231	218,958	232,870	192,085
Chum, or keta:								
½-pound flat	985	373	----------	1,423	26,760	3,559	3,981	53
1-pound flat	2,619	5,568	317	----------	2,530	2,996	----------	46,167
1-pound tall	287,314	657,918	479,629	722,692	877,457	1,358,405	1,361,582	987,297
Total	290,918	663,859	479,946	724,115	906,747	1,364,960	1,365,563	1,033,517
Humpback, or pink:								
½-pound flat	20,822	2,103	4,325	41,491	91,403	63,557	28,185	18,970
1-pound flat	3,258	9,286	3,508	14,796	6,014	20,215	7,553	76,017
1-pound tall	1,348,801	974,660	1,867,683	1,681,506	2,199,559	2,355,182	1,575,870	1,498,133
Total	1,372,881	986,049	1,875,516	1,737,793	2,296,976	2,438,954	1,611,608	1,593,120
King, or spring:								
½-pound flat	1,585	3,143	2,404	2,617	12,973	6,000	7,584	10,196
1-pound flat	----------	4,804	3,755	3,804	5,133	5,267	11,532	18,319
1-pound tall	32,785	40,092	82,092	59,452	43,845	37,959	76,870	81,488
Total	34,370	48,039	88,251	65,873	61,951	49,226	95,986	110,003
Red, or sockeye:								
½-pound flat	29,041	53,825	52,033	81,565	124,309	137,008	122,236	101,716
1-pound flat	11,735	64,671	112,847	86,395	89,612	151,864	110,491	120,147
1-pound tall	1,924,461	2,083,147	1,765,139	1,936,971	2,274,460	2,244,865	1,044,934	1,278,875
1½-pound nominals	----------	----------	2,293	----------	----------	----------	----------	----------
2-pound nominals	----------	----------	----------	6,006	----------	----------	----------	----------
Total	1,965,237	2,201,643	1,932,312	2,110,937	2,488,381	2,533,737	1,277,661	1,500,738
Grand total	3,739,185	4,056,653	4,500,293	4,900,627	5,947,286	6,605,835	4,583,688	4,429,463

Product	1921	1922	1923	1924	1925	1926	1927	1928
Coho, or silver	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
½-pound flat	4,084	22,237	13,866	8,059	7,145	10,354	10,105	13,498
1-pound flat	7,918	12,099	10,151	5,403	7,223	16,625	15,047	5,840
1-pound tall	94,553	141,657	140,090	170,139	146,642	175,548	227,892	279,285
Total	106,555	175,993	164,107	183,601	161,010	202,527	253,044	298,623
Chum, or keta:								
½-pound flat	608	3,698	6,356	346	3,051	1,367	9,414	5,057
1-pound flat	----------	6,185	16	630	----------	48,982	1,449	4
1-pound tall	254,887	556,035	519,250	1,027,512	1,075,629	852,094	496,860	990,724
Total	255,495	565,918	525,622	1,028,488	1,078,680	902,443	507,723	995,785
Humpback, or pink:								
½-pound flat	1,292	42,736	29,303	21,365	34,005	59,835	50,455	40,473
1-pound flat	----------	30,879	9,428	13,095	185	82,161	14,662	6,189
1-pound tall	422,692	1,584,808	2,409,338	2,566,823	2,076,403	3,196,353	1,355,658	2,740,580
Total	423,984	1,658,423	2,448,129	2,601,283	2,110,593	3,338,349	1,420,775	2,787,242
King, or spring:								
½-pound flat	4,061	3,770	5,466	1,501	2,755	3,324	10,528	11,782
1-pound flat	19,192	3,967	7,281	9,500	8,828	11,125	11,371	14,854
1-pound tall	21,741	22,923	25,596	22,647	38,395	38,027	48,492	27,523
Total	44,994	30,660	38,343	33,648	49,978	52,476	70,391	54,159
Red, or sockeye:								
½-pound flat	60,831	171,896	121,775	31,947	68,901	82,181	88,874	89,063
1-pound flat	71,108	121,449	159,271	110,352	28,757	104,329	57,771	87,100
1-pound tall	1,633,859	1,777,313	1,578,450	1,305,596	962,018	1,970,577	1,173,550	1,771,931
Total	1,765,798	2,070,658	1,859,496	1,447,895	1,059,676	2,157,087	1,320,195	1,948,094
Grand total	2,596,826	4,501,652	5,035,697	5,294,915	4,459,937	6,652,882	3,572,128	6,083,903

[1] The number of cases shown has been put upon the common basis of forty-eight 1-pound cans per case.

Average annual price per case of forty-eight 1-pound cans of Alaska salmon, 1908 to 1928

Product	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Coho, or silver	$3.98	$4.07	$4.89	$5.67	$4.44	$3.[illegible]5	$4.39	$4.31	$5.34	$8.76	$9.15
Chum, or keta	2.53	2.28	3.04	3.72	2.37	2.21	3.37	2.59	3.34	6.14	6.27
Humpback, or pink	2.69	2.40	3.15	3.94	2.55	2.58	3.50	2.78	3.64	6.44	6.58
King, or spring	4.20	4.32	5.34	6.48	5.37	4.04	5.01	4.63	5.36	10.40	9.85
Red, or sockeye	4.52	4.53	5.30	6.33	5.45	4.54	5.58	5.82	6.04	9.48	9.44

Product	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Coho, or silver	$11.27	$9.13	$5.63	$5.47	$5.74	$6.83	$9.72	$8.40	$8.51	$7.12
Chum, or keta	6.92	4.19	3.68	3.98	4.65	4.68	4.44	5.01	5.47	6.06
Humpback, or pink	8.35	5.47	4.21	4.34	4.86	4.93	5.28	5.39	5.87	6.56
King, or spring	13.13	10.97	10.22	8.08	8.56	8.89	11.91	10.37	11.25	11.13
Red, or sockeye	12.98	13.05	8.96	9.24	9.27	9.53	13.12	9.89	12.08	9.41

Pack of canned salmon in British Columbia since the inception of the industry, by waters

Year	Canneries operated	Fraser River	Skeena River	Rivers Inlet and Smiths Inlet	Naas River	Outlying districts	Total
		Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
1876	2	7,247					7,247
1877	5	55,387	3,000				58,387
1878	8	81,446	8,500				89,946
1879	9	50,490	10,603				61,093
1880	9	42,155	19,694				61,849
1881	11	142,516	21,560			5,500	169,576
1882	16	199,204	24,522	5,635	6,500	4,600	240,461
1883	20	105,701	31,157	10,780	9,400	6,400	163,438
1884	14	34,037	53,786	20,383	8,500	7,000	123,706
1885	9	89,617	12,900			6,000	108,517
1886	16	99,177	37,587	15,000		1,200	152,964
1887	20	130,088	58,592	11,203		4,200	204,083
1888	21	76,616	70,106	20,000	12,318	5,000	184,040
1889	28	310,122	58,405	21,722	19,800	7,162	417,211
1890	33	244,352	91,645	33,500	24,700	17,060	411,257
1891	38	177,989	77,057	36,500	11,058	11,907	314,511
1892	36	98,491	90,750	14,955	26,100	18,425	248,721
1893	44	474,237	59,021	35,416	15,680	25,848	610,202
1894	42	363,566	61,005	40,161	20,000	7,500	492,232
1895	49	432,920	69,356	58,575	20,541	6,300	587,692
1896	56	375,344	97,863	107,473	14,649	22,453	617,782
1897	65	879,776	61,310	40,090	20,000	26,007	1,027,183
1898	67	264,225	80,102	105,362	20,000	22,862	492,551
1899	68	527,396	112,562	76,428	19,442	29,691	765,519
1900	69	331,371	135,424	74,196	20,200	45,349	606,540
1901	78	998,913	125,845	66,794	15,004	40,656	1,247,212
1902	69	327,197	155,936	70,298	23,212	50,518	627,161
1903	61	237,125	98,669	69,390	12,100	56,390	473,674
1904	51	128,903	154,869	94,292	19,085	68,745	465,894
1905	64	877,136	114,065	83,122	32,725	60,392	1,167,460
1906	59	240,486	162,420	122,878	32,534	71,142	629,460
1907	42	163,116	159,255	94,064	31,832	99,192	547,459
1908	50	89,184	209,177	75,090	46,908	122,330	542,689
1909	86	567,203	140,739	91,014	40,990	127,974	967,920
1910	58	223,148	222,035	129,398	39,720	147,900	762,201
1911	59	301,344	254,410	101,066	65,684	226,461	948,965
1912	57	173,921	254,258	137,697	71,162	359,538	996,576
1913	78	732,059	164,055	68,096	53,423	336,268	1,353,901
1914	63	328,390	237,634	109,052	94,890	341,073	1,111,039
1915	63	289,199	279,161	146,838	104,289	313,894	1,133,381
1916	73	106,440	223,158	85,383	126,686	453,398	995,065
1917	90	377,988	292,219	95,302	119,495	672,481	1,557,485
1918	83	206,003	374,216	103,155	143,908	788,875	1,616,157
1919	74	158,718	398,877	80,367	97,512	657,682	1,393,156
1920	50	132,860	334,392	152,828	81,153	486,383	1,187,616
1921	49	103,919	234,765	56,957	51,765	156,142	603,548
1922	50	137,482	482,305	86,828	124,071	459,640	1,290,326
1923	51	224,637	338,863	127,774	99,580	550,823	1,341,677
1924	50	208,516	390,858	114,314	142,939	888,686	1,745,313
1925	46	272,993	348,859	197,087	89,008	811,335	1,719,282
1926	54	272,860	407,524	108,148	92,749	1,183,909	2,065,190
1927	48	280,041	187,716	98,331	39,828	754,718	1,360,634
1928	36	255,455	298,709	111,066	104,877	1,265,522	2,035,629
Total		14,008,706	8,391,516	3,604,008	2,266,017	11,832,531	40,102,778

Number of salmon canneries operated in various sections of British Columbia in recent years

Year	Fraser River	Naas River	Skeena River	Rivers Inlet and Smiths Inlet	Outlying districts	Total
1910	23	4	12	7	12	58
1911	22	4	12	7	14	59
1912	18	4	12	7	16	57
1913	36	4	13	7	18	78
1914	21	5	13	7	17	63
1915	22	5	13	7	16	63
1916	23	5	14	8	23	73
1917	29	6	14	9	32	90
1918	16	7	15	9	36	83
1919	11	7	15	9	32	74
1920	11	5	15	10	23	64
1921	13	5	13	10	15	56
1922	10	5	13	10	26	64
1923	11	5	13	10	22	61
1924	9	4	13	10	24	60
1925	10	3	13	11	28	65
1926	10	4	15	12	35	76
1927	10	4	13	13	36	76
1928	9	4	13	12	42	80

Pack, by districts and species, of canned salmon in British Columbia from 1903 [1] to 1919

District and species	1903	1904	1905	1906	1907	1908
Fraser River district:	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
Chums		1,066				
Cohos	25,728	45,667	30,836	34,413	35,766	24,198
Pinks	4,504		3,304	15,543	63,530	415
Sockeyes	204,809	72,688	837,489	183,007	59,815	63,126
Springs, red	2,084	9,482	5,507	6,503	3,448	1,427
Springs, white				1,020	557	18
Total	237,125	128,903	877,136	240,486	163,116	89,184
Skeena River district:						
Chums		35,329				
Cohos	9,648	5,515	7,247	16,897	15,247	10,085
Pinks	20,045		7,523	38,991	25,217	45,404
Sockeyes	50,968	93,404	84,717	86,394	108,413	139,846
Springs, red	18,008	20,621	14,598	20,138	10,378	13,374
Springs, white						468
Total	98,669	154,869	114,085	162,420	159,255	209,177
Rivers Inlet and Smiths Inlet district:						
Chums		61				
Cohos	219	358		66	5,040	9,505
Pinks	180				700	479
Sockeyes	68,119	93,862	82,771	122,631	87,874	64,652
Springs, red	872	11	351	181	450	454
Total	69,390	94,292	83,122	122,878	94,064	75,090
Naas River district:						
Chums		31				
Cohos	2,187	1,697	3,083	5,997	6,093	8,348
Pinks			1,840	3,450	5,957	6,612
Sockeyes	8,438	15,000	24,462	22,166	17,813	27,584
Springs, red	1,475	2,357	3,340	858	1,288	3,263
Springs, white				63		
Steelheads					681	1,101
Total	12,100	19,085	32,725	32,534	31,832	46,908
Outlying districts:						
Chums		1,155				
Cohos	14,136	13,114	3,292	11,759	25,754	29,781
Pinks	2,653		1,303	10,321	23,300	23,538
Sockeyes	36,383	48,272	51,234	45,481	40,159	59,815
Springs, red	3,218	6,204	4,563	3,581	7,595	6,915
Springs, white					2,382	2,245
Steelheads					2	36
Total	56,390	68,745	60,392	71,142	99,192	122,330

[1] In 1901 in the Fraser River district 920,313 cases of sockeyes were packed, and in 1902 sockeyes were packed as follows: 293,477 cases in Fraser River district, 117,677 cases in Skeena River district, 68,819 cases in Rivers Inlet district, 20,953 cases in Naas River district, and 30,510 cases in outlying districts.

Pack, by districts and species, of canned salmon in British Columbia from 1903 to 1919—Continued

District and species	1903	1904	1905	1906	1907	1908
TOTAL BY SPECIES	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
Chums		37,642				
Cohos	51,918	66,351	44,458	69,132	87,900	81,917
Pinks	27,382		13,970	[1] 68,305	[1] 118,704	[1] 76,448
Sockeyes	368,717	323,226	1,080,673	459,679	314,074	355,023
Springs, red	25,657	38,675	28,359	31,261	23,159	25,433
Springs, white				1,083	2,939	2,731
Steelheads					683	1,137
Grand total	473,674	465,894	1,167,460	629,460	547,459	542,689

District and species	1909	1910	1911	1912	1913	1914
Fraser River district:	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
Chums		52,177	47,237	12,961	22,220	74,726
Cohos	21,540	27,855	39,740	28,574	11,648	38,639
Pinks	1,987	128	142,101	574	9,973	6,057
Sockeyes	542,248	133,045	58,487	108,784	684,596	185,483
Springs, red	1,428	1,018	7,028	14,655	3,573	9,485
Springs, white		8,925	6,751	8,373	49	14,000
Total	567,203	223,148	301,344	173,921	732,059	328,390
Skeena River district:						
Chums			70	504		8,329
Cohos	12,249	11,531	23,376	39,628	18,647	16,378
Pinks	28,120	13,473	81,956	97,588	66,045	71,021
Sockeyes	87,901	187,246	131,066	92,498	52,927	130,166
Springs, red	11,727	9,546	15,514	19,332	23,250	11,529
Springs, white	742	239	2,428	4,501	3,186	211
Steelheads				207		
Total	140,739	222,035	254,410	254,258	164,055	237,634
Rivers Inlet and Smith's Inlet district:						
Chums			288	3,845		5,023
Cohos	1,400	2,075	6,287	11,010	3,660	7,789
Pinks		19	5,411	8,809	2,097	5,784
Sockeyes	89,027	126,921	88,763	112,884	61,745	89,890
Springs, red	587	383	317	681	594	566
Springs, white				468		
Total	91,014	129,398	101,066	137,697	68,096	109,052
Naas River district:						
Chums		351	5,189	3,245	2,987	25,569
Cohos	6,818	6,285	7,842	12,468	3,172	9,276
Pinks	3,589	895	11,467	12,476	20,539	25,333
Sockeyes	28,246	30,810	37,327	36,037	23,574	31,327
Springs, red	2,280	1,228	3,434	5,710	2,999	2,660
Springs, white	57	11	325	1,226	152	725
Steelheads		140	100			
Total	40,990	39,720	65,684	71,162	53,423	94,890
Outlying districts:						
Chums		5,834	39,167	37,770	52,758	70,827
Cohos	19,911	20,636	42,457	73,422	32,695	48,119
Pinks	12,848	20,098	64,312	128,296	94,233	112,145
Sockeyes	93,019	87,893	67,866	94,559	149,330	99,830
Springs, red	2,196	7,138	12,458	21,907	7,017	8,668
Springs, white		301	201	3,524	229	1,484
Total	127,974	147,900	226,461	359,538	336,268	341,073
TOTAL BY SPECIES						
Chums		58,362	91,951	58,325	77,965	184,474
Cohos	61,918	74,382	119,702	165,102	69,822	120,201
Pinks	[1] 46,544	34,613	305,247	247,743	192,887	220,340
Sockeyes	840,441	565,915	383,509	444,762	972,178	536,696
Springs, red	18,218	19,313	38,751	62,345	37,433	32,908
Springs, white	799	9,476	9,705	18,092	3,616	16,420
Steelheads		140	100	207		
Grand total	967,920	762,201	948,965	996,576	1,353,901	1,111,039

[1] Pinks and chums combined.

Pack, by districts and species, of canned salmon in British Columbia from 1903 to 1919—Continued

District and species	1915	1916	1917	1918	1919
	Cases	*Cases*	*Cases*	*Cases*	*Cases*
Fraser River district:					
Chums	18,539	30,184	59,973	86,215	15,718
Cohos	34,114	27,676	30,735	43,871	54,866
Pinks	128,555	840	134,442	18,388	39,363
Sockeyes	89,040	27,394	123,614	16,849	29,628
Springs, red	15,388	11,096	10,197	15,192	15,223
Springs, white	3,532	9,217	18,916	24,853	3,592
Steelheads	31	33	111	635	328
Total	289,199	106,440	377,988	206,003	158,718
Skeena River district:					
Chums	5,769	17,121	21,516	22,573	31,457
Cohos	32,190	47,409	38,456	38,759	36,559
Pinks	107,578	73,029	148,319	161,727	117,303
Sockeyes	116,553	60,923	65,760	123,322	184,945
Springs, red	15,069	18,372	13,586	16,013	23,285
Springs, white	204	2,561	2,699	6,828	2,656
Steelheads	1,798	3,743	1,883	4,994	2,672
Total	279,161	223,158	292,219	374,216	398,877
Rivers Inlet and Smith's Inlet district:					
Chums	5,387	20,144	16,101	6,729	7,089
Cohos	7,115	15,314	9,124	12,074	9,038
Pinks	2,964	3,567	8,065	29,542	6,538
Sockeyes	130,350	44,936	61,195	53,401	56,258
Springs, red	1,022	1,033	715	957	1,201
Springs, white		389	102	452	241
Steelheads					2
Total	146,838	85,383	95,302	103,155	80,367
Naas River district:					
Chums	11,076	11,200	24,938	40,368	24,041
Cohos	15,171	19,139	22,180	17,061	10,900
Pinks	34,879	59,593	44,568	59,206	29,949
Sockeyes	39,349	31,411	22,188	21,816	28,259
Springs, red	3,053	3,061	3,170	2,332	2,993
Springs, white	648	784	1,326	1,820	581
Steelheads	113	1,498	1,125	1,305	789
Total	104,289	126,686	119,495	143,908	97,512
Outlying districts:					
Chums	41,229	161,552	352,745	341,730	293,730
Cohos	58,366	77,181	64,814	87,359	88,630
Pinks	93,376	143,615	161,365	258,882	153,486
Sockeyes	100,750	50,125	67,091	61,071	70,355
Springs, red	17,202	17,669	20,962	31,041	39,554
Springs, white	1,986	2,544	4,603	7,866	11,225
Steelheads	985	712	901	926	702
Total	313,894	453,398	672,481	788,875	657,682
TOTAL BY SPECIES					
Chums	82,000	240,201	475,273	497,615	372,035
Cohos	146,956	186,719	165,309	199,124	199,993
Pinks	367,352	280,644	496,759	527,745	346,639
Sockeyes	476,042	214,789	339,848	276,459	369,445
Springs, red	51,734	51,231	48,630	65,535	82,256
Springs, white	6,370	15,495	27,646	41,819	18,295
Steelheads	2,927	5,986	4,020	7,860	4,493
Grand total	1,133,381	995,065	1,557,485	1,616,157	1,393,156

Pack by districts and species, of canned salmon in British Columbia from 1920 to 1928

District and species	1920	1921	1922	1923	1924	1925	1926	1927	1928
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
Fraser River district:									
Bluebacks	4,488	1,323	812		1,757	5,107	13,736	10,627	795
Chums	23,884	11,223	17,895	103,248	109,495	66,111	88,495	67,259	193,106
Cohos	22,934	29,978	23,587	20,173	21,401	36,717	21,783	24,079	27,061
Pinks	12,839	8,178	29,578	63,645	31,968	99,800	32,256	102,536	2,881
Sockeyes	44,598	35,900	48,744	29,423	36,200	31,523	83,598	57,056	26,530
Springs, red	24,083	17,309	12,994	4,518	3,574	7,989	12,783	7,925	1,173
Springs, white			3,867	3,615	4,056	25,701	20,169	10,528	3,909
Steelheads	34	8	5	15	65	45	40	31	
Total	132,860	103,919	137,482	224,637	208,516	272,993	272,860	280,041	255,455
Skeena River district:									
Chums	3,834	1,993	39,758	16,527	25,588	74,308	63,527	19,006	17,716
Cohos	18,068	45,033	24,699	31,967	26,968	39,168	30,206	26,326	30,194
Pinks	177,679	124,457	301,655	145,973	181,313	130,079	210,081	38,768	209,579
Sockeyes	90,869	41,018	100,667	131,731	144,747	81,146	82,360	83,996	34,559
Springs, red	42,724	21,766	12,671	11,748	10,727	18,205	18,352	17,636	5,696
Springs, white			1,805	499	1,301	5,240	2,242	1,402	724
Steelheads	1,218	498	1,050	418	214	713	754	582	241
Total	334,392	234,765	482,305	338,863	390,858	348,859	407,524	187,716	298,709
Rivers Inlet and Smiths Inlet:									
Bluebacks			82						
Chums	1,226	173	311	3,242	4,924	11,510	11,758	3,727	3,613
Cohos	2,908	4,718	1,120	1,526	1,980	4,946	7,450	5,084	1,098
Pinks	25,647	5,305	24,292	10,057	15,105	8,625	13,504	1,403	16,713
Sockeyes	121,254	46,300	60,700	112,350	91,760	171,510	74,628	87,143	88,875
Springs, red	1,793	364	285	499	414	444	662	748	283
Springs, white			38	100	131	52	135	209	471
Steelheads		97					11	17	13
Total	152,828	56,957	86,828	127,774	114,314	197,087	108,148	98,331	111,066
Naas River:									
Bluebacks			42						
Chums	12,145	2,176	11,277	25,791	26,612	22,504	15,392	3,307	3,538
Cohos	3,700	8,236	3,533	7,894	6,481	8,027	4,274	3,966	10,734
Pinks	43,151	29,488	75,687	44,165	72,496	35,530	50,815	16,609	83,183
Sockeyes	16,740	9,364	31,277	17,821	33,590	18,945	15,929	12,026	5,540
Springs, red	4,857	2,088	1,807	2,979	2,350	3,365	5,367	3,545	1,539
Springs, white			255	335	375	392	597	279	307
Steelheads	560	413	193	595	1,035	245	375	96	36
Total	81,153	51,765	124,071	99,580	142,939	89,008	92,749	39,828	104,877
Outlying districts:									
Bluebacks	3,573	5,737	5,495	7,097	2,510	4,832	5,409	10,194	5,277
Chums	43,537	55,843	188,963	269,247	402,297	432,776	523,065	469,895	645,257
Cohos	54,362	29,323	49,906	50,484	58,892	100,016	98,734	103,277	81,570
Pinks	261,540	25,478	150,767	177,092	356,656	172,131	466,356	88,310	490,016
Sockeyes	77,944	31,332	58,226	43,322	63,306	89,394	80,497	67,831	48,038
Springs, red	44,844	8,225	5,319	2,653	3,949	9,306	7,485	11,425	3,352
Springs, white			555	196	579	1,360	1,387	2,821	1,437
Steelheads	583	204	409	732	497	1,520	976	965	575
Total	486,383	156,142	459,640	550,823	888,686	811,335	1,183,909	754,718	1,265,522
TOTAL BY SPECIES									
Bluebacks	8,061	7,060	6,431	7,097	4,267	9,939	19,145	20,821	6,072
Chums	84,626	71,408	258,204	418,055	568,916	607,209	702,237	563,194	863,230
Cohos	101,972	117,288	102,845	112,044	115,722	188,874	162,449	162,732	150,657
Pinks	520,856	192,906	581,979	440,932	657,538	446,165	773,012	247,626	792,372
Sockeyes	351,405	163,914	299,614	334,647	369,603	392,518	337,012	308,052	203,542
Springs, red	118,301	49,752	33,076	22,397	21,014	39,309	44,649	41,279	12,043
Springs, white			6,520	4,745	6,442	32,745	24,530	15,239	6,848
Steelheads	2,395	1,220	1,657	1,760	1,811	2,523	2,156	1,691	865
Grand total	1,187,616	603,548	1,290,326	1,341,677	1,745,313	1,719,282	2,065,190	1,360,634	2,035,629

MARKET PRICES FOR CANNED SALMON

The manner of fixing the selling price at which the canner is willing to dispose of his canned product varies slightly in certain regions. In May or June, when the spring-packing season has sufficiently advanced so that a line can be gotten on the probable pack of chinook, the highest priced of the pack, the Columbia River canners agree upon a price, this usually being high or low, as the pack is small or large.

Since the Alaska Packers Association was formed, through a combination of a number of canneries operating in the Territory of Alaska, it has packed in some years as much as one-fourth of the salmon canned. It also owns canneries on Puget Sound.

The custom grew up amongst the smaller packers of Alaska and Puget Sound of waiting until the association fixed the prices on its own pack, when the others would generally fall into line with the same prices for their packs. At no time has it ever been compulsory on the part of any packer to adopt the same prices as the association. In fact, it has sometimes been the case that, while the small packer publicly quoted the association's opening prices, yet in secret he was shading it by 2½ to 5 cents per dozen on certain grades.

Occasionally the other packers do not like a certain quotation of the association and make one more nearly in consonance with their own views. This happened in 1913, when the association quoted 60 cents for chums, while the Puget Sound canners quoted 55 cents for this grade, and in 1915 when the association quoted 65 cents for chums and the Puget Sound interests 70 cents for the same grade, thus showing clearly the independence of the smaller packers.

Owing to a peculiar feature of the salmon marketing business, more depends upon the opening prices than appears on the surface to the uninitiated.

Shortly after the first of the year buyers throughout the world begin to take stock of their salmon supplies and shortly thereafter begin placing their "future" orders. These cover the quantity required of each grade, and when the buyer orders through a broker the orders are placed subject to a contract similar to the following:

> The undersigned hereby authorizes ——— to book the number of cases of canned salmon specified below; said booking to be filed with packers for delivery from ——— (naming year) pack, subject to buyers' approval of opening prices when named; *the option being granted buyers of confirming the total number* of cases specified below; *confirming a smaller quantity*, or *declining any confirmation.* ——— furthermore agrees that *buyers shall have the option of increasing quanities* listed below, when he names opening prices for his packers, contingent upon his ability to secure at that time an increased allotment from his packers. In event ——— secures an increased allotment from his packers insufficient to meet all increases requested by his patrons, he will distribute such increase as he can secure among the dealers who have filed conditional contracts with him, according to the date order that said contracts have been received in his office.

Under this form of contract the packer is expected to be ready to fulfill the terms of same, except in case of a short pack, when the orders are generally prorated; i. e., all orders are proportionately reduced until they come within the compass of the pack. Should the buyer dislike the opening price he has the privilege of canceling the order. While this latter privilege may not, at first glance, look just to the packer, yet it is doubtful if any buyer would place a

"future" order unless he was assured of a chance to cancel it should he feel that too high a sum was fixed in the opening prices.

Some canneries contract to sell their entire output to one buyer, and the price fixed is usually the opening prices for the year in question. In such cases the buyer and seller are both compelled to abide by the price, no matter how unjust one or the other may consider it.

The announcement of opening prices does not occur ordinarily until late in August or early in September, when the greater part of the packing is over with and a good line on the total pack has been obtained.

AMERICAN OPENING PRICES

Below are shown the yearly opening prices on the various grades and sizes from 1890 to 1928. The most interesting part of this is the increase shown in the value of high-grade salmon. Columbia River chinook was quoted at $1.05 for 1-pound talls in 1897, and it gradually advances until in 1928 it is quoted at $4.15. Alaska red 1-pound talls in 1897 sold for 90 cents, the lowest during the period in question, advancing, with occasional recessions, until in 1925 it reached high-water mark of $3.50. In 1897 Puget Sound 1-pound tall sockeye sold for 80 cents, 10 cents below Alaska red. In 1898 it sold for 20 cents less than reds. In 1902 it sold for $1 as compared with 95 cents for Alaska red, and from that time on brought a higher price, being quoted at $4.25 in 1922 as compared with $2.25 for Alaska red. No sockeye 1-pound talls were packed since 1922.

Medium red or coho does not figure in the opening prices until 1908, when Puget Sound coho sold for 5 cents a dozen more than Alaska coho. Very shortly thereafter, however, both were classed together and sold for the same price. This grade has not had the wide fluctuations of the others, due mainly to the generally small pack made annually.

Pink salmon has been the football of the salmon market ever since the pack became of sufficient size to become a feature in it. The size of the pack has been steadily increasing, as the fish became better known, and while the price obtained has been excellent in certain years (in 1911 it sold at $1 per dozen, the highest point reached up to that time), usually the price has been low. In 1897 it was quoted at 65 cents. In 1915 the opening price was 75 cents, but as a matter of fact a large part of the pack really sold for 65 cents. The lowest point it reached was in 1903, when it was quoted at 50 cents a dozen. As a result of the demand created by the war pink salmon opened at 90 cents in 1916, $1.65 in 1917 and 1918, and $2.25 in 1919. The market collapsed under the last-named price, however, and since 1919 the average opening price has been $1.35.

It is only of recent years that chum salmon has become a factor in the market. Although sold for some time before then, chum salmon appears first in the regular opening prices in 1908, when it was quoted at 70 cents a dozen. In 1913 it was quoted at 55 cents while the opening price in 1915 was 70 cents on Puget Sound and 65 cents at San Francisco. During the war the opening prices on chums were materially increased, being 85 cents in 1916, $1.60 in 1917, $1.75 in 1918, and $2.15 in 1919. As in the case of pinks, the market collapsed under the 1919 price, and some sales under $1 were made in 1920. The following years the prices showed no appreciable gain until 1928 when chum salmon was quoted at $1.60.

The pack of Alaska and Puget Sound kings or springs has always been small, and while they have always been quoted at $1 per dozen or better (in 1919 they were quoted at $3.12½) they have always been slow sellers. It is extremely improbable that the canned pack will increase much in the future, as this fish is the best for mild curing, and as the mild curers are able to offer better prices for the raw fish than the canneries, they will always get the fish when desired.

American opening prices per dozen cans since 1890

1890 to 1902

Year and species	Talls	Year and species	Talls	Year and species	Talls
1890		1895		1899	
Columbia River chinook	$1.40	Columbia River chinook	$1.32½	Columbia River chinook	$1.25
Alaska red	1.20	Alaska red	1.15	Alaska red	1.10
Alaska pink	.75	Alaska pink	.80	Puget Sound sockeye	1.10
1891		1896		Alaska pink	.67½
Columbia River chinook	1.35	Columbia River chinook	1.25	1900	
Alaska red	1.20	Alaska red	1.10	Columbia River chinook	1.60
Alaska pink	.75	Alaska pink	.75	Alaska red	1.25
1892		1897		Puget Sound sockeye	1.10
Columbia River chinook	1.35	Columbia River chinook	1.05	Alaska pink	.75
Alaska red	1.15	Alaska red	.95	1901	
Alaska pink	.75	Puget Sound sockeye	.80	Columbia River chinook	1.50
1893		Alaska pink	.65	Alaska red	1.25
Columbia River chinook	1.32½	1898		Puget Sound sockeye	.95
Alaska red	1.17½	Columbia River chinook	1.05	Alaska pink	.75
Alaska pink	.65	Alaska red	.97½	1902	
1894		Puget Sound sockeye	.80	Columbia River chinook	1.35
Columbia River chinook	1.35	Alaska pink	.65	Alaska red	1.00
Alaska red	1.10			Puget Sound sockeye	1.00
Alaska pink	.60			Alaska pink	.65

1903 to 1928

Year and species	Talls	Flats	Halves	Year and species	Talls	Flats	Halves
1903				1907			
Puget Sound sockeye	$1.50	$1.60	$0.90	Columbia River chinook	$1.65	$1.75	$1.05
Columbia River chinook	1.35	1.45	.85	Puget Sound sockeye	1.60	1.75	1.10
Alaska red	1.30			Alaska red	1.15		
Alaska pink	.50			Alaska pink	.80		
1904				1908			
Columbia River chinook	1.45	1.15	.90	Columbia River chinook	1.65	1.75	1.05
Puget Sound sockeye	1.55	1.65	.95	Puget Sound sockeye	1.60	1.75	1.05
Alaska red	1.30			Puget Sound pink	.75	.80	
Alaska pink	.70			Puget Sound coho	1.05	1.15	.75
1905				Alaska red	1.15		
Columbia River chinook	1.45	1.55	.90	Alaska king	1.05		
Puget Sound sockeye	1.35	1.50	4.00	Alaska coho	1.00		
Alaska red	1.00			Alaska pink	.70		
Alaska pink	.70			Alaska chum	.70		
1906				1909			
Columbia River chinook	1.50	1.60	1.00	Columbia River chinook, fancy	1.65	1.75	1.05
Puget Sound sockeye	1.45	1.60	1.00	Puget Sound sockeye	1.35	1.50	1.00
Alaska red	.95			Alaska red	1.15	1.35	.85
Alaska pink	.75			Alaska king	1.10		
				Alaska coho	1.05	1.20	.70
				Alaska pink	.60		
				Alaska chum	.57½		

American opening prices per dozen cans since 1890—Continued

Year and species	Talls	Flats	Halves
1910			
Columbia River chinook, fancy	$1.75	$1.90	$1.10
Puget Sound sockeye	1.65	1.80	1.10
Alaska red	1.35	1.50	1.00
Alaska king	1.35	------	------
Alaska pink	.80	------	------
Alaska chum	.77½	------	------
Medium red and coho	1.25	1.40	.80
1911			
Columbia River chinook, fancy	1.95	2.00	1.30
Puget Sound sockeye	1.95	2.00	1.30
Alaska red	1.60	1.75	1.12½
Alaska medium red	1.45	1.65	1.00
Alaska king	1.80	2.00	1.12½
Pink	1.00	1.15	.80
Chum	.95	1.05	.75
1912			
Chinook	1.95	2.00	1.25
Sockeye	1.95	2.00	1.30
Alaska red	1.40	1.60	1.15
Alaska medium red	1.15	1.25	.80
Alaska king	1.40	1.60	1.15
Pink	.65	.65	.55
Chum	.62½	------	.50
1913			
Chinook	1.95	2.00	1.25
Sockeye	1.50	1.65	1.05
Alaska red	1.15	1.35	.95
Alaska medium red	.85	1.00	.70
Alaska king	1.00	1.15	.90
Pink	.65	.80	.55
Chum	[1].55	.70	.50
1914			
Chinook	1.95	2.10	1.25
Sockeye	1.95	2.15	1.35
Alaska red	1.45	1.80	1.10
Medium red	1.15	1.35	.82½
Alaska king	1.40	------	1.10
Pink	.90	1.00	.70
Keta, or chum	.85	.95	.65
1915			
Chinook	1.90	2.00	1.25
Sockeye	1.95	2.15	1.35
Alaska red	1.50	1.85	1.15
Medium red	1.15	1.30	.75
Alaska king	1.25	------	------
Pink	.75	.85	.57½
Keta, or chum	[2].70	.80	.52½
1916 [3]			
Chinook	1.90	2.00	1.25
Sockeye	2.05	2.25	1.40
Alaska red	1.50	1.75	1.20
Medium red	1.30	1.45	.90
Alaska king	1.35	------	------
Pink	.90	1.10	.75
Chum	.85	------	.67½
1917			
Chinook	$2.90	$3.00	$1.75
Sockeye	2.90	3.00	1.75
Alaska red	2.35	2.60	1.65
Medium red	2.00	2.15	1.35
Alaska king	2.25	------	------
Pink	1.65	1.80	1.15
Chum	1.60	1.75	------
1918 [4]			
Chinook:			
Fancy	3.15	3.25	2.00
Standard	2.75	2.85	1.75
Blueback	------	------	2.00
Sockeye	[5] 3.15	[5] 3.25	2.00
Alaska red	2.35	2.50	1.65
Medium red:			
Alaska	2.25	2.40	1.60
Puget Sound, etc.	2.40	2.50	1.60
Pink	1.65	1.80	1.15
Chum:			
Alaska	1.60	1.75	1.10
Puget Sound, etc.	1.75	1.85	1.10
Steelhead	3.00	3.10	1.90
1919			
Chinook	3.15	3.25	2.00
Sockeye	------	------	[6] 2.50
Alaska red	[7] 3.35	3.50	2.25
Tips and tails	3.10	------	------
Alaska king	[8] 3.12½	------	------
Medium red	3.00	3.15	2.00
Pink	2.25	2.40	1.40
Chum	[9] 2.15	2.30	1.25
1920			
Chinook:			
Fancy	3.90	4.00	2.50
Standard	3.15	3.25	1.95
Sockeye	------	------	3.00
Alaska red	3.25	3.40	2.25
Medium red	2.00	2.15	1.50
Alaska king	3.00	------	2.10
Pink	1.50	1.65	1.10
Chum	1.15	------	.90
1921			
Chinook, fancy	3.15	3.25	2.10
Sockeye	------	------	2.50
Alaska red	2.35	3.00	2.00
Medium red	1.50	1.65	.95
Alaska king	1.75	1.90	1.05
Pink	1.10	1.25	.80
Chum	1.00	------	.65
1922			
Chinook, fancy	3.40	3.50	3.25
Puget Sound sockeye	4.25	4.50	2.50
Alaska red	2.25	2.75	1.75
Medium red	1.25	1.60	1.00
Alaska king	1.75	2.00	1.75
Pink	1.15	1.25	.80
Chum	1.05	------	.70

[1] The opening price in San Francisco was 60 cents.
[2] The opening price in San Francisco was 65 cents.
[3] The Kelley-Clarke prices differed from these in the following particulars: Red talls, $1.60; red halves, $1.25; medium red talls, $1.35; medium red flats, $1.50; medium red halves, $1; pink talls, $1; chum talls, 95c.; and king talls, $1.40.
[4] Maximum prices set by U. S. Food Administration.
[5] Pack of 1-pound talls and 1-pound flats taken for British Government at these prices.
[6] No price named by Alaska Packers Association or Deming & Gould Co.
[7] Alaska Packers Association and Northwestern Fisheries Co. quoted $3.25; others reduced to conform.
[8] Quoted by Alaska Packers Association only.
[9] Alaska Packers Association quoted $2.10.

American opening prices per dozen cans since 1890—Continued

Year and species	Talls	Flats	Halves
1923			
Chinook:			
Fancy	$4.00	$4.00	$2.50
Standard	2.15	2.25	1.35
Puget Sound sockeye	------	4.00	2.50
Alaska red	2.25	2.75	1.65
Alaska medium red	1.40	1.65	1.00
Puget Sound coho	1.50	1.70	1.05
Alaska king	2.00	2.25	1.50
Pink	1.25	1.35	.90
Chum	1.20	------	.85
1924			
Chinook, fancy	3.55	3.60	2.20
Puget Sound sockeye	------	3.50	2.25
Alaska red	2.25–2.50	2.50–2.75	1.50–1.75
Alaska medium red	1.50–1.75	1.65–2.00	1.05–1.35
Alaska king	2.10–2.15	2.40	1.50
Alaska pink	1.25–1.30	1.35	.90
Puget Sound pink	1.25–1.35	------	------
Chum	1.20	------	.85
1925			
Chinook, fancy	3.50	3.60	2.10
Puget Sound sockeye	------	3.75	2.35–2.50
Alaska red	3.50	3.75	2.25
King	3.00–3.25	3.50	2.00–2.15
Medium red or coho	2.50–2.75	2.75–2.90	1.75–1.85
Pink	1.25–1.45	1.35–1.50	1.00–1.10
Chum	1.10–1.15	------ ------	.85–.90
1926			
Chinook, fancy	$3.95	$4.00	$2.35
Puget Sound sockeye	------	4.00	2.50
Alaska red	2.50	3.15	2.00
King	2.25	3.00	1.75
Medium red or coho	2.25	2.50	1.50
Pink	1.35	1.50	1.05
Chum	1.25	------	.80–.90
1927			
Chinook, fancy	3.95	4.00	2.35
Puget Sound sockeye	------	4.00	2.75
Alaska red	3.10	3.25	2.15–2.25
King	2.65–2.85	3.00	1.90
Medium red or coho	2.25–2.50	2.50	1.55–1.0–
Pink	1.35–1.50	1.60	1.106–1.15
Chum	1.30–1.35	------	.95
1928			
Chinook, fancy	4.15	4.20	2.45
Puget Sound sockeye	------	4.50	2.60
Alaska red	2.35	3.00	1.85
King	2.00–2.15	2.40	1.80
Coho, fancy	1.85	2.15	1.35
Medium red	1.75–1.85	2.00	1.35
Pink	1.65	1.75	1.10
Chum	1.60	------	1.00

BRITISH COLUMBIA OPENING PRICES

The packers of British Columbia and the United States both sell a considerable portion of their high-grade salmon abroad, and the competition thus engendered compels a fairly close conformity in prices. On salmon sold in the domestic markets, however, the competition is not so keen; hence there is room for a considerable diversity of opinion as to values. Unlike the United States, there is a very small market in Canada for chum salmon, and it has only been in recent years that opening prices have been fixed on this grade.

British Columbia opening prices since 1902 [1]

[Prices are for full cases]

Year and species	Talls	Flats	Halves
1902			
Sockeye	$4.75	$4.90	------
Red spring	4.00	------	------
Coho	3.75	------	------
Pink	2.50	2.50	------
1903			
Sockeye	4.65	------	------
Red spring	4.00	------	------
Coho	3.75	------	------
Pink	2.60	2.50	------
1904			
Sockeye	$5.75	$6.25	------
Red spring	5.25	------	------
Coho	4.25	------	------
Pink	2.75	------	------
1905			
Sockeye	5.00	5.30	------
Red spring	4.50	5.00	------
Coho	4.00	------	------
Pink	2.60	------	------

[1] These opening prices have been furnished by H. Bell-Irving & Co. (Ltd.), of Vancouver, British Columbia, Canada, well-known packers and handlers of canned salmon.

British Columbia opening prices since 1902—Continued

[Prices are for full cases]

Year and species	Talls	Flats	Halves
1906			
Sockeye	$5.50	------	------
Red spring	5.25	------	------
Coho	4.50	$4.75	------
Pink	------	3.00	------
1907			
Sockeye	5.50	------	------
Red spring	5.50	5.50	------
Coho	4.50	4.50	------
Pink	3.00	3.00	------
1908			
Sockeye	6.10	------	------
Red spring	5.75	5.75	------
Coho	4.75	5.00	------
Pink	3.25	3.25	------
1909			
Sockeye	5.25	------	$6.75
Red spring	5.10	5.60	------
Coho	4.25	------	------
Pink	2.75	------	------
1910			
Sockeye	6.50	7.00	8.25
Red spring	5.75	6.00	------
Coho	5.00	5.50	6.50
Pink	3.25	------	------
1911			
Sockeye	7.75	8.00	10.00
Red spring	6.50	------	------
Coho	6.00	6.25	7.50
Pink	4.00	4.25	5.50
Chum	3.75	------	------
1912			
Sockeye	9.00	9.25	10.75
Red spring	7.75	------	9.25
Coho	7.25	7.25	7.50
Pink	3.00	3.00	4.50
Chum	2.75	------	------
1913			
Sockeye	6.00	6.25	7.75
Red spring	5.75	5.75	------
Coho	4.25	4.50	------
Pink	2.50	2.50	------
1914			
Sockeye	7.50	8.75	9.25
Red spring	6.75	------	------
Coho	4.75	------	5.50
Pink	3.50	------	------
1915			
Sockeye	8.25	8.25	10.25
Red spring	6.75	------	------
Coho	4.50	5.00	------
Pink	3.25	3.50	4.75
Chum	2.75	------	------
1916			
Sockeye	9.00	------	11.00
Red spring	8.00	------	9.50
Coho	6.50	------	9.00
Pink	3.75	------	5.25
Chum	3.00	4.00	------
1917			
Sockeye	13.00	------	16.00
Red spring	------	12.00	13.00
Coho	10.00	11.00	12.50
Pink	8.00	------	9.25
Chum	6.65	------	------
1918			
Sockeye	$14.50	$15.00	$16.00
Red spring	13.00	13.25	14.00
Coho	11.50	12.00	13.00
Pink	8.50	8.75	10.00
Chum	6.75	------	7.75
1919			
Sockeye	16.00	16.50	17.50
Red spring	------	------	16.00
Coho	12.00	12.50	13.50
Pink	------	9.00	10.00
Chum	6.75	------	------
1920			
Sockeye	19.00	19.50	20.50
Red spring	16.50	16.75	18.00
Coho	12.00	12.25	13.50
Pink	6.50	------	7.50
Chum	5.25	------	6.25
1921			
Sockeye	17.00	17.25	18.00
Red spring	12.50	12.75	14.00
Coho	10.00	10.25	11.50
Pink	4.50	------	6.00
Chum	4.00	------	5.25
1922			
Sockeye	18.00	18.25	19.00
Red spring	13.00	13.25	14.00
Coho	8.00	8.25	9.00
Pink	5.00	------	6.75
Chum	4.50	------	6.00
1923			
Sockeye	13.00	13.50	14.00
Red spring	11.00	------	12.00
Coho	6.50	7.00	8.00
Pink	5.00	5.50	6.50
Chum	4.50	4.75	6.00
1924			
Sockeye	11.50	11.75	12.50
Red spring	10.00	10.50	11.00
Coho	6.50	6.75	8.00
Pink	5.00	5.25	6.00
Chum	4.50	4.75	5.50
1925			
Sockeye	15.00	15.50	16.00
Red spring	12.50	13.00	13.75
Coho	9.25	9.75	10.50
Pink	5.50	6.00	7.00
Chum	4.50	5.00	6.00
1926			
Sockeye	16.00	16.50	17.00
Red spring	14.00	------	15.50
Coho	12.00	12.50	13.00
Pink	5.75	6.25	7.75
Chum	4.75	5.25	6.50
1927			
Sockeye	16.00	16.50	17.00
Red spring	14.00	14.50	15.50
Coho	12.00	12.50	13.00
Pink	5.75	6.00	7.50
Chum	5.00	5.25	6.50
1928			
Sockeye	16.50	17.00	17.50
Red spring, fancy	13.50	------	14.50
Coho	12.00	12.50	13.00
Pink	6.00	6.50	7.50
Chum	5.25	5.75	6.50

PICKLING INDUSTRY

The salmon-pickling industry was so overshadowed by its giant brother, the canning industry, that statistical data, except for Alaska, were found in extremely fragmentary shape, and only that portion is shown relating to Alaska from the time of annexation to and including 1928.

Pack of salted salmon in Alaska, 1868 to 1928

Year	Salmon		Salmon bellies		Dry-salted salmon	
	Barrels	Value	Barrels	Value	Pounds	Value
1868	2,000	$16,000				
1869	1,700	13,600				
1870	1,800	14,400				
1871	700	6,300				
1872	1,000	9,000				
1873	900	7,200				
1874	1,400	11,200				
1875	1,200	9,600				
1876	1,800	14,400				
1877	1,950	15,700				
1878	2,100	16,800				
1879	3,500	28,000				
1880	3,700	29,600	300	$3,300		
1881	1,760	15,840				
1882	5,890	53,010				
1883	7,251	65,259				
1884	6,106	54,954				
1885	3,230	29,070				
1886	4,861	43,749				
1887	3,978	35,802				
1888	9,500	85,500				
1889	6,457	58,013				
1890	18,039	162,351				
1891	8,913	71,304				
1892	17,374	140,057	53	815		
1893	24,005	120,083				
1894	32,011	176,060				
1895	14,234	85,404				
1896	9,314	65,198	150	1,200		
1897	15,848	110,936	2,846	28,460		
1898	22,670	181,360	580	5,800		
1899	22,382	167,865	235	2,350		
1900	31,852	238,890	2,353	23,530	511,400	$10,228
1901	24,477	171,339	652	3,816		
1902	30,384	212,688	328	2,952		
1903	27,921	223,368	3,667	32,973	300,000	5,500
1904	13,674	89,209	208	1,950	966,812	16,180
1905	19,071	143,811	1,360	11,355	7,280,234	115,643
1906	17,283	126,194	1,338	13,644	1,107,680	16,969
1907	22,307	203,127	2,965	37,422	107,580	1,505
1908	34,337	293,377	4,736	59,330	20,800	416
1909	28,915	183,400	1,970	25,358	71,600	1,038
1910	12,779	111,634	1,626	19,007	22,178	554
1911	8,483	102,477	1,337	15,561	33,285	1,340
1912	34,602	305,928	37	606		
1913	37,881	272,726	451	6,523	21,282	1,235
1914	25,954	247,195	408	5,467	12,200	810
1915	12,058	157,457	571	13,610		
1916	17,259	205,706	475	6,961	44,552	2,408
1917	36,165	584,962	225	5,535	371,600	33,044
1918	56,837	1,078,456	53	1,425	516,975	47,544
1919	8,110	195,447			212,244	17,601
1920	4,800	104,213	22	660	224,840	37,535
1921	9,977	176,789	105	2,625		
1922	17,742	277,607	184	6,408	79,400	940
1923	11,596	184,546	68	2,244		
1924	6,518	119,223	297	13,000	6,400	206
1925	2,935	70,346	213	14,385	5,200	582
1926	7,593	163,230	475	10,450	75,018	7,263
1927	3,668	86,480	164	6,232	21,400	2,011
1928	4,283	108,562	3	75	21,800	1,900
Total	827,034	8,352,002	30,455	385,029	12,034,480	322,452

NOTE.—The statistics on salmon bellies for the years 1920 to 1928, inclusive, were taken from Pacific Fisherman.

Alaska pickled-salmon pack, 1906 to 1918, by species, quantity,[1] and value

Species	1906		1907		1908		1909		1910	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
Whole salmon:										
Coho	539	$5,642	1,665	$16,406	692	$5,648	318	$2,485	160	$1,504
Chum	231	1,550	233	1,521	122	707	35	190		
Humpback	2,446	13,852	4,248	29,374	2,346	17,935	1,557	9,405	330	1,998
King	1,007	8,058	964	10,684	660	6,813	441	3,798	352	3,399
Red	13,060	97,092	15,197	145,142	30,517	262,274	26,508	167,298	11,931	104,649
Total	17,283	126,194	22,307	203,127	34,337	293,377	28,859	183,176	12,773	111,550
Bellies:										
Coho			191	2,696	229	3,535	255	3,843	126	1,135
Chum	30	150			117	699			70	770
Humpback	1,273	13,188	1,800	21,080	2,447	28,140	738	7,438	616	6,135
King	22	185	84	1,002	48	720	35	175	6	128
Red	13	121	890	12,644	1,895	26,236	942	13,902	808	10,839
Total	1,338	13,644	2,965	37,422	4,736	59,330	1,970	25,358	1,626	19,007
Backs, etc.:										
Humpback							56	224		
King									2	24
Red									4	60
Total							56	224	6	84
Grand total	18,621	139,838	25,272	240,549	39,073	352,707	30,885	208,758	14,405	130,641

Species	1911		1912		1913		1914	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
Whole salmon:								
Coho	223	$2,149	1,165	$9,565	1,006	$6,452	365	$2,767
Chum	133	666	93	652	100	778	53	293
Humpback	1,122	11,238	4,236	28,304	2,724	18,181	482	2,954
King	600	8,095	225	2,442	135	1,410	269	2,588
Red	6,239	79,578	28,883	264,965	33,916	245,905	24,785	238,593
Total	8,317	101,726	34,602	305,928	37,881	272,726	25,954	247,195
Bellies:								
Coho	38	489			54	946	67	982
Chum	7	77			67	941	18	180
Humpback	676	5,122	37	606	324	4,546	229	2,620
King	2	30					2	13
Red	614	9,843			6	90	92	1,672
Total	1,337	15,561	37	606	451	6,523	408	5,467
Backs, etc.:								
Humpback	150	600						
King	1	15						
Red	15	136						
Total	166	751						
Grand total	9,820	118,038	34,639	306,534	38,332	279,249	26,362	252,662

[1] Barrels hold 200 pounds of fish; when of a different size they have been reduced to conform to this weight.

Alaska pickled-salmon pack, 1906 to 1918, by species, quality, and value—Contd.

Species	1915		1916		1917		1918	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
Whole salmon:								
Coho	1,763	$19,393	2,076	$22,287	1,798	$29,631	2,501	$47,152
Chum	325	2,925	495	4,057	1,722	21,899	6,080	84,878
Humpback	662	5,958	503	3,624	5,576	73,857	11,973	182,490
King	377	4,147	636	7,956	359	6,556	297	7,645
Red	8,931	125,034	13,549	167,782	26,710	453,019	35,977	756,191
Total	12,058	157,457	17,259	205,706	36,165	584,962	56,828	1,078,356
Bellies:								
Coho			27	500	11	326	10	180
Chum			285	3,556	73	1,362		
Humpback	133	2,660	61	882	110	2,885	26	650
King			2	23	7	150		
Red	438	10,950	100	2,000	24	812	17	595
Total	571	13,610	475	6,961	225	5,535	53	1,425
Backs, etc: Coho							9	100
Grand total	12,629	171,067	17,734	212,667	36,390	590,497	56,890	1,079,881

Alaska pickled-salmon pack, 1919 to 1928, by species and districts

Year and species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1919								
Coho or silver	141,200	$13,206	40,800	$3,024	58,400	$5,918	240,400	$22,148
Chum or keta	14,000	2,080	5,400	135	8,200	555	27,600	2,770
Humpback or pink	5,200	260	10,000	700	9,000	548	24,200	1,508
King or spring	48,200	4,542	1,600	232	123,600	16,267	173,400	21,041
Red or sockeye	2,400	355	117,400	12,380	1,036,600	135,245	1,156,400	147,980
Total	211,000	20,443	175,200	16,471	1,235,800	158,533	1,622,000	195,447
1920								
Coho or silver	22,000	2,160	36,600	3,880	21,800	2,090	80,400	8,130
Chum or keta	21,000	1,400			23,800	2,360	44,800	3,760
Humpback or pink	12,200	882			27,000	1,400	39,200	2,282
King or spring	20,000	2,000	1,600	160	28,800	3,201	50,400	5,361
Red or sockeye	32,800	3,280	1,200	150	715,600	81,910	749,600	85,340
Total	108,000	9,722	39,400	4,190	817,000	90,961	964,400	104,873
1921								
Coho or silver	23,000	1,624	16,600	1,120	1,600	120	41,200	2,864
Chum or keta	36,600	1,443	1,000	50	20,600	1,558	58,200	3,051
Humpback or pink	75,600	3,062	6,000	355			81,600	3,417
King or spring			51,200	5,120	43,400	5,487	94,600	10,607
Red or sockeye	97,200	9,574	114,200	10,654	1,529,400	139,247	1,740,800	159,475
Total	232,400	15,703	189,000	17,299	1,595,000	146,412	2,016,400	179,414
1922								
Coho or silver	149,800	10,915	4,200	285	13,400	914	167,400	12,114
Chum or keta			6,200	600	11,000	901	17,200	1,501
Humpback or pink			33,100	1,660			33,100	1,660
King or spring	200	10	7,100	748	63,900	5,754	71,200	6,512
Red or sockeye			291,600	27,753	3,004,600	234,475	3,296,200	262,228
Total	150,000	10,925	342,200	31,046	3,092,900	242,044	3,585,100	284,015

Alaska pickled-salmon pack, 1919 to 1928, by species and districts—Continued

Year and species	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1923								
Coho or silver	33,000	$2,200	38,644	$2,080			71,644	$4,280
Chum or keta	1,500	120	6,000	900	5,200	$270	12,700	1,290
Humpback or pink	5,000	400	3,000	150			8,000	550
King or spring	3,000	240	4,800	411	64,000	10,656	71,800	11,307
Red or sockeye			62,300	6,390	2,106,400	162,973	2,168,700	169,363
Total	42,500	2,960	114,744	9,931	2,175,600	173,899	2,332,844	186,790
1924								
Coho or silver	18,300	1,129	34,668	5,118			52,968	6,247
Chum or keta	600	27	644	75	60,600	3,580	61,844	3,682
Humpback or pink	6,000	268	257,540	15,399			263,540	15,667
King or spring	400	40			101,100	12,937	101,500	12,977
Red or sockeye	15,400	1,723	4,100	500	863,600	91,427	883,100	93,650
Total	40,700	3,187	296,952	21,092	1,025,300	107,944	1,362,952	132,223
1925								
Coho or silver	80,500	7,853	87,250	9,636	5,600	630	173,350	18,119
Chum or keta	4,200	420	9,400	1,025	12,300	1,100	25,900	2,545
Humpback or pink	8,200	686	30,250	3,255			38,450	3,941
King or spring	1,800	144	500	62	121,000	18,046	123,300	18,252
Red or sockeye	200	27	101,800	10,787	166,600	31,060	268,600	41,874
Total	94,900	9,130	229,200	24,765	305,500	50,836	629,600	84,731
1926								
Coho or silver	24,000	2,300	48,100	8,882	11,200	1,044	83,300	12,226
Chum or keta			48,500	5,062	34,700	2,616	83,200	7,678
Humpback or pink	32,800	2,040	90,900	7,160	6,600	462	130,300	9,662
King or spring			5,800	596	49,400	6,157	55,200	6,753
Red or sockeye			267,200	23,732	994,400	113,629	1,261,600	137,361
Total	56,800	4,340	460,500	45,432	1,096,300	123,908	1,613,600	173,680
1927								
Coho or silver	17,600	1,800	95,200	8,934	10,000	950	122,800	11,684
Chum or keta			1,000	100	16,100	1,623	17,100	1,723
Humpback or pink	1,800	100	18,700	1,419			20,500	1,519
King or spring			11,700	1,109	24,000	3,246	35,700	4,355
Red or sockeye	13,600	1,700	66,800	8,680	489,900	63,051	570,300	73,431
Total	33,000	3,600	193,400	20,242	540,000	68,870	766,400	92,712
1928								
Coho or silver	21,200	2,092	38,400	3,403	9,800	735	69,400	6,230
Chum or keta					15,300	1,458	15,300	1,458
Humpback or pink	5,000	258	200	15	3,400	229	8,600	502
King or spring	200	40	300	43	29,200	4,091	29,700	4,174
Red or sockeye	1,400	195	53,700	2,466	679,000	93,612	734,100	96,273
Total	27,800	2,585	92,600	5,927	736,700	100,125	857,100	108,637

MILD-CURING INDUSTRY

The beginning of this industry on the Pacific coast is of comparatively recent date, and the following table is complete, with the possible exception of a few tierces, which may not have been reported for the coastal rivers of Oregon:

Tierces of mild-cured salmon packed on Pacific coast from 1897 to 1928 [1]

Year	Alaska	British Columbia	Puget Sound, Wash.	Grays Harbor, Wash.	Willapa Harbor, Wash.	Columbia River (both sides)	Coastal rivers, Oreg.	Klamath, Noyo, and Eel Rivers, Calif.	Sacramento River, Calif.	Monterey Bay, Calif.	Total
1897						400					400
1898	70					700					770
1899	130			375		1,250					1,755
1900						1,275			950		2,225
1901	67		600			3,000			3,100		6,767
1902	67		425			4,213	188		2,325	504	7,722
1903	8		824			6,725			3,600	354	11,511
1904	34		1,250			9,088		200	4,719	248	15,539
1905	189	1,175	3,000			9,805	415		2,979	310	17,873
1906	1,126	957				8,000	740	175	2,177	510	13,685
1907	1,657	1,993	2,060	20	100	6,070	740	140	4,102	582	17,464
1908	1,378	1,060				4,960			3,243	252	10,893
1909	2,292	1,560	2,109	75	29	5,540	560	80	5,111	911	18,267
1910	3,357	1,638	2,435	67		7,922	1,398		5,516	75	22,408
1911	3,164	1,965	2,745	100	30	8,185	1,247	110	2,011	160	19,717
1912	5,245	1,489	3,013	357	40	5,824	3,082	100	3,274		22,424
1913	7,443	3,150	3,923	250	50	5,746	2,381		4,789	550	28,282
1914	4,091	3,182	1,934			5,205	457		1,829	1,476	18,174
1915	2,966	1,119	2,235			4,078	333	3	1,630	942	13,306
1916	4,898	1,848	1,755			4,656	194		650	1,069	15,070
1917	3,563	429	1,063			1,886			1,508	300	8,749
1918	3,948	729	1,093			1,804	275	455	1,913	266	10,483
1919	5,376	1,173	2,423			3,328	148	1,326	2,355	1,055	17,184
1920	2,295	1,116	2,036			2,275	102	1,463	1,345	330	10,962
1921	3,556	1,076	4,517	90		3,051	70	1,050	812	201	14,423
1922	5,283	2,253	4,727			1,621	162	550	1,195		15,791
1923	4,219	1,819	5,799			1,769	176	1,126	606	103	15,617
1924	6,484	2,969	6,409			2,320	286	2,619	1,291	5	22,383
1925	6,522	3,098	5,600			2,746	547	1,965	1,523	276	22,277
1926	5,712	2,183	4,087			1,055	1,205	929	1,767		16,938
1927	8,804	2,689	5,160			951	918	895	1,125	32	20,574
1928	5,850	2,676	4,304	89		1,175	1,924	1,686	179		17,883
Total	99,794	43,346	75,526	1,423	249	126,623	17,548	14,872	67,624	10,511	457,516

[1] The net weight of fish in a tierce is about 800 pounds. King, chinook, or spring salmon were used almost exclusively. From most places the data are complete from the time of the inception of the industry but from a few minor places the data are somewhat fragmentary.

YUKON TERRITORY, CANADA

Some salmon fishing is carried on in that section of the upper Yukon River which lies in Yukon Territory, Dominion of Canada. The species taken are principally king and chum, and these are sold mainly in a fresh condition. The following table shows the quantity taken and the value of same in certain years:

Catch of salmon in Yukon Territory, Canada, in specified years

Year	Salmon		Year	Salmon	
	Pounds	Value		Pounds	Value
1903	70,000	$5,600	1914	188,600	$18,860
1909	138,574	17,566	1915	157,000	15,700
1910	169,900	18,689	1916	143,500	14,350
1911	229,000	22,900	1917		
1912	224,100	22,410	1918		
1913	182,000	18,200	1919		

TRADE WITH OUTLYING POSSESSIONS

As a result of the war with Spain the United States in 1898 acquired possession of Porto Rico, Guam, and the Philippine Islands, while in the same year Hawaii became a part of this country at its own request. In 1900 two islands of the Samoan group were acquired by a partition agreement with Great Britain and Germany, and in 1917 the Virgin Islands were purchased from Denmark. The trade with the Philippine Islands and the Virgin Islands is shown to date in the tables of exports and imports to foreign countries, but the trade with the other possessions has been eliminated from these tables and shown separately ever since their annexation to the United States.

HAWAII

The islands constituting this Territory, owing to their reciprocity treaty with this country for a number of years before annexation, purchased their supplies of salmon from the United States almost exclusively. In recent years the Territory has imported the following quantities of salmon from the mainland:

Year	Canned salmon		All other salmon, fresh or cured	Year	Canned salmon		All other salmon, fresh or cured
	Pounds	Value			Pounds	Value	
			Value				*Value*
1907	1,126,217	$89,286	$64,232	1918 [2]	758,022	$108,771	(1)
1908	965,029	89,025	67,143	1919	633,391	129,851	(1)
1909	1,440,410	121,716	73,848	1920	1,657,663	296,863	(1)
1910	1,381,398	113,526	72,194	1921	1,129,847	202,236	(1)
1911	1,231,264	119,872	76,572	1922	1,150,358	135,301	(1)
1912	1,850,567	194,385	57,495	1923	1,385,146	219,849	(1)
1913	1,841,874	173,202	(1)	1924	1,565,036	232,961	(1)
1914	1,418,941	97,532	(1)	1925	2,033,553	267,985	(1)
1915	1,005,848	90,705	(1)	1926	892,212	149,961	(1)
1916	1,582,528	132,597	(1)	1927	1,026,536	195,518	(1)
1917	1,463,729	145,531	(1)	1928	1,269,029	222,425	(1)
1918	1,168,528	174,777	(1)				

[1] Not shown separately.
[2] Compilation of trade statistics changed from fiscal year to calendar year basis in 1918.

PORTO RICO

Of recent years the following shipments of domestic salmon have been made to this island:

Year	Canned salmon		All other salmon, fresh or cured	Year	Canned salmon		All other salmon, fresh or cured
	Pounds	Value			Pounds	Value	
			Value				*Value*
1907	604,627	$53,916	$2,893	1918 [2]	531,325	$75,096	(1)
1908	512,038	48,195	1,428	1919	331,635	48,673	(1)
1909	381,171	34,777	3,810	1920	1,063,633	126,109	(1)
1910	511,055	43,494	6,243	1921	720,073	57,577	(1)
1911	357,382	30,699	3,868	1922	802,558	72,736	(1)
1912	710,721	65,354	1,208	1923	604,296	58,627	(1)
1913	666,602	66,811	(1)	1924	1,221,828	127,035	(1)
1914	416,414	41,726	(1)	1925	746,957	75,999	(1)
1915	588,889	56,527	(1)	1926	865,767	80,037	(1)
1916	860,873	60,453	(1)	1927	641,177	68,517	(1)
1917	881,360	70,427	(1)	1928	344,187	60,012	(1)
1918	378,206	52,737	(1)				

[1] Not shown separately.
[2] Compilation of trade statistics changed from fiscal year to calendar year basis in 1918.

PHILIPPINE ISLANDS

Of recent years the following shipments of domestic salmon have been made to these islands:

Year	Canned salmon		All other salmon, fresh or cured	Year	Canned salmon		All other salmon, fresh or cured
	Pounds	Value			Pounds	Value	
			Value				*Value*
1909	1,126,470	$74,792	$712	1919	2,371,736	$279,408	(1)
1910	5,425,404	396,604	2,089	1920	8,616,832	902,202	(1)
1911	3,069,118	225,885	3,542	1921	4,271,892	313,280	(1)
1912	5,096,810	422,001	2,437	1922	7,719,124	610,114	$3,279
1913	10,122,820	590,128	(1)	1923	7,055,041	667,713	2,675
1914	5,034,252	266,369	(1)	1924	7,884,986	793,939	6,481
1915	4,159,580	288,548	(1)	1925	7,533,837	709,599	2,605
1916	5,640,858	356,366	(1)	1926	8,140,977	824,512	1,462
1917	4,202,574	351,633	(1)	1927	4,742,208	499,526	2,270
1918	5,558,796	618,697	(1)	1928	258,357	33,046	3,466
1918 [2]	5,291,182	579,410	(1)				

[1] Not shown separately.
[2] Compilation of trade statistics changed from fiscal year to calendar year basis in 1918.

VIRGIN ISLANDS

Of recent years the following shipments of domestic salmon have been made to these islands:

Year	Canned salmon		All other salmon, fresh or cured	Year	Canned salmon		All other salmon, fresh or cured
	Pounds	Value			Pounds	Value	
			Value				*Value*
1918	20,059	$4,221	$257	1923	30,454	$3,829	$323
1919	22,498	4,447	695	1924	37,989	4,496	495
1920	56,124	10,441	1,729	1925	48,475	5,883	498
1921	57,316	7,637	1,790	1926	42,777	5,201	376
1922	42,014	5,178	412	1927	42,754	5,313	427

ALASKA

It seems like "carrying coals to Newcastle" to ship canned salmon to Alaska, from which Territory more than half the canned salmon of the world is produced, and yet a small business is done each year in this line, most of the product going to the mining camps and towns somewhat removed from the fishing sections.

The table below shows the shipments of such fish in certain years. After 1914 the shipments were lumped together with all other kinds of fish and thus prevented the listing of salmon separately.

Year	Canned salmon		All other salmon, fresh or cured	Year	Canned salmon		All other salmon, fresh or cured
	Pounds	Value			Pounds	Value	
			Value				*Value*
1909	67,132	$7,123	$3,966	1912	134,320	$15,022	$4,218
1910	67,658	7,204	3,558	1913	43,346	5,074	(1)
1911	38,265	4,513	1,061	1914	42,945	5,278	(1)

[1] Not shown separately.

GUAM

Since annexation, this country and Japan have been competing for the trade of this island, which, in earlier years, Japan controlled quite largely. During the last two years shown in the statement, however, the United States has secured the advantage. The table below shows the extent of the trade, which is made up almost entirely of salted or pickled salmon, only 900 pounds of fresh salmon, valued at $92, having been shipped by this country to Guam in 1908. Since 1909 all the fishery products imported have been lumped under one heading and it has been impossible to distinguish the salmon from the other species.

Year and country	Pickled salmon		Year and country	Pickled salmon	
	Pounds	Value		Pounds	Value
1905			1908		
United States	1,415	$71	United States	7,406	$623
Japan	16,526	1,221	Japan	6,130	465
1907			1909		
United States	13,604	1,086	United States	10,779	740
Japan	19,862	1,601	Japan	4,295	344

TUTUILA, SAMOA

The customs statistics lump the imports of fish under one general heading, thus making it impossible to show separately the imports of salmon.

FOREIGN TRADE IN SALMON

As we do not consume all of the salmon produced by our fisheries, it is necessary to find a foreign market for the surplus each season, but, as canned salmon has become one of the staples of the world, there is not much difficulty in this respect, especially since our only competitors are Canada, Siberia, and Japan. There is more competition in the pickled, fresh, and frozen markets, several European and Asiatic countries being large producers of these goods, as is Canada also, for a considerable proportion of which she is compelled to find an outside market.

The World War greatly disturbed the usual course of our foreign trade. Because of the need for foodstuffs a tremendous demand arose in Europe for our salmon, resulting in a decided increase in the quantities shipped there and, for a while, in a reduction of our exports in other directions. In time, however, the markets adjusted themselves to the changed conditions of trade.

EXPORTS OF DOMESTIC CANNED SALMON

From the beginning of the industry a considerable proportion of the salmon canned has been exported, especially of the higher grades. In Europe the chief customer is Great Britain, although Belgium, Netherlands, and Greece are good customers. Great Britain does not, however, consume this quantity, for a considerable part of her importations are reexported. On the North American Continent and adjacent islands the best customers are Mexico, Cuba, Pan-

ama, and the British West Indies. The heavy shipments to Canada are mainly transit shipments to Europe by Canadian steamship lines. In South America, Chile, Peru, Argentina, Colombia, and Venezuela are the leading markets. In Asia, Hong Kong and China import canned salmon, although neither buys great quantities. The islands of the Pacific and Indian Oceans are large consumers. British Australasia, British East Indies, and British, French, and German Oceania are good customers. In Africa the British and Portuguese possessions are the largest importers.

The movements of these products are naturally often influenced favorably or adversely as the tariffs of the various countries in which they are marketed are raised or lowered.

Some countries maintain excessively high tariffs on canned salmon, among these being Argentina, 29.06 cents per pound; Brazil, 21.62 cents; Cuba, 6.80 cents; New Zealand, 6.09 cents; Mexico, 5.67 cents; Peru, 5.52 cents; Chile, 5.48 cents; and Australia, 5.08 cents.

In but few of the tariff acts is canned salmon distinguished by name, being usually classed as "preserved fish," and as these are usually luxuries in many countries they bear an extra high duty as a result.

In addition to these high duties in some countries, especially in South America, there are various other charges, fees, etc., which materially enhance the value of the goods before they reach the consumer. C. H. Clarke, of the salmon brokerage firm of Kelley-Clarke Co., of Seattle, Wash., prepared and published a statement [40] showing the comparative charges on 100 cases each of red Alaska and pink canned salmon from the time they leave Seattle up to the time they reach the hands of wholesalers in South America. This shows that the f. o. b. Seattle value of the red salmon was $500 and of the pink salmon $280. By the time these goods reached the hands of the Rio de Janeiro wholesalers the red salmon were worth $1,900.07, while the pink salmon were worth $1,677.87. At Montevideo, Uruguay, the red salmon were worth $1,436.01 and the pink salmon $1,213.81. The table is so interesting and instructive that it is reproduced entire herewith.

Comparative charges on 100 cases each of red Alaska and pink canned salmon from Seattle, Wash., to hands of wholesalers in South America

	Argentina (Buenos Aires)		Brazil (Rio de Janeiro)		Chile (Valparaiso)		Ecuador (Guayaquil)	
	Red	Pink	Red	Pink	Red	Pink	Red	Pink
F. o. b. Seattle value	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00
Strapping	5.00	5.00	5.00	5.00				
Freight	104.75	104.75	114.50	114.50	45.00	45.00	45.00	45.00
Marine insurance, 5 per cent f. p. a.	6.10	3.90	6.20	4.00	5.50	3.25	5.50	3.25
C. i. f. value	615.85	393.65	625.70	403.50	550.50	328.25	550.50	328.25
Consular fees in United States	2.00	2.00	3.25	3.25	5.25	4.25	22.35	14.00
Customs duty	519.56	519.56	1,138.78	1,138.78	160.46	160.46	345.37	234.37
Analysis	2.12	2.12	6.47	6.47				
Storage in customhouse	2.41	2.41	33.90	33.90	5.35	5.35		
Handling in customhouse	7.24	7.24			2.51	2.51		
Stamps and entry blanks	1.49	1.49			1.43	1.43		
Statistics			.10	.10				
Internal-revenue tax			7.77	7.77				
Port tax			57.20	57.20				
Customs brokerage	12.74	12.74			7.15	7.15		
Wharfage, lighterage, cartage	7.64	7.64	26.90	26.90	3.65	3.65	19.30	19.30
Value ex customhouse	1,171.05	948.85	1,900.07	1,677.87	736.30	513.05	937.52	706.92

[40] Pacific Fisherman, Vol. 13, No. 5, p. 11, 1915.

Comparative charges on 100 cases each of red Alaska and pink canned salmon from Seattle, Wash., to hands of wholesalers in South America—Continued

	Paraguay (Asuncion)		Peru (Callao)		Uruguay (Montevideo)		Venezuela (La Guayra)	
	Red	Pink	Red	Pink	Red	Pink	Red	Pink
F. o. b. Seattle value	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00
Strapping	5.00	5.00			5.00	5.00	5.00	5.00
Freight	134.75	134.75	37.50	37.50	104.75	104.75	54.60	54.60
Marine insurance, 5 per cent f. p. a.	9.60	6.30	5.40	3.20	6.10	3.90	5.60	3.40
C. i. f. value	649.35	426.05	542.90	320.70	615.85	393.65	565.20	343.00
Consular fees in United States	2.00	2.00	5.75	3.45	1.05	1.05	12.85	12.85
Customs duty	308.25	308.25	275.86	275.86	779.30	779.30	238.96	238.06
Analysis								
Storage in customhouse								
Handling in customhouse					16.15	16.15		
Stamps and entry blanks			.58	.58	1.55	1.55	1.35	.97
Statistics	.37	.37						
Internal-revenue tax								
Port tax								
Customs brokerage			4.86	4.86	15.50	15.50	5.00	2.80
Wharfage, lighterage, cartage	6.33	6.33	15.69	15.69	6.61	6.61	12.82	12.82
Value ex customhouse	966.30	743.00	845.64	621.14	1,436.01	1,213.81	836.18	611.40

The following table shows in summarized form the yearly exports of domestic canned salmon and the countries to which exported for the years 1900 to 1915, inclusive, and in detailed form for the years 1916 to 1927, inclusive:

Exports, by countries receiving, of domestic canned salmon

SUMMARY, 1900–1915[1]

Country receiving	1900		1901		1902		1903	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Europe	18,941,109	$1,881,725	31,877,663	$3,234,862	30,683,551	$2,625,284	35,410,768	$3,125,197
North America	1,051,808	98,064	2,443,561	297,440	2,780,844	242,029	4,285,406	378,655
South America	1,868,225	192,918	1,577,013	160,862	1,291,998	107,907	1,756,214	121,918
Asia	654,126	67,941	853,634	86,571	1,597,346	120,674	1,759,294	134,783
Oceania	3,882,646	390,466	3,681,276	367,533	8,179,161	670,741	5,511,514	444,505
Africa	684,456	62,534	856,553	83,003	2,640,214	224,767	1,630,138	145,733

Country receiving	1904		1905		1906	
	Pounds	Value	Pounds	Value	Pounds	Value
Europe	33,591,896	$3,508,818	21,071,263	$1,877,509	32,061,402	$2,753,643
North America	2,446,023	204,363	1,565,773	132,134	2,069,357	171,946
South America	2,055,859	147,333	1,708,828	134,941	3,499,603	249,052
Asia	12,995,768	930,054	3,994,862	280,704	779,415	60,173
Oceania	3,898,606	341,849	5,257,446	467,928	6,340,346	509,257
Africa	936,126	92,181	1,468,383	142,253	1,194,291	103,872

Country receiving	1907		1908		1909	
	Pounds	Value	Pounds	Value	Pounds	Value
Europe	7,756,780	$791,436	13,321,086	$1,205,375	23,028,476	$2,207,194
North America	3,052,658	261,138	2,654,175	242,879	2,209,405	198,043
South America	5,659,690	414,774	5,571,000	410,743	1,461,662	123,502
Asia	1,419,391	105,364	1,004,571	86,908	1,386,702	119,582
Oceania	6,719,157	552,205	5,131,554	439,917	7,383,494	705,204
Africa	610,429	58,132	543,659	52,696	647,370	62,911

[1] Detailed statistics for 1900 to 1915, inclusive, may be found in Pacific Salmon Fisheries, by John N. Cobb, Appendix III, Report, U. S. Commissioner of Fisheries, 1916, pp. 187-194. Washington, 1917.

Exports, by countries receiving, of domestic canned salmon—Continued

Country receiving	1910		1911		1912	
	Pounds	Value	Pounds	Value	Pounds	Value
Europe	44, 765, 898	$4, 712, 182	22, 134, 328	$2, 408, 708	19, 545, 720	$2, 183, 982
North America	2, 224, 516	191, 551	1, 979, 950	190, 637	3, 411, 176	332, 692
South America	3, 193, 812	226, 197	3, 006, 927	266, 903	6, 756, 440	609, 383
Asia	1, 596, 775	133, 516	1, 489, 282	148, 721	1, 702, 426	160, 119
Oceania	11, 568, 824	998, 219	9, 699, 624	991, 540	11, 220, 515	1, 255, 149
Africa	510, 871	52, 593	290, 688	30, 633	787, 479	79, 238

Country receiving	1913		1914		1915	
	Pounds	Value	Pounds	Value	Pounds	Value
Europe	25, 408, 154	$2, 705, 254	62, 862, 328	$6, 026, 170	63, 760, 758	$7, 110, 728
North America	4, 271, 710	370, 823	6, 907, 615	511, 545	4, 328, 246	370, 444
South America	4, 134, 771	292, 367	3, 472, 438	233, 675	1, 301, 962	107, 783
Asia	3, 593, 538	254, 209	2, 875, 995	180, 402	1, 135, 793	97, 662
Oceania	17, 419, 390	1, 441, 270	12, 089, 003	1, 017, 994	12, 100, 414	1, 309, 376
Africa	463, 403	39, 417	353, 541	29, 507	818, 943	76, 450

DETAILS, 1916 TO 1918 [3]

Country receiving	1916		1917		1918	
	Pounds	Value	Pounds	Value	Pounds	Value
EUROPE						
Belgium			1, 115, 792	$8, 546	18, 000	$2, 525
Denmark	366, 948	$29, 255	89, 405	9, 650		
France	3, 447, 022	377, 597	985, 582	153, 927	7, 937, 490	1, 167, 737
Gibraltar					1, 156, 864	167, 157
Greece	70, 560	6, 059	190, 736	14, 486	173, 400	24, 935
Iceland, and Faroe Islands	136	16	2, 820	297	96	16
Italy	34, 184	3, 170	4, 169, 250	436, 576	13, 540, 046	1, 752, 163
Malta, Gozo, etc	9, 120	702	5, 520	525		
Netherlands	21, 868	2, 865	20, 450	2, 709		
Norway	41, 280	4, 383	54, 440	6, 164		
Portugal	20	2	60	7	794	178
Russia in Europe			240	18		
Serbia and Montenegro	170	17				
Spain	4, 995	382	37, 481	3, 369	1, 315	274
Sweden	60, 122	6, 666	14, 100	1, 800		
United Kingdom:						
England	109, 039, 707	11, 105, 506	74, 941, 169	8, 536, 248	46, 415, 026	7, 447, 389
Scotland	1, 067, 530	111, 381	1, 131, 832	139, 718	848, 295	129, 652
Ireland					900	220
NORTH AMERICA						
Bermuda	89, 599	8, 741	93, 523	22, 066	87, 832	16, 028
British Honduras	32, 021	3, 228	30, 057	3, 072	25, 178	3, 410
Canada	7, 994, 185	677, 655	9, 158, 079	838, 734	12, 184, 077	1, 755, 690
Central American States:						
Costa Rica	118, 002	8, 878	95, 435	8, 065	10, 750	1, 643
Guatemala	58, 528	4, 084	45, 484	4, 708	19, 026	2, 584
Honduras	37, 695	3, 651	26, 168	3, 080	10, 536	1, 612
Nicaragua	36, 644	3, 064	50, 719	6, 029	33, 421	5, 115
Panama	633, 645	57, 042	454, 064	50, 793	306, 765	49, 031
Salvador	21, 404	1, 826	18, 368	2, 134	6, 691	1, 144
Mexico	1, 611, 929	132, 406	3, 707, 225	342, 564	1, 800, 185	246, 830
Miquelon, Langley, etc	957	100	3, 026	377	60	8
Newfoundland and Labrador	700	37	2, 640	286		
West Indies:						
British—						
Barbados	60, 361	5, 767	73, 610	8, 643	97, 722	18, 121
Jamaica	228, 973	19, 017	180, 965	18, 347	86, 503	14, 170
Trinidad and Tobago	267, 548	26, 060	134, 832	18, 230	372, 420	61, 443
Other British	75, 578	7, 097	103, 004	12, 001	32, 116	5, 760

[3] From Pacific Fisherman Yearbook for 1919, p. 93. Customs returns are for the fiscal year ending June 30 of the year noted.

Exports, by countries receiving, of domestic canned salmon—Continued

DETAILS, 1916 TO 1918—Continued

Country receiving	1916		1917		1918	
	Pounds	Value	Pounds	Value	Pounds	Value
NORTH AMERICA—continued						
West Indies—Continued.						
Cuba	927,129	$87,479	1,619,236	$149,492	1,632,073	$210,167
Danish	11,582	1,063	34,598	4,100	23,629	4,633
Dutch	21,599	2,122	24,673	2,782	8,370	1,683
French	4,772	477	4,770	543	548	80
Haiti	3,586	361	4,297	486	1,793	349
Santo Domingo	85,722	7,048	231,413	22,859	100,417	14,148
SOUTH AMERICA						
Argentina	273,900	23,429	191,618	19,043	353,103	61,428
Bolivia	14,579	1,466	122,092	11,724	211,978	24,478
Brazil	40,732	3,921	64,657	7,599	187,615	26,245
Chile	2,812,537	192,581	1,452,155	121,019	2,304,499	330,244
Colombia	136,254	11,514	126,861	22,575	75,477	11,479
Ecuador	245,149	16,009	276,654	25,302	215,456	28,360
Guiana—						
British	184,654	18,249	196,261	26,637	151,719	27,749
Dutch	87,398	8,048	39,050	3,888	35,143	5,812
French	26,128	2,371	17,909	1,910	26,560	3,825
Peru	523,580	36,361	434,329	37,447	1,150,276	158,794
Uruguay	23,464	1,841	5,258	590	6,630	1,509
Venezuela	195,618	16,234	297,125	28,158	181,236	26,834
ASIA						
Aden	27,716	2,817			2,832	472
China			42,017	5,177	68,949	13,372
China, leased territory:						
Japanese	96	16	192	32	144	30
Chosen	1,632	172	2,520	456	1,062	207
East Indies:						
British—						
British India	1,117,839	91,767	601,935	62,264	1,349,057	222,947
Straits Settlements	1,215,214	71,585	106,896	9,081	232,755	34,468
Other British	166,144	12,787	101,286	10,355	41,818	6,944
Dutch	727,006	81,121	374,832	42,693	405,326	66,240
French	4,712	615	6,816	1,340	240	69
Hong Kong	47,558	5,170	74,585	9,570	86,203	14,678
Japan	1,348	141	2,604	340	4,590	883
Persia	24,960	1,892	9,600	800		
Russia in Asia	48	4				
Siam	1,392	219	2,880	533	6,048	1,012
OCEANIA						
British:						
Australia and Tasmania	11,035,294	1,204,354	6,990,835	865,865	7,397,009	1,337,231
New Zealand	216,292	24,684	96,912	10,332	240,240	45,409
Other British	30,878	2,923	141,735	14,749	174,138	24,921
French	290,854	29,201	248,415	32,643	186,574	31,160
German	448,860	29,434	357,386	37,172	285,605	39,071
Philippine Islands	5,640,858	356,366	4,202,574	351,633	5,558,796	618,697
AFRICA						
British Africa:						
West	100,310	7,860	613,545	62,925	480,414	72,960
South	620,555	56,255	1,421,021	157,853	1,293,714	161,423
East			25,608	2,543	57,275	8,938
Belgian Congo			1,750	331	2,293	463
Canary Islands	10,480	1,071	7,200	432	836	115
Egypt	105,800	9,534			261,673	42,335
French Africa			2,250	235	20,268	4,255
Italian Africa	110	10				
Liberia	3,624	366	2,810	258	9,448	1,499
Portuguese Africa	37,508	3,231	138,580	13,291	52,298	7,207
Spanish Africa	9,700	911	138,580	13,291	8,845	1,175
Total	152,943,962	15,032,497	117,962,807	12,963,425	110,060,480	16,570,834
RECAPITULATION						
Europe	114,163,722	11,648,003	82,758,877	9,390,858	70,092,226	10,692,246
North America	12,322,259	1,056,904	16,196,177	1,565,409	16,840,112	2,413,649
South America	4,563,993	332,024	3,314,969	305,964	4,899,692	706,757
Asia	3,336,665	268,306	1,326,163	142,641	2,199,024	361,322
Oceania	17,659,036	1,646,962	12,037,857	1,312,394	13,842,362	2,096,439
Africa	898,298	80,298	2,328,764	246,159	2,187,064	300,371

In 1918 the practice of publishing customs figures for the calendar year instead of the fiscal year, as had prevailed previously, was inaugurated. The following tables show the exports of canned salmon, by countries, for the calendar years 1918 to 1927, inclusive:

Exports, by countries receiving, of canned salmon, calendar years 1918 and 1919

Country receiving	1918		1919	
	Pounds	Value	Pounds	Value
EUROPE				
Austria-Hungary			157,396	$33,394
Azores and Madeira Islands			432	71
Belgium	18,072	$2,539	5,179,022	970,696
Denmark			1,062,434	181,178
Finland			68,000	13,010
France	11,458,346	1,270,675	15,947,105	2,525,449
Germany			833,793	147,783
Gibraltar	273,540	44,593	370,890	85,860
Greece			2,722,686	471,555
Iceland and Faroe Islands			12,025	2,557
Italy	19,654,988	2,785,844	36,925,190	4,801,911
Malta, Gozo, etc			1,892	262
Netherlands			231,710	46,356
Norway			441,776	87,668
Portugal	662	193	200	38
Rumania			9,720	1,538
Russia in Europe			19,500	2,795
Serbia, Montenegro, and Albania			480	96
Spain			79,457	16,253
Sweden	164	40	88,012	17,158
Switzerland			12,184	2,414
Turkey in Europe			100,040	17,072
United Kingdom:				
England	43,515,880	6,742,494	66,524,438	12,788,932
Scotland	154,495	22,672	1,460,082	219,951
Ireland	1,320	286	1,459,360	197,677
NORTH AMERICA				
Bermuda	35,144	6,288	53,429	6,940
British Honduras	8,560	1,181	58,194	9,409
Canada	4,077,166	620,195	9,587,861	1,467,611
Central American States:				
Costa Rica	5,310	818	98,155	16,049
Guatemala	10,492	1,374	74,407	12,599
Honduras	3,459	488	50,936	8,693
Nicaragua	11,586	1,866	125,179	21,095
Panama	172,206	30,485	141,733	25,441
Salvador	4,290	741	29,783	5,173
Mexico	347,384	54,709	4,917,900	703,262
Miquelon, Langley, etc			3,090	751
Newfoundland and Labrador			108	21
West Indies:				
British—				
Barbados	33,074	6,305	65,114	12,947
Jamaica	77,002	12,225	367,119	51,537
Trinidad and Tobago	153,207	24,923	143,694	27,023
Other British	10,148	1,983	37,935	7,717
Cuba	428,208	60,432	1,646,913	238,858
Dominican Republic	50,887	7,973	238,502	36,503
Dutch	3,206	701	17,678	4,603
French	184	24	10,456	2,422
Haiti	1,036	190	6,199	1,393
Virgin Islands of United States	20,059	4,221	22,498	4,447
SOUTH AMERICA				
Argentina	255,950	51,437	403,019	76,052
Bolivia	94,076	8,765	84,559	13,087
Brazil	161,529	21,625	31,113	7,273
Chile	1,316,148	195,478	1,331,484	214,284
Colombia	31,816	5,493	275,050	47,078
Ecuador	40,358	5,895	368,939	55,947
Guiana:				
British	38,595	7,765	122,715	25,974
Dutch	13,769	2,380	68,581	14,336
French	5,456	778	36,562	7,007

Exports, by countries receiving, of canned salmon, calendar years 1918 and 1919—Continued

Country receiving	1918		1919	
	Pounds	Value	Pounds	Value
ASIA				
Aden	2,400	$394	2,880	$480
China	41,980	8,579	90,232	19,088
China, leased territory: Japanese	48	10	168	43
Chosen	42	8	5,274	1,246
East Indies:				
British—				
British India	367,273	67,256	984,672	193,089
Straits Settlements	111,440	16,021	223,168	42,403
Other British	26,890	4,495	61,814	13,402
Dutch	124,502	17,692	427,298	71,132
French	240	69	2,412	692
Hong Kong	41,424	7,839	116,912	22,628
Japan	25,968	3,259	12,038	1,940
Russia in Asia			192	52
Siam	4,800	760	2,122	558
Turkey in Asia			20,504	3,646
OCEANIA				
British:				
Australia	1,149,888	215,715	5,777,713	1,293,194
New Zealand	26,592	4,835	61,533	13,919
Other British	67,674	9,872	93,423	16,115
French	116,535	19,203	225,429	42,303
German	153,840	20,394	80,577	12,966
Philippine Islands	5,291,182	579,410	2,371,736	279,408
AFRICA				
Abyssinia			92	18
Belgian Congo	2,354	477	14,990	3,251
British Africa:				
West	192,376	33,051	976,463	172,258
South	121,990	18,255	1,269,317	284,633
East	34,260	6,098	5,996	1,417
Canary Islands			59,790	8,025
Egypt	261,673	42,335	939,895	133,358
French Africa	17,136	3,572	32,989	7,208
German Africa			50,465	9,332
Liberia	2,633	539	8,218	1,761
Madagascar			48	8
Morocco			5,688	932
Portuguese Africa	2,788	485	31,868	6,839
Spanish Africa			36,266	7,009
Total	91,101,734	13,149,307	169,750,672	28,680,706
RECAPITULATION				
Europe	75,077,467	10,869,336	133,727,824	22,631,674
North America	5,152,608	837,122	17,696,883	2,664,494
South America	2,383,731	362,226	4,333,783	720,185
Asia	747,007	126,382	1,949,686	370,399
Oceania	6,805,711	849,429	8,610,411	1,657,905
Africa	635,210	104,812	3,432,085	636,049

Exports, by countries receiving, of canned salmon, calendar years 1920 and 1921

Country receiving	1920		1921	
	Pounds	Value	Pounds	Value
EUROPE				
Austria	138,476	$19,652	9,612	$2,044
Azores and Madeira Islands			1,380	264
Belgium	132,419	22,116	1,517,408	161,970
Czechoslovakia	600	220	126	14
Denmark	135,409	28,394	162,130	29,306
Estonia			[1] 96,000	[1] 20,000
France	702,913	116,856	114,576	9,811
Germany	136,149	24,135	2,122,354	103,921
Gibraltar	15,364	3,652		
Greece	301,609	50,063	509,454	44,236
Iceland and Faroe Islands	144	30	480	152
Italy	164,956	31,107	24,275	2,467
Malta, Gozo, and Cyprus Islands	42,640	7,923	24,000	1,800
Netherlands	237,966	53,418	646,567	90,457
Norway	16,977	4,268	78,835	14,694
Poland and Danzig	443	53	1,350	135
Rumania	57	19		
Russia in Europe	4,872	1,245		
Spain	216,719	35,048	489	83
Sweden	27,742	4,632	3,250	446
Turkey in Europe	118,348	21,919	40,948	3,514
United Kingdom—				
England	27,562,725	6,501,431	23,675,477	4,457,818
Scotland	815,664	256,619	615,993	127,872
Ireland	96	20		
Total	30,772,288	7,182,820	29,644,704	5,071,004
NORTH AMERICA				
Bermuda	58,261	11,715	98,562	16,309
British Honduras	43,150	6,334	23,681	2,860
Canada	1,566,129	281,368	2,779,728	416,493
Costa Rica	192,838	31,090	95,759	9,751
Guatemala	48,112	7,664	29,039	3,260
Honduras	57,859	10,013	58,180	7,393
Nicaragua	67,863	12,661	26,081	2,727
Panama	300,712	59,430	186,085	24,870
Salvador	23,962	4,539	3,459	402
Mexico	4,950,099	572,779	2,286,759	209,306
Barbados	111,925	24,346	18,962	3,702
Jamacia	401,272	61,373	61,154	11,015
Trinidad and Tobago	188,079	42,564	130,873	27,475
Other British West Indies	58,000	11,507	25,971	5,065
Cuba	1,220,910	158,125	190,416	21,008
Dominican Republic	515,114	77,852	289,016	31,224
Dutch West Indies	39,107	9,428	27,920	5,743
French West Indies	1,988	325	75	6
Haiti	12,041	2,317	4,771	680
Virgin Islands of United States	56,124	10,441	57,316	7,637
Total	9,913,565	1,395,871	6,393,807	806,926
SOUTH AMERICA				
Argentina	1,265,555	213,516	99,844	11,303
Bolivia	110,366	15,936		
Brazil	54,660	15,192	5,486	1,674
Chile	1,248,171	149,665	8,676	1,509
Colombia	740,470	135,441	80,639	12,001
Ecuador	416,076	47,943	5,136	368
British Guiana	153,891	39,421	89,262	14,772
Dutch Guiana	52,187	9,609	33,716	4,528
French Guiana	26,053	4,433	26,925	3,514
Paraguay	1,025	268	48	11
Peru	1,203,984	181,927	5,773	637
Uruguay	24,024	4,848		
Venezuela	514,108	85,342	205,189	20,503
Total	5,810,870	903,541	560,694	70,820

[1] July 1 to Dec. 31.

Exports, by countries receiving, of canned salmon, calendar years 1920 and 1921—Continued

Country receiving	1920		1921	
	Pounds	Value	Pounds	Value
ASIA				
Aden	13,384	$2,878	3,000	$500
China	109,037	27,332	80,377	9,948
Kwantung, leased territory	2,160	661	384	87
Chosen	816	239	576	122
British India	1,347,018	271,892	248,724	36,371
British Straits Settlements	568,470	85,660	809,423	54,095
Other British East Indies	114,779	24,144	75,073	11,617
Dutch East Indies	1,255,519	204,914	1,802,837	135,815
French Indo-China	2,009	679	360	98
Hong Kong	28,404	6,360	37,116	6,561
Japan	4,176	1,068	184,573	10,819
Palestine and Syria			[2] 14,058	[2] 1,619
Russia in Asia			65,096	5,518
Siam	15,758	2,904	1,916	436
Turkey in Asia	244,072	32,157	12,058	1,745
Total	3,705,602	660,888	3,335,571	275,351
OCEANIA				
Australia	2,879,583	543,185	5,158,273	822,373
New Zealand	98,916	25,844	139,336	25,093
Other British Oceania	40,164	7,052	35,327	3,248
French Oceania	184,686	34,712	99,234	11,905
Philippine Islands	8,616,832	902,202	4,271,892	313,280
Other Oceania	220,240	35,581	21,084	1,792
Total	12,040,421	1,548,576	9,725,146	1,177,691
AFRICA				
Belgian Congo	1,440	265	935	167
British West Africa	716,907	129,326	152,225	12,250
British South Africa	1,425,585	287,483	422,033	62,543
British East Africa	37,720	7,489	683	138
Canary Islands	29,716	5,501	21,419	2,205
Egypt	173,455	28,419	220,419	26,159
French Africa	24,006	4,008	3,721	577
German Africa (Kamerun, etc.)	24,654	4,895	348	92
Liberia	12,425	2,440	1,721	218
Madagascar	31,069	4,550		
Morocco	4,800	725	520	57
Portuguese Africa	91,150	17,002	11,465	1,815
Spanish Africa	16,990	3,234	3,000	240
Total	2,589,917	495,037	838,489	106,461
RECAPITULATION				
Europe	30,772,268	7,182,820	29,644,704	5,071,004
North America	9,913,565	1,395,871	6,393,807	806,926
South America	5,810,570	903,541	560,694	70,820
Asia	3,705,602	660,888	3,335,571	275,351
Oceania	12,040,421	1,548,576	9,725,146	1,177,691
Africa	2,589,917	495,037	838,489	106,461
Total	64,832,363	12,186,733	50,498,411	7,508,253

[2] July 1, to Dec. 31.

Exports, by countries receiving, of canned salmon, calendar years 1922 and 1923

Country receiving	1922		1923	
	Pounds	Value	Pounds	Value
EUROPE				
Azores and Madeira Islands	360	$31		
Belgium	2,608,391	250,333	814,367	$91,817
Denmark	102,144	10,301	6,000	635
France	32,540	2,743	57,700	6,049
Germany	93,431	11,768	82,918	11,478
Greece	11,350	1,200	120,041	14,534
Hungary	48	6		
Iceland and Faroe Islands	150	8		
Italy	1,212,351	108,904	194,800	19,210
Malta, Gozo, etc	14,400	1,400		
Netherlands	618,028	77,002	479,836	76,799
Norway	36,590	3,909	45,192	10,855
Poland and Danzig	107	22		
Russia in Europe	33,000	4,329	45,000	3,675
Spain	214	20	1,008	119
Sweden	69,506	13,912	20,041	3,739
Switzerland	75,998	10,127		
Turkey in Europe	48,760	4,640	12,560	1,581
Ukraine	329,840	28,134	572	157
England	23,937,667	3,732,859	31,090,188	5,685,074
Scotland	346,200	67,407	637,768	125,416
Ireland			40,800	7,700
Total	29,571,075	4,329,055	33,648,791	6,068,838
NORTH AMERICA				
Canada, Maritime Provinces	25,438	3,537	13,742	1,667
Quebec and Ontario	599,834	67,487	245,809	29,848
Canada, Prairie Provinces	79,840	14,241	23,560	3,665
British Columbia and Yukon	3,175,943	321,872	1,073,172	137,562
British Honduras	27,234	3,193	36,375	3,926
Costa Rica	187,848	17,193	87,393	9,353
Guatemala	50,271	5,168	51,066	5,605
Honduras	66,924	9,021	69,266	8,753
Nicaragua	42,003	4,309	89,027	9,553
Panama	283,390	35,599	220,927	29,459
Salvador	8,564	994	16,800	1,807
Mexico	2,819,248	227,649	1,654,380	143,263
Miquelon and St. Pierre Islands	2,400	200		
Bermuda	41,302	6,440	41,326	8,134
Barbados	22,262	3,450	118,346	16,008
Jamaica	85,548	10,088	86,171	15,592
Trinidad and Tobago	117,381	18,670	139,119	22,499
Other British West Indies	48,284	8,048	67,570	12,107
Cuba	434,803	38,397	844,877	82,169
Dominican Republic	167,784	15,417	190,885	20,271
Dutch West Indies	32,418	5,553	39,942	6,902
French West Indies	912	73	700	82
Haiti	2,356	398	4,064	575
Virgin Islands of United States	42,014	5,178	30,454	3,829
Total	8,364,001	822,125	5,144,991	572,629
SOUTH AMERICA				
Argentina	477,872	48,188	1,021,474	116,777
Bolivia	125,560	10,483	65,676	6,154
Brazil	14,400	3,075	3,491	741
Chile	1,893,557	181,242	216,696	23,299
Colombia	290,178	31,592	414,017	47,561
Ecuador	237,196	23,317	117,542	10,832
British Guiana	99,632	17,144	212,694	37,525
Dutch Guiana	76,928	9,517	32,497	3,594
French Guiana	2,783	400	9,948	1,164
Paraguay			840	105
Peru	42,353	4,342	426,163	45,684
Uruguay	3,120	556	8,096	1,404
Venezuela	555,873	56,473	577,041	58,614
Total	3,819,452	386,329	3,106,175	553,454

Exports, by countries receiving, of canned salmon, calendar years 1922 and 1923—Continued

Country receiving	1922		1923	
	Pounds	Value	Pounds	Value
ASIA				
Aden	24,000	$1,900	480	$60
Armenia and Kurdistan	350	36		
British India	769,867	95,127	205,472	30,766
Ceylon	88,276	10,282	54,931	8,607
Straits Settlements	1,893,804	160,220	115,750	19,431
Other British East Indies	1,516	88	2,736	350
China	83,459	13,321	51,357	8,295
Chosen	1,692	343	5,610	635
Java and Madura	1,687,365	149,187	249,343	27,207
Other Dutch East Indies	249,466	25,830	115,724	11,961
French Indo-China	9,168	1,187	240	51
Greece in Asia	9,600	940		
Hong Kong	86,364	13,297	24,710	4,307
Japan	5,606	714	1,577,926	150,328
Kwantung, leased territory			144	32
Palestine and Syria	54,321	5,076	31,588	3,676
Russia in Asia			1,491	159
Siam	158,538	13,775	2,916	794
Turkey in Asia	4,800	500	19,200	2,280
Other Asia			336	29
Total	5,128,192	491,823	2,459,954	268,968
OCEANIA				
Australia	6,663,952	1,045,545	6,142,166	999,702
British Oceania	88,472	8,487	27,317	3,871
French Oceania	164,122	18,547	190,548	21,263
New Zealand	149,598	26,413	153,854	28,405
Other Oceania	108,454	10,674	33,893	3,688
Philippine Islands	7,719,124	610,114	7,055,041	667,713
Total	14,893,722	1,719,780	13,602,819	1,724,642
AFRICA				
Belgian Congo	1,268	205	1,498	216
British West Africa	59,998	6,363	34,778	3,631
British South Africa	1,724,928	181,061	1,495,449	160,324
British East Africa	15,360	1,591	450	97
Canary Islands	44,792	4,586	8,202	742
Egypt	73,408	9,193	41,755	5,572
Other French Africa	732	75	384	54
Liberia	3,930	403	1,684	195
Morocco	4,925	606	1,353	186
Portuguese East Africa	88,973	8,814	46,095	5,150
Other Portuguese Africa	48	11	44	13
Spanish Africa	2,475	355		
Total	2,020,837	213,263	1,631,692	176,180
RECAPITULATION				
Europe	29,571,075	4,329,055	33,648,791	6,058,838
North America	8,364,001	822,125	5,144,991	572,629
South America	3,819,452	386,329	3,106,175	353,454
Asia	5,128,192	491,823	2,459,954	268,968
Oceania	14,893,722	1,719,780	13,602,819	1,724,642
Africa	2,020,837	213,263	1,631,692	176,180
Total	63,797,279	7,962,375	59,594,422	9,154,711

Exports, by countries receiving, of canned salmon, calendar years 1924 and 1925

Country receiving	1924		1925	
	Pounds	Value	Pounds	Value
EUROPE				
Austria			3,720	$624
Azores, and Madeira Islands	332	$55	600	113
Belgium	1,337,489	138,779	803,068	110,340
Czechoslovakia			1,200	178
Denmark	9,600	1,488	27,863	3,422
Finland			5,040	593
France	42,659	7,855	16,844	1,992
Germany	150,167	20,820	31,988	5,129
Gibraltar	1,536	227		
Greece	494,062	57,988	674,003	78,126
Irish Free State			37,400	4,640
Italy	107,880	10,594	49,632	4,447
Malta, Gozo, and Cyprus Islands	1,528	253		
Netherlands	622,228	89,085	521,259	93,282
Norway	21,120	2,628	19,600	1,975
Poland and Danzig			96	25
Rumania	3,720	639		
Russia in Europe			5,294	770
Spain			2,400	520
Sweden	14,160	2,223	23,304	3,059
Switzerland	4,800	520	24,000	2,700
Turkey in Europe	38,400	1,280	9,600	892
United Kingdom			24,978,401	5,145,443
England	36,485,985	5,865,023		
Scotland	391,100	60,689		
Ireland	308,120	36,621		
Total	40,034,886	6,296,767	27,235,312	5,458,270
NORTH AMERICA				
Canada	2,051,011	264,052	2,581,457	327,003
British Honduras	24,910	2,763	47,895	4,786
Costa Rica	139,776	13,793	88,319	10,967
Guatemala	71,388	8,043	32,467	3,575
Honduras	52,478	6,715	56,979	7,487
Nicaragua	109,730	13,208	115,476	13,323
Panama	277,357	36,579	321,743	44,946
Salvador	5,814	729	9,360	1,196
Mexico	2,482,065	227,473	2,013,017	172,483
Miquelon and St. Pierre Islands			5,660	435
Newfoundland and Labrador	96	18	610	64
Bermuda	46,485	8,943	19,640	4,956
Barbados	43,024	7,222	7,857	1,342
Jamaica	52,956	10,951	45,311	10,360
Trinidad and Tobago	37,910	7,082	19,760	4,897
Other British West Indies	45,744	7,771	42,546	7,248
Cuba	647,574	66,161	404,760	41,033
Dominican Republic	230,416	23,643	286,842	30,928
Dutch West Indies	37,026	6,901	34,602	7,668
French West Indies	2,068	181	240	29
Haiti	5,365	897	6,502	1,076
Virgin Islands of United States	37,989	4,496	48,475	5,883
Total	6,401,182	717,621	6,189,518	701,685
SOUTH AMERICA				
Argentina	218,068	24,048	155,276	16,181
Bolivia	25,918	2,896	41,812	4,052
Brazil	13,033	2,442	28,347	4,637
Chile	154,006	23,192	297,873	47,583
Colombia	558,147	64,456	567,260	64,580
Ecuador	112,538	12,611	215,669	21,555
Falkland Islands	48	11		
British Guiana	58,742	11,819	107,966	25,852
Dutch Guiana	42,346	4,957	18,913	2,739
French Guiana	12,586	1,470	20,040	2,381
Paraguay	720	109	960	160
Peru	226,972	23,285	319,252	34,764
Uruguay	18,130	2,424	10,664	1,888
Venezuela	957,426	103,093	582,055	63,996
Total	2,398,680	276,813	2,366,087	290,368

Exports, by countries receiving, of canned salmon, calendar years 1924 and 1925—Continued

Country receiving	1924		1925	
	Pounds	Value	Pounds	Value
ASIA				
Aden	1,340	$188	960	$151
British India	439,559	74,608	357,201	69,327
Ceylon	134,750	19,412	261,192	42,499
Straits Settlements	175,130	18,210	129,559	19,371
Other British East Indies			7,536	973
China	100,425	17,828	286,311	36,226
Chosen	768	112	344	41
Java and Madura	260,822	32,483	162,723	23,313
Other Dutch East Indies	79,128	10,400	106,035	12,488
French Indo-China			96	14
Hejaz, Arabia, etc	1,680	144	3,826	415
Hong Kong	59,852	9,327	88,358	12,654
Japan	249,350	27,847	102,106	15,306
Kwantung, leased territory	144	38	96	13
Palestine and Syria	14,269	1,601	6,936	927
Persia			1,200	175
Siam	3,469	1,386	5,384	1,175
Turkey in Asia	9,600	1,280	9,100	910
Other Asia			4,529	717
Total	1,530,286	214,864	1,533,492	236,695
OCEANIA				
Australia	7,167,084	1,186,765	6,966,059	1,491,392
British Oceania	23,464	3,016	37,121	5,294
French Oceania	246,556	27,170	235,122	25,966
New Zealand	102,078	17,289	159,624	35,617
Other Oceania	59,381	7,218	34,700	4,409
Philippine Islands	7,884,986	793,939	7,533,837	709,599
Total	15,483,549	2,035,397	14,966,463	2,272,277
AFRICA				
Belgian Congo	1,587	338	5,275	918
British West Africa	75,162	6,820	164,621	14,273
British South Africa	980,445	105,558	617,387	72,348
British East Africa	15,816	2,120	8,276	1,149
Canary Islands	8,388	695	7,968	1,781
Egypt	27,376	4,499	21,534	4,520
Other French Africa	636	92	332	65
Liberia	3,164	323	5,644	925
Portuguese East Africa	45,648	4,505	29,414	3,235
Other Portuguese Africa	444	75	793	244
Spanish Africa	6,120	639	19,500	1,950
Total	1,116,786	125,664	880,744	101,408
RECAPITULATION				
Europe	40,084,886	6,296,767	27,235,312	5,458,270
North America	6,401,182	717,621	6,189,518	701,685
South America	2,398,680	276,813	2,366,087	290,368
Asia	1,530,286	214,864	1,533,492	236,695
Oceania	15,483,549	2,035,397	14,966,463	2,272,277
Africa	1,164,786	125,664	880,744	101,408
Total	67,013,369	9,667,126	53,171,616	9,060,703

Exports, by countries receiving, of canned salmon, calendar years 1926 and 1927

Country receiving	1926		1927	
	Pounds	Value	Pounds	Value
EUROPE				
Austria	2,020	$263	1,400	$180
Azores and Madeira Islands	773	139	12,002	1,261
Belgium	732,117	100,312	398,945	51,900
Czechoslovakia	2,500	300	2,400	325
Denmark	48,772	6,835	11,328	1,266
Finland	620	132	1,200	175
France	329	102	29,212	4,445
Germany	181,461	24,440	76,358	12,164
Gibraltar	1,200	135	1,200	160
Greece	584,456	65,382	495,122	54,598
Irish Free State	60,000	12,550	31,900	3,535
Italy	80,400	9,445	293,078	24,404
Malta, Gozo, and Cyprus Islands	5,664	1,144	4,390	758
Netherlands	653,940	102,666	367,868	69,011
Norway	31,255	8,139	20,230	2,829
Portugal	1,444	235	1,572	239
Rumania	48	11	1,392	301
Soviet Russia in Europe	740	179		
Spain	25,420	4,245	18,240	3,099
Sweden	29,576	6,165	19,521	3,970
Switzerland	47,520	5,454	14,400	1,707
Turkey in Europe	1,615	278	25,872	2,743
United Kingdom	25,357,747	4,596,052	20,736,856	3,529,255
Total	27,849,617	4,944,603	22,564,486	3,778,320
NORTH AMERICA				
Canada	1,681,771	287,976	1,692,648	269,600
British Honduras	32,360	3,744	21,129	2,653
Costa Rica	109,451	15,261	119,767	16,059
Guatemala	50,565	7,168	44,354	5,824
Honduras	44,954	5,706	43,403	5,970
Nicaragua	91,070	10,898	84,523	9,519
Panama	266,432	43,109	242,859	40,465
Salvador	12,170	1,533	6,029	781
Mexico	2,084,845	191,699	803,559	73,614
Miquelon and St. Pierre Islands	1,020	140	490	55
Bermuda	21,268	5,274	24,543	6,211
Barbados	30,248	6,029	8,576	1,821
Jamaica	32,998	9,586	70,661	15,900
Trinidad and Tobago	60,853	13,111	30,145	7,091
Other British West Indies	53,785	9,355	36,602	6,864
Cuba	639,796	66,994	312,383	36,521
Dominican Republic	270,073	31,914	209,166	22,566
Dutch West Indies	46,350	10,301	46,938	11,624
French West Indies	96	13	1,156	152
Haiti, Republic of	11,404	1,731	9,262	1,489
Virgin Islands of United States	42,777	5,201	42,754	5,313
Total	5,584,286	726,743	3,850,947	540,092
SOUTH AMERICA				
Argentina	275,488	35,323	18,472	4,117
Bolivia	18,989	2,872	21,921	2,716
Brazil	18,193	4,643	9,871	2,278
Chile	875,131	126,062	101,872	15,973
Colombia	628,132	81,120	716,104	89,855
Ecuador	46,236	5,036	25,870	3,437
Falkland Islands	192	43	568	87
British Guiana	95,254	21,260	45,596	10,028
Dutch Guiana	21,138	3,508	12,109	1,960
French Guiana	3,840	522	15,308	2,036
Paraguay	1,015	214	1,906	304
Peru	199,563	24,531	77,215	9,950
Uruguay	14,956	2,411	13,119	2,135
Venezuela	481,831	59,762	311,729	41,963
Total	2,679,958	367,307	1,371,659	186,859

Exports, by countries receiving, of canned salmon, calendar years 1926 and 1927—Continued

Country receiving	1926		1927	
	Pounds	Value	Pounds	Value
ASIA				
Aden	5,717	$778	4,630	$503
Arabia and Hejaz	1,900	210	2,992	291
British India	526,487	82,878	416,160	61,965
British Malaya	236,438	38,156	181,235	28,671
Ceylon	333,669	44,331	209,511	28,720
China	245,599	31,676	63,160	9,175
Java and Madura	191,276	28,449	241,642	25,510
Other Dutch East Indies	129,730	16,527	83,705	13,080
French Indo-China	576	90	624	70
Hong Kong	28,100	6,292	38,432	8,378
Iraq	7,200	915	2,784	329
Japan	122,424	12,018	1,448	240
Kwantung Leased Territory	480	105	48	24
Palestine	7,880	966	7,152	1,139
Persia			279	88
Siam	4,294	1,025	2,012	599
Syria			342	101
Turkey in Asia	384	82	1,200	250
Other Asia	144	21	1,200	150
Total	1,842,298	264,519	1,258,556	179,283
OCEANIA				
Australia	6,370,522	1,299,712	3,561,061	709,782
British Oceania	75,914	9,793	100,382	18,662
French Oceania	218,266	24,175	147,413	17,178
New Zealand	228,784	44,979	60,080	12,578
Philippine Islands	8,140,977	824,512	4,742,208	499,526
Total	15,034,463	2,203,171	8,611,144	1,257,726
AFRICA				
Belgian Congo	3,489	400	3,012	417
British East Africa	25,536	3,697	21,360	3,724
British South Africa	318,165	45,392	385,075	60,937
British West Africa	51,120	5,359	84,624	8,189
Egypt	82,064	11,596	54,237	8,110
Other French Africa	720	96		
Liberia	365	115	1,901	304
Morocco	1,200	135	1,440	156
Mozambique	19,293	3,012	25,064	2,880
Other Portuguese Africa	812	223	1,231	431
Canary Islands	17,712	1,854	13,196	1,532
Total	520,476	71,878	591,040	86,680
RECAPITULATION				
Europe	27,849,617	4,944,603	22,564,486	3,778,320
North America	5,584,286	726,743	3,850,947	540,092
South America	2,679,958	367,307	1,371,659	186,859
Asia	1,842,298	264,519	1,258,556	179,283
Oceania	15,034,463	2,203,171	8,611,144	1,257,726
Africa	520,476	71,878	591,040	86,680
Total	53,511,098	8,578,221	38,247,832	6,028,960

The following tables show in summarized form the customs districts from which canned salmon was exported for the years 1900 to 1915, inclusive, and in detailed form for the years 1916 to 1927, inclusive. Up to 1910 about two-thirds of the total exports have gone from the port of San Francisco, while about one-fifth of the total passed through the port of Puget Sound, Wash. In 1910 the exports from Puget Sound exceeded those from San Francisco and, although San Francisco regained the lead for a few years, Puget Sound has maintained first place since 1918. The only other port through which any considerable quantity is shipped is New York City. It is usual now to load the salmon on steamers and sailing vessels at San Francisco and the Puget Sound cities to go direct to Europe.

Exports, by customs districts, of canned salmon

SUMMARY, 1900 TO 1915 [1]

Customs district from which exported	1900		1901		1902		1903	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Atlantic ports	3,820,656	$370,302	8,834,322	$947,729	4,538,073	$427,335	5,734,469	$611,868
Gulf ports	38,868	3,430	55,425	5,426	50,116	4,965	54,016	5,085
Mexican border ports	30,264	2,861	20,140	2,082	188,346	15,498	130,363	11,741
Pacific ports	23,168,445	2,314,541	32,337,112	3,270,524	42,357,217	3,539,231	44,391,379	3,716,926
Northern border and Lake ports	24,137	2,514	42,501	4,510	39,362	4,373	43,107	5,171

Customs district from which exported	1904		1905		1906	
	Pounds	Value	Pounds	Value	Pounds	Value
Atlantic ports	2,133,121	$214,332	2,693,503	$267,263	3,277,571	$318,321
Gulf ports	72,792	6,455	97,561	8,425	127,255	10,910
Mexican border ports	355,248	24,183	289,439	23,148	455,413	36,130
Pacific ports	53,362,492	4,979,565	31,957,252	2,734,269	41,906,406	3,469,472
Northern border and Lake ports	625	63	28,800	2,364	177,769	13,110

Customs district from which exported	1907		1908		1909	
	Pounds	Value	Pounds	Value	Pounds	Value
Atlantic ports	2,314,535	$227,779	2,334,663	$227,113	4,043,807	$409,933
Gulf ports	165,050	14,450	206,120	19,245	107,018	8,954
Mexican border ports	570,343	47,776	723,689	65,119	219,128	21,574
Pacific ports	22,160,349	1,892,398	24,961,173	2,126,995	31,705,144	2,971,984
Northern border and Lake ports	7,828	646	400	46	42,012	3,991

Customs district from which exported	1910		1911		1912	
	Pounds	Value	Pounds	Value	Pounds	Value
Atlantic ports	3,003,430	$306,122	1,564,485	$166,971	2,506,989	$257,792
Gulf ports	118,559	9,554	159,359	15,194	109,045	12,029
Mexican border ports	254,717	21,503	213,226	20,393	415,259	38,455
Pacific ports	60,450,190	5,974,196	36,663,729	3,834,584	40,391,058	4,312,116
Northern border and Lake ports	33,800	2,883	.....	.....	1,405	171

Customs district from which exported	1913		1914		1915	
	Pounds	Value	Pounds	Value	Pounds	Value
New York	1,935,881	$189,959	2,404,220	$207,924	5,316,456	$512,549
New Orleans	.....	.....	182,717	19,787	261,709	28,682
El Paso	.....	.....	120,140	9,045	176,390	12,348
San Francisco	31,687,774	3,277,841	38,844,912	3,600,636	35,321,058	4,209,914
Oregon	624,000	83,000	124,512	9,391	671,452	64,517
Washington	19,827,745	1,434,451	45,876,703	4,038,449	41,064,868	4,183,410
All other districts	1,215,566	118,089	197,716	14,061	634,183	60,663

[1] Detailed statistics for 1900 to 1915, inclusive, may be found in Pacific Salmon Fisheries, by John N. Cobb, Appendix III, Report U. S. Commissioner of Fisheries, 1916, pp. 194–198. Washington, 1917.

Exports, by customs districts, of canned salmon—Continued

DETAILS, 1916 TO 1918

Customs district from which exported	1916		1917		1918	
	Pounds	Value	Pounds	Value	Pounds	Value
Georgia			156,000	$37,052	96	$24
Maine and New Hampshire	2,583,306	$274,432	1,186,871	160,399	3,336	621
Maryland	517,800	47,603	1,884,672	168,537	1,208,142	149,080
Massachusetts	1,314,778	130,701	2,447,156	279,184	789,629	159,052
New York	24,257,388	2,339,629	23,993,032	2,607,602	49,034,077	7,690,025
Philadelphia	111,578	8,680	2,445,373	237,540	302,740	40,431
Porto Rico	9,813	578	3,060	384	6,106	839
Virginia	2,589,040	211,848	5,969,268	551,269	489,242	82,563
Florida	4,252	350	9,971	672	7,262	1,623
Galveston	3,211	159	30,096	3,467	16,457,201	2,124,530
Mobile	7,635	851	7,055	686	6,505	838
New Orleans	1,125,031	109,238	8,003,488	967,410	1,720,839	223,676
Sabine	4,867	428	8,244	1,233	5,411	1,325
Arizona	134,358	10,263	170,372	15,005	97,046	12,228
Eagle Pass	37,922	3,496	95,077	7,783		
El Paso	117,715	8,876	196,331	15,878	105,630	12,547
San Antonio					401,640	47,445
Laredo	252,826	16,637	367,324	33,159		
Alaska	87,371	6,319	3,094,290	267,489	5,396,783	691,897
Hawaii	78	15	137,328	13,959	56,044	8,195
Oregon	657,121	60,257	303,888	36,105		
San Francisco	53,221,608	5,845,811	32,390,693	3,910,502	18,278,622	3,153,508
Southern California	33,455	2,463	35,133	3,758	30,009	4,327
Washington	60,520,904	5,461,097	30,549,747	3,034,487	13,783,070	1,874,726
Buffalo	850	107	5,437	722	250	25
Dakota			66,825	5,906	2,630	437
Duluth and Superior			171	39	15	1
Michigan	1,949,086	207,808	3,354,350	427,810	1,814,899	284,746
Montana and Idaho	3,389,969	283,727	987,925	166,323	1,248	222
St. Lawrence			100	28	61,990	5,901
Vermont	12,000	1,124	63,530	8,957	18	2
Total	152,943,962	15,032,497	117,962,807	12,963,425	110,060,480	16,570,834

In 1918 was inaugurated the practice of publishing customs figures, for calendar years instead of, as previously, for the fiscal year ending June 30. The following tables show the exports of canned salmon by customs districts for the calendar years 1918 to 1927:

Exports, by customs districts, of canned salmon, calendar years 1918 to 1927, inclusive

Customs district from which exported	1918		1919		1920	
	Pounds	Value	Pounds	Value	Pounds	Value
Georgia	99	$25				
Maine and New Hampshire	96	24	130,994	$27,831	87,519	$27,223
Maryland	1,705,877	220,669	2,385,585	411,895	448,229	93,029
Massachusetts	517,456	84,118	331,296	58,267	326,609	85,724
New York	46,490,264	7,500,562	85,463,019	13,977,432	15,538,924	2,932,488
Philadelphia	305,414	42,261	2,593,197	322,858	602,458	156,533
Porto Rico	1,711	394	7,458	1,262	35,983	5,032
Virginia	303,650	44,586	1,203,496	211,701	465,425	104,940
Florida			171,653	20,673	9,745	1,726
Galveston	15,169,801	1,942,094	11,156,255	1,357,799	3,935	1,324
Mobile	3,567,735	482,945	1,654,115	219,879	207,480	36,165
New Orleans	542,161	80,586	10,060,979	1,613,503	2,905,887	347,346
Sabine	3,033	833	16,439	3,354	37,343	8,025
Arizona	30,063	4,319	118,946	17,726	115,728	14,763
El Paso	21,290	2,891	320,836	41,491	456,784	45,534
San Antonio	46,914	7,373	855,588	116,612	1,040,304	104,151
Alaska	72	12	1,594,476	188,038	624	95
Hawaii	48,428	7,052	49,232	7,718	11,812	2,732
Oregon			244,600	56,680	770,092	148,713
San Francisco	4,490,375	749,095	19,596,548	4,359,336	15,626,294	3,671,489
Southern California	34,045	5,159	125,793	21,856		
Washington	16,422,108	1,764,105	27,911,740	4,930,335	24,818,862	4,118,562
Buffalo	501	75	863,795	140,568	1,748	375
Dakota	2,541	437	90,206	19,841	524	176
Duluth and Superior			13,460	2,996		
Michigan	1,345,300	200,873	1,057,458	199,096	466,041	76,374
Montana and Idaho			1,527,576	281,707	753,010	184,596
St. Lawrence	52,800	8,819	163,063	26,108	696	168
Vermont			42,869	8,144		
San Diego					53,108	11,417
Los Angeles					47,199	8,033
Total	91,101,734	13,149,307	169,750,672	28,644,706	64,832,363	12,186,733

Exports, by customs districts, of canned salmon, calendar years 1918 to 1927, inclusive—Continued

Customs district from which exported	1921		1922		1923	
	Pounds	Value	Pounds	Value	Pounds	Value
South Carolina	350	$35				
Virginia			38,750	$3,030		
Maine and New Hampshire	294	47	48	11	82	$7
Massachusetts	192,048	30,813	52,052	9,143	13,660	1,660
Maryland	35,069	2,510	72,600	8,810		
New York	4,032,364	561,486	6,913,597	699,810	4,271,731	505,127
Philadelphia	226,324	27,025	67,715	10,916		
Buffalo			211,544	12,541	70,636	9,107
Porto Rico	22,892	2,371	19,336	1,922	19,278	2,283
Florida	7,516	1,400	9,555	1,758	11,081	1,871
Galveston	19,375	2,819	1,016	96		
New Orleans	769,020	67,294	1,320,427	102,464	1,380,298	115,598
Mobile	5,870	518	36,627	2,809	22,380	2,518
Sabine	33,283	3,835	6,262	798	2,980	378
Arizona	35,589	3,220	28,318	2,822	48,782	4,851
El Paso	256,235	22,642	315,754	27,533	145,043	13,434
San Antonio	299,654	25,940	193,587	16,427	148,161	11,868
Alaska	1,056	263	370,048	35,674	281,014	33,294
San Francisco	14,374,795	2,639,684	10,145,853	1,619,688	16,556,708	2,834,286
San Diego	51,652	6,811	24,810	3,301		
Los Angeles	44,391	4,864	10,438	992	69,387	5,465
Hawaii	363	172	2,408	525	320	48
Washington	24,311,192	3,210,872	40,168,916	4,902,559	33,038,739	5,016,966
Oregon	4,876,417	732,026	3,779,494	453,716	3,358,262	577,181
Duluth and Superior	68	16	130	19		
Dakota	1,188	314	10,904	2,162	570	180
Michigan	892,797	159,469	229,000	33,165	764	158
Montana and Idaho	7,270	1,413	130	22	105	14
Ohio	96	12				
St. Lawrence	1,243	382	184	47	58,321	6,954
Vermont			67,776	9,615	96,120	11,463
Total	50,498,411	7,508,253	63,797,279	7,962,375	59,594,422	9,154,711

Customs district from which exported	1924		1925		1926	
	Pounds	Value	Pounds	Value	Pounds	Value
Maine and New Hampshire	63	$12	45	$7	70,000	$14,329
Massachusetts	96,064	17,448	2,449	350	52,064	10,726
Maryland	68,000	10,340				
New York	4,138,407	499,933	3,164,954	390,088	2,224,341	400,543
Philadelphia	1,820	156	2,370	240	1,050	92
Buffalo	910	219	180	55	136,479	17,234
Porto Rico	29,490	3,236	64,264	6,716	142,941	15,365
Rhode Island	480	40				
Florida	7,400	1,375	5,162	950	5,028	884
Galveston	138	18				
New Orleans	1,592,318	153,888	1,349,392	114,561	1,452,184	140,522
Mobile	3,860	327	3,040	284	4,543	566
Sabine	1,571	302	1,152	300		
Arizona	37,256	3,864	56,817	6,101	30,270	3,484
El Paso	99,068	13,085	74,256	8,254	57,175	8,975
San Antonio	828,017	62,996	87,333	8,982	755,721	64,192
Alaska	437,885	50,709	976,745	142,795	479,678	69,266
San Francisco	19,412,016	3,383,007	13,473,136	2,884,790	15,093,267	2,638,090
Georgia	70	14	240	29		
Los Angeles	122,938	8,576	15,388	1,843	48,609	4,454
Hawaii	24	10	337	58	98	29
Washington	33,424,148	4,520,928	27,475,180	4,301,397	29,947,081	4,662,609
Oregon	6,705,384	935,565	6,409,937	1,191,835	2,980,644	520,603
Dakota	103	37	7,200	501	11,880	2,500
Michigan	300	45			14,749	3,017
Montana and Idaho					10	4
St. Lawrence	5,254	963	2,039	567	786	227
Vermont	385	33			2,500	510
Total	67,013,369	9,667,126	53,171,616	9,060,703	53,511,098	8,578,221

Exports, by customs districts, of canned salmon, calendar years 1918 to 1927, inclusive—Continued

Customs district from which exported	1927		Customs district from which exported	1927	
	Pounds	Value		Pounds	Value
Maine and New Hampshire	25, 200	$5, 250	El Paso	10, 244	$1, 737
Vermont	6, 000	990	Arizona	19, 763	2, 325
Massachusetts	13, 401	2, 694	Los Angeles	45, 193	5, 784
St. Lawrence	38, 100	3, 880	San Francisco	9, 035, 513	1, 653, 460
Buffalo	32, 667	6, 863	Oregon	1, 555, 903	330, 206
New York	2, 027, 752	310, 960	Washington	24, 391, 190	3, 601, 511
Philadelphia	3, 082	281	Alaska	27, 936	4, 026
Georgia	70	23	Hawaii	175	52
Florida	5, 367	907	Dakota	2, 400	500
Mobile	5, 059	592	Michigan	8, 442	1, 808
New Orleans	552, 174	59, 670	Porto Rico	50, 846	6, 025
Galveston	355	60	Total	38, 247, 932	6, 028, 960
San Antonio	391, 100	29, 356			

EXPORTS OF DOMESTIC FRESH AND CURED SALMON

The following tables show in summarized form the value of the exports of fresh and cured salmon, by countries to which exported, for the period 1900 to 1915, inclusive, and in detailed form for the years 1916 to 1927, inclusive. As with the canned salmon, the greater part of these exports go to European countries, Germany, under ordinary conditions, taking by far the largest quantity. A small portion of this is salmon caught in Atlantic waters.

Exports, by countries receiving, of domestic fresh and cured salmon

SUMMARY, FISCAL YEARS 1900 TO 1915 [1]

Country receiving	1900	1901	1902	1903	1904	1905
Europe	$340, 643	$344, 368	$496, 637	$760, 197	$1, 094, 950	$1, 748, 039
North America	87, 964	60, 416	132, 704	67, 225	36, 408	25, 809
South America	1, 702	901	3, 063	1, 690	1, 822	3, 438
Asia	3, 324	15, 037	25, 843	5, 393	1, 382	30, 170
Oceania	101, 388	5, 982	35, 863	34, 835	28, 063	25, 085
Africa	255	24	325	12	864	114

Country receiving	1906	1907	1908	1909	1910
Europe	$1, 776, 086	$1, 794, 885	$1, 587, 535	$1, 225, 948	$1, 468, 015
North America	36, 943	23, 204	27, 263	28, 383	29, 688
South America	2, 600	2, 351	517	1, 365	5, 242
Asia	92, 861	19, 384	3, 962	3, 640	348
Oceania	18, 914	38, 721	28, 767	28, 935	28, 079
Africa	60	198	----------	289	1, 268

Country receiving	1911	1912	1913	1914	1915
Europe	$1, 511, 184	$1, 587, 973	$2, 055, 109	$2, 074, 499	$1, 375, 123
North America	24, 880	20, 350	34, 741	86, 087	20, 336
South America	384	142	3, 409	933	618
Asia	3, 933	107	1, 398	2, 428	1, 362
Oceania	32, 334	21, 575	25, 699	31, 330	27, 420
Africa	424	4	2, 210	32	----------

[1] Detailed statistics for 1900 to 1915, inclusive, may be found in Pacific Salmon Fisheries, by John N. Cobb, Appendix III, Report, U. S. Commissioner of Fisheries, 1916, pp. 198-201. Washington, 1917.

Exports, by countries receiving, of domestic fresh and cured salmon—Continued

Exports, by countries receiving, of domestic fresh and cured salmon—Continued

DETAILS, CALENDAR YEARS 1919–1927

Country receiving	1919	1920	1921
EUROPE			
Belgium	$1,230		
Greece		$6,913	$504
Denmark	75,095	8,400	11,800
France	6,444	950	
Germany		61	31,700
Iceland, and Faroe Islands	200		
Netherlands	617	5,003	393
Norway	43,840	1,540	
Spain	16		
Sweden	2,430	1,800	50
United Kingdom: England	251,730	118,916	66,431
Russia in Europe		38	
NORTH AMERICA			
Bermuda	25	111	177
British Honduras		30	80
Canada	421,498	191,710	321,276
Newfoundland and Labrador		12	
Costa Rica		32	37
Guatemala	96	20	
Honduras	5	8	8
Nicaragua	21	43	20
Panama	646	246	682
Salvador	26	222	13
Mexico	13,884	3,268	1,612
British West Indies:			
Barbados	4,000		
Jamaica	108	102	416
Trinidad and Tobago	16		58
Other British West Indies	15	92	378
Cuba	1,643	2,266	510
Dominican Republic	525	833	586
Dutch West Indies	110	273	72
French West Indies	255		125
Haiti	38	145	117
Virgin Islands of United States	241	552	304
British Columbia and Yukon			
SOUTH AMERICA			
Argentina			585
Bolivia	2	15	
Brazil	2,194	105	
Chile	190		
SOUTH AMERICA—cont.			
Colombia	$182	$1,826	$297
Ecuador		10	
Dutch Guiana	238	52	
British Guiana		24	
French Guiana	135	78	14
Peru	10		
Venezuela	49	509	
ASIA			
China	286	53	26
Chosen		11	
British India			645
British Straits Settlements	29	365	201
Other British East Indies	3		
Dutch East Indies	749	1,785	310
French East Indies	5		
Hong Kong		3	
Japan	6,214	3,888	
Russia in Asia	67		32
Siam	3		
OCEANIA			
Australia	4,840	5,666	249
New Zealand		145	
Other British Oceania		12	
French Oceania	134	159	80
German Oceania	36		
Philippine Islands	1,513	979	3,245
Other Oceania			76
AFRICA			
Belgian Congo			
British West Africa	381	75	67
British South Africa		18	
Egypt			16
French Africa	450		85
Total	842,464	359,364	443,277
RECAPITULATION			
Europe	381,602	143,621	110,878
North America	443,152	199,965	326,471
South America	3,000	2,619	896
Asia	7,356	6,105	1,214
Oceania	6,523	6,961	3,650
Africa	831	93	168

Exports, by countries receiving, of domestic fresh and cured salmon—Continued

Country receiving	1922		1923	
	Pounds	Value	Pounds	Value
Belgium			1,595	$418
Denmark	123,969	$53,324	63,138	19,359
France	16,265	2,160	29,000	5,700
Germany	305,883	42,865	56,255	5,745
Netherlands	22,538	4,963	110,185	24,106
Norway	204,020	49,697	183,825	43,698
Sweden			34,991	7,333
United Kingdom:				
England	484,826	90,721	1,539,671	240,177
Scotland	12,000	2,160		
NORTH AMERICA				
Quebec and Ontario	96,681	15,883	34,058	8,031
Bermuda	2,177	357	551	128
British Honduras			296	36
Canada, Prairie Provinces	3,351	1,049	3,042	950
Canada, Maritime Provinces	1,350	240	38,984	2,535
Costa Rica	1,380	122	200	34
Honduras	50	7	440	67
Nicaragua	70	22		
Panama	9,903	1,016	4,774	600
Salvador	25	13	49	19
Mexico	14,518	2,094	12,022	2,117
Jamaica	440	81	1,162	231
Trinidad and Tobago	1,065	75	138	50
Other British West Indies	808	103	506	76
Cuba	16,557	1,599	53,503	8,016
Dominican Republic	12,700	997	4,228	424
Dutch West Indies	1,043	117	1,401	164
Haiti			200	60
Virgin Islands of United States	2,170	139	1,730	179
British Columbia and Yukon	4,540,905	280,727	2,728,357	290,346
SOUTH AMERICA				
Argentina	14,557	3,989	17,299	6,845
Brazil			240	51
Chile			1,200	140
Colombia	1,168	83	1,060	133
Dutch Guiana	250	101	3,520	454
British Guiana			1,600	233
French Guiana			500	58
Peru	20	12		
Venezuela	8,630	790	16,232	1,627
ASIA				
China	3,379	426		
Java and Madura	1,195	375	66	20
British India			715	87
Hong Kong	12,150	785		
Japan	11,263	1,114	328,459	14,894
Palestine and Syria	960	115		
Russia in Asia	100	13		
OCEANIA				
Australia	9,915	2,917	600	150
New Zealand	100	13		
French Oceania	84	32	703	115
Philippine Islands	19,492	3,247	18,150	2,675
AFRICA				
British South Africa	50	20	1,650	207
Total	5,958,007	564,563	5,296,295	688,288
RECAPITULATION				
Europe	1,169,501	245,890	2,018,660	346,536
North America	4,705,193	304,641	2,885,641	314,063
South America	24,625	4,975	41,651	9,541
Asia	29,047	2,828	329,240	15,001
Oceania	29,591	6,209	19,453	2,940
Africa	50	20	1,650	207

Exports, by countries receiving, of domestic fresh and cured salmon—Continued

Country receiving	1924		1925	
	Pounds	Value	Pounds	Value
EUROPE				
Austria	1,100	$156		
Belgium	1,650	429	42,970	$7,077
Denmark	115,890	31,039	124,575	39,410
France	202,700	44,668	200,200	43,985
Germany	1,122,095	236,828	1,616,515	286,163
Greece	55,780	6,594	17,500	1,475
Netherlands	252,039	48,515	170,425	34,518
Norway	123,950	27,600	167,865	48,065
Rumania	5,069	912		
Sweden	103,800	11,560	18,050	2,102
United Kingdom: England	1,230,082	230,586	1,324,722	194,387
NORTH AMERICA				
Canada	2,009,074	233,013	1,944,288	150,684
British Honduras	70	15	62	15
Costa Rica	500	51	200	31
Guatemala	600	60	156	18
Honduras	1,270	127		
Nicaragua	60	6		
Panama	5,602	759	9,198	1,403
Salvador	48	11		
Mexico	19,376	2,136	125,465	8,109
Newfoundland and Labrador	135	34		
Bermuda	14,752	2,195	2,379	623
Barbados			60	18
Jamaica	425	55	2,320	298
Other British West Indies	1,056	153	1,276	244
Cuba	5,807	544	18,531	2,003
Dominican Republic	2,430	341	1,050	154
Dutch West Indies	1,242	215	1,020	142
Haiti	750	103		
Virgin Islands of United States	2,196	300	2,438	320
SOUTH AMERICA				
Argentina	14,789	4,621	12,220	2,834
Bolivia	1,542	123		
Brazil			445	89
Chile	591	94		
Colombia			462	50
British Guiana	320	33		
Dutch Guiana			3,000	409
French Guiana			350	50
Peru			100	14
Venezuela	6,778	688	300	34
ASIA				
China	75	16	1,484	217
Hong Kong	6,680	204		
Japan	30	5	1,820	260
Straits Settlements	8,750	1,884	26,092	6,391
OCEANIA				
Australia	30,700	3,102	3,150	359
British Oceania			40	15
French Oceania	865	121	300	50
New Zealand	300	47		
Philippine Islands	108,833	6,481	15,780	2,573
Other Oceania			485	107
AFRICA				
British West Africa	3,500	260		
Canary Islands			1,786	301
Total	5,463,301	896,684	5,859,089	834,997
RECAPITULATION				
Europe	3,214,155	638,887	3,682,822	657,182
North America	2,065,393	240,118	2,108,453	164,062
South America	24,020	5,559	16,877	3,480
Asia	15,535	2,109	29,396	6,868
Oceania	140,698	9,751	19,755	3,104
Africa	3,500	260	1,786	301

Exports, by countries receiving, of domestic fresh and cured salmon—Continued

Country receiving	1926	
	Pounds	Value
EUROPE		
Belgium	122,600	$20,787
Denmark	54,275	17,100
France	74,350	14,170
Germany	1,733,162	361,686
Italy	4,000	720
Netherlands	448,594	105,125
Norway	60,862	14,247
Sweden	60,285	10,974
United Kingdom	1,560,879	279,394
NORTH AMERICA		
Canada	856,455	90,712
British Honduras	210	28
Honduras	790	96
Panama	6,060	937
Mexico	81,657	5,855
Newfoundland and Labrador	160	29
Bermuda	2,812	603
Barbados	380	83
Jamaica	312	115
Trinidad and Tobago	70	17
Other British West Indies	338	84
Cuba	2,725	565
Dominican Republic	2,835	369
French West Indies	2,498	505
Virgin Islands of United States	532	46

Country receiving	1926	
	Pounds	Value
SOUTH AMERICA		
Argentina	5,290	$1,788
Colombia	2,700	251
French Guiana	624	78
Peru	100	18
Venezuela	1,245	180
ASIA		
China	2,339	397
Hong Kong	1,000	175
Japan	1,160	155
Malaya	11,160	2,730
OCEANIA		
Australia	71,400	10,814
British Oceania	1,630	403
French Oceania	100	12
New Zealand	600	102
Philippine Islands	8,088	1,462
Total	5,184,277	942,812
RECAPITULATION		
Europe	4,119,007	824,203
North America	957,834	100,044
South America	9,959	2,315
Asia	15,659	3,457
Oceania	81,818	12,793

Country receiving	1927	
	Pounds	Value
EUROPE		
Belgium	160,200	$33,280
Denmark	37,198	9,957
France	10,000	1,500
Germany	1,799,341	384,526
Hungary	38,775	8,663
Netherlands	435,201	99,184
Norway	71,975	20,736
Sweden	222,855	37,567
United Kingdom	1,567,980	256,935
NORTH AMERICA		
Canada	945,017	104,849
Costa Rica	7,400	928
Guatemala	10	2
Nicaragua	4,070	378
Panama	7,500	817
Salvador	120	24
Mexico	4,415	773
Bermuda	1,765	446
Barbados	550	149
Jamaica	315	102
Other British West Indies	287	42
Cuba	6,470	1,347
Dominican Republic	5,736	666
Netherland West Indies	3,466	805
Haiti, Republic of	1,170	181
Virgin Islands of United States	1,196	163

Country receiving	1927	
	Pounds	Value
SOUTH AMERICA		
Argentina	9,093	$4,061
Colombia	2,160	289
Peru	2,980	384
Venezuela	3,460	469
ASIA		
British India	336	56
British Malaya	9,745	2,207
China	3,138	453
Netherland East Indies	110	12
Hong Kong	3,825	585
Japan	170	22
OCEANIA		
Australia	53,204	7,575
British Oceania	200	35
French Oceania	1,050	216
New Zealand	600	116
Philippine Islands	12,359	2,270
Total	5,435,542	982,170
RECAPITULATION		
Europe	4,343,525	851,748
North America	989,487	111,672
South America	17,693	5,203
Asia	17,324	3,335
Oceania	67,513	10,212

Exports, by countries receiving, of domestic pickled salmon, calendar years 1918 to 1927[1]

Country receiving	1918		1919	
	Pounds	Value	Pounds	Value
EUROPE				
Azores and Madeira Islands			400	$62
Belgium			200	35
Denmark			2,008,800	466,359
Germany			461,400	41,538
Greece			21,800	3,879
Netherlands			54,000	15,995
Norway			502,800	123,069
Spain			200	29
Sweden			435,600	105,010
United Kingdom:				
England	83,800	$17,800	442,000	124,152
Scotland			20,200	2,830
NORTH AMERICA				
Bermuda			7,400	662
British Honduras			200	20
Canada	13,200	1,300	54,400	5,031
Central American States:				
Costa Rica			600	66
Guatemala	1,000	138	1,000	199
Honduras	200	6		
Nicaragua			600	59
Panama	6,200	817	5,600	846
Mexico	1,000	104	400	36
West Indies:				
British—				
Barbados	1,400	176	60,200	11,380
Jamaica	200	17	3,600	390
Trinidad and Tobago	1,200	115	131,800	18,148
Other British	600	59	1,800	243
Cuba	3,400	452	6,200	1,008
Danish	3,600	350		
Dominican Republic	10,800	1,180	7,000	1,004
Dutch	400	20	2,600	213
French	400	46	3,800	547
Haiti	4,800	497	4,000	652
Virgin Islands of United States			4,000	454
SOUTH AMERICA				
Colombia	200	20	400	36
Guiana:				
British	2,800	369	2,000	270
Dutch	3,000	386	20,200	2,726
French	7,000	865	7,000	1,186
Peru			600	72
Venezuela	400	42	200	50
ASIA				
China	1,800	210	600	86
Japan			18,600	1,864
OCEANIA				
British:				
Australia	211,600	23,704	147,200	16,292
New Zealand	200	28		
Other British	400	35	600	70
French	8,800	937	5,800	692
German	15,000	1,645	3,800	413
Philippine Islands	600	63		
AFRICA				
British South Africa			200	32
Liberia	400	20	1,400	69
Total	384,400	51,401	4,451,200	947,694
RECAPITULATION				
Europe	83,800	17,800	3,947,400	882,958
North America	48,400	5,277	295,200	8,84,340
South America	13,400	1,682	30,400	740
Asia	1,800	210	19,200	1,950
Oceania	236,600	26,412	157,400	17,467
Africa	400	20	1,600	101

[1] Included in "All others" in previous years.

Exports, by countries receiving, of domestic pickled salmon, calendar years 1918 to 1927—Continued

Country receiving	1920		1921	
	Pounds	Value	Pounds	Value
EUROPE				
Belgium	2,400	$570		
Denmark	1,155,600	298,586	1,195,800	$304,724
Germany	1,319,400	318,406	2,436,400	528,105
Greece	61,800	9,640	12,000	700
Italy	35,400	8,231	15,400	4,660
Malta, Gozo, etc	32,000	3,925	9,000	875
Netherlands	266,200	59,853	361,000	85,796
Norway	1,068,000	268,221	694,000	208,822
Rumania			1,400	275
Spain			400	80
Sweden	873,400	210,466	290,000	82,215
United Kingdom: England	658,400	193,263	504,200	137,521
NORTH AMERICA				
Canada	24,000	2,317	73,600	11,767
Costa Rica	2,800	295	2,400	219
Guatemala	600	41	1,200	110
Honduras	200	22	800	149
Panama	7,400	1,134	9,400	1,044
Mexico	1,800	188	1,200	185
Newfoundland and Labrador			1,000	52
Barbados	18,000	2,722	31,200	4,405
Jamaica	5,000	589	15,400	1,370
Trinidad and Tobago	14,200	2,308	13,000	1,810
Other British West Indies	200	20	7,200	924
Cuba	16,800	1,967	9,000	771
Dominican Republic	18,600	2,390	4,000	334
Dutch West Indies	9,000	1,265	8,200	798
French West Indies			4,600	586
Haiti	6,400	826	8,200	627
Virgin Islands of United States	10,200	1,177	14,200	1,486
SOUTH AMERICA				
Colombia			3,200	389
British Guiana			3,400	390
Dutch Guiana	21,000	2,699	2,200	238
French Guiana	2,000	173		
Venezuela	200	36		
ASIA				
China	5,400	432	200	15
Hong Kong	400	35		
Japan	1,000	185	1,000	91
Turkey in Asia			1,200	250
OCEANIA				
Australia	63,200	7,602	140,600	16,362
New Zealand	12,400	1,308	1,600	232
Other British Oceania	600	60		
French Oceania	5,200	650	2,800	295
Other Oceania	2,400	254	3,000	283
Philippine Islands			1,000	38
AFRICA				
British West Africa	2,000	315		
British East Africa	3,000	420		
French Africa	600	90		
Total	5,727,200	1,402,681	5,884,400	1,398,993
RECAPITULATION				
Europe	5,472,600	1,371,161	5,519,600	1,353,773
North America	135,200	17,261	204,600	26,637
South America	23,200	2,908	8,800	1,017
Asia	6,800	652	2,400	356
Oceania	83,800	9,874	149,000	17,210
Africa	5,600	825		

Exports, by countries receiving, of domestic pickled salmon, calendar years 1918 to 1927—Continued

Country receiving	1922		1923	
	Pounds	Value	Pounds	Value
EUROPE				
Finland			200	$16
Denmark	654, 600	$193, 063	436, 400	153, 360
Germany	1, 399, 000	293, 967	481, 400	116, 569
Netherlands	54, 400	13, 559	264, 200	53, 519
Norway	383, 000	113, 212	470, 600	131, 039
Sweden	234, 600	65, 024	260, 600	71, 449
United Kingdom: England	569, 600	154, 647	363, 600	103, 140
NORTH AMERICA				
Bermuda	600	49		
British Columbia and Yukon	178, 400	17, 039	271, 600	67, 806
Canada, Maritime Provinces	200	15	400	40
Quebec and Ontario	600	65	2, 800	584
Canada, Prairie Provinces	52, 000	6, 258	400	21
Costa Rica	2, 800	198	2, 800	256
Guatemala	800	66		
Honduras	200	21	200	19
Panama	6, 800	650	3, 800	421
Mexico	2, 200	277	200	9
British West Indies:				
Barbados	8, 600	837		
Jamaica			1, 000	84
Trinidad and Tobago	10, 000	675		
Other British			200	18
Cuba	1, 800	168	1, 400	135
Dominican Republic	1, 400	123	1, 800	170
Dutch West Indies	3, 000	281	3, 200	292
French West Indies	800	67		
Haiti	9, 200	727	7, 600	652
Virgin Islands of United States	3, 400	273	1, 600	144
SOUTH AMERICA				
Argentina			200	33
Colombia	200	12		
British Guiana	800	60	200	28
Dutch Guiana	1, 000	80	1, 200	108
French Guiana			200	27
Venezuela	3, 000	288	200	24
ASIA				
China	200	18	200	16
Hong Kong			200	25
Japan	200	20	124, 200	10, 491
OCEANIA				
British Oceania			600	54
Australia	253, 400	25, 478	201, 000	20, 082
New Zealand	3, 800	331	400	69
Other British Oceania			2, 000	129
French Oceania	6, 600	477	6, 400	638
Other Oceania	5, 800	472		
Philippine Islands	200	32		
AFRICA				
British West Africa	400	40		
Liberia	200	30	400	19
Total	3, 853, 800	888, 599	2, 913, 400	731, 436
RECAPITULATION				
Europe	3, 295, 200	833, 472	2, 277, 000	629, 092
North America	282, 800	27, 789	299, 000	70, 651
South America	5, 000	440	2, 000	220
Asia	400	38	124, 600	10, 532
Oceania	269, 800	26, 790	210, 400	20, 922
Africa	600	70	400	19

Exports, by countries receiving, of domestic pickled salmon, calendar years 1918 to 1927—Continued

Country receiving	1924		1925	
	Pounds	Value	Pounds	Value
EUROPE				
Denmark	625,400	$188,126	554,200	$162,268
France			30,000	7,800
Germany	2,395,800	571,298	2,853,000	763,221
Greece	2,400	690		
Netherlands	235,600	64,091	234,600	63,253
Norway	360,200	112,596	321,200	97,859
Sweden	402,200	99,562	509,800	143,837
United Kingdom: England	331,600	97,761	153,600	43,373
NORTH AMERICA				
British Honduras			200	18
Canada	723,800	122,775	28,000	4,438
Costa Rica	200	25	600	76
Guatemala	200	24	400	52
Honduras	200	33		
Nicaragua			200	24
Panama	31,000	7,530	2,800	448
Mexico	1,000	77	600	45
Miquelon and St. Pierre Islands			200	19
Bermuda			200	50
Other British West Indies	400	36	400	43
Trinidad and Tobago	200	27		
Cuba	27,600	2,739	2,600	357
Dominican Republic	600	59	400	52
Dutch West Indies	3,400	311	3,600	457
French West Indies	600	58	400	58
Haiti	3,800	450	400	43
Virgin Islands of United States	2,200	195	1,400	178
SOUTH AMERICA				
British Guiana	200	25		
Dutch Guiana	2,000	200	400	80
French Guiana	800	84	2,000	244
Venezuela	200	32		
ASIA				
Japan			200	18
OCEANIA				
Australia	204,200	28,350	64,000	12,647
New Zealand	800	122	400	80
French Oceania	7,800	982	4,000	569
Other Oceania	1,000	113	3,800	418
Philippine Islands			200	32
Total	5,365,400	1,298,371	4,773,800	1,302,057
RECAPITULATION				
Europe	4,353,200	1,134,124	4,656,400	1,281,611
North America	795,200	134,339	42,400	6,358
South America	3,200	341	2,400	324
Asia			200	18
Oceania	213,800	29,567	72,400	13,746

Country receiving	1926	
	Pounds	Value
EUROPE		
Belgium	27,200	$7,567
Austria	7,200	1,800
Denmark	262,600	79,678
Germany	1,852,200	436,892
Netherlands	192,400	49,498
Norway	183,800	55,520
Sweden	596,400	119,701
United Kingdom	123,400	35,103
Italy	1,200	125
NORTH AMERICA		
Canada	6,800	1,242
Costa Rica	1,400	184
Guatemala	200	23
Panama	4,000	684
Mexico	200	20
Bermuda	1,400	209
Other British West Indies	200	17
Cuba	6,000	678
Dominican Republic	3,000	285
Dutch West Indies	2,600	383
Haiti	600	104
Virgin Islands of United States	2,400	330
SOUTH AMERICA		
Dutch Guiana	2,000	320
Colombia	200	32
ASIA		
Hong Kong	200	20
OCEANIA		
French Oceania	1,000	202
Australia	75,600	12,092
British Oceania	2,000	242
Total	3,356,200	803,051
RECAPITULATION		
Europe	3,246,400	785,884
North America	28,800	4,259
South America	2,200	352
Asia	200	20
Oceania	78,600	12,536

Exports, by countries receiving, of domestic pickled salmon, calendar years 1918 to 1927—Continued

Country receiving	1927		Country receiving	1927	
	Pounds	Value		Pounds	Value
EUROPE			OCEANIA		
Denmark	295, 400	$88, 196	Australia	57, 400	$9, 626
Germany	1, 853, 800	475, 486	British Oceania	600	60
Netherlands	187, 400	49, 454	French Oceania	200	14
Norway	196, 400	67, 816	New Zealand	4, 400	474
Sweden	230, 600	64, 567	AFRICA		
United Kingdom	77, 600	24, 527	British South Africa	8, 200	2, 888
NORTH AMERICA			Total	2, 947, 400	787, 371
Canada	9, 600	1, 594	RECAPITULATION		
Costa Rica	1, 000	66			
Panama	3, 600	480			
Bermuda	200	51			
Jamaica	200	39	Europe	2, 841, 200	769, 546
Other British West Indies	1, 200	125	North America	34, 400	4, 361
Cuba	600	85	South America	1, 000	402
Dominican Republic	1, 400	187	Oceania	62, 600	10, 174
Netherland West Indies	12, 800	1, 405	Africa	8, 200	2, 888
French West Indies	600	65			
Virgin Islands of United States	3, 200	264			
SOUTH AMERICA					
Argentina	800	386			
Venezuela	200	16			

The following table gives a summary, by customs districts, of the exports of domestic fresh and cured salmon from 1900 to 1915, inclusive, and a detailed statement of the same for the years 1916 to 1927, inclusive. The greater part of the shipments pass through the New York City customs district.

Exports, by customs districts, of domestic pickled, fresh, etc., salmon

SUMMARY, FISCAL YEARS 1900 TO 1915 [1]

Customs district from which exported	1900	1901	1902	1903	1904	1905	1906
Atlantic ports	$346, 924	$330, 890	$503, 439	$767, 397	$1, 103, 034	$1, 757, 832	$1, 781, 476
Gulf ports	----------	5	143	30	124	159	14
Mexican border ports	1, 192	535	1, 857	1, 227	1, 160	997	788
Pacific ports	185, 644	92, 698	188, 177	99, 018	56, 167	66, 772	139, 606
Northern border and Lake ports	1, 516	2, 610	819	1, 680	3, 004	6, 895	5, 580

Customs district from which exported	1907	1908	1909	1910	1911	1912
Atlantic ports	$1, 797, 411	$1, 590, 778	$1, 230, 542	$1, 479, 656	$1, 514, 599	$1, 586, 319
Gulf ports	276	7, 226	49	74	1, 542	----------
Mexican border ports	424	167	25	202	18	202
Pacific ports	73, 927	44, 313	50, 834	50, 521	46, 167	33, 190
Northern border and Lake ports	6, 705	5, 560	7, 110	2, 187	10, 813	10, 440

Customs district from which exported	1913	1914	1915	Customs district from which exported	1913	1914	1915
New York	$2, 060, 068	$2, 067, 366	$1, 377, 840	San Francisco	$26, 030	$29, 880	$28, 777
Alaska	20, 995	16, 932	6, 630	All other districts	8, 119	21, 418	9, 592
Puget Sound	7, 354	59, 713	2, 020				

[1] A more detailed statement for 1900 to 1912 may be found in Pacific Salmon Fisheries, by John N. Cobb, Appendix III, Report U. S. Commissioner of Fisheries, 1916, pp. 202-203. Washington, 1917.

Exports, by customs districts, of domestic pickled, fresh, etc., salmon—Continued

DETAILS, FISCAL YEARS 1916 TO 1918

Customs district from which exported	1916	1917	1918	Customs district from which exported	1916	1917	1918
Maine and New Hampshire	$16	$22,480	$37	Alaska	$5,203	$29,348	$14,529
Massachusetts	2,925	14,764	32,002	Hawaii	16	15	7
New York	732,782	360,348	106,636	San Francisco	33,648	23,804	6,907
Porto Rico	47	635	57	Southern California	80	255	191
Florida	60		210	Washington	1,155	4,779	19,825
Mobile	48	5	5	Buffalo	394	2,939	6,450
New Orleans	610	166	408	Dakota	706	2,233	1,942
Sabine	33		950	Duluth and Superior	13	42	251
Arizona	1,736	374	501	Michigan	8,845	12,695	11,910
Eagle Pass		454		Montana and Idaho		5,567	49
El Paso		276	24	St. Lawrence	1,300	7,167	1,258
San Antonio			1,123	Vermont	565	4,433	174
Laredo	16	100		Total	790,198	492,879	205,446

Exports, by customs districts, of domestic pickled salmon, 1918 to 1927

Customs district from which exported	1918		1919		1920	
	Pounds	Value	Pounds	Value	Pounds	Value
Maine and New Hampshire			24,000	$2,220		
Massachusetts			400	65		
New York	131,400	$23,346	4,208,200	919,375	5,596,000	$1,387,502
Porto Rico	200	23			4,800	739
Philadelphia			8,800	3,500		
New Orleans	400	39	1,400	163	600	41
Alaska	8,000	770	800	100	1,000	77
San Francisco	237,000	26,443	159,400	17,724	85,200	10,534
Southern California	600	58	400	36		
Washington	4,000	458	20,000	2,017	38,400	3,639
Dakota	1,200	91	25,000	2,112	600	81
Duluth and Superior	400	60				
Michigan	600	53	800	168		
Montana and Idaho			200	34		
St. Lawrence	600	60	1,800	180		
San Antonio					600	68
Total	384,400	51,401	4,451,200	947,694	5,727,200	1,402,681

Customs district from which exported	1921		1922		1923	
	Pounds	Value	Pounds	Value	Pounds	Value
Buffalo			200	$21	2,400	$516
Massachusetts	1,000	$52				
New York	4,179,600	1,144,743	2,185,400	600,743	1,635,000	495,709
Philadelphia	1,800	450				
Maryland	5,000	1,150	2,000	395		
Porto Rico			1,200	74	800	66
New Orleans	2,600	348	1,000	87	17,200	6,216
Arizona			1,800	255		
San Antonio			400	22		
Alaska	69,000	11,304	178,000	16,978	271,600	67,806
San Francisco	334,600	57,959	850,600	165,150	498,600	82,412
Oregon	421,600	104,091	371,400	60,964	283,600	52,198
Washington	865,200	78,460	209,800	37,628	203,000	26,384
Montana and Idaho					200	10
Michigan					600	88
Dakota	4,000	436	52,000	6,258	200	11
St. Lawrence			200	24	200	20
Total	5,884,400	1,398,993	3,854,000	888,599	2,913,400	731,436

Exports, by customs districts, of domestic pickled salmon, 1918 to 1927—Continued

Customs district from which exported	1924		1925		1926	
	Pounds	Value	Pounds	Value	Pounds	Value
Maryland	5,600	$1,398				
Buffalo	10,800	2,777	10,600	$1,969	2,000	$496
New York	3,942,000	1,033,183	3,906,200	1,078,093	2,389,400	599,830
Philadelphia					11,000	1,250
Porto Rico	400	36	400	26	2,000	253
New Orleans	2,000	258	1,400	239	3,200	551
El Paso					200	20
Alaska	711,000	119,778	3,400	482	3,800	479
San Francisco	306,800	45,631	318,800	61,878	278,200	54,560
Los Angeles			200	15		
Florida					4,000	379
Oregon	364,800	90,667	488,600	148,912	310,000	93,317
Washington	19,800	4,458	43,400	10,278	351,400	51,549
Michigan			200	53	800	305
Dakota	200	28				
Duluth and Superior			200	60		
Vermont	400	40				
St. Lawrence	800	77	400	52	200	62
San Antonio	800	40				
Total	5,365,400	1,298,371	4,773,800	1,302,057	3,356,200	803,051

Customs district from which exported	1927		Customs district from which exported	1927	
	Pounds	Value		Pounds	Value
St. Lawrence	600	$150	Alaska	6,400	$809
Buffalo	1,600	338	Michigan	1,000	297
New York	2,326,200	636,046	Porto Rico	3,400	297
San Francisco	264,600	64,184			
Oregon	341,600	85,250	Total	2,947,400	787,871

Exports of all other salmon, by customs districts, calendar years 1919–1927

Customs district	1919	1920	1921	1922		1923	
				Pounds	Value	Pounds	Value
Maine and New Hampshire	$72,305	$26		198	$41		
Vermont	2,831	1,370	$152	10,720	1,419	3,850	$496
Massachusetts	18,986	80		1,114	172	77,871	9,428
St. Lawrence	29,252	4,299	4,922	32,705	6,770	20,791	5,537
Buffalo	5,964	5,692	5,978	28,377	6,057	7,442	1,579
New York	218,204	135,415	63,574	433,716	114,035	430,949	88,271
Philadelphia	44,625		38			115	40
Georgia		770					
Florida	4	58	107	5,482	528	360	60
Mobile			74			186	24
New Orleans	4,049	400	35	530	57	1,030	137
Sabine	29	1,161	288	1,420	212		
Galveston		487	125				
San Antonio	13,365	176	834	2,301	405	7,985	1,467
El Paso	5		19	180	30	102	56
Arizona	65	61	170	680	60	225	50
San Diego	315	430	106	4,411	869		
Los Angeles		906	11			3,230	486
San Francisco	41,046	2,655	5,104	41,640	6,631	95,435	15,328
Oregon		1,000	25,035	592,861	102,212	1,164,210	191,469
Washington	13,861	23,195	39,652	282,117	46,089	712,381	78,760
Alaska	347,068	170,518	294,155	4,515,658	277,854	2,727,449	290,162
Hawaii		12	12	20	3		
Montana and Idaho	12,283	15		244	33	640	115
Dakota	4,250	5,979	2,432	2,623	877	2,433	844
Duluth and Superior	44			384	110		
Michigan	13,591	4,429	399	300	64	38,975	3,917
Ohio	123						
Porto Rico	199	230	55	326	35	636	62
Total	842,464	359,364	443,277	5,958,007	564,563	5,296,295	688,288

Exports of all other salmon, by customs districts, calendar years 1919–1927—Con.

Customs district	1924		1925		1926		1927	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Maine and New Hampshire					160	$29		
Vermont	1,300	$117	200	$46	1,000	85	33	$15
Massachusetts	2,385	394	2,262	383				
St. Lawrence	19,732	4,864	22,603	5,188	9,356	2,860	16,927	5,054
Buffalo	6,590	1,667	5,729	1,654	15,542	3,981	4,074	1,474
New York	1,551,778	325,025	1,196,681	270,852	1,063,373	223,191	804,940	143,582
Philadelphia							825	50
Florida			520	81	142	37	70	14
Mobile	600	60			210	28		
New Orleans	4,372	259	162	35	180	36		
San Antonio	12,417	1,262	121,964	7,513	79,288	5,560	1,820	448
El Paso	552	100	254	62	20	11	89	21
Arizona			285	40			120	12
Los Angeles	99,735	5,253	2,851	477	2,349	284	2,210	264
San Francisco	74,053	9,513	82,492	15,031	206,550	27,986	184,776	39,644
Oregon	1,007,896	190,188	1,025,589	181,935	2,164,319	454,077	1,463,575	334,569
Washington	706,013	132,307	1,577,510	219,398	855,119	152,220	2,053,282	361,394
Alaska	1,968,996	224,132	1,769,513	126,835	782,368	71,511	889,425	91,567
Montana and Idaho			85	11				
Dakota	1,565	462	475	105	217	69	661	64
Duluth and Superior	124	40					176	29
Michigan	4,923	994	48,206	5,144	3,552	801	11,343	3,806
Porto Rico	270	47	1,708	207	532	46	1,196	163
Total	5,463,301	896,684	5,859,089	834,997	5,184,277	942,812	5,435,542	982,170

IMPORTS OF FRESH SALMON [41]

For some years it was the custom of the canneries on Puget Sound, when fish were scarce on the American side and abundant on the Canadian side, to import fresh salmon to fill out the domestic supply and the Canadian canneries would do the same when the conditions were reversed. In 1904 the Canadian Government prohibited the export of fresh sockeye salmon to Puget Sound for packing purposes, and in 1910 an effort was made to have Congress retaliate by enacting a similar law for this side of the line, but the bill failed of passage.

The table below shows the yearly imports of fresh salmon from British Columbia:

Imports of fresh salmon from British Columbia, Canada, for a series of years [1]

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
1890	4,660	$241	1897	93,454	$2,681	1904	40,610	$1,025
1891	4,950	170	1898	11,580	278	1905	1,015	35
1892	6,288	301	1899	58,002	4,101	1906	3,457,738	64,408
1893	64,811	3,639	1900	19,404	855	1907	113,224	4,131
1894	3,872	219	1901	27,072	2,050	1908	8,880	795
1895	14,000	1,403	1902	22,353	739	1909	41,073	2,346
1896	11,799	419	1903	6,860	343	1910	198,251	10,116

[1] After 1909 all imports of fresh salmon are listed under "Fish, fresh."

After 1911 the imports of fresh salmon from both coasts of Canada and from Newfoundland were lumped together, and are shown in the table below. Generally, about nine-tenths of this salmon came from the Province of British Columbia in Canada.

[41] The tables include salmon—fresh, frozen, and packed in ice.

Imports of fresh salmon from British Columbia, Canada, for a series of years—Continued

FISCAL YEAR

June 30—	Pounds	Value	June 30—	Pounds	Value	June 30—	Pounds	Value
1911	1, 122, 286	$114, 123	1914	3, 262, 828	$245, 791	1917	19, 769, 660	$599, 442
1912	1, 520, 687	135, 416	1915	10, 676, 296	383, 697	1918	14, 408, 294	957, 169
1913	2, 089, 781	180, 513	1916	24, 026, 481	501, 115	1919	15, 571, 451	928, 552

CALENDAR YEAR

Dec. 31—	Pounds	Value	Dec. 31—	Pounds	Value	Dec. 31—	Pounds	Value
1918	13, 085, 998	$631, 119	1922	10, 490, 728	$1, 165, 291	1926	5, 441, 629	$645, 609
1919	13, 745, 496	825, 803	1923	7, 644, 640	892, 071	1927	6, 052, 871	668, 982
1920	5, 645, 306	663, 552	1924	8, 606, 343	970, 572			
1921	11, 495, 880	1, 119, 719	1925	6, 548, 711	749, 578			

The following table shows, by customs districts, the imports of fresh salmon during the calendar year 1927. Included therein are 8,508 pounds, valued at $841, which were imported from Japan, in addition to the imports from Canada.

Imports of fresh salmon, by customs districts, calendar year 1927

Customs district	Pounds	Value	Customs district	Pounds	Value
Maine and New Hampshire	346, 377	$64, 806	Hawaii	6, 420	$746
Vermont	301, 134	57, 226	Montana and Idaho	3, 426	578
Massachusetts	644, 450	85, 507	Dakota	152, 810	16, 249
St. Lawrence	465, 681	77, 709	Duluth and Superior	35, 544	8, 785
Buffalo	214, 036	31, 310	Wisconsin	25, 050	1, 754
New York	68, 884	11, 345	Michigan	2, 250	259
Washington	3, 794, 783	313, 440			
Alaska	534	107	Total	6, 061, 379	669, 823

During the calendar year 1928 imports of fresh and frozen salmon amounted to 6,221,101 pounds, valued at $711,462.

IMPORTS OF CURED SALMON

Below are shown the imports into this country of foreign-cured salmon, the product of the Pacific salmon fisheries, from 1886 to 1909, inclusive.

Imports of foreign cured or pickled Pacific salmon, 1886 to 1909 [1]

Year	British Columbia		Japan		Hong Kong		Russia, Asiatic		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1886	5,600	$224							5,600	$224
1887	200	4							200	4
1888	86,000	4,031							86,000	4,031
1889	18,200	860							18,200	860
1890	600	36							600	36
1891	200	5							200	5
1893	5,478	291							5,478	291
1894	149,410	17,592			1,200	$29	11,875	$298	162,485	17,919
1895	6,550	250			600	13			7,150	263
1896	6,530	474							6,530	474
1897	6,890	156							6,890	156
1898	4,145	188			30	2	9,870	266	14,045	456
1899	15,875	1,554							[2] 16,032	[2] 1,560
1900	162,558	11,061	600	$41					163,158	11,102
1901	165,243	11,225							165,243	11,225
1902	175,411	13,794	606	28					176,017	13,822
1903	161,549	11,756	360	18					161,909	11,774
1904	282,210	23,319	1,400	52					283,610	23,371
1905	282,027	25,584	3,015	133					285,042	25,717
1906	35,475	1,730	5,510	175					40,985	1,905
1907	6,393	322	680	31					7,073	353
1908	13,230	631	4,185	174					17,415	805
1909	30,710	1,523	3,537	148					34,247	1,617
1910	111,645	5,506								

[1] After 1909 all imports of salmon, pickled or salted, are included under "All other cured or preserved."
[2] Includes 157 pounds, valued at $6, from China.

Since 1910 all imports of cured or pickled salmon have been lumped together and it has been impossible to distinguish the imports of Pacific salmon from those imported from Atlantic districts. The table below shows the total imports, almost all of which comprise salmon from the Province of British Columbia in the Dominion of Canada.

FISCAL YEAR

June 30—	Pounds	Value	June 30—	Pounds	Value	June 30—	Pounds	Value
1911	695,878	$62,769	1914	1,114,927	$84,503	1917	945,394	$81,776
1912	417,938	33,901	1915	1,162,341	104,451	1918	739,759	74,042
1913	344,530	28,650	1916	1,010,844	70,837	1919	859,276	117,352

CALENDAR YEAR [1]

Dec. 31 —	Pounds	Value	Dec. 31—	Pounds	Value	Dec. 31—	Pounds	Value
1923	1,658,666	$283,477	1925	2,652,138	$422,452	1927	2,440,939	$375,900
1924	2,678,908	391,470	1926	4,496,976	658,605			

[1] For the years 1920 to 1922, inclusive, imports of salmon are not shown separately from other cured fish.

EXPORTS OF CANADIAN CANNED SALMON

Exports of canned salmon from Canada, 1916–1927

[Fiscal year ended Mar. 31]

Destination	1916	1917	1918	1919
	Pounds	*Pounds*	*Pounds*	*Pounds*
Australia	4,789,094	3,365,149	2,236,742	3,750,194
Barbados				1,642
Bermuda	11,480	10,934	9,132	25,884
Bolivia		9,600		120,000
British Guiana		48		96
British India	298,200	101,344	2,400	55,950
British South Africa	52,800			48,000
British West Indies	28,643	116,112	48,238	
Chile		14,400		614,016
China	11,976	1,440	101	2,540
Cuba				1,048,800
Dutch East Indies	343,632	319,344	47,768	28,800
Ecuador				2,400
Fiji Islands	928,752	860,400	736,616	354,196
France	3,905,461	5,521,100	13,529,569	2,869,658
French Oceania		14,400	48,000	
Greenland, Iceland, etc			200	
Hong Kong	18,240		7,300	15,550
Italy		60	3,109,694	5,454,670
Jamaica				576
Japan				192
Newfoundland			120	48,000
New Zealand	1,338,050	1,339,282	1,689,652	1,623,496
Other British East Indies				36,000
Other British Oceania	91,056	105,360	6,000	12,000
Other British West Indies				8,646
Panama		4,700		
Peru		21,600		
Russia in Europe				48,600
Siam	14,400	124,848		24,096
St. Pierre and Miquelon	2,394	1,351	1,869	4,784
Straits Settlements	2,064,736	1,060,018	292,800	412,810
Switzerland	192			
Trinidad and Tobago				240
United Kingdom	35,225,051	34,772,879	21,117,314	29,265,108
United States	18,725	567,758	893,639	1,936,753
Total	49,142,882	48,332,127	43,777,154	47,813,697

Destination	1920	1921	1922	1923
	Pounds	*Pounds*	*Pounds*	*Pounds*
Aden				
Argentina		3,400		
Australia	2,198,800	2,285,900	3,739,900	2,993,800
Austria-Hungary	2,000			
Barbados	59,700	94,700	66,400	75,000
Belgian Congo				
Belgium	713,600	127,100	1,090,000	1,144,600
Bermuda	5,400	19,800	6,500	51,600
Bolivia				45,600
Brazil		1,300		
British:				
East Africa				
Guiana	3,700	41,600	22,200	80,600
Honduras				
India				
South Africa	275,100	269,300	117,500	52,800
Straits Settlements	2,551,400	2,193,000	1,261,100	470,500
West Africa	52,800	48,000	3,600	
Canary Islands				
Ceylon	1,300			12,200
Chile	1,451,000	488,200		201,600
China	6,000	12,300	8,900	2,800
Colombia				
Costa Rica		1,000	28,700	
Cuba	334,800	177,100	2,400	
Czechoslovakia				
Denmark		100	24,000	39,000
Dutch:				
East Indies	140,200	391,500	378,200	84,000
West Indies				200
Guiana	500	44,400	13,100	37,700

Exports of canned salmon from Canada, 1916–1927—Continued

Destination	1920	1921	1922	1923
	Pounds	*Pounds*	*Pounds*	*Pounds*
Ecuador	142,600	75,100		45,600
Egypt	23,400	55,100	255,000	52,800
Fiji Islands	329,700	808,800	424,500	544,700
Finland		200		
France	11,986,800	3,541,100	17,422,000	16,386,100
French:				
Africa		6,700	12,700	11,100
East Indies				
Guiana			500	
Oceania	15,700	26,400		2,900
West Indies				
Gambia				
Germany		48,000		
Gibraltar				
Gold Coast		48,000	9,600	
Greece	488,800	48,000	342,000	
Guatemala				
Haiti				
Hawaii		1,200		
Holland	1,900	52,400	470,000	319,900
Hong Kong	44,600	14,500	100	9,300
Irish Free State				
Iraq (Mesopotamia)				
Italy	413,100	48,500		341,200
Jamaica	124,400	92,100	13,900	113,900
Japan	200	2,900	100	1,600
Liberia				
Malta	22,600	4,900	29,800	72,000
Mexico	589,000	125,500	6,700	
Morocco				
Netherlands				
Newfoundland	400	100		
New Zealand	1,392,600	838,900	839,800	1,650,900
Nicaragua				3,800
Nigeria		10,100	26,400	
Norway	100	5,000	900	4,800
Other British:				
East Indies		1,200	16,600	
Oceania	68,100	46,200	119,900	102,700
West Indies	3,600	26,400	6,400	30,300
Palestine				
Panama	32,600		12,300	
Peru	187,000	162,200	2,400	
Philippine Islands	144,000	38,500		
Porto Rico	215,000	100		
Portuguese:				
Africa		3,000		
Asia				
Salvador				1,000
San Domingo			1,900	
Siam	19,300	81,600	163,300	96,000
Sierra Leone		2,400	4,800	
Spain		16,700		
Spanish Africa				
St. Pierre and Miquelon	4,200	1,800		900
Sweden	10,300	8,200	23,300	12,000
Switzerland	2,800	2,400	48,300	52,900
Syria				
Trinidad and Tobago		101,800	116,000	124,800
Turkey	14,400	1,900		
United Kingdom	31,045,100	16,865,700	15,900,400	6,228,400
United States	6,224,800	1,228,500	544,900	592,000
United States of Colombia		15,600		800
Uruguay				
Venezuela		96,000		
Virgin Islands of United States				
Yugoslavia				
Total	61,528,800	30,857,800	43,623,900	32,196,900

Exports of canned salmon from Canada, 1916–1927—Continued

Destination	1924	1925	1926	1927
	Pounds	*Pounds*	*Pounds*	*Pounds*
Aden			8,400	2,400
Argentina	2,400		2,400	9,600
Australia	5,731,400	7,608,500	9,223,600	10,528,800
Austria-Hungary				
Barbados	82,800	144,500	95,300	197,300
Belgian Congo			20,100	29,700
Belgium	4,105,000	2,752,100	2,318,800	2,003,100
Bermuda	28,700	49,700	50,600	75,700
Bolivia	208,000	26,400	69,200	28,800
Brazil	5,300		5,600	1,900
British:				
East Africa		1,200	39,100	34,200
Guiana	93,500	225,700	139,000	133,600
Honduras	1,500		9,500	11,500
India	171,800	424,500	169,500	191,700
South Africa	1,194,600	1,448,600	2,402,900	1,891,500
Straits Settlements	770,700	1,260,400	1,171,100	1,061,900
West Africa	104,600	149,100	228,800	81,100
Canary Islands		37,300	13,200	98,600
Ceylon	95,400	31,400	50,900	65,200
Chile	1,500,800	1,725,700	2,084,500	1,741,900
China	4,300	1,300	23,600	7,500
Colombia	33,300	116,100	196,100	226,000
Costa Rica	27,100	116,200	110,900	37,600
Cuba	172,000	237,000	32,000	248,700
Czechoslovakia			3,000	7,700
Denmark	36,000	21,600	45,500	59,200
Dutch:				
East Indies	98,000	799,500	389,500	512,100
West Indies	14,200	55,500	56,600	17,900
Guiana	131,000	333,500	338,700	115,000
Ecuador	313,000	590,700	235,500	498,900
Egypt	554,100	493,000	459,500	489,000
Fiji Islands				
Finland	14,853,900	16,530,000	17,369,300	9,310,200
France	12,700	54,200	29,800	14,400
French:				
Africa		1,000		1,000
East Indies				
Guiana		28,800	7,700	28,100
Oceania	4,800			
West Indies		1,700		
Gambia	84,500	38,300	149,900	77,400
Germany		13,400	12,000	3,900
Gibraltar	41,700	82,200	336,500	510,600
Gold Coast		112,800	251,100	866,700
Greece	18,300	11,200	6,100	15,900
Guatemala		1,700		
Haiti				
Hawaii				
Holland	27,500	43,000	38,200	20,500
Hong Kong		55,200	28,800	11,300
Irish Free State			14,400	
Iraq (Mesopotamia)	3,437,900	7,373,600	4,877,500	6,572,200
Italy	193,600	199,600	221,800	273,800
Jamaica	421,000	1,400	300	
Japan		2,400		5,800
Liberia	48,000	94,400	69,200	151,200
Malta	514,000	1,011,400	824,200	787,000
Mexico	2,400	1,200	23,500	16,600
Morocco				
Netherlands	330,000	745,900	457,300	616,300
Newfoundland		13,500	1,000	
New Zealand	1,569,400	2,733,900	2,586,300	2,570,500
Nicaragua	7,700	36,200	61,400	15,400
Nigeria	70,200	49,900	535,200	749,000
Norway	5,100	12,000	1,200	
Other British:				
East Indies				9,600
Oceania	147,800	297,000	477,800	264,900
West Indies	34,600	18,700	86,300	50,900
Palestine	43,200	64,200	46,800	78,400
Panama	42,900	75,600	73,200	70,700
Peru	268,400	287,600	230,400	191,700
Philippine Islands	24,000	4,800		4,800
Porto Rico	77,100			155,200
Portuguese:				
Africa	103,200	191,600	199,600	263,200
Asia			2,400	6,000
Salvador	2,700	10,700	4,300	8,800
San Domingo		15,200	40,800	19,600
Siam	2,100	10,100	41,200	5,300

Exports of canned salmon from Canada, 1916–1927—Continued

Destination	1924	1925	1926	1927
	Pounds	*Pounds*	*Pounds*	*Pounds*
Sierra Leone	40,800	128,600	158,300	32,400
Spain			5,400	1,200
Spanish Africa		5,300	26,600	26,000
St. Pierre and Miquelon	1,700	1,800	1,200	
Sweden	7,200	5,200	10,200	31,400
Switzerland	79,700	80,500	32,400	32,200
Syria		3,800	2,400	59,500
Trinidad and Tobago	59,800	160,400	252,400	226,500
Turkey		28,800	9,800	7,300
United Kingdom	15,263,100	26,576,100	16,588,700	12,775,100
United States	709,300	1,448,000	211,000	2,166,900
United States of Colombia				
Uruguay				4,800
Venezuela	15,600	343,800	625,800	514,400
Virgin Islands of United States	2,400			
Yugoslavia	1,200	5,800	9,400	8,200
Total	54,063,500	77,726,400	67,088,500	60,153,900

SALMON CULTURE [42]

The artificial culture of salmon on the Pacific coast has developed into a large and constantly expanding industry. The United States Bureau of Fisheries operates a number of large and well-equipped hatcheries, while the State governments of California, Oregon, and Washington, the Dominion of Canada and the Province of British Columbia, and certain private companies have built and maintain a large number of hatcheries, some of these being among the largest in the world.

OBTAINING THE SPAWNING FISH

The eggs used for artificial propagation are obtained from salmon taken on their way upstream to the natural spawning grounds. In order to arrest the ascent of the fish a rack is usually built across the stream. Where this is not feasible a trap is sometimes constructed for the purpose of catching the fish. Sometimes the racks have slat traps attached in which some fish are caught.

John Pease Babcock, assistant to the Commissioner of Fisheries of the Province of British Columbia, in 1910 advanced a novel suggestion that freshly fertilized eggs buried immediately under sand and gravel would produce strong healthy fry at less cost than under existing hatching methods, and that fry so produced are stronger and more capable of resisting the attacks of their active enemies. The interesting account of his experiments is reproduced entire: [43]

In writing of the propagation of salmon and trout, some authorities state that considerable loss is occasioned in natural propagation by many of the eggs becoming embedded in sand and gravel; that all the eggs so embedded are lost.

Observation and experiment in the propagation of Pacific salmon and trout for a considerable period lead me to advance the theory that in natural propagation

[42] After the third revision was completed there appeared an excellent work on this subject, entitled "Artificial Propagation of the Salmons of the Pacific Coast," revised and enlarged by Henry O'Malley. Appendix II, Report, U. S. Commissioner of Fisheries, 1919, 32 pp., 9 pls. Washington, 1920. As this report brought the art of fish culture up to date it was decided, in order to reduce the size of this report to eliminate from it the methods of the art and refer the reader to Mr. O'Malley's excellent work. As a result the chapter on Salmon Culture now embraces the historical and statistical aspects.

[43] Some Experiments in the Burial of Salmon Eggs—Suggesting a New Method of Hatching Salmon and Trout. By John Pease Babcock. Transactions, American Fisheries Society, 1910, pp. 393–395. Washington, 1911.

This method has been carried out on a considerable scale by A. Robertson, a Dominion of Canada hatchery superintendent located on the Fraser River, and the results published in "Hatching Salmon Fry in Gravel," Pacific Fisherman, Seattle, Wash., Vol. 17, No. 6, June, 1919, p. 38, illus.

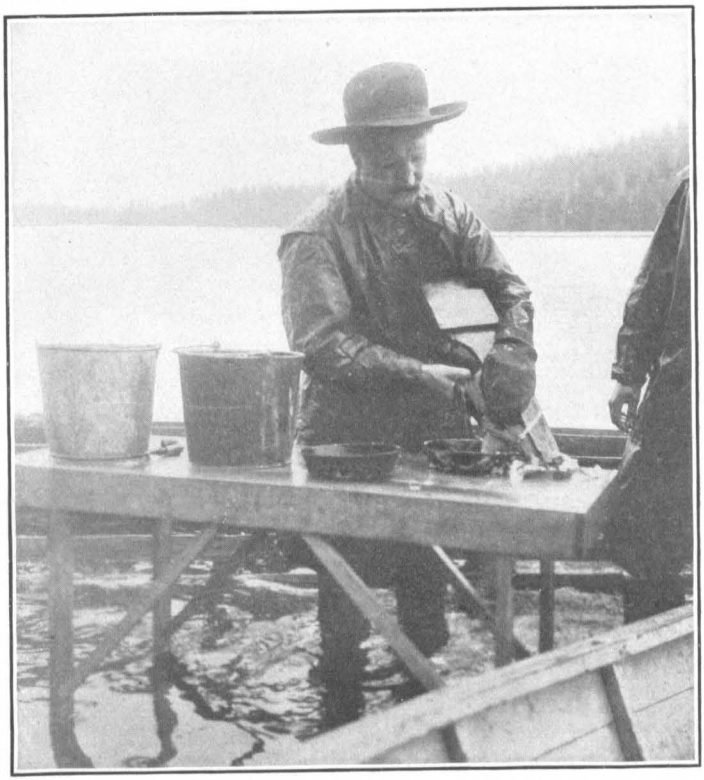


FIG. 40.—STRIPPING SALMON WITH AID OF STRAIT JACKET

FIG. 41.—CHEHALIS HATCHERY, WASHINGTON FISH AND GAME COMMISSION, SHOWING RACKS TO PREVENT SALMON FROM GOING UPSTREAM, AND PEN FOR HOLDING SPAWNING FISH

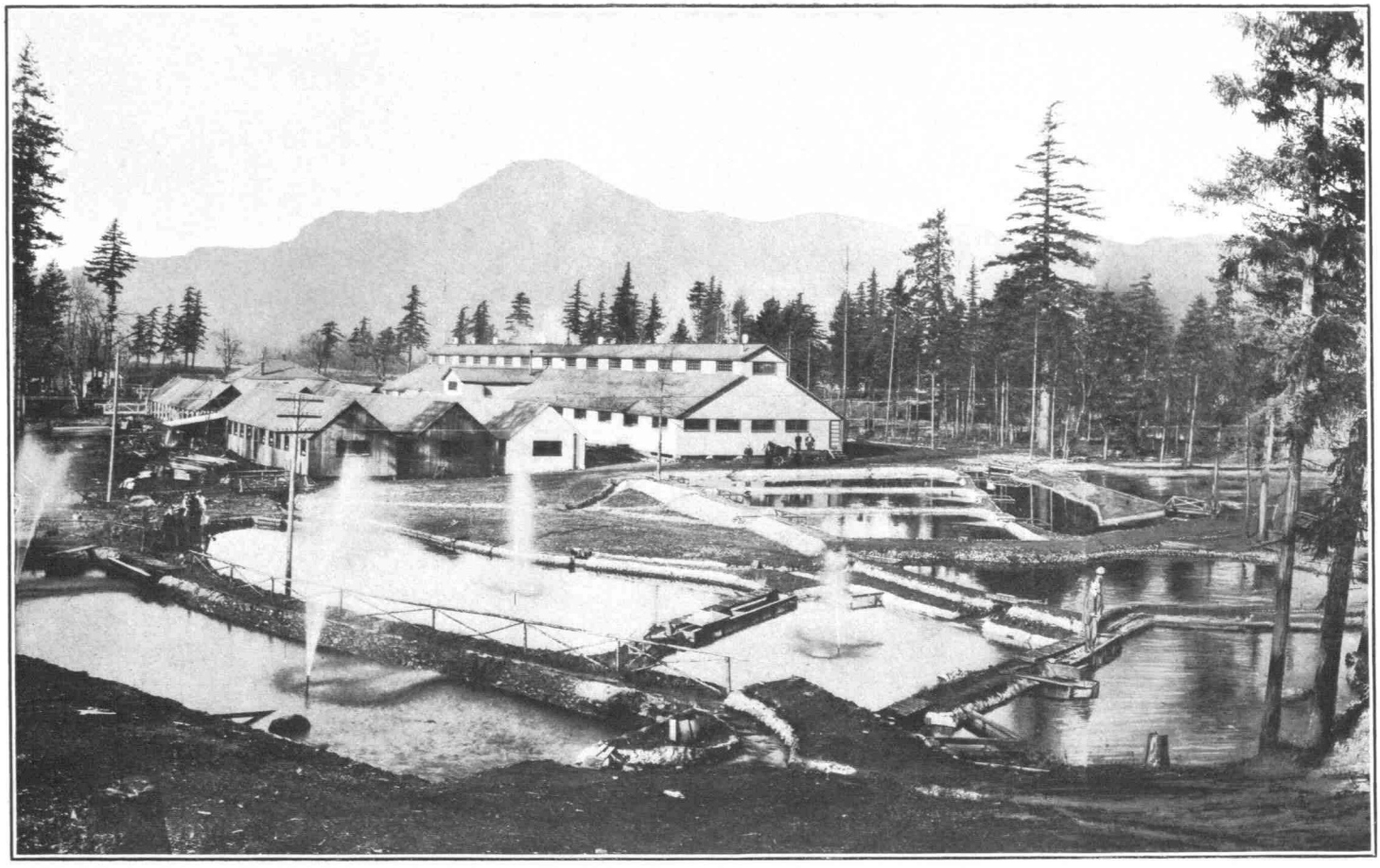


FIG. 42.—BONNEVILLE SALMON HATCHERY OF THE OREGON FISH AND GAME COMMISSION, SHOWING REARING PONDS

only those eggs which become embedded beneath several inches of sand and gravel produce alevins which live to attain the fry stage; and that those eggs which are not covered by several inches of sand and gravel are either consumed by active aquatic enemies or destroyed by vegetable molds, commonly termed "fungus."

My experiments have demonstrated that the burial of freshly fertilized eggs of the *nerka* and other Pacific salmon does not smother them; that eggs so treated not only live but hatch; and that if they are covered to a sufficient depth the alevins produced survive and possess the instinct and power to work their way gradually to the surface; that if buried beneath 5 or 6 inches of sand and gravel such eggs will hatch, and the young will work their way up through the sand and gravel to the surface, and that by the time they emerge, have absorbed their sacs and are then exempt from the attacks of vegetable molds.

Eggs buried under 1 or 2 inches of sand and gravel produce alevins that work their way up to the surface before the sac is absorbed, and upon reaching the surface are subject to attack by vegetable molds, and a very large percentage are thus destroyed, as well as by the more developed forms of aquatic life.

Eggs buried to a depth of 3 inches produce alevins that work their way to the surface so gradually that by the time they reach the surface their sacs are so nearly absorbed that many, but not all, resist the effects of fungus. Alevins from eggs buried beneath less than 4 inches of sand are liable to reach the surface while the sac is so thinly covered that few, if any, survive the effects of fungous growth.

The spawning beds of Pacific coast streams from California to Alaska (to which my observations have been confined), where the salmon spawn in numbers are, during and after the spawning period, covered with more or less vegetable molds. These molds are particularly common in the beds of streams where great numbers of salmon have spawned and died. Every experienced fish culturist knows that most waters carry great numbers of spores of fungi, and how difficult it is to prevent eggs and alevins from being attacked and injured by their growth. I believe that in natural propagation fungous growths destroy more salmon eggs and alevins than all other causes combined. The vegetable molds of Pacific streams are not active beneath the surface of the beds of streams. Salmon eggs cast therein, if even thinly covered with sand, are not injured by them. These molds do not affect the fry that have nearly or entirely absorbed their sacs, but they are deadly if permitted to attach themselves to either the eggs or the alevins.

My experiments along this line lead me to express the opinion that by the burial of freshly fertilized salmon eggs under 6 or 7 inches of sand and gravel strong healthy fry can be produced at less cost than under existing hatching methods, and that fry so produced are stronger and more capable of resisting the attacks of their active enemies.

I trust that this short statement of my experiments in the burial of salmon eggs may be deemed of sufficient economic importance to stimulate fish culturists generally in experimenting along similar lines. Those who do will perhaps experience some difficulty at first in the covering of a large number of eggs. Experimenters will find that after preparing suitable beds of sand and small gravel the eggs can be evenly laid and held until covered, if the surface of the bed is first thickly indented with cells a little deeper than the eggs. This can be readily accomplished by stamping the bed with a board covered with projections or pegs of suitable size.

My experiments suggest that in the near future most of the buildings and hatching apparatus now used in the propagation of salmon and trout will be dispensed with; that after the eggs have been expressed and fertilized, instead of being placed in wire baskets in hatcheries, they will be buried beneath the sand and gravel of the beds of natural or prepared streams, and that with the exception of watchmen to protect them, little or no other labor will be required.

The subsequent development of this practice has been largely confined to British Columbia. Some 30,000,000 eyed eggs were planted in inaccessible waters by the Canadian hatcheries in 1927. In the United States such plants have been made in only a limited number of instances.

REARING SALMON FRY

For many years it was the custom to plant the fry as soon as they had absorbed the yolk sac, a period of about 30 days. A few thousands were sometimes raised to the fingerling, yearling, or adult

stage, more as a curiosity than anything else. No particular difficulty was experienced in raising these fish, but the expense entailed in feeding them for a prolonged period, and the impossibility of doing so unless large ponds were constructed at great expense for the purpose of holding them during the feeding period, prevented the general adoption of the rearing system.

For some years certain fish culturists and others had contended that the planting of fry just after they had absorbed the umbilical sac was an economic mistake, claiming that at this age they were weak and comparatively sluggish in their movements, and would fall easy prey to their numerous fish, bird, and other enemies. The late Robert D. Hume, who built and operated a hatchery on the lower Rogue River, also one on the upper Rogue River, which the United States Bureau of Fisheries operated for some years, was one of the first to take up the rearing of salmon fry on any scale.

In time these objections bore weight, and a few years ago the construction of ponds in which fry could be held and fed until they had reached a size which would insure them at least an even chance for their lives was undertaken all along the coast, with the result that to-day there is a pond capacity for about one-half of the total capacity of the various hatcheries.

Most of the nursery ponds have been constructed near the hatcheries and usually comprise oblong trenches dug in the earth and walled with cement and stone.

In Oregon the State authorities found that the best results in pond rearing were obtained by using creek or natural ponds, which were made by placing dams across the small streams in the vicinity of the hatcheries. When first taken from the hatching troughs the fry are placed in the artificial ponds until the danger from spring freshets in the small streams is over. They are then transferred to the natural ponds, where the continual flow of fresh water, and the logs, rocks, etc., which provide shade and shelter, afford more natural conditions, and in which the natural food of the fry supplements the artificial food provided by man.

A big advantage in connection with the use of natural ponds is the comparatively small expense involved in providing for them as compared with the large expense involved in the construction of cement ponds.

The young fry show when they are ready to feed by darting to one side or the other when small particles of food are dropped in the water and float past them. For the first few weeks they should be fed regularly and as often as six times a day, and the earlier in the day the feeding begins and the later it continues at night the better. Two hours after feeding they will be found to be ravenously hungry, and as they grow much faster for frequent feeding great care should be taken to see that they are well fed. If not fed sufficiently, they will bite at one another and cause more or less mortality among themselves.

FIG. 43.—UNITED STATES SALMON HATCHERY, YES BAY, ALASKA

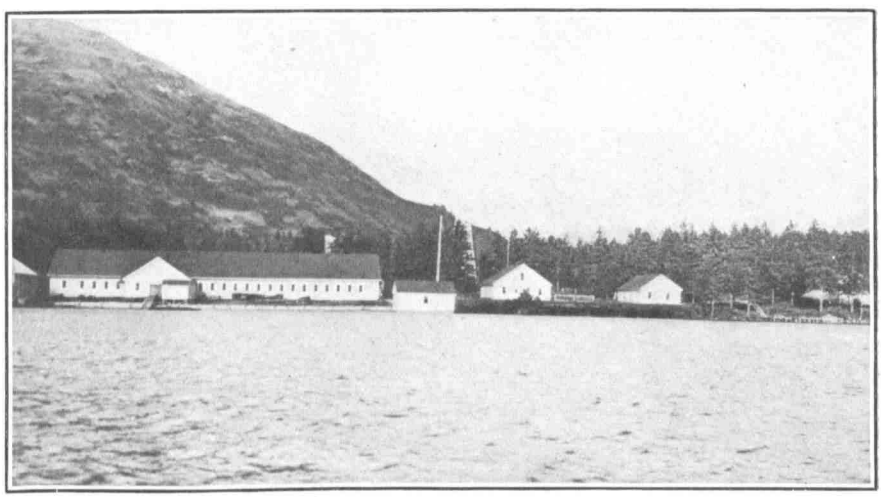


FIG. 44.—UNITED STATES SALMON HATCHERY, AFOGNAK, ALASKA

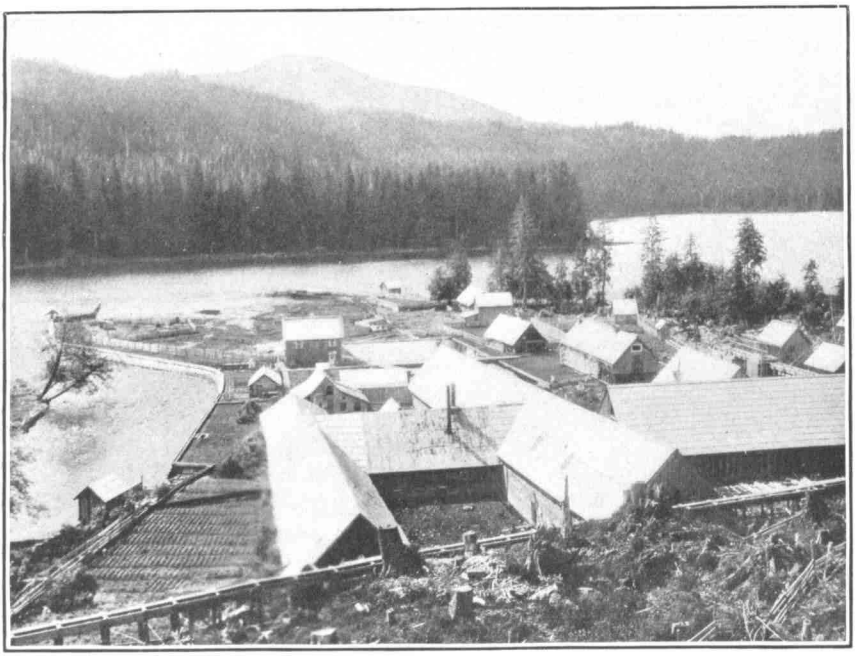


FIG. 45.—ALASKA PACKERS ASSOCIATION FORTMANN HATCHERY, NAHA STREAM, ALASKA

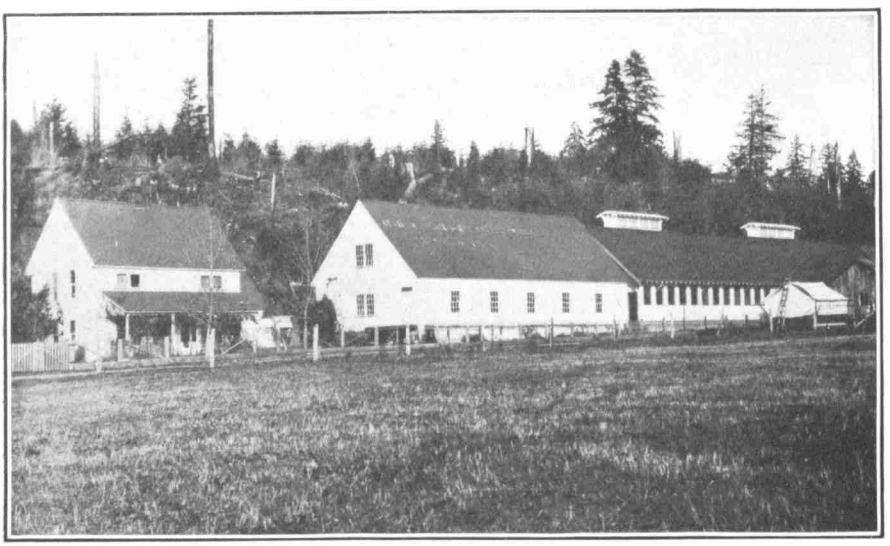


FIG. 46.—CHEHALIS HATCHERY, WASHINGTON FISH AND GAME COMMISSION, SATSOP, WASH.

SALMON HATCHERIES ON THE PACIFIC COAST

Below is shown a list of the salmon and steelhead-trout hatcheries operated on the Pacific coast during the year 1929:

UNITED STATES BUREAU OF FISHERIES

Alaska:
- Afognak.
- Yes Bay.

California:
- Baird.
- Battle Creek.
- Mill Creek.

Oregon:
- Clackamas.
- Applegate.
- Snake River.
- Rogue River.
- Upper Clackamas.

Washington:
- Baker Lake.
- Birdsview.
- Brinnon.
- Duckabush.
- Illabott Creek.
- Quilcene.
- Big White Salmon.
- Little White Salmon.

STATE OF CALIFORNIA

Mount Shasta and Klamath River.
Fort Seward.
Fall Creek.

STATE OF OREGON

Herman Creek.
Wallowa River.
McKenzie River.

STATE OF OREGON—CON.

Bonneville.
Santiam River.
Klaskanine.
Willamette River.
Tillamook.
Siuslaw.
Umpqua.
South Coos.
Coquille.
Alsea.
Rogue River.
Nehalem.
Trask.
Scottsburg.

STATE OF WAHINGTON

Chambers Creek.
Chehalis.
Chehalis No. 2.
Chinook.
Cowlitz River.
Dungeness.
Green River.
Kittitas.
Nasel River.
Nooksack.
Pilchuck.
Puyallup River.
Samish.
Skykomish.
Stillaguamish.
Kalama.
Pateros-Methow.

STATE OF WASHINGTON—continued

Wenatchee.
Wind River.
Humptulips.
Willapa.

DOMINION OF CANADA

Cultus Lake.
Pemberton.
Stuart Lake.
Babine Lake.
Rivers Inlet.
Anderson Lake.
Kennedy Lake.
Cowichan Lake.
Pitt Lake.

PROVINCE OF BRITISH COLUMBIA

Seton Lake.

BRITISH COLUMBIA PACKERS ASSOCIATION

Nimpkish Lake.

ALASKA (PRIVATE HATCHERY)

Northwestern Fisheries Co.:
- Quadra.

GENERAL STATISTICS

Distribution of fry, etc.—In the next table is shown by years and species the distribution in Pacific coast waters of fry, fingerlings, yearlings, and adults from 1873, when the first hatchery began operation, to 1928, inclusive. The figures on fingerlings, yearlings, and adults are not as complete as could be wished, this being due to certain of the State fish commissions not separating them from the fry in the published results.

The table shows the enormous total of 12,330,512,122 fry and 1,045,726,909 fingerlings, yearlings, and adults as having been deposited in local waters since the inception of the work on this coast. Of these nearly one-half were sockeye, or red salmon, followed by chinook, or spring, coho, or silver, chum, steelhead trout, and humpback salmon in the order named.

This table does not show the large number of eggs, fry, etc., shipped from the coast hatcheries to other sections of the country and to various foreign countries. These appear in the tables shown under the various States, Provinces, and Territories.

Distribution of salmon in the Pacific coastal streams of North America, in specified years

Year	Chinook, king, or spring		Coho or silver		Chum		Humpback or pink	
	Fry	Fingerlings, yearlings, and adults	Fry	Fingerlings, yearlings, and adults	Fry	Fingerlings, yearlings, and adults	Fry	Fingerlings, yearlings, and adults
1873	520,000							
1874	850,000							
1875	2,250,000							
1876	2,000,000							
1877	2,550,000							
1878	2,582,620							
1879	5,376,500							
1880	4,059,290							
1881	4,974,790							
1882	3,991,750							
1884	600,000							
1886	150,000							
1887	200,000							
1888	2,590,000							
1889	8,168,000							
1890	5,250,475							
1891	9,269,000							
1892	4,299,000	25,000						
1893	10,825,950							
1894	8,427,900		280,000					
1895	6,458,000		910,000	560,000				
1896	25,581,033	807,150						
1897	31,146,095		298,137					
1898	73,684,076							
1899	56,773,351		189,000					
1900	33,974,064		13,925,104		10,301,760			
1901	36,563,138	1,668	20,047,935		16,478,280			
1902	73,852,120		41,436,123		9,937,390			
1903	75,558,389		34,460,291		10,012,390			
1904	161,530,963		23,894,026				521,797	
1905	143,714,117		30,743,492					
1906	167,745,494	122,980	47,356,449	300	3,268,800		969,990	
1907	124,578,390		44,426,380		6,120,000		4,224,255	
1908	135,447,179	2,165,797	54,108,557		4,342,350		31,920,662	
1909	88,188,707	16,949	50,648,674		7,805,000		10,000	
1910	97,361,532	225	45,863,952		8,607,500		2,251,340	
1911	80,570,265	11,700	52,869,759		13,435,750		460,150	
1912	101,810,515	1,405,860	66,087,446	116,300	4,684,950		34,205,460	
1913	112,008,886		79,313,839		35,792,440		1,888	
1914	133,271,477	2,571,711	67,682,576		16,623,984		39,685,814	
1915	149,666,221	9,875,745	92,926,831		63,088,372		7,867,484	
1916	151,649,595	26,070,128	56,647,147	5,543,712	63,390,798	1,000,000	15,842,627	2,915,000
1917	96,975,725	27,060,581	17,828,235	4,663,560	26,133,925	7,014,580	4,953,000	7,449,030
1918	133,102,069	22,384,610	55,697,111	10,148,815	82,020,140		22,159,186	4,736,000
1919	67,908,011	58,007,670	32,207,426	3,286,580	26,772,025	4,524,560	5,426,000	369,958
1920	124,741,938	66,408,670	106,879,090	1,842,550	37,450,425	5,916,300	1,380,200	
1921	67,598,711	63,434,765	73,616,268	6,571,700	128,550,237	24,504,300	7,077,100	
1922	97,624,865	108,819,170	65,166,590	11,174,940	29,474,210	14,027,610	4,846,300	909,400
1923	106,698,933	54,044,545	67,281,795	6,249,445	10,786,590	15,160,400	19,309,567	1,672,435
1924	142,814,464	59,667,905	105,453,212	11,552,000	33,866,101	1,523,600	8,948,944	
1925	147,420,665	25,155,100	104,209,247	4,383,639	27,471,224	2,501,000	41,286,175	2,946,000
1926	156,062,256	69,061,600	108,741,808	5,156,400	36,362,587		19,368,915	
1927	182,537,463	47,263,800	81,786,234	1,638,500	28,675,805		8,858,000	
1928	155,560,442	64,381,420	101,391,211	2,073,500	40,560,082		9,221,650	
Total	3,619,114,424	708,764,749	1,744,373,945	74,961,941	782,013,115	76,172,350	290,796,504	20,997,823

Distribution of salmon in the Pacific coastal streams of North America, in specified years—Continued

Year	Sockeye, red, or blueback		Steelhead trout		Total	
	Fry	Fingerlings, yearlings, and adults	Fry	Fingerlings, yearlings, and adults	Fry	Fingerlings, yearlings, and adults
1873					520,000	
1874					850,000	
1875					2,250,000	
1876					2,000,000	
1877					2,550,000	
1878					2,582,620	
1879					5,376,500	
1880					4,059,290	
1881					4,974,790	
1882					3,991,750	
1884					600,000	
1885	1,800,000				1,800,000	
1886	2,625,000				2,775,000	
1887	4,414,000				4,614,000	
1888	5,807,000				8,397,000	
1889	4,419,000				12,587,000	
1890	6,640,000				11,890,475	
1891	3,603,800				12,872,800	
1892	6,000,000				10,299,000	25,000
1893	6,274,000				17,099,950	
1894	8,504,000		353,500		17,565,400	
1895	11,681,000				19,049,000	560,000
1896	15,868,000		107,808		41,556,841	807,150
1897	18,374,440		262,000		50,080,672	
1898	20,916,000		650,000		95,250,076	
1899	15,761,000		8,625		72,731,976	
1900	29,590,000		2,061,560		89,852,488	
1901	19,901,253		1,709,326		94,699,932	1,668
1902	72,679,000		3,243,948		201,148,581	
1903	89,398,789		4,509,641	37,033	213,939,500	37,033
1904	70,710,200		4,207,920		260,864,906	
1905	119,963,200		3,805,675		298,226,484	
1906	232,037,442		6,725,965	24,383	458,104,140	147,663
1907	228,018,450		5,629,493		412,996,968	
1908	230,528,455		5,837,671		462,184,874	2,165,797
1909	239,251,146		8,193,778		394,097,305	16,949
1910	396,215,795		11,368,446		561,668,565	225
1911	257,463,497		14,995,717		419,795,138	11,700
1912	324,325,768		12,710,382	177,790	543,824,521	1,699,950
1913	242,146,069		16,654,906		485,918,028	
1914	261,365,781		11,719,558		530,349,190	2,571,711
1915	198,910,010	8,369,830	22,942,900		535,401,818	18,245,575
1916	256,582,879	15,292,732	18,952,136	3,480,092	563,065,182	54,301,664
1917	215,853,504	12,305,953	15,241,720	1,887,950	376,986,109	60,381,654
1918	155,043,461	12,705,285	18,480,440	3,520,420	466,502,407	53,495,130
1919	62,397,320	14,299,960	17,755,206	135,500	212,465,988	80,624,228
1920	245,403,605	676,615	31,576,780	2,693,250	547,432,038	77,537,385
1921	151,125,130	4,093,970	16,383,856	3,785,550	444,351,302	102,390,285
1922	186,916,052	8,195,000	19,677,824	2,028,220	403,705,841	145,154,340
1923	174,210,216	3,885,126	24,925,709	4,683,105	403,212,810	85,695,056
1924	166,605,240	9,855,310	33,464,943	5,547,240	491,152,904	88,146,055
1925	185,524,414	7,971,887	21,153,141	1,657,275	527,064,866	44,614,901
1926	218,248,487	12,942,680	23,504,593	4,659,840	562,288,646	91,820,520
1927	206,414,631	8,421,670	9,416,882	839,700	517,689,015	58,163,670
1928	111,203,403	8,372,980	25,261,648	2,283,700	443,198,436	77,111,600
Total	5,480,720,437	127,388,998	413,493,697	37,441,0481	2,330,512,122	1,045,726,909

Output of United States Bureau of Fisheries hatcheries.—The next table shows by years and species the combined output of the various hatcheries of the United States Bureau of Fisheries on this coast. The greater part of the egg output was to various State hatcheries on the Pacific coast, more particularly those belonging to the State of California. The total figures show that since the bureau began operations on this coast it has distributed 1,643,354,071 eggs, 2,700,214,782 fry, and 735,061,098 fingerlings, yearlings, and adults.

Output of Pacific coast salmon hatcheries owned by the United States Bureau of Fisheries, 1872 to 1928

Year	Chinook, king, or spring			Coho or silver		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1872	30,000					
1873	1,400,000					
1874	4,155,000	850,000				
1875	6,250,000	1,750,000				
1876	5,065,000	1,500,000				
1877	4,983,000	2,000,000				
1878	7,810,000	2,500,000				
1879	4,250,000	2,300,000				
1880	3,800,000	2,000,000				
1881	4,300,000	3,100,000				
1882		3,991,750				
1883		776,125				
1889 [1]	3,450,000	6,000,000				
1890	2,554,000	2,860,475				
1891	3,688,000	5,678,525				
1892	2,902,000	1,647,900				
1893	3,530,000	5,290,100				
1894	7,500,000	651,500			280,000	
1895	3,699,000	500,000			690,000	560,000
1896	2,798,500	3,547,850	557,150			
1897	18,232,590	9,828,095			298,137	
1898	30,605,000	39,950,698				
1899	32,618,000	9,366,366				
1900	7,411,000	14,287,264			146,824	
1901	11,615,036	7,987,107	1,668		302,041	
1902	19,446,410	29,340,308			424,530	
1903	16,160,177	23,845,956	250	680,800	81,812	
1904	75,217,354	35,006,988			3,984,645	
1905	96,055,765	21,620,292		107,000	9,321,513	
1906	115,648,145	20,797,543	123,118	239,180	6,445,574	300
1907	78,587,705	17,567,092		760,000	3,636,952	
1908	68,520,550	24,998,185	2,165,797	296,000	13,420,714	57,932
1909	38,859,265	20,177,286	16,949	272,000	9,470,925	
1910	38,306,709	15,682,064	225	275,000	10,888,025	
1911	37,314,514	16,659,684	211,700	2,391,900	6,210,296	
1912	36,837,550	31,040,893	1,405,860	52,000	12,955,824	
1913	58,296,873	33,419,423		202,000	13,952,963	
1914	31,032,645	48,895,607	5,582,796	95,840	24,619,456	27,258
1915	25,751,005	53,612,056	9,604,985	111,200	24,018,355	267,662
1916	20,622,340	57,870,714	22,982,655	198,500	8,124,334	1,469,507
1917	7,191,200	16,404,404	27,858,026		4,403,700	4,662,960
1918	18,074,900	6,028,918	63,176,244		980,300	10,504,115
1919	12,782,500	389,002	34,088,150		7,544,020	1,291,730
1920	11,267,000	1,250,000	38,366,070		68,411,050	1,820,500
1921	6,780,000		40,947,265		600,000	6,571,700
1922	1,420,000	1,311,500	57,987,870		600,000	11,074,940
1923	4,200,000	716,000	30,174,345	100,000	8,371,025	5,910,655
1924	12,785,000	2,243,000	27,389,605		11,419,990	11,430,150
1925	7,494,880	2,528,800	10,106,900	862,000	10,177,650	3,797,639
1926	10,656,640	545,000	24,659,600	211,000	4,555,800	5,156,400
1927	9,112,000	266,000	26,912,800	148,000	5,142,400	1,638,500
1928	19,033,000	342,500	35,369,920	1,025,000	10,852,200	2,073,500
Total	1,050,109,253	610,923,070	459,689,948	8,027,420	282,331,055	68,315,448

[1] Operations suspended from 1884 to 1888, both inclusive.

Output of Pacific coast salmon hatcheries owned by the United States Bureau of Fisheries, 1872 to 1928—Continued

Year	Chum		Humpback, or pink			Sockeye, red, or blueback		
	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1900							10,683,000	
1901							3,834,453	
1902							3,371,000	
1903							3,731,789	
1904				176,597			3,855,000	
1905							7,819,281	10,000
1906			2,000	969,990		880,000	9,923,680	9,500
1907							58,835,055	
1908			502,000	6,764,762		75,000	69,883,305	
1909				10,000		100,000	93,408,496	
1910				1,731,740			146,081,595	
1911	911,650		100,000	460,150			100,490,900	
1912	2,495,000		3,271,740	2,566,325		2,000,000	91,422,273	
1913	19,479,000			1,880		2,000,000	78,724,900	
1914	8,672,735		13,260,000	37,648,422	4,355	6,020,000	53,071,574	120,000
1915	35,504,707		14,500,000	7,153,500	119,480	155,000	46,282,691	8,416,405
1916	21,500,944	1,000,000	7,000,000	6,106,400	2,915,000	3,100,000	90,988,566	2,666,308
1917	14,403,300	7,014,580		165,000	7,499,030	2,000,000	84,152,825	2,145,953
1918	9,892,145			2,132,831	3,736,000	18,000,000	67,591,200	12,705,285
1919	4,544,000	4,524,560	10,062,000	5,426,500	369,958	101,981,000	48,393,000	25,959,960
1920	7,318,100	5,667,150		64,700		88,930,000	70,911,000	
1921	7,000,000	19,436,400						
1922	1,540,000	14,027,610		210,000	909,400		4,200,000	7,701,635
1923	8,324,830	14,902,900	1,149,200	633,600	1,672,435	86,790,000	84,632,045	1,998,400
1924	23,512,320	758,000		918,000		28,870,000	30,337,640	4,528,000
1925	16,051,650			10,892,500		33,230,000	49,152,000	2,845,000
1926	18,163,400			844,600		50,830,000	47,263,000	6,979,180
1927	17,966,000		4,212,000	3,544,000		52,135,000	45,430,000	2,668,170
1928	23,669,000			2,387,000		28,875,408	29,979,000	2,613,600
Total	240,948,781	67,331,200	54,058,940	90,808,497	17,225,658	505,971,408	1,434,449,268	81,367,396

Year	Steelhead trout			Total		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1872				30,000		
1873				1,400,000		
1874				4,155,000	860,000	
1875				6,250,000	1,750,000	
1876				5,095,000	1,500,000	
1877				4,983,000	2,000,000	
1878				7,810,000	2,500,000	
1879				4,250,000	2,300,000	
1880				3,800,000	2,000,000	
1881				4,300,000	3,109,000	
1882					3,991,750	
1883					776,125	
1889 [1]				3,450,000	6,000,000	
1890				2,554,000	2,860,475	
1891				3,688,000	5,678,525	
1892				2,902,000	1,647,900	
1893				3,530,000	5,290,100	
1894	75,000	308,500		7,575,000	1,249,000	
1895		852,500	332,000	3,699,000	2,042,500	892,000
1896	175,000	107,808		2,973,500	3,655,658	557,150
1897	50,000	257,000		18,282,590	10,383,232	
1898	60,000	650,000		30,665,000	40,600,698	
1899	159,000	12,125		32,777,000	9,378,491	
1900	415,000	125,000		7,826,000	25,242,088	
1901	246,000	65,850	25,000	11,861,036	12,189,451	26,668
1902	481,000	130,250		19,927,410	33,266,068	
1903	480,000	702,700	285,848	17,320,977	28,362,257	286,098
1904	225,000	93,205	11,090	75,442,354	43,116,435	11,090
1905	464,400	537,205		96,627,165	39,298,291	10,000
1906	358,000	1,834,485	40,383	117,127,325	39,971,272	173,301
1907	250,000	1,190,305		79,597,705	81,229,404	
1908	487,725	1,069,596		69,881,275	116,156,562	2,223,729
1909	482,725	1,670,371		39,714,990	124,737,078	16,949
1910	300,000	3,511,226		38,881,709	177,894,650	225
1911	660,000	3,826,439		40,466,414	128,559,119	211,700
1912	905,000	4,289,415	294,090	43,066,290	144,769,730	1,699,950

[1] Operations suspended from 1884 to 1888, both inclusive.

Output of Pacific coast salmon hatcheries owned by the United States Bureau of Fisheries, 1872 to 1928—Continued

Year	Steelhead trout			Total		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1913	1,330,000	4,272,225		61,828,873	149,850,391	
1914	729,000	4,022,438		51,137,485	176,930,232	5,734,409
1915	877,000	5,262,973	1,048,317	41,394,205	171,834,282	19,456,849
1916	1,490,000	841,600	2,676,805	32,410,840	185,432,558	34,710,275
1917	3,237,600	2,013,510	1,891,450	12,428,800	121,542,739	51,071,999
1918	1,070,000	103,000	6,854,785	37,144,900	86,728,394	96,976,429
1919	775,000		1,148,000	125,600,500	66,296,522	67,382,358
1920	941,600	138,200	2,532,650	101,147,600	148,093,150	48,386,370
1921	493,000	15,000	3,785,550	7,273,000	7,615,000	70,740,915
1922	500,000		2,028,220	1,920,000	7,861,500	93,729,675
1923	1,744,000	260,000	3,960,106	43,835,000	102,937,500	48,876,215
1924	2,180,000	368,685	4,770,460	42,193,880	68,799,635	17,932,814
1925	607,000	50,000	1,183,275	62,825,640	88,852,600	41,077,200
1926	1,128,000	970,000	4,282,020	66,057,000	72,341,800	32,049,170
1927	450,000		829,700	50,293,408	72,348,400	42,208,720
1928	1,360,000	1,182,500	2,151,700	93,983,200	68,412,200	58,618,840
Total	25,187,050	40,754,111	41,131,448	1,643,354,071	2,700,214,782	735,061,098

ACCLIMATIZING PACIFIC SALMON IN OTHER WATERS

For many years efforts have been made by the United States Bureau of Fisheries and various State fish commissions to introduce Pacific coast salmon in eastern waters. In the early history of fish culture chinook fry were planted in almost every imaginable stream along the Atlantic seaboard, in various streams in the Mississippi Valley, and also in tributaries of the Great Lakes. In most cases, owing to the unsuitability of the water, the experiment was doomed to failure from the start. In the case of a few streams where results might have been obtained, the plantings were at long intervals and the fish were too small to protect themselves, while no effort was made by the State authorities to protect them.

The most successful results with plants of chinook salmon have been obtained in Lake Sunapee, N. H., where it is now a not uncommon thing for anglers to catch chinook with rod and reel.

In 1912 about 10,000 chinook fingerlings from Columbia River eggs furnished by the United States Bureau of Fisheries were planted by the Massachusetts Fish Commission in Lake Quinsigamond, and during July, 1914, about 20 months after they were hatched, over 600 salmon, according to a member of the commission, were caught, ranging from 1½ to 5 pounds each.

Other plants have been made since in Lake Quinsigamond and other lakes and ponds, with fairly satisfactory results.

The most successful effort in this line was initiated by the United States Bureau of Fisheries in the fall of 1913, when it transferred from its hatcheries on the Pacific coast to those in Maine 13,240,000 humpback-salmon eggs. These were followed by a second shipment of 7,022,000 eggs in the fall of 1914, a third shipment of about 7,000,000 eggs in the fall of 1915, and a few smaller shipments subsequently. These eggs were hatched out and the fry planted in various selected New England streams where the conditions seemed favorable.

Early in August, 1915, a female humpback salmon 22½ inches long and weighing 4 pounds 3 ounces was taken at the Bangor waterworks in the Penobscot River. Shortly after, a male fish of about the same size was taken in this river at Orland Dam. A little later, agents of the bureau captured 20 alive near Bangor, and about 3,000 eggs were obtained and fertilized.

In Dennys River, in Maine, during the period between August 15 and September 24, local fishermen caught a number. Since then they have been running regularly each season into certain of these streams.

The chinook salmon has also been acclimatized in the waters of New Zealand. They were first introduced in 1900, and eggs were imported for six years in succession. A considerable annual run now enters those rivers in which the salmon were planted.

In 1908 the United States Bureau of Fisheries initiated an effort to establish a run of sockeye salmon in Grandy Creek, a stream in the immediate vicinity of the Birdsview (Wash.) hatchery of the bureau, and one which had not been visited by this species. The first fish, numbering 64,000, were planted in the creek in 1908. Four years afterwards, in September, 1912, the first sockeye salmon entered the hatchery trap in Grandy Creek, and from them 222,000 eggs were secured. In 1916 the water in the creek was too low to permit the ascent of salmon until September 26, when its level was slightly raised by local rains, and a few fish immediately entered it and were taken in the hatchery trap. The eggs secured from the small number available amounted to 24,500. The fish have since continued to run in this stream.

In 1916 L. H. Darwin, commissioner of fish and game for the State of Washington, began an experiment looking to the stocking, with sockeye salmon, of the Samish River, a stream debouching in Puget Sound, and in which this species had not hitherto been found. The parent fish were obtained from traps and transported alive in crates to the Samish State hatchery, where they were held until ripe and then stripped and fertilized. After hatching, the fry were planted in the stream. A few returned in 1920.

Since then the practice has been followed to some extent in other streams, and the possibility of establishing a run of nonindigenous species of salmon in suitable streams by hatchery plants has been well demonstrated.

CALIFORNIA

HISTORY

The first fish-cultural station on the Pacific coast was located on McCloud River, a stream of the Sierra Nevada Mountains emptying into Pit River, a tributary to the Sacramento, 323 miles nearly due north of San Francisco. The site on the west bank of the river, about 3 miles above the mouth, was chosen after investigation of a number of places on the Sacramento, by Livingston Stone, one of America's pioneer fish culturists, and the station was named Baird, in honor of the then Commissioner of Fisheries, Prof. Spencer F. Baird. Although the season had nearly passed when the station was sufficiently advanced to handle eggs, 50,000 eggs were secured, and while 20,000 were lost, owing to the excessive heat, the remaining 30,000 were shipped east, all of which were eventually lost but 7,000 fry, which were planted in the Susquehanna River, in Pennsylvania.

The main object of the hatchery the first few years was to secure eggs to ship to the East for the purpose of introducing Pacific salmon in the waters of that section. The commission early made an agreement with the State of California, however, under which the latter at first paid part of the expense, and the commission hatched and planted a portion of the take in the McCloud River. Later, part of the eggs were turned over to the States, which hatched and planted the salmon in local waters.

In 1881 the station buildings were washed away in a freshet, but were immediately rebuilt. From 1884 to 1887, both inclusive, all operations were suspended.

In 1889 a hatchery was established at Fort Gaston, on the Army reservation in the Hoopa Indian Reservation in Humboldt County, but it was not put into operation until 1890. As the reservation was abolished on July 1, 1892, the commission took complete charge of the plant and in 1893 established a tributary station on Redwood Creek. The same year Korbel station was established about one-half mile above Korbel, on Mad River, in Humboldt County. Owing to the lack of money this station was closed in the fiscal year 1896, but was reopened during the fiscal year 1897.

That same year the commission erected, on ground owned by the State, a hatchery at Battle Creek, in Tehama County, and also took charge of and operated the hatchery erected at this place by the State fish commission the previous year. Under the terms of an agreement the commission was to deliver to the States as many eyed spawn as the latter could hatch at Sisson, its own station.

Owing to their inaccessibility, the Fort Gaston hatchery and its substations were abandoned in 1898. The same year an experimental station was established at Olema, Bear Valley, in Marin County, whence eggs were transferred from Baird station, hatched out here, and planted in Olema Creek in order to see if they could not be domesticated here, where they had not been found previously.

During the fiscal year 1902 a substation was established on Mill Creek, a stream which has its source in the foothills of the Sierra Mountains, in the northeastern part of Tehama County, and empties into the Sacramento River from the east about a mile above the town of Tehama. The eggs are retained here until eyed and then shipped to other hatcheries.

As stated above, the State aided the work of the United States Fish Commission in a financial way and also by hatching and distributing the eggs turned over to its care. In 1885 the State legislature passed a bill authorizing the establishment of a hatchery of its own, and the same year such a station was built upon Hat Creek about 2½ miles above its junction with Pitt River, a tributary of the Sacramento River. As the work of the first few seasons developed that the location was unsuitable, the hatchery was removed in 1888 to Sisson, in Siskiyou County. It is now known as the Mount Shasta hatchery. The work of this hatchery was to handle the eggs turned over to it by the United States Fish Commission. It was almost doubled in size in 1917.

In 1895 another hatchery was built by the State near the mouth of Battle Creek, a tributary of the Sacramento River. In 1896 and 1897 this hatchery was operated jointly by the State and the United States Fish Commission while awaiting the appropriation of money by the commission to purchase it from the State.

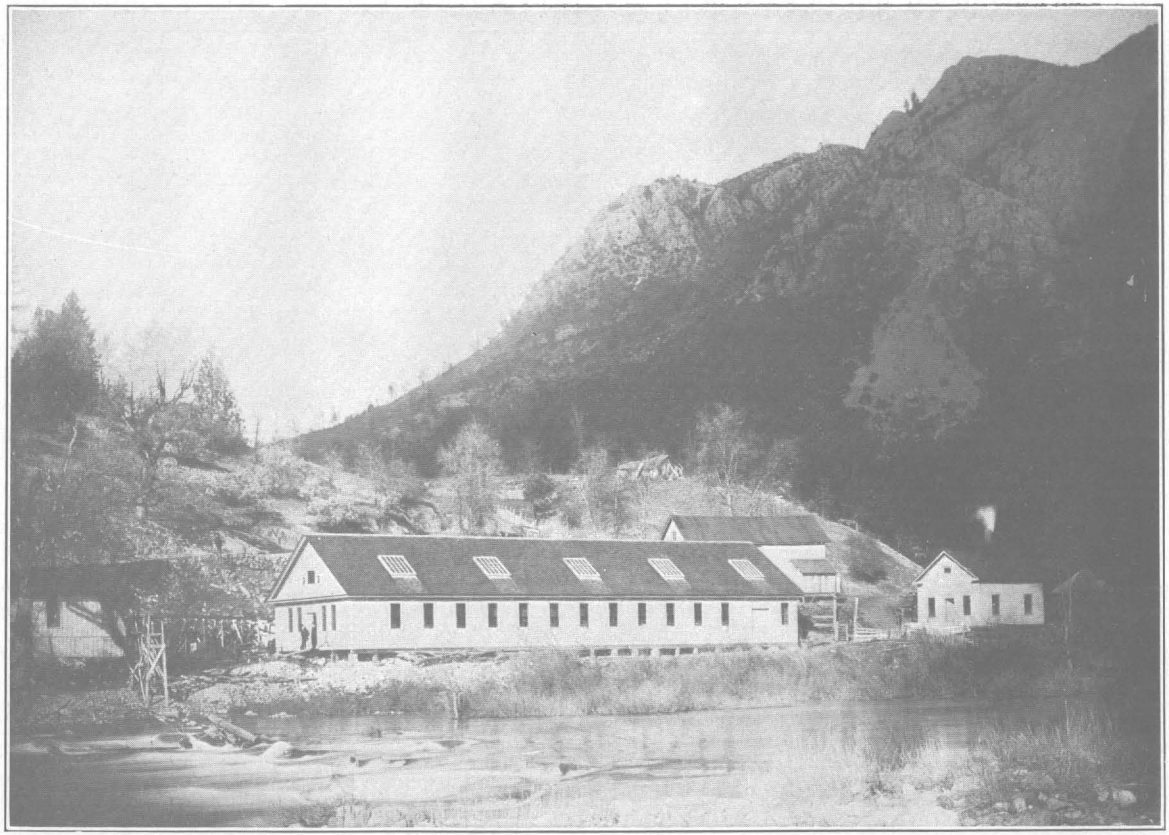


FIG. 47.—UNITED STATES BUREAU OF FISHERIES HATCHERY AT BAIRD, CALIF.; THE FIRST FISH-CULTURAL STATION ON THE PACIFIC COAST

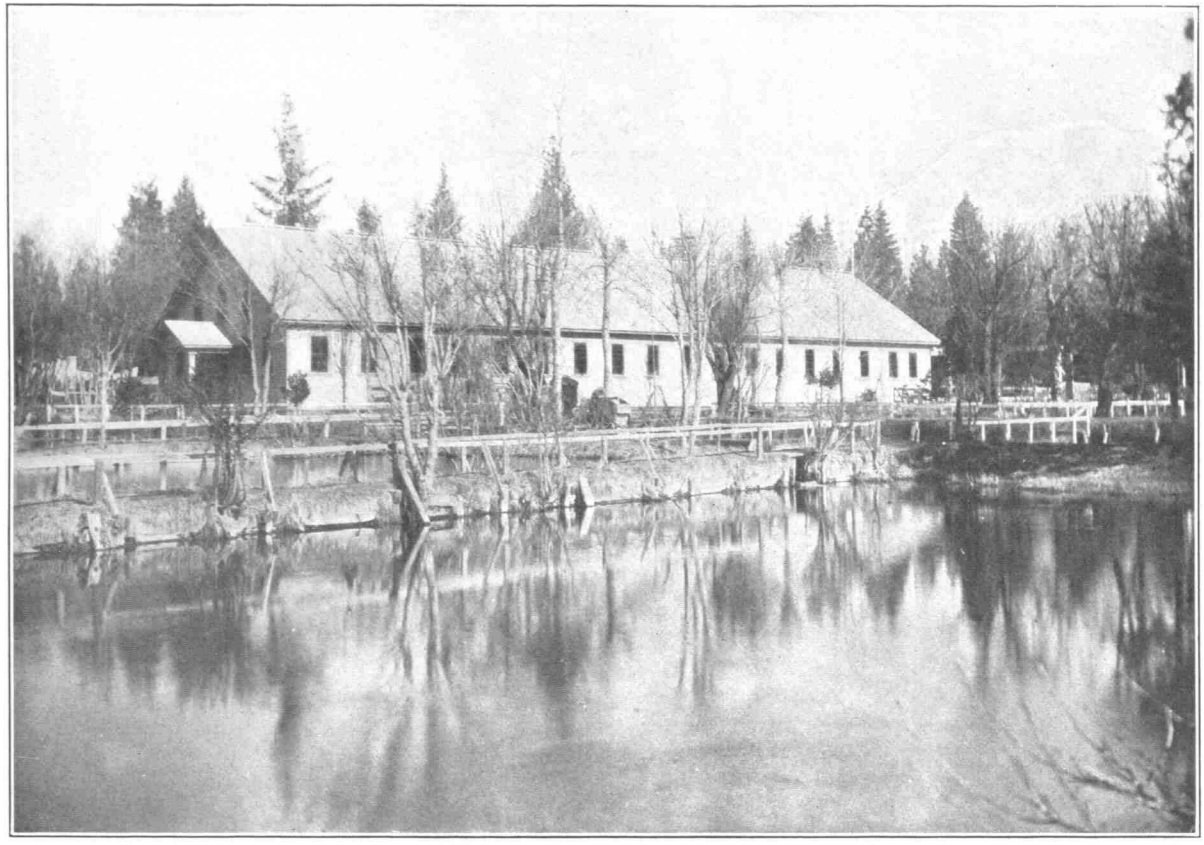


FIG. 48.—MOUNT SHASTA HATCHERY OF THE CALIFORNIA FISH AND GAME COMMISSION, AT SISSON, CALIF.

In the fall of 1897 a hatchery was established by the State at Grizzly Bluff, on Price Creek, a tributary of Eel River, in Humboldt County, and in 1902 this hatchery made the first plant in the State of steelhead trout fry. In 1916 it was moved to a point on Eel River near Fort Seward.

Santa Cruz County has had a hatchery at Brookdale for a number of years. In 1911 it was leased to the State and operated by the latter during the seasons of 1911 and 1912. In 1913 the State gave up the lease and entered into a contract to purchase the eggs produced from this hatchery. The price agreed upon was that the State commission was to pay $1.50 per thousand for the eyed steelhead eggs, up to the number of 2,000,000, and $1 per thousand for all eggs up to 3,000,000, provided that the eggs were collected and eyed by a skilled fish culturist and would pass inspection before they were accepted. In 1916 the State leased the plant for a term of years.

A hatchery was established by the United States Bureau of Fisheries at Hornbrook, on Klamath River, in 1913. At first this hatchery was devoted to rainbow-trout work, but later the collection and distribution of silver and chinook salmon was taken up.

During the fall of 1911 the State established an experimental station at Sacramento in order to carry on a series of experiments to determine whether the eggs of the quinnat salmon could be successfully hatched and the fry reared near the city of Sacramento. Of the fish hatched at this station 50,000 were marked.

Nearly all of the fry that were liberated in the Sacramento River were floated in a screen cage by boat into the middle of the stream and there released. N. B. Scofield took 500 in a floating box down the river, where they were held and fed for several weeks in brackish and salt water. They were apparently not affected by the changes in the salinity of the water.

Experiments were carried on until the summer of 1913, when they were abandoned due to the killing of the embryos by the mineral substances in the water used at the station.

During the fiscal year 1912 the Mill Creek hatchery of the United States Bureau of Fisheries was operated by the California Commission.

Some years ago the town of Ukiah, Mendocino County, established a hatchery 1 mile from the town, and on Russian River. For some years it was operated as a trout station, but eventually became an important steelhead hatchery. It was not operated in 1913. In 1914 the State Fish Commission collected steelhead eggs at the Eel River dam of the Snow Mountain Water & Power Co., and having secured permission from the town of Ukiah, hatched them out in its hatchery.

As the Hornbrook hatchery on Klamath River was on private property, the United States Bureau of Fisheries in 1915 removed the buildings from the old location on the south side to property owned by the Government on the north side of the river.

In 1915 new hatchery buildings were erected at the Mill Creek hatchery.

In 1917 the State of California began operations for the collection of salmon eggs at Klamathon, on the Klamath River. This station was previously operated by the Bureau of Fisheries and has been operated with fair success to the present time. The eggs taken have been hatched at the Mount Shasta and Fall Creek hatcheries. The Fall Creek hatchery began operations in 1920, and is located on Fall Creek, a tributary of the Klamath in Siskiyou County.

Silver-salmon eggs have been taken at the Prairie Creek hatchery and hatched at the Fort Seward and Prairie Creek hatcheries in Humboldt County, beginning in 1928. The Prairie Creek hatchery is located in Humboldt County and began operations in the fall of 1927.

OUTPUT

The following tables show separately the quantity of salmon eggs, fry, fingerlings, yearlings, and adults distributed by the United States Bureau of Fisheries and by the State since the inception of the work. The large quantity of eggs shown by the bureau represents largely the eggs supplied to the State, which hatched and distributed them, and eggs sent to other States and to foreign countries.

Output of hatcheries in California owned by the United States Bureau of Fisheries

Year ending June 30 [1]—	Chinook			Silver		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1872	30, 000					
1873	1, 400, 000					
1874	4, 155, 000	850, 000				
1875	6, 250, 000	1, 750, 000				
1876	5, 065, 000	1, 500, 000				
1877	4, 983, 000	2, 000, 000				
1878	7, 810, 000	2, 500, 000				
1879	4, 250, 000	2, 300, 000				
1880	3, 800, 000	2, 000, 000				
1881	4, 300, 000	3, 100, 000				
1882		3, 991, 750				
1883		776, 125				
1889 [2]	3, 450, 000	1, 500, 000				
1890	1, 554, 000	84, 000				
1891	2, 988, 000	777, 000				
1892	2, 902, 000	315, 500				
1893	3, 530, 000	1, 190, 100				
1894	7, 500, 000	438, 500			280, 000	
1895	3, 676, 000	500, 000			690, 000	560, 000
1896	6, 170, 800	715, 700				
1897	18, 232, 590	3, 056, 701			298, 137	
1898	30, 605, 000	15, 643, 300				
1899	27, 665, 000	3, 275, 110				
1900	2, 925, 000	3, 533, 950				
1901	3, 934, 036	889, 570				
1902	17, 580, 410	2, 115, 560				
1903	11, 275, 777	1, 618, 066				
1904	64, 598, 354	2, 350, 130				
1905	96, 025, 765	7, 561, 380				
1906	107, 905, 945	3, 496, 267	138			
1907	73, 376, 315	2, 512, 250				
1908	64, 990, 550	4, 780, 855				
1909	32, 278, 265	3, 590, 078				
1910	30, 539, 467	2, 286, 257				
1911	33, 364, 514	3, 666, 061		2, 289, 900		
1912	20, 697, 550	7, 243, 325				
1913	17, 092, 873	2, 195, 100		100, 000	17, 320	
1914	25, 373, 645	5, 598, 349	3, 849, 991	95, 840	2, 536, 460	
1915	20, 716, 005	5, 015, 400	8, 086, 139		971, 740	226, 162
1916	19, 622, 340	9, 940, 950	11, 938, 224		2, 169, 050	
1917	7, 027, 300	800, 000	14, 628, 300		50, 000	11, 000
1918	14, 421, 900		10, 689, 400			
1919	11, 802, 500		10, 287, 800			
1920	4, 235, 000		7, 235, 000			
1921	3, 000, 000		4, 593, 400			
1922			5, 872, 200			
1923			3, 804, 400			
1924		1, 050, 000	4, 486, 000			
1925		2, 148, 800	1, 892, 500			
1926	25, 000	800, 000	5, 327, 700			
1927			9, 305, 000			
1928	954, 000		6, 559, 700			
Total	834, 078, 901	121, 456, 134	108, 555, 892	2, 485, 740	7, 012, 707	797, 162

[1] Calendar year was used up to 1889. [2] The hatchery was closed from 1884 to 1888.

Output of hatcheries in California owned by the United States Bureau of Fisheries—Continued

Year ending June 30[1]—	Steelhead trout			Total		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1872				30,000		
1873				1,400,000		
1874				4,155,000	850,000	
1875				6,250,000	1,750,000	
1876				5,065,000	1,500,000	
1877				4,983,000	2,000,000	
1878				7,810,000	2,500,000	
1879				4,250,000	2,300,000	
1880				3,800,000	2,000,000	
1881				4,300,000	3,100,000	
1882					3,991,750	
1883					776,125	
1889[2]				3,450,000	1,500,000	
1890				1,554,000	84,000	
1891				2,988,000	777,000	
1892				2,902,000	315,500	
1893				3,530,000	1,190,100	
1894	75,000	308,500		7,575,000	1,027,000	
1895		852,500	332,000	3,676,000	2,042,500	892,000
1896	175,000	107,808		6,345,800	823,508	
1897	50,000	257,000		18,282,590	3,611,838	
1898	60,000	650,000		30,665,000	16,293,300	
1899				27,665,000	3,275,110	
1900				2,925,000	3,533,950	
1901				3,934,036	889,570	
1902				17,580,410	2,115,560	
1903				11,275,777	1,618,066	
1904				64,598,354	2,350,130	
1905				96,025,765	7,561,380	
1906				107,905,945	3,496,267	138
1907				73,376,315	2,512,250	
1908				64,990,550	4,780,855	
1909				32,278,265	3,590,078	
1910				30,539,467	2,286,257	
1911				35,654,414	3,666,061	
1912				20,697,550	7,243,325	
1913				17,192,873	2,212,420	
1914				25,469,485	8,134,809	3,849,991
1915				20,716,005	5,987,140	8,312,301
1916				19,622,340	12,110,000	11,938,224
1917				7,027,300	850,000	14,639,300
1918				14,421,900		10,689,400
1919				11,802,500		10,287,800
1920				4,235,000		7,235,000
1921				3,000,000		4,593,400
1922						5,872,200
1923						3,804,400
1924					1,050,000	4,486,000
1925					2,148,800	1,892,500
1926				25,000	800,000	5,327,700
1927						9,305,000
1928				954,000		6,559,700
Total	360,000	2,175,808	332,000	836,924,641	130,644,649	109,685,054

[1] The calendar year was used up to 1889.

[2] The hatchery was closed from 1884 to 1888.

Output of hatcheries owned by the State of California

Year	Chinook		Silver fry	Steelhead fry	Total	
	Eggs	Fry [1]			Eggs	Fry
1873		520,000				520,000
1874		850,000				850,000
1875	[2] 250,000	2,250,000			250,000	2,250,000
1876		2,000,000				2,000,000
1877		2,200,000				2,200,000
1878		2,500,000				2,500,000
1879		2,300,000				2,300,000
1880		2,225,000				2,225,000
1881		2,420,000				2,420,000
1882		3,991,750				3,991,750
1884		600,000				600,000
1886		150,000				150,000
1887		200,000				200,000
1888		1,290,000				1,290,000
1889		2,168,000				2,168,000
1890		1,320,000				1,320,000
1891		2,798,000				2,798,000
1892		2,651,000				2,651,000
1893		3,941,650				3,941,650
1894		7,776,400				7,776,400
1895		3,435,000				3,435,000
1896		15,283,183				15,283,183
1897		18,123,000				18,123,000
1898		31,476,388				31,476,388
1899		21,234,000				21,234,000
1900		2,536,000				2,536,000
1901		3,239,000				3,239,000
1902		16,852,040		301,000		17,153,040
1903		20,040,487		120,000		20,160,487
1904		63,632,000		90,000		63,722,000
1905		87,000,000		108,000		87,108,000
1906		105,815,920		243,000		106,058,920
1907		71,267,000		352,000		71,619,000
1908		60,619,000		170,000		60,789,000
1909		28,000,000		517,000		28,517,000
1910		28,469,745		637,800		29,107,545
1911		29,657,263	2,060,910	1,858,100		33,576,273
1912		18,909,445		2,177,958		21,087,403
1913		16,277,227	25,000	1,983,500		18,285,727
1914		25,290,615	12,500	3,171,083		28,474,198
1915		33,313,150	1,417,000	8,582,500		43,312,650
1916		19,339,738		5,213,170		24,552,908
1917		6,853,000		6,699,420		13,552,420
1918		14,439,000		4,483,000		18,922,000
1919		11,970,000	178,000	4,950,000		17,098,000
1920		12,326,200		4,718,000		17,044,200
1921		8,644,000		1,859,000		10,503,000
1922		9,393,000		4,592,000		13,985,000
1923		17,639,430		3,281,300		20,920,730
1924		17,856,120		9,730,000		27,586,120
1925		5,576,370		2,243,290		7,819,660
1926		8,580,780		3,683,610		12,264,390
1927		16,911,590		3,591,810		20,503,400
1928		9,817,000		5,442,275		15,259,275
Total	250,000	903,968,491	3,693,410	80,798,816	250,000	988,460,717

[1] The greater part of the output of chinook fry was from eggs supplied by the U. S. Bureau of Fisheries hatcheries in California.
[2] All were lost.

DISTRIBUTION

The following table shows, by streams and species, the distribution in California of the salmon eggs, fry, fingerlings, yearlings, and adults, from the hatcheries of the United States Bureau of Fisheries and the State. This far from represents the work of the hatcheries, as large quantities of eggs were sent to other States and foreign countries.

Distribution of salmon in the waters of California, 1873–1919

Year	Klamath River and tributaries				Redwood Creek and tributaries			
	Chinook		Silver		Chinook fry	Silver		Steelhead fry
	Fry	Yearlings	Fry	Yearlings and adults		Fry	Yearlings and adults	
1890	90,000							
1891	30,000				25,000			
1892	147,600	25,000			142,500			
1893	487,200				170,000			
1895			300,000	160,000		140,000	400,000	
1896					65,700			107,808
1897					280,250	124,750		202,000
1898	16,600				1,280,000			650,000
1903	40,000							
1911			2,060,910					
1913			17,320					
1914	2,155,100		2,548,960					
1915	5,820,000		1,098,000					
1916	7,733,135		2,169,050					
1917	1,728,000	368,000	50,000	11,000				
1918	3,675,000							
1919	1,148,000		178,000					
Total	23,070,035	393,000	8,422,240	171,000	1,943,450	264,750	400,000	959,808

Year	Mad River and North Fork			Eel River		Russian River	Skaggs Springs	Marin County creeks
	Chinook fry	Silver fry	Steelhead fry	Chinook fry	Steelhead fry	Chinook fry		
1881						15,000	15,000	
1894		280,000	308,500					
1895		470,000						
1897	145,365	173,387	60,000					635,000
1898				7,857,388				1,970,000
1899				8,202,000				900,000
1900				885,000				
1902				2,069,500	301,000			
1903				5,257,947	120,000			
1904				5,200,000	90,000			
1905				8,100,000				
1906				9,265,920	243,000			
1907				7,570,000	352,000	25,000		25,000
1908				6,154,000				
1909				5,500,000	349,000			
1910				5,969,745	334,800			
1912	100,000			3,103,660				
1913	100,000			1,386,500				
1914	225,000			3,723,000				
1915	350,000			2,618,150				
1917	400,000			91,000				
1918	250,000			844,000				
1919	250,000			682,000				
Total	1,820,365	923,387	368,500	84,479,810	1,789,800	40,000	15,000	3,530,000

Distribution of salmon in the waters of California 1873–1919—Continued

Year	Sacramento River and tributaries					San Francisco Bay streams	Smith River	Santa Ynez River	Monterey Bay and tributaries
	Chinook			Silver fry	Steelhead fry	Chinook fry			
	Eggs	Fry	Yearlings, fingerlings, and adults						
1873	20,000	520,000							
1874		850,000							
1875	[1] 250,000	2,000,000							
1876		2,000,000							
1877		2,200,000							
1878		2,500,000							
1879		2,300,000							
1880		2,225,000							
1881		[2] 2,300,500				20,000			30,000
1882	80,300	3,991,750							
1884		600,000							
1886		150,000							
1887		200,000							
1888		1,290,000							
1889		3,668,000							
1890		1,404,000							
1891		3,520,000							
1892		2,676,500							
1893		4,474,750							
1894		8,214,900			45,000				
1895		3,935,000							
1896		15,683,183	250,000						
1897		19,264,086							
1898		33,998,300							
1899	85,200	16,307,110							
1900		5,184,950							
1901		4,128,570							
1902		16,898,100							
1903		16,359,606							
1904		60,782,130							
1905		94,561,380			108,000				
1906		100,038,552							900,000
1907		66,209,250			135,000				1,200,000
1908		59,245,855			170,000				800,000
1909		26,090,000			168,000				
1910		24,786,257			303,000				
1911		33,323,324							
1912		22,949,110							
1913		16,691,167				294,660			
1914		24,637,864	838,906				100,000		
1915		[3] 28,688,000	9,053,635	1,194,762				42,000	
1916		26,800,604	5,538,224				300,000	25,000	
1917		5,875,000	14,260,300					25,000	
1918		9,470,000	10,689,400				100,000	25,000	
1919		9,840,000	10,287,000					25,000	
Total	435,500	788,832,798	50,917,465	1,194,762	929,900	314,660	500,000	142,000	2,930,000

[1] All were lost.
[2] Includes 15,000 chinook fry planted in San Gregorio River and 15,000 chinook fry planted in Pescadero Creek.
[3] Includes the following plants in Santa Barbara county streams: Bear Creek, 4,000; Maguelito Creek, 2,000; and Salispuedes Creek, 2,000.

Distribution of salmon in the waters of California 1873–1919—Continued

Year	Monterey Bay and tributaries	Ventura River	Truckee River	Total					
				Chinook			Silver		Steelhead fry [3]
	Silver fry	Chinook fry		Eggs	Fry	Yearlings, fingerlings, and adults [1]	Fry	Adults and yearlings	
1873				20,000	520,000				
1874					850,000				
1875			250,000	250,000	2,250,000				
1876					2,000,080				
1877					2,200,000				
1878					2,500,000				
1879					2,300,000				
1880					2,225,000				
1881			10,000		2,390,500				
1882				80,300	3,991,750				
1884					600,000				
1886					150,000				
1887					200,000				
1888					1,290,000				
1889					3,668,000				
1890					1,494,000				
1891					3,575,000				
1892					2,966,600	25,000			
1893					5,131,950				
1894					8,214,900		280,000		353,500
1895					3,935,000		910,000	560,000	
1896					15,748,883	250,660			107,808
1897					20,324,701		298,137		262,000
1898					45,101,688				650,000
1899				85,200	26,409,110				
1900					6,069,950				
1901					4,128,570				
1902					18,967,600				301,000
1903					21,657,553				120,000
1904					65,982,130				90,000
1905					102,661,380				108,000
1906					110,204,472				243,000
1907	80,000				75,029,250		80,000		487,000
1908	80,000				66,199,855		80,000		170,000
1909	[2] 54,000				31,590,000		42,000		518,200
1910					30,756,002				637,800
1911					33,323,324		2,060,910		1,858,100
1912					26,152,770				2,177,958
1913	25,000				18,472,327		42,320		1,983,500
1914					30,840,964	838,906	2,548,960		3,171,083
1915	71,000	25,000			37,543,150	9,053,635	2,363,762		8,582,500
1916		25,000			34,888,739	5,538,224	2,169,050		5,213,170
1917		25,000			8,144,000	14,628,300	50,000	11,000	6,699,420
1918		25,000			14,389,000	10,689,400			
1919		25,000			11,970,000	10,287,000	178,000		4,950,000
Total	310,000	125,000	260,000	435,500	908,003,118	51,310,465	11,103,139	571,000	38,684,039

[1] Of recent years it has been impossible to show the total number of yearlings, fingerlings, and adults planted, as the State reports do not distinguish them from the fry. Those shown in 1914–1919 were reared by the U. S. Bureau of Fisheries.

[3] After 1911 the practice of showing waters in which steelheads were planted was abandoned as the number of streams was becoming unwieldy.

[2] Includes 1,200 steelhead fry, which in "Total" column are included under "Steelhead fry."

After 1919 it was found impossible to show, by streams and species, the distribution in California of salmon and steelhead trout, as the State authorities had abandoned printing the data in this way and substituted that of showing it by counties. The following table shows the total plantings in this manner from 1920 to 1928, both inclusive:

Distribution of salmon in California, 1920—1928

Year	Chinook			Steelhead	Total		
	Eggs	Fry	Fingerlings, yearlings, and adults	Fry	Eggs	Fry	Fingerlings, yearlings, and adults
1920	4, 235, 000	[1] 12, 326, 200	7, 235, 000	4, 614, 100	4, 235, 000	16, 940, 300	7, 235, 000
1921	3, 000, 000	8, 644, 000	4, 593, 400	1, 859, 000	3, 000, 000	10, 503, 000	4, 593, 400
1922	----------	9, 393, 000	5, 872, 200	4, 592, 000	----------	13, 985, 000	5, 872, 200
1923	----------	17, 639, 430	3, 804, 400	3, 281, 300	----------	20, 920, 730	3, 804, 400
1924	----------	18, 906, 120	4, 486, 000	9, 730, 000	----------	28, 636, 120	4, 486, 000
1925	----------	7, 725, 170	1, 892, 500	2, 243, 290	----------	9, 968, 460	1, 892, 500
1926	25, 000	9, 380, 000	5, 327, 700	3, 683, 610	25, 000	13, 063, 610	5, 327, 700
1927	----------	16, 911, 590	9, 305, 000	3, 591, 810	----------	20, 503, 400	9, 305, 000
1928	954, 000	9, 817, 000	6, 559, 700	5, 442, 275	954, 000	15, 259, 275	6, 559, 700
Total	8, 214, 000	110, 742, 510	49, 075, 900	39, 037, 385	8, 214, 000	149, 779, 895	49, 075, 900

[1] Includes 178,000 silver salmon fry.

OREGON

HATCHERIES ON COASTAL STREAMS

Rogue River.—In 1877 R. D. Hume, who had been packing salmon on this river for some years, erected a hatchery at Ellensburg. In 1888 the Oregon Legislature appropriated a sum of money for the enlargement and support of this hatchery, Mr. Hume to retain complete control. As the location is on tidewater, it is necessary to catch the parent fish and hold them until they are ready to spawn, and in order to do this Mr. Hume had an excavation 32 by 62 feet and 11 feet deep made in the bank of the river. This was lined with concrete 1 foot thick, which, when filled with water, made a pond 30 by 60 feet and 10 feet deep. Over the entire pond he constructed a building which could be closed up so as virtually to exclude the light. It is supposed that retaining the fish in a dark place aids in keeping them in good physical condition until ready to spawn. After the death of Mr. Hume in 1908 this hatchery was taken over and operated by the State. After a closure of four years it was reopened as a feeding station in 1912.

In 1897 Mr. Hume built and equipped a hatchery on the upper Rogue River at the mouth of Elk Creek about 26 miles from the town of Central Point, in Jackson County, and, in pursuance of an understanding with the United States Fish Commission, the latter operated then and still continues to operate this plant.

In 1900 the Government established an auxiliary station for the collection of steelhead trout eggs on Elk Creek, about 10 miles above the main station. In 1905 a substation was operated at Grants Pass, while during the fiscal year 1908 and in subsequent years substations were operated at Findley Eddy, on the Rogue River, Illinois River, and Applegate Creek, tributaries of the Rogue.

Many of the eggs gathered at the upper Rogue River stations were shipped to Mr. Hume's hatchery, on the lower river, and there hatched out and planted.

Coquille River.—The State formerly had a hatchery on this river, but it was abandoned during the winter of 1902–3. In the winter of 1904–5 a substation was established on one of the tributaries of the Coquille River, about 6 miles from the South Coos River hatchery, and was used in hatching eggs brought to it from the latter place. A station was built on the north fork of the Coquille River in 1910.

Coos River.—A hatchery was built by the State in 1900 on the South Coos River, about 20 miles from the town of Marshfield.

Umpqua River.—In 1900 the State built a hatchery on the north fork of the Umpqua River, near the town of Glide and about 24 miles east of Roseburg. In 1901 a station was established farther up the north fork, at the mouth of Steamboat Creek. After working here two years the station was moved a couple of miles farther up the stream. In 1907 work was resumed again at the original station near Glide, as winter freshets had seriously damaged the upper station. A permanent station was built in 1910.

Siuslaw River.—In 1893 the State erected a hatchery on Knowles Creek, a tributary of the Siuslaw River, about 20 miles above the mouth of the river. It was turned over to the United States Fish Commission to operate, but no fish came up to the hatchery because the fishermen lower down stretched their nets entirely across the river.

In 1897 and 1898 the United States Fish Commission operated a hatchery owned by a Mr. McGuire and located close to Mapleton, about 2 miles below the head of tidewater.

In 1902 the State established an experimental station at the Bailey place, near Meadow post office. In 1907, a permanent station was established by the State on Land Creek fork of the Siuslaw River.

Alsea River.—In 1902 the State established a station on the Willis Vidito place, near the town of Alsea. In 1907 an experimental station was established on this river at the mouth of Rock Creek, about 14 miles above the head of tidewater. In 1910 an experimental station was established between Alsea and tidewater.

Yaquina River.—In 1902 the State established a hatching station on the Big Elk River, a tributary of Yaquina River, about 3 miles above its confluence with the main river. This station was abandoned in 1924.

Tillamook Bay.—In 1902 the State established a station on Wilson River, a tributary of Tillamook Bay, and about 8 miles above tidewater. In 1906 the station was removed to the Trask River, a tributary of Tillamook Bay.

Additional plants were established at Nehalem in 1919, and Alsea, near Tidewater, in 1912. Two new egg-collecting stations at Nestucca and Wilson River were created in 1912. The latter was temporarily discontinued.

DISTRIBUTION

The following table shows the distribution of fry and fingerlings in the coastal streams of the State by the Government and the State.

Distribution of salmon in the coastal streams of Oregon

Year ending June 30—	Tillamook Bay and tributaries			Yaquina River			Alsea River		
	Chinook fry	Silverside fry	Steelhead fry	Chinook fry	Silverside fry	Steelhead fry	Chinook fry	Silverside fry	Steelhead fry
1898	19,994								
1901				213,500					
1903	251,875			557,700			67,750		
1904	799,300			3,144,380	985,220				
1905				1,407,470	3,009,075	780,500	1,000,000	1,000,000	
1906				816,608	4,178,000	1,033,150	806,938	1,785,351	
1907	312,700	2,648,000		1,919,508	1,955,793	376,245			
1908	2,124,000	1,629,000		2,193,043	909,855		199,700	812,300	
1909		4,896,000	569,690	485,500	1,006,309				
1910	624,800	2,506,990	2,309,770	324,038	28,815				
1911	1,818,245	1,080,000	1,196,000	582,785	2,637,550	621,015	495,950	30,300	
1912	646,300	1,578,131	761,000	148,992	1,554,602	7,145	287,645	997,455	
1913	1,747,530	422,886	848,229	727,567	3,288,650		87,935	424,925	
1914	487,692	1,112,392	660,588						
1915	2,833,428		213,900						
1916	[1] 1,982,724	[1] 130,130					[1] 646,431		
1917	2,143,430	183,800	495,090				1,373,100	1,649,830	1,495,315
1918	1,442,400	534,600					869,370	1,107,483	
1919	706,656	2,097,442	384,370				1,151,720	1,872,473	1,753,104
1920	1,077,090	1,070,135	826,995				1,295,375	1,706,650	3,707,800
1921	1,362,780	1,785,485	1,051,150				3,019,870	6,859,321	
1922			2,036,000				1,311,305	4,783,435	2,397,869
1923	1,529,366	805,987					1,346,361	1,609,761	4,306,533
1924	3,114,848	3,546,649	1,134,460	[2] 1,467,010			3,165,534	1,076,986	2,153,596
1925	5,323,668	1,888,350	820,900		293,125		2,562,333	4,487,800	3,250,214
1926	12,731,300	8,411,200	3,197,350	517,288	966,425		2,301,047	2,766,291	6,060,294
1927	6,177,121	4,280,100	2,370,900	887,850	1,091,670		769,528	5,585,378	2,737,226
1928	2,852,120	2,144,482	545,070				1,770,514	3,534,517	1,615,134
Total	52,108,367	43,751,759	19,421,462	15,393,239	21,905,089	2,818,055	24,528,406	42,089,206	29,476,585

Year ending June 30—	Siuslaw River			Umpqua River		Coos Bay and tributaries		
	Chinook fry	Silverside fry	Steelhead fry	Chinook fry	Steelhead fry	Chinook fry	Silverside fry	Steelhead fry
1897	180,000							
1898	440,275							
1899	2,700,000							
1901	213,500			730,000		235,000		
1902	112,000	214,800		1,136,000		2,416,350		
1903	389,239			1,596,213				
1904	822,567			1,399,860		4,079,274		
1905	435,162	311,900		2,654,925		3,877,172		
1906	1,826,531	1,296,732	397,355	4,903,700		2,744,000		
1907	608,949	1,030,486		4,685,900		4,014,400		
1908	729,130	1,127,293		2,378,853		3,000,000		
1909	191,267	1,092,540	98,243	4,093,848		2,084,500	1,032,000	222,000
1910	273,352	25,289		5,686,273		1,683,738		
1911	594,702	20,693	227,580	2,541,236	293,996	2,374,200		
1912	715,758	504,429	72,097	1,053,516		1,767,170	2,317,370	
1913	255,028	627,312	106,717	903,704	181,065	1,281,120	962,528	
1914	1,062,546	476,273	17,735	1,882,985	80,000	1,331,217	2,973,390	
1915	1,472,410		257,850	1,333,171		1,212,805	1,551,645	192,625
1916	[1] 972,395			[1] 1,216,518		[1] 2,236,229	[1] 2,492,217	
1917	984,945	153,662		918,622	65,200	2,370,000	1,089,500	
1918	529,904	147,475		1,402,700		1,208,840	1,193,960	
1919	743,057			3,259,258		1,932,210	2,416,680	
1920	738,182		100,595	3,896,439		976,600		
1921	614,735	574,620		2,715,075		1,316,780	2,423,530	
1922		1,670,867		2,088,590		2,174,290	1,636,420	
1923	1,000,000			994,848		3,013,810	2,869,610	
1924	761,819	1,591,424		2,466,243	[3] 282,915	[4] 6,284,035	1,237,950	858,100
1925	1,137,160			3,236,539	431,069	3,062,490	1,736,600	490,760
1926	629,900	1,488,614	612,875	2,714,500	[5] 2,280,348	3,541,110	3,246,387	252,820
1927	440,300	805,400		3,879,500	[6] 1,045,113	1,919,100	2,193,320	660,740
1928			333,000	4,018,968	802,072	1,881,100	1,467,200	392,665
Total	21,574,813	13,159,809	2,224,047	69,787,984	2,439,383	64,017,540	32,840,307	3,069,710

[1] All fingerlings.
[2] Includes 423,607 humpbacks reported by game commission and 1,043,403 humpbacks from Yaquina River.
[3] 282,915 silverside fry.
[4] 1,670,867 reported by the Oregon Game Commission.
[5] Includes 1,990,500 silverside fry.
[6] Includes 749,000 silverside fry.

Distribution of salmon in the coastal streams of Oregon—Continued

Year ending June 30—	Coquille River		Rogue River and tributaries			
			Chinook			
	Chinook fry	Silverside fry	Fry	Yearlings, fingerlings, and adults	Silverside fry	Steelhead fry
1877			50,000			
1898			1,910,045			
1900			2,156,945			
1901	235,000		2,967,058		128,000	65,850
1902			4,750,763		424,530	20,250
1903	3,084,577		3,480,300		680,800	
1904	1,000,000		9,023,428			8,073
1905	2,210,000		4,758,653		1,250,432	531,000
1906	2,978,700		47,500	75,000		12,625
1907	2,840,000		5,880,290		1,375,000	105,300
1908	2,450,000	226,600	6,597,027	170,051	158,000	937,680
1909		1,185,800	771,710		643,000	878,847
1910			1,430,292			89,850
1911	500,000	980,770	1,364,248		501,081	2,592,665
1912	196,855	1,672,850	9,574,340		2,355,885	[7] 1,313,890
1913	496,680	962,528	4,169,150		3,198,346	2,795,075
1914	491,580	1,331,910	3,752,483		[8] 7,832,000	1,376,308
1915	495,333	1,365,815	4,747,623	9,309	2,336,359	[9] 3,908,699
1916	[1] 1,465,321	[1] 1,451,858	2,515,500	2,517,892	[10] 198,103	[11] 3,083,092
1917	1,100,500	674,293	171,500	1,758,800	[12] 399,700	[12] 561,955
1918	1,219,628	1,098,650		900,750	366,500	2,810,700
1919	1,491,210	1,469,440		1,032,950	592,150	807,000
1920						
1921	890,630	1,340,880				382,000
1922						2,644,427
1923						
1924	498,482	1,994,020				
1925			1,977,511		40,000	1,021,010
1926	995,000	1,975,000	2,720,000		98,689	
1927		794,500	1,994,208			840,511
1928		798,040	1,220,000			821,179
Total	24,639,496	19,322,954	78,030,574	6,464,752	22,578,575	27,607,986

[1] All fingerlings.
[7] Includes 177,790 fingerlings, yearlings, and adults.
[8] Includes 860,903 fingerlings, yearlings, and adults.
[9] Includes 27,258 fingerlings.
[10] Includes 9,153 fingerlings.
[11] Includes 2,583,092 fingerlings; all were planted by U. S. Bureau of Fisheries.
[12] Includes 6,000 fingerlings.
[13] Includes 128,600 fingerlings.

Distribution of salmon in the coastal streams of Oregon—Continued

Year ending June 30—	Total				Grand total, all species
	Chinook		Silverside fry	Steelhead fry	
	Fry	Yearlings, fingerlings, and adults			
1877	50,000				50,000
1897	180,000				180,000
1898	2,370,314				2,370,314
1899	2,700,000				2,700,000
1900	2,156,945				2,156,945
1901	4,594,058		128,000	65,850	4,787,908
1902	8,415,113		639,330	20,250	9,074,693
1903	9,427,654		680,800		10,108,454
1904	20,268,809		985,220	8,073	21,262,102
1905	16,343,382		5,571,407	1,311,500	23,226,289
1906	14,123,977	75,000	7,260,083	1,443,130	22,902,190
1907	20,261,747		7,009,279	481,545	27,752,571
1908	19,671,753	170,051	4,863,048	937,680	25,642,532
1909	7,626,825		9,855,649	1,768,780	19,251,254
1910	10,022,493		3,561,094	2,399,620	15,983,207
1911	10,271,366		5,250,394	4,931,256	20,453,016
1912	14,390,576		10,980,722	2,154,132	27,525,430
1913	9,668,714		9,887,175	3,931,106	23,486,995
1914	9,008,503		13,725,965	2,134,631	24,869,099
1915	12,094,770	9,309	5,253,819	4,573,074	21,930,972
1916	2,515,500	11,037,510	4,272,308	3,083,092	20,908,410
1917	9,062,097	1,758,800	4,150,785	2,617,560	17,589,242
1918	6,672,842	900,750	4,448,668	2,810,700	14,832,960
1919	9,283,111	1,032,950	8,448,185	2,944,474	21,708,720
1920	7,983,638		2,775,785	4,634,890	15,394,313
1921	9,919,870		12,983,836	1,433,150	24,336,856
1922	5,574,185		8,090,722	7,078,296	20,743,203
1923	7,884,385		5,285,358	4,306,533	17,476,276
1924	17,757,971		9,729,894	4,146,156	31,634,021
1925	17,299,701		8,445,875	6,013,953	31,759,529
1926	26,150,145		20,943,106	10,413,187	57,506,438
1927	16,067,607		15,499,368	6,905,490	38,472,465
1928	11,742,702		7,944,239	4,509,120	24,196,061
Total	341,560,753	14,984,370	198,670,114	87,057,228	642,272,465

The following tables show separately the total output of the hatcheries in Oregon owned by the United States Bureau of Fisheries and of those owned by the State:

Output of hatcheries in Oregon owned by the United States Bureau of Fisheries

Year ending June 30—	Chinook			Silverside		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1889		4,500,000				
1890	1,000,000	2,776,475				
1891	700,000	4,901,525				
1892		1,332,400				
1893		4,100,000				
1894		213,000				
1895	23,000					
1896		[1] 2,852,150	[2] 557,150			
1897		4,922,634				
1898		16,915,512				
1899	27,000	4,300,200				
1900	1,800,000	4,126,367			146,824	
1901	1,100,000	1,669,857	1,668		128,000	
1902	1,866,000	11,587,061			424,530	
1903	4,884,400	5,453,860	250	680,800		
1904	3,113,000	15,270,675				
1905	20,000	9,822,636			1,250,432	
1906	28,200	2,454,371	122,980			300
1907	1,661,390	8,542,104			158,000	57,952
1908	2,045,000	7,844,827	627,856		1,799,915	
1909	3,531,000	5,021,655	2,763			
1910	3,953,992	4,220,197	225			
1911	600,000	5,686,168	200,000		1,659,681	
1912	8,000,000	12,837,840	750,765		2,355,885	
1913	21,491,000	11,291,023			3,198,346	
1914	1,075,000	12,156,818	602,300		8,441,642	27,258
1915	37,000	10,434,517	531,351	76,200	2,373,559	
1916	1,000,000	9,916,900	3,556,161	196,000	488,950	9,153
1917	163,900	634,500	7,364,500		393,700	92,100
1918	3,000	3,843,700	11,284,150		8,000	385,300
1919	20,000		5,325,450			594,350
1920	30,000	1,250,100	[3] 6,674,100			20,500
1921	130,000		[4] 12,618,400			417,050
1922	20,000	1,311,500	[5] 11,759,650			110,000
1923	200,000	716,000	[6] 6,518,200			2,833,600
1924	10,539,100	[7] 448,000	[8] 16,075,000			7,538,150
1925			[9] 8,214,400	762,000		2,081,000
1926	520,000		[10] 18,218,000	10,000		2,685,500
1927			[11] 12,051,000	48,000		640,900
1928			[12] 11,590,500	925,000		1,369,500
Total	69,591,982	193,334,572	134,646,819	2,698,000	22,827,464	18,862,593

[1] All but 17,000 of these were from eggs received from the California stations.
[2] All raised from eggs received from the California stations.
[3] Includes 95,000 chum salmon.
[4] Includes 1,935,500 from Idaho.
[5] Includes 224,000 from Idaho.
[6] Includes 1,124,700 from Idaho, and 95,000 chums.
[7] All from Idaho waters.
[8] Includes 7,600 chums and 23,700 sockeyes.
[9] Includes 46,700 sockeyes.
[10] Includes 10,970,000 from Idaho, and also 64,000 sockeyes.
[11] Includes 7,879,000 from Idaho.
[12] Includes 7,349,500 from Idaho; and 71,000 sockeyes.

Output of hatcheries in Oregon owned by the United States Bureau of Fisheries—Continued

Year ending June 30—	Steelhead trout			Total		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1889					4,500,000	
1890				1,000,000	2,776,475	
1891				700,000	4,901,525	
1892					1,332,400	
1893					4,100,000	
1894					213,000	
1895				23,000		
1896					2,832,150	557,150
1897					4,922,634	
1898					16,915,512	
1899	159,000	12,125		186,000	4,312,325	
1900	415,000	99,000		2,215,000	4,372,191	
1901	246,000	65,850	25,000	1,346,000	1,863,707	26,668
1902	481,000	20,250		2,347,000	12,031,841	
1903	400,000	262,700	62,033	5,965,200	5,716,560	62,283
1904		23,205	11,090	3,113,000	15,293,880	11,090
1905	50,000	534,000		80,000	11,607,068	
1906	10,000	1,294,485	40,383	38,200	3,748,856	163,663
1907	50,000	105,200		1,711,390	8,647,404	
1908	263,725	952,680		2,308,725	8,955,507	685,788
1909	51,468	1,374,308		3,582,468	8,195,878	2,763
1910		2,074,188		3,953,992	6,294,385	225
1911		2,914,789		600,000	10,260,638	200,000
1912		2,005,100	294,090	8,000,000	17,198,825	1,044,855
1913		2,795,075		21,491,000	17,284,444	
1914		2,230,008		1,075,000	22,828,468	629,558
1915	752,000	3,254,275	910,652	865,200	16,062,351	1,442,008
1916	450,000	500,000	2,785,805	1,646,000	10,905,850	6,351,119
1917	2,687,600	34,500	467,450	2,851,500	1,062,700	7,924,050
1918	750,000		3,372,165	753,000	3,851,700	15,041,615
1919	525,000		843,000	545,000		6,762,800
1920	700,000		2,062,250	730,000	1,250,100	8,756,850
1921			1,316,000	130,000		14,351,450
1922	200,000		1,662,420	220,000	1,311,500	13,532,070
1923	1,310,000		2,704,000	1,510,000	716,000	12,055,800
1924	2,110,000		2,871,900	12,649,100	448,000	26,485,050
1925	507,000		474,000	1,269,000		10,769,400
1926	1,060,000		[13] 3,375,200	1,590,000		24,278,700
1927	250,000		10,000	298,000		12,701,900
1928	1,070,000		843,700	1,995,000		13,808,700
Total	14,497,793	20,551,838	24,131,138	86,787,775	236,713,874	177,640,550

[13] Includes 79,000 from Idaho.

Output of hatcheries owned by the State of Oregon

Year	Chinook fry	Silverside fry	Steelhead trout fry	Sockeye fry	Total
1877	50,000				50,000
1878	79,620				79,620
1879	1,876,500				1,876,500
1880	1,834,290				1,834,290
1881	2,554,290				2,554,290
1888	1,300,000				1,300,000
1889	4,500,000				4,500,000
1890	990,000				990,000
1891	[1] 792,000				792,000
1895	2,500,000				2,500,000
1896	2,500,000				2,500,000
1899	2,700,000				2,700,000
1900	2,500,000		200,000		2,700,000
1901	7,562,000		245,000		7,807,000
1902	11,220,550	7,957,000	256,327		19,433,877
1903	18,502,072	3,288,600	300,850		22,091,522
1904	[2] 48,730,791	3,974,185	143,849		52,848,825
1905	16,393,249	5,509,085	1,495,735		23,398,069
1906	[3] 27,404,596	7,503,655	1,859,696		36,767,947
1907	[4] 25,156,732	6,446,628	376,245		31,979,605
1908	[5] 21,209,394	5,359,709			26,569,103
1909	[6] 20,108,990	9,212,649	1,403,129		30,724,768
1910	[7] 24,169,365	3,631,827	2,364,120		30,165,312
1911	[8] 19,762,229	4,749,319	4,018,598	[9] 1,488,327	30,018,473
1912	[10] 18,077,971	9,580,497	1,358,742	[11] 1,957,825	30,975,035
1913	[11] 26,623,268	9,879,666	1,136,031	[12] 1,937,134	39,576,099
1914	[13] 21,945,746	5,893,965	758,233	[11] 1,978,140	30,576,084
1915	[14] 27,532,168	2,917,460	4,793,208		35,242,836
1916	[15] 27,120,254	[16] 4,215,705	3,180,709	[17] 2,399,000	[18] 36,915,668
1917	27,615,600	4,183,000	4,804,743	[11] 1,526,024	[18] 38,129,367
1918	28,109,125	4,556,207	1,633,580	[17] 2,731,823	[18] 37,030,735
1919	33,732,431	9,140,769	4,004,754	[19] 3,199,800	[18] 50,077,754
1920	26,033,409	2,775,785	5,240,190	600,000	34,649,384
1921	26,834,572	17,214,721	3,096,969	4,063,970	51,210,232
1922	16,811,710	12,297,662	7,828,851	467,000	37,405,223
1923	23,351,681	7,480,271	8,150,621	[20] 1,836,326	40,818,899
1924	45,272,574	12,766,536	[21] 11,273,124	5,327,310	74,639,724
1925	57,799,916	13,896,498	7,945,142	[22] 4,138,827	83,775,383
1926	63,889,286	22,755,821	11,836,722	[23] 5,942,000	104,423,829
1927	55,039,328	17,702,740	8,486,252	[24] 3,178,500	84,406,820
1928	48,610,426	13,099,329	6,785,219	[25] 5,732,500	74,227,854
Total	838,796,313	227,989,289	104,976,639	48,499,886	1,220,262,127

[1] Eggs from which hatched obtained from U. S. Bureau of Fisheries.
[2] 6,826,540 eggs obtained from U. S. Bureau of Fisheries.
[3] 7,714,000 eggs obtained from U. S. Bureau of Fisheries.
[4] 3,550,000 eggs obtained from U S. Bureau of Fisheries
[5] 3,020,000 eggs obtained from U. S. Bureau of Fisheries.
[6] 6,581,000 eggs obtained from U. S. Bureau of Fisheries.
[7] 6,465,300 eggs obtained from U. S. Bureau of Fisheries
[8] 3,950,000 eggs obtained from U. S. Bureau of Fisheries.
[9] 1,500,000 eggs obtained from U. S. Bureau of Fisheries.
[10] 8,000,000 eggs obtained from U. S Bureau of Fisheries
[11] 2,000,000 eggs obtained from U. S. Bureau of Fisheries.
[12] 2,491,000 eggs obtained from U. S. Bureau of Fisheries.
[13] 1,000,000 eggs obtained from U. S. Bureau of Fisheries.
[14] Eggs from which hatched obtained from U. S. Bureau of Fisheries
[15] All but 490,000 were fingerlings.
[16] All but 41,500 were fingerlings.
[17] 3,000,000 eggs obtained from U. S. Bureau of Fisheries.
[18] Most of the output comprised of fish 4 to 9 months old.
[19] 3,174,800 from eggs obtained from Alaska, and 25,000 from dwarf sockeye eggs obtained from Montana.
[20] Includes 884,335 pinks.
[21] Includes 646,700 pinks.
[22] Includes 2,503,100 pinks.
[23] Includes 277,500 pinks.
[24] Includes 754,600 pinks.
[25] Includes 1,837,995 pinks.

COLUMBIA RIVER AND TRIBUTARIES

The first fish-cultural work upon the Columbia River and in Oregon was at Clackamas, on the Clackamas River, a tributary of the Willamette River, which empties into the Columbia River about 180 miles from its mouth.

This hatchery was built in 1876 by the Oregon & Washington Fish Propagating Co., which operated it until 1880. In 1887 the State provided for and there was appointed a State fish commission. Almost the first work of the commission was to spend $12,000 appropriated by the legislature to put in repair and operate this hatchery. On July 1, 1888, it was informally turned over to the United States Commission of Fish and Fisheries, which paid over the purchase price, took formal possession in the following winter, and has operated it ever since, with the exception of several years when the building of dams stopped the progress of salmon to the hatchery. During this period a temporary station for the collection of eggs was established on Sandy River, about 15 miles away, and on Salmon River, a tributary of Sandy River, both tributaries of the Columbia River. Some eggs were also brought in from the California hatcheries and hatched at the Clackamas station. In 1901 the hatchery was moved about 4 miles down the river and has since been operated as both a rearing and a collecting station. In 1901 the State established another hatchery on the Clackamas River about 30 miles below the main station and between the north and south forks. In 1904 all were turned over to the United States. In 1915 the hatchery was moved again. In 1907 an experimental station for the collection of eggs of the early variety of chinook salmon was established by the State of Oregon on the Clackamas River below the Portland Railway, Light & Power Co.'s dam at Cazadero, but this was later operated by the United States Bureau of Fisheries. The building of a dam having cut off this station, another was established in 1913 at a point 30 miles distant from Portland.

In 1889 the State established a hatchery in the cannery of F. M. Warren, at Warrendale, in Multnomah County, on the Columbia River, which was operated in that year and in 1890.

In 1895 some of the Oregon salmon packers combined and organized the Columbia River Packers Propagating Co., which established a hatchery on the upper Clackamas River at the junction of the Warm Springs and the Clackamas and operated it in 1895 and 1896. The Government operated it in 1897 and 1898, after which it was turned over to the State and moved to the opposite side of the river.

In 1898 the collection of steelhead-trout eggs was first undertaken on the northwest coast by the State of Oregon on Salmon River, a tributary of the Columbia River, and met with fair success. In March, 1899, the Government sent a party to the falls of the Willamette River, near Oregon City, to collect steelhead eggs, and also operated for this purpose at its substation on the Salmon River, but the latter effort met with failure, as the rack was washed away. This station was turned over to the State on June 15, 1899.

In 1901 the State of Oregon did some experimental work at Swan Falls, on Snake River, the boundary for a considerable distance between Oregon and Idaho. During the winter and early spring of 1902 the State also worked Tucannon River, which is a tributary of

Snake River, for steelhead, but met with poor success. Snake River was worked again in 1902 at the foot of Morton Island, which is situated 2 miles above Ontario, in Malheur County. Title to the necessary property was secured from the War Department in 1903 and permanent buildings were erected. It was closed for some years and finally abandoned in 1911.

In 1901 the State of Oregon established an experimental hatchery in Wallowa County, on the Grande Ronde River, at the mouth of a small tributary called the Wenaha River, which enters the main stream about 50 miles from its mouth. A permanent station was established in the canyon about 1½ miles below the Wallowa bridge on the Wallowa River, a tributary of the Grande Ronde River, in 1903. This was transferred to Enterprise in 1921.

In 1902 the State of Oregon erected a permanent plant on Salmon River at its junction with Boulder Creek. This plant was closed in 1911.

In the same year the State established an experimental station on the McKenzie River, a tributary of the Willamette River, about one-half mile above Vida post office. This experimental work was resumed in 1905 at a point 2 miles below Gate Creek. The hatchery was permanently established at a spot about 30 miles from Eugene and near the town of Leaburg a year or two later. The plant has since been enlarged by the construction of rearing ponds.

In 1903 a hatchery was built by the State of Oregon on the Snake River near the town of Ontario, in eastern Oregon.

In 1906 an experimental station was established by the State on Breitenbush Creek, a short distance above its junction with the Santiam River, a tributary of the Willamette River, but the plant was destroyed, very shortly after its establishment, by a forest fire. An experimental station was reestablished here in 1909, but a heavy freshet raised the river so high that the penned fish escaped around the rack.

In 1909 the State of Oregon built at Bonneville, on Tanner Creek, a tributary of the Columbia River, a large central hatchery capable of handling 60,000,000 eggs, it being the intention of the State to hatch at this plant the eggs collected at other stations.

In the same year a temporary hatchery was located on the Santiam River by the State of Oregon, and an additional plant was placed at South Santiam in 1923.

During 1910 the State of Oregon received 1,500,000 red salmon eggs from the Yes Bay (Alaska) hatchery of the United States Bureau of Fisheries, and in a number of succeeding years they have received a consignment from the same source, as will be noted in the statistical tables. These were hatched out in the Bonneville hatchery and planted in the Columbia River.

The State of Oregon built a hatchery on the Klaskanine River, a tributary of Youngs River, near Olney, in Clatsop County, in 1911. In the same year an eyeing station for spring chinooks was opened by the State on the Willamette River, near Lowell.

Additional construction consisted of an egg-collecting station located on the Willamette at Reserve, and a hatchery at Oakridge, both created in 1914. Hatcheries located at Ontario and on the Salmon River in 1903 were abandoned in 1909 and 1910.

The first entrance of Washington (then a Territory) into fish-cultural operations was in 1879, when the State fish commissioner

paid the Oregon & Washington Fish Propagating Co., which was operating the hatchery on the Clackamas River, $2,000 for salmon fry deposited in that river. In 1893 the State legislature established a hatchery fund which was to be supplied by licenses from certain lines of the fishery business. In 1895 its first hatchery in the Columbia River Basin was built on the Kalama River, about 4 miles distant from its junction with the Columbia, and in Cowlitz County. Shortly after this hatchery was built it was discovered that it was above where the salmon spawned, and a second hatchery was built 1¼ miles below the first named, as the rugged mountainous character of the country made transportation between the two sites difficult. The plant was rebuilt and enlarged in 1928, and 20 rearing ponds were built.

Another station for the collection and eyeing of eggs was established on the Chinook River, a small stream which empties into Baker Bay near the mouth of the Columbia.

During the fiscal year 1897 the United States Fish Commission established a station on Little White Salmon River, a stream which empties into the Columbia, on the Washington side, about 14 miles above the Cascades. During the fiscal year 1901 an auxiliary station was operated on Big White Salmon River, while fishing was carried on in Eagle and Tanner Creeks, in Oregon, the eggs obtained from these creeks being brought to the Little White Salmon hatchery.

In 1899 the State of Washington built and operated hatcheries on the Wenatchee River, a tributary of the Columbia River, about 1½ miles from Chiwaukum Station on the Great Northern Railway, and on Wind River, a tributary of the Columbia, about 1 mile from the junction. The latter was abandoned in 1922 and rebuilt in 1928.

In 1900 Washington State hatcheries were established in the Columbia River Basin as follows: White River hatchery, which was built on Coos Creek, which empties into a tributary of the White River, the location being about 2½ miles from where the Green River joins the White River; Methow River hatchery, built on the Methow River at the point where it is joined by the Twisp, about 22 miles from the Columbia River; Colville River hatchery, built on the north bank of Colville River, about 1½ miles from its mouth, and about 1 mile from Kettle Falls; Klickitat River hatchery, located on the east bank of the Klickitat River, about 6 miles from its mouth; and one on the Little Spokane River, about 10 miles from its mouth and about 9 miles north of the city of Spokane. The Klickitat River hatchery never was operated, while most of the others were operated intermittently.

In 1906 a hatchery was extablished by the State of Washington on the Lewis River, some distance above the town of Woodland. In 1919 this hatchery was operated by the United States Bureau of Fisheries. This has since been abandoned.

In 1909 the State of Washington established a hatchery near Pateros, on the Methow River, a tributary of the Columbia River, and on the Tilton.

In 1915 Clarke County, Wash., built a hatchery on the east side of Cold Creek, about 2 miles from the town of Vancouver.

A temporary station was established by the State of Washington on Wenatchee Lake, near Leavenworth, in 1915.

The Cowlitz hatchery was rebuilt on a new site near Lewis, Wash., in 1926. A small plant was located at Tilton, Wash., and abandoned in 1922.

The following table shows the plants of salmon and steelhead trout in the Columbia River and its tributaries by the Bureau of Fisheries and the States of Oregon and Washington:

Plants of salmon in the Columbia River and tributaries since 1877

Year ending June 30—	Sockeye		Chinook		Silverside	
	Fry	Yearlings, fingerlings, and adults	Fry	Yearlings, fingerlings, and adults	Fry	Yearlings, fingerlings, and adults
1877			300,000			
1878			79,620			
1879			3,076,500			
1880			1,834,290			
1881			2,554,290			
1888			1,300,000			
1889			4,500,000			
1890			3,756,475			
1891			5,694,000			
1892			1,332,400			
1893			4,100,000			
1894			213,000			
1895			[1] 2,523,000			
1896			9,832,150	557,150		
1897			10,641,394			
1898			26,212,074			
1899			19,979,241			
1900			22,510,869		7,175,824	
1901			24,977,310	1,668	5,559,750	
1902			44,328,085		17,545,724	
1903			40,174,313		8,721,720	
1904			71,694,587		8,422,085	
1905			17,107,217		1,354,610	
1906			[2] 36,324,805	47,980	828,472	300
1907			23,171,235		2,657,349	
1908			32,856,262	1,995,746	1,705,543	
1909			33,081,994	16,949	2,439,415	
1910			37,743,777	225	3,374,733	
1911	1,488,327		28,791,095	11,700	[3] 1,308,900	
1912	1,957,825		49,335,065	1,405,860	1,243,660	
1913	1,937,134		70,211,177		4,591,500	
1914	1,978,140		[4] 81,995,039	1,732,805	636,900	
1915			81,504,641	812,801	608,747	
1916	4,478,362	1,526,024	85,657,635	8,686,789	873,882	
1917	1,526,024		47,187,410	9,922,869	1,381,915	86,100
1918	2,731,823		64,929,898	10,383,400	3,763,832	18,800
1919	3,199,800	939,960	22,571,500	46,382,420	4,205,864	2,200
1920		676,615	48,115,679	28,042,600	4,803,585	22,050
1921		4,093,970	21,614,552	22,487,500	6,869,085	
1922		493,365	26,765,875	50,831,300	6,320,625	
1923		1,886,726	33,703,765	23,870,200	2,979,323	338,800
1924		5,327,310	46,301,753	32,278,300	4,902,150	121,850
1925		4,280,527	55,703,215	10,344,200	9,918,489	586,000
1926		5,963,500	52,677,283	42,613,000	7,210,186	
1927		3,178,500	60,551,361	18,532,000	2,888,972	
1928		5,759,380	56,544,029	29,011,500	10,909,450	
Total	19,297,435	34,125,877	1,416,059,860	339,968,962	135,202,293	1,176,100

[1] Includes 23,000 eggs. [2] Includes 48,200 eggs. [3] Includes 100,000 eggs. [4] Includes 1,000,000 eggs.

Plants of salmon in the Columbia River and tributaries since 1877—Continued

Year ending June 30—	Steelhead trout		Chum		Total	
	Fry	Yearlings, fingerlings, and adults	Fry	Yearlings, fingerlings, and adults	Fry	Yearlings, fingerlings, and adults
1877					300,000	
1878					79,620	
1879					3,076,500	
1880					1,834,290	
1881					2,554,290	
1888					1,300,000	
1889					4,500,000	
1890					3,750,475	
1891					5,694,000	
1892					1,332,400	
1893					4,100,000	
1894					213,000	
1895					2,523,000	
1896					9,832,150	557,150
1897					10,641,394	
1898					26,212,074	
1899	8,625				19,987,866	
1900	299,000				29,985,693	
1901	245,000				30,782,060	1,668
1902	256,327				62,130,136	
1903	563,550	37,033			49,459,583	37,033
1904	158,981				80,275,653	
1905	[5] 768,235				19,230,062	
1906	[6] 1,745,111	24,383			38,898,388	72,663
1907	26,640				25,855,224	
1908	15,000				34,576,805	1,995,746
1909	[5] 1,058,657				36,580,066	16,949
1910	[7] 2,063,688				43,182,198	225
1911	1,982,331		420,730		33,991,383	11,700
1912	1,387,500	116,300	106,020		54,030,070	1,522,160
1913	40,000		105,800		76,885,611	
1914	[8] 932,700		591,638		86,134,417	1,732,805
1915	4,128,833		8,299,572		94,541,793	812,801
1916	1,459,067	6,000	16,448,199		108,917,145	10,218,813
1917	4,074,330	338,850	5,332,125	248,050	59,501,804	10,595,869
1918	4,274,330		8,881,640		84,581,523	10,402,200
1919	4,663,820	135,500	210,600	460,800	34,851,584	47,920,880
1920	9,323,400	160,600	2,376,000	249,150	64,618,664	29,151,015
1921	3,027,260		2,140,180	5,067,900	33,651,077	31,649,370
1922	1,759,355		484,955		35,330,810	51,324,665
1923	3,457,139	723,000		257,500	40,140,227	27,076,226
1924	4,166,842	776,600	493,231	765,600	55,863,976	39,289,660
1925	3,007,324	474,000	480,000		69,109,028	15,684,727
1926	2,126,002	377,820	66,732		62,080,266	48,954,320
1927	2,398,362	10,000	591,400		66,430,095	21,720,500
1928	3,278,479	132,000	370,850		71,102,808	34,902,880
Total	62,605,948	3,312,086	47,399,672	7,049,000	1,680,655,208	385,632,025

[5] Includes 50,000 eggs. [6] Includes 58,000 eggs. [7] Includes 25,000 eggs. [8] Includes 79,000 eggs.

WASHINGTON

Willapa River.—In 1899 Washington established a hatchery on Trap Creek, a tributary of the Willapa River, situated about 200 yards from the creek's mouth. This was rebuilt and enlarged in 1928.

In 1916 local residents along the North River, a tributary of Willapa Harbor, contributed the funds to build a salmon hatchery, and this was constructed and put into operation the same year.

In 1917 a salmon hatchery was built and put into operation at Raymond. It is designated as Willapa Hatchery No. 2. The two latter were discontinued in 1922.

In 1918 some fishermen and public-spirited citizens of this section contributed the money for the building of a State hatchery on the Nasel River, a tributary of Willapa Harbor.

Chehalis River.—The construction of a hatchery on the Chehalis River, about 4 miles above the city of Montesano, was begun by the

State in October, 1897, but owing to bad weather and extreme high water was not completed until late in 1898. The hatchery was a failure until 1902 when a fair season was had, as was again true in 1903. It was not operated in 1904. Since the State began taking eggs from the Satsop River, a tributary of the Chehalis, it has been possible to fill the hatchery each season, and the project was enlarged in 1929.

In 1909 the site where eggs had been gathered on the Satsop River was purchased, and a new hatchery was erected there. It has three concrete rearing ponds and is fully equipped for the taking of spawn and the hatching out and caring for 5,000,000 fry. This plant was first operated in the fall of 1909.

Work was begun in September, 1914, by the United States Bureau of Fisheries on a hatching station on Lake Quinault, Wash., and a take of eggs was made the same year.

In lieu of installing fishways in their dams in the Humptulips River and tributaries, in the Grays Harbor section, two timber firms agreed to furnish the money needed to build a hatchery on Stevens Creek, west of Humptulips, and the same was constructed and put into operation in October of 1914. The plant is now the property of the State and was rebuilt in 1929.

In 1917 a hatchery was built by the State on Chehalis River near Dryad, with money contributed by two lumber companies in lieu of building fishway over a dam.

Puget Sound and tributaries.—In 1896 the State established a hatchery on Baker Lake, which is the head of Baker River, a tributary of the Skagit River, and this was the first establishment for the hatching of sockeye salmon. In July, 1899, it was sold to the United States Fish Commission. In 1901 steelhead trout eggs were collected on Phinney Creek, about 5 miles from the town of Birdsview, and some 30 miles from Baker Lake. In 1901 an auxiliary station was opened at Birdsview, on Skagit River, and steelhead trout eggs were collected on Phinney and Grandy Creeks and brought to Baker Lake to be hatched. The Birdsview station has since been developed as a main station, and the Baker Lake hatchery relegated to auxiliary status.

In 1898 a private hatchery (the necessary money being raised by subscription among the residents of Fairhaven, now Bellingham, and vicinity) was built near Lake Samish, a few miles from Fairhaven.

In 1899 a hatchery was built by the State on Kendall Creek, a tributary of the Nooksack River, about 300 yards from same, and about 2 miles from the railway station of Kendall. Except in 1903, this hatchery has since been operated continuously. An eyeing station was built in 1907 on the south fork of the Nooksack River, about 1 mile from Acme.

In the same year the State built a hatchery on the Skokomish River, about 4 miles from its mouth. An eyeing station was also erected on the north fork of the same river. The main station was not operated in 1904 and only on a small scale in 1903 and 1905.

The State, in 1889, built a hatchery on Friday Creek, a tributary of the Samish River, situated about 1 mile from the mouth of the creek.

The following State hatcheries were first operated in 1900: Snohomish hatchery, built on the west bank of Skykomish River, a few miles from its mouth; Nisqually River hatchery, built on Muck Creek, about one-half mile from the Nisqually River, and about 4 miles

from the town of Roy, in Pierce County; and the Stillaguamish hatchery, located on the Stillaguamish River, about 4 miles from the town of Arlington, in Snohomish County. The latter has since been moved to Jim Creek, a tributary of the south branch of the Stillaguamish River.

The Startup hatchery, located near Startup, on the Skykomish River, was formerly used as a collecting station for the Snohomish hatchery. It is still used for this purpose, but also retains and hatches a considerable quantity of spawn. The station is about 4 miles from the Snohomish hatchery. In 1918 it was rebuilt and now bears the name of Skykomish hatchery.

In 1900 the State established a fisheries experimental station at Keyport Landing, on the east arm of Port Orchard Bay, with Pearson as the nearest post office. The work of the station was devoted to salmon and oysters until it was abandoned a few years later.

The State established a hatchery on the Dungeness River, about 7 miles from the town of Dungeness, in Clallam County, in 1901. In 1906 it constructed a hatchery on a small tributary of the Skagit River, between Hamilton and Lyman. This was destroyed in 1917 by floods. The station built on Sauk River, a tributary of the Skagit, has been operated only occasionally since the Skagit hatchery was built.

The White River hatchery was constructed on Suice Creek, a tributary of Green River, some years ago. During the summer of 1909 a new hatchery was built at this station, the old one being too small to accommodate the amount of spawn that could be taken. The new hatchery is located on the east side of Suice Creek near the county road. The building contains 140 hatching troughs. The plant has a pond system, where the fry are kept and fed until they are able to shift for themselves.

During the summer of 1911 the city of Tacoma constructed a large concrete dam in the Green River, about 4 miles west of Eagle Gorge. As this dam prevented the salmon from reaching the spawning beds, the State established an eyeing station the same year just below the dam. In 1913 the name was changed to Green River hatchery, to conform to the name of the main stream. All work in this field has been concentrated in a large new establishment completed in 1927.

In 1912 the United States Bureau of Fisheries completed the Quilcene and Duckabush hatcheries. Both are on small tributaries entering the west side of Hoods Canal, an arm of Puget Sound.

In 1913 a new station was operated by the Bureau on the Dusewallips River, a tributary of Hoods Canal, Puget Sound, near Brinnon. Two new field stations—on Elwell River, a tributary of the Skykomish River, near Sultan, and on Sauk River, a tributary of the Skagit River, near Darrington—were also put into operation the same year. The Sauk River had been worked by the State at one time.

In 1913 the Middle Fork Nooksak eyeing station was transformed into a hatchery. In the same year the eyeing station on the south fork was moved farther up the river. The plant was finally abandoned in 1922.

In 1914 stations were established by the United States Bureau of Fisheries on Day Creek and Illabot Creek, tributaries of the Skagit River, while a substation was opened on Hamahama River at Eldon, distant about 9 miles up Hood Canal from the mouth of the Duckabush River.

On May 23, 1914, the Baker Lake hatchery building was destroyed by fire. In addition to the building and equipment, 1,305,820 silver fry and 823,097 sockeye fry were destroyed. The station was rebuilt but was burned down again in 1919. It has since been rebuilt.

In 1915 the State built a hatchery on the Pilchuck River, a tributary of the Skykomish River, near Granite Falls.

In lieu of building a fishway in its dam on the Elwha River, near Port Angeles, the Olympic Power Co. furnished the funds needed to build a hatchery below the dam, and this was opened by the State in 1915. It was discontinued in 1922.

In 1916 the city of Tacoma furnished funds to build a hatchery in lieu of a fish ladder over the Nisqually power plant dam, and the hatchery was constructed by the State at Chambers Prairie and opened in 1916. It is known as the Chambers Creek hatchery.

In 1917 a new hatchery was established by the State at Orting, on the Puyallup River, while in 1918 an eyeing station was established at Tahuya, on Hoods Canal, near the Skokomish hatchery.

In 1919 the Nisqually hatchery was destroyed by floods.

The following tables show the total output of the salmon hatcheries in the State of Washington owned by the United States Bureau of Fisheries and the hatcheries owned by the State itself:

Output of the salmon hatcheries in Washington owned by the United States Bureau of Fisheries

Year ending June 30—	Chinook			Sockeye, or blueback			Silver, or coho		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1897		1,848,760							
1898		7,391,886							
1899	4,926,000	1,791,056							
1900	2,686,000	6,626,947			10,683,000				
1901	6,581,000	5,427,680			3,834,453			174,041	
1902		15,637,687			3,371,000				
1903		16,774,030			3,731,789			81,812	
1904	7,506,000	17,386,183			3,855,000			3,984,645	
1905		4,236,276			7,819,281	10,000	107,000	8,071,081	
1906	7,714,000	14,846,905		880,000	3,285,130	9,500	239,180	6,445,574	
1907	3,550,000	6,512,738			4,224,255		760,000	3,636,952	
1908	1,485,000	12,372,503	1,537,941	75,000	8,514,305		296,000	13,262,714	
1909	3,650,000	11,565,553	14,186	100,000	5,430,626		272,000	7,661,110	
1910	3,813,250	9,175,610			4,554,825		275,000	10,888,025	
1911	3,350,000	7,307,455	11,700		5,496,000		102,000	4,550,615	
1912	8,020,000	10,959,728	655,095		4,692,573		52,000	10,599,939	
1913	19,713,000	19,933,300			5,751,700		102,000	10,754,617	
1914	4,584,000	31,140,440	1,130,505	50,000	2,583,469	120,000		13,591,354	
1915	4,998,000	38,162,139	987,495	155,000	10,820,441	46,575	35,000	20,673,056	41,500
1916		38,012,864	7,488,270		15,737,420	2,666,308	2,500	5,466,334	1,460,354
1917		14,969,904	5,865,226		11,861,825	2,145,953		3,960,000	4,559,860
1918	3,150,000	2,185,218	41,202,694		3,625,000	12,705,285		972,300	10,118,815
1919	960,000	389,002	18,474,900		1,000,000	15,799,960		7,544,020	697,380
1920	7,002,000		24,456,970		14,726,615	9,876,000		6,887,050	1,820,500
1921	3,650,000		23,735,465	[1] 50,000	8,000,000	3,457,000		600,000	6,551,200
1922	1,400,000		40,356,070		4,200,000	7,701,635		600,000	10,964,940
1923	[2] 4,000,000		19,852,145		14,200,000	1,998,400	100,000	8,371,025	3,077,055
1924	2,246,000	745,000	21,296,105	[3] 3,320,000	8,519,840	4,528,000		11,419,990	3,892,000
1925	7,494,880	380,000	25,346,000	3,150,000	21,770,000	2,845,000	100,000	10,177,650	1,716,639
1926	10,656,640		23,859,600	150,000	9,795,800	6,979,180	201,000	4,555,800	2,470,900
1927	9,112,000	266,000	17,607,800	125,000	12,030,000	2,668,170	100,000	5,142,400	997,600
1928	18,079,000	342,500	28,810,220	4,410,000	13,337,000	2,613,600	100,000	10,852,700	704,000
Total	150,326,770	296,387,364	302,688,337	12,465,000	227,451,347	76,170,566	2,843,680	190,924,804	49,072,743

[1] 30,000 from Birdsview to Clackamas, Oreg., and 20,000 from Birdsview to Craig Brook, Me.
[2] 225,000 from Little White Salmon to central station, Washington, D. C., and 1,750,000 from same station to Clackamas, Oreg.
[3] 25,000 from Quinault, Wash., to Medford, Oreg.

Output of the salmon hatcheries in Washington owned by the United States Bureau of Fisheries—Continued

Year ending June 30—	Humpback			Steelhead trout		
	Eggs	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1900					26,000	
1902					110,000	
1903				80,000	440,000	223,815
1904		176,597		255,000	70,000	
1905				414,400	3,205	
1906	2,000	969,990		348,000	540,000	
1907				200,000	941,505	
1908	502,000	6,764,762		224,000	136,916	
1909				220,000	717,691	
1910		1,368,000		300,000	1,437,038	
1911		96,000		660,000	911,650	
1912		2,566,325		905,000	2,284,315	
1913		1,880		1,330,000	1,477,150	
1914	13,260,000	21,114,023	4,355	729,000	1,792,430	
1915		6,929,500		125,000	2,008,698	137,665
1916	7,000,000	6,106,400	2,915,000	1,040,000	341,600	891,000
1917		165,000	7,449,030	550,000	1,979,010	1,424,000
1918		2,132,831	3,736,000	320,000	103,000	3,482,620
1919		2,354,500	369,958	250,000		305,000
1920		64,700		241,600	138,200	470,400
1921				[4] 493,000	15,000	2,469,550
1922			909,400	[5] 300,000		365,800
1923	50,000		1,672,435	[6] 434,000	260,000	1,256,105
1924		918,000		[7] 70,000	308,685	1,898,560
1925		10,892,500		100,000	50,000	709,275
1926		844,600		68,000	120,000	906,820
1927		3,544,000		200,000		819,700
1928		2,387,000		290,000	1,182,500	1,308,000
Total	20,814,000	69,396,608	17,056,178	10,147,000	17,454,593	16,668,310

Year ending June 30—	Chum		Total		
	Fry	Fingerlings, yearlings, and adults	Eggs	Fry	Fingerlings, yearlings, and adults
1897				1,848,760	
1898				7,391,886	
1899			4,926,000	1,791,056	
1900			2,686,000	17,335,947	
1901			6,581,000	9,436,174	
1902				19,118,687	
1903			80,000	21,027,631	223,815
1904			7,761,000	25,472,425	
1905			521,400	20,129,843	10,000
1906			9,183,180	26,087,599	9,500
1907			4,510,000	15,315,450	
1908			2,582,000	41,051,200	1,537,941
1909			4,242,000	25,374,980	14,186
1910			4,388,250	27,423,498	
1911	69,000		4,112,000	18,430,720	11,700
1912	2,495,000		8,977,000	33,597,880	655,095
1913	19,479,000		21,145,000	57,397,647	
1914	8,672,735		18,623,000	78,894,451	1,254,860
1915	35,504,707		5,313,000	114,098,541	1,213,235
1916	21,500,944	1,000,000	8,042,500	87,165,562	18,420,932
1917	14,403,300	7,014,580	550,000	47,339,039	28,458,649
1918	9,892,145		3,470,000	18,910,494	71,245,414
1919	4,544,000	4,524,560	1,210,000	15,831,522	40,171,758
1920	7,318,100	5,667,150	7,243,600	29,134,665	42,291,020
1921	7,000,000	19,436,400	4,193,000	15,615,000	55,649,615
1922	1,540,000	14,027,610	1,700,000	6,340,000	74,325,405
1923	[8] 8,324,830	14,902,900	4,634,000	31,105,855	42,759,040
1924	23,512,320	758,000	5,636,000	45,483,835	32,372,665
1925	16,051,650		10,844,880	59,321,800	30,616,914
1926	18,163,400		11,075,640	33,479,600	34,216,500
1927	17,966,000		9,537,000	38,948,400	22,093,270
1928	[9] 23,669,000		25,879,000	48,770,700	33,435,820
Total	240,106,131	67,331,200	199,646,450	1,038,670,847	528,987,334

[4] 118,500 were transferred from Birdsview to eastern hatcheries where they were hatched and planted in near-by waters.
[5] 25,000 from Birdsview to Manchester, Iowa; 25,000 to Woods Hole, Mass.; 20,000 from Quilcene to Charlevoix, Mich.
[6] 185,000 from Washougal River to Bozeman, Mont., Clackamas, Oreg., St. Johnsbury, Vt., and Spearfish, S. Dak.
[7] 25,000 from Birdsview, Wash., to Leadville, Colo.
[8] Includes 50,000 eggs sent from Birdsview, Wash., to central station, Washington, D. C.
[9] Includes 3,000,000 eggs.

Output of the salmon hatcheries owned by the State of Washington [1]

Year ending June 30—	Chinook fry	Chum fry	Humpback fry	Silver, or coho, fry	Sockeye, or blueback, fry	Steelhead-trout fry	Total
1896	4, 500, 000						4, 500, 000
1897	4, 050, 000				5, 500, 000		9, 550, 000
1898	4, 275, 000				5, 400, 000		9, 675, 000
1899	8, 595, 000			189, 000			8, 784, 000
1900	12, 251, 600	10, 301, 760		13, 778, 280		1, 736, 560	38, 068, 200
1901	12, 275, 400	16, 478, 280		19, 747, 894		1, 398, 476	49, 900, 050
1902	14, 766, 822	9, 937, 390		32, 964, 593		2, 481, 371	60, 150, 176
1903	14, 283, 499	9, 937, 390		28, 659, 079		3, 134, 076	56, 014, 044
1904	13, 261, 184		295, 200	15, 725, 196		3, 868, 866	33, 150, 446
1905	7, 101, 180			12, 226, 294		2, 433, 635	21, 761, 109
1906	10, 943, 550	3, 268, 800		28, 906, 380		2, 769, 784	45, 888, 514
1907	8, 897, 670	6, 120, 000		28, 668, 600		3, 575, 943	47, 262, 213
1908	18, 647, 600	4, 342, 350	2, 655, 900	29, 273, 202		4, 578, 075	59, 497, 127
1909	17, 440, 950	8, 218, 000		24, 543, 200		4, 080, 450	54, 282, 600
1910	21, 168, 350	8, 607, 500	519, 600	30, 894, 100		4, 855, 000	66, 044, 550
1911	16, 458, 502	13, 326, 750		33, 097, 750		5, 163, 180	68, 046, 182
1912	23, 380, 516	4, 684, 950	370, 785	37, 164, 125		4, 832, 067	70, 432, 443
1913	30, 542, 928	14, 711, 400		50, 263, 290		9, 089, 250	104, 606, 868
1914	35, 529, 709	7, 842, 266	1, 532, 737	33, 494, 380	49, 792	3, 601, 514	82, 050, 398
1915 [2]	[3] 39, 784, 092	27, 458, 665	578, 504	60, 169, 474	62, 631	3, 457, 130	131, 510, 496
1916 [4]	48, 239, 092	41, 890, 354	5, 902, 227	38, 877, 396	607, 979	9, 984, 852	145, 501, 900
1917 [5]	34, 228, 979	15, 086, 648		5, 842, 775	808, 455		55, 966, 857
1918 [6]	83, 175, 074	71, 750, 001	6, 086, 256	45, 660, 603	[7] 6, 571, 770	10, 250, 532	223, 494, 236
1919 [6]	45, 773, 503	22, 228, 025		16, 220, 087	645, 520	7, 993, 452	92, 860, 590
1920	[8] 32, 984, 300	22, 602, 325	1, 315, 500	28, 601, 000		12, 011, 480	97, 514, 605
1921	8, 297, 607	[9] 114, 144, 057	718, 600	[10] 41, 330, 887		[11] 8, 300, 217	172, 791, 368
1922	40, 957, 290	24, 671, 252	3, 475, 300	43, 884, 473		5, 408, 158	118, 396, 473
1923	30, 322, 357	2, 359, 150	[12] 14,417,127	46, 643, 976	284, 800	7, 397, 664	101, 425, 074
1924	29, 046, 267	9, 655, 351	6, 880, 944	76, 305, 136		7, 899, 502	129, 787, 260
1925	24, 750, 314	10, 939, 574	[13] 29,588,675	69, 473, 210		7, 753, 145	142, 504, 918
1926	28, 929, 007	17, 867, 454	4, 608, 715	74, 219, 998	5, 700	3, 824, 539	129, 455, 413
1927	48, 948, 584	9, 993, 405	1, 300, 000	55, 579, 622		5, 509, 050	121, 130, 661
1928	[14] 40, 246, 487	16, 520, 232	[15] 6, 834, 650	[16] 66, 520, 232	49, 400	8, 573, 175	138, 744, 176
Total	813, 852, 416	524, 943, 329	87, 080, 720	1, 088, 924, 232	19, 986, 047	155, 961, 203	2, 690, 747, 947

[1] As the printed reports of the State before 1913 in many instances report as the output the number of eggs gathered, it has been necessary in such cases to make an arbitrary reduction from these figures, in order to allow for the loss in the egg stage. In addition to figures in table, in 1916, 13,424,362; in 1918, 6,745,823; and in 1919, 12,351,780 dwarf sockeyes were hatched and planted in waters of the State.
[2] A considerable proportion of the fry was fed in rearing ponds for some time before planting.
[3] 29,900 eggs were distributed in addition.
[4] Year ends Nov. 30, 1916.
[5] Period from Nov. 30, 1916, to Mar. 31, 1917.
[6] Year ending Mar. 31.
[7] In addition 6,000,000 eggs were furnished by the U. S. Bureau of Fisheries.
[8] 550,000 were eggs shipped to eastern States and 16,000 were eggs furnished University of Washington.
[9] Includes 10,000 eggs furnished to University of Washington.
[10] Includes 22,000 eggs furnished to University of Washington and 100,000 eggs sold to State of Connecticut.
[11] Includes 50,000 eggs sold to State of Connecticut and 470,000 eggs sold to private hatcheries in Washington.
[12] Hatched from eggs received from U. S. Bureau of Fisheries of Alaska.
[13] Eggs gathered in Alaska waters.
[14] 1,990,000 eggs were furnished to Alaska Territorial Fish Commission.
[15] 1,000,000 eggs furnished U. S. Bureau of Fisheries, Quilcene, Washington.
[16] 200,000 eggs furnished Lincoln Park, Chicago.

The table following shows the plantings made in waters of Washington other than the Columbia River by the United States Bureau of Fisheries and the State of Washington.

Plants of salmon in the waters of Washington other than the Columbia River

Year ending June 30—	Puget Sound and tributaries					
	Chinook		Sockeye		Silver, or coho	
	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults
1897			5,500,000			
1898			5,400,000			
1899	7,470,000				189,000	
1900			10,683,000		6,749,280	
1901	300,000		3,834,453		14,360,185	
1902	2,141,322		3,371,000		23,161,069	
1903	2,113,850		3,731,789		21,507,771	
1904	1,865,933		3,855,000		14,071,845	
1905	2,590,738				16,441,375	
1906	4,819,290		3,573,130	9,500	29,755,574	14,840
1907	3,907,598				26,960,552	
1908	8,356,709		8,514,305		37,613,466	
1909	9,647,288		5,430,626		28,622,310	
1910	11,681,060		4,554,825		36,837,125	
1911	4,984,482		5,496,000		29,941,865	
1912	4,646,254		4,692,573		39,788,614	
1913	7,561,328		5,751,700		56,128,207	
1914	7,392,826		[1] 2,683,261	[2] 120,000	42,213,911	
1915	15,222,734		7,371,056		74,505,147	
1916	22,022,439	802,795	1,897,420	520	42,696,932	1,455,490
1917	26,890,383	750,612	1,520,280	2,093,000	6,227,775	4,560,460
1918	35,318,366	411,060	7,696,750	9,319,275	29,249,710	6,845,115
1919	22,244,102	195,900	645,520	8,622,000	12,285,222	2,864,980
1920	2,726,414	175,900	10,250,000	980,000	26,007,664	2,671,000
1921	15,343,540	1,277,165	7,050,000	9,000	26,456,155	4,671,100
1922	8,675,578	669,020	4,234,800	4,390,000	17,776,266	10,016,940
1923	6,646,267	300,445	14,200,000	1,004,000	61,297,693	3,068,055
1924	5,708,470	1,415,105	2,840		60,279,113	3,892,000
1925	8,992,786	1,160,000	5,700		53,832,128	1,716,639
1926	15,106,794	1,513,300	5,275,000	214,360	37,420,067	1,960,900
1927	13,959,402	1,947,800			38,608,757	614,100
Total	278,335,953	10,619,102	137,221,028	26,751,655	910,984,778	44,351,619

Year ending June 30—	Puget Sound and tributaries					
	Humpback		Chum		Steelhead	
	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults
1900			10,361,760		1,572,560	
1901			16,478,280		1,398,476	
1902			9,937,390		2,591,371	
1903			9,937,390		3,107,891	218,200
1904	471,797				3,518,476	
1905					[3] 1,329,940	
1906	969,990		1,800,000		3,162,174	15,000
1907	4,224,255		5,220,000		3,964,308	
1908	9,420,662		2,278,350		4,566,491	
1909			6,048,000		[4] 4,499,141	
1910	1,887,600		7,748,500		6,292,338	
1911	96,000		12,074,060		4,841,330	
1912	5,432,110		3,526,170		[5] 6,732,805	1,000
1913	1,888		31,408,960		9,731,400	
1914	22,647,060	[2] 4,355	15,535,046		4,444,271	
1915	7,508,004		51,852,050		4,925,555	
1916	12,005,627	2,918,000	41,541,049	1,000,000	5,102,566	891,000
1917	165,000	7,449,030	12,955,800	6,766,530	1,979,010	1,420,500
1918	8,219,086	4,736,000	52,674,752		4,851,092	3,520,420
1919	2,354,000	369,958	21,480,325	4,063,760	3,152,452	
1920	64,700		7,311,100	5,484,000	[6] 3,275,000	393,400
1921	3,490,300		37,672,212	7,793,000	2,752,113	1,603,300
1922	16,425,627	798,400	3,899,150	14,027,610	4,130,794	365,800
1923	6,880,994	1,672,435	11,835,480	14,645,400	3,639,674	1,178,105
1924	30,506,675		30,331,894		4,638,230	1,638,560
1925	14,367,215		8,027,263		1,986,370	708,875
1926	2,144,600		18,233,400		3,882,565	312,700
1927	12,077,495		32,225,751		6,631,975	819,700
Total	161,360,685	17,948,178	462,335,032	53,780,300	112,700,368	13,086,560

[1] Includes 50,000 eggs.
[2] All fingerlings.
[3] Includes 14,400 eggs.
[4] Includes 100,000 eggs.
[5] Includes 25,000 eggs.
[6] Includes 125,000 eggs.

Plants of salmon in the waters of Washington other than the Columbia River—Con.

Year ending June 30—	Quinault Lake and River							
	Chinook		Sockeye		Silverside		Steelhead	
	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults	Fry	Yearlings, fingerlings, or adults	Fry	Fingerlings
1915	19,913		3,558,591		198,966		10,598	
1916	29,600	4,810	13,840,000	2,665,788	96,650	4,864		
1917	160,000		11,150,000	52,953	1,910,000			
1918	220,000		2,500,000	3,386,010	200,000	3,303,700		
1919	100,000	109,400	1,000,000	4,738,000	600,000	419,400		
1920		34,600	4,400,000	8,896,000	500,000	178,000		
1921		24,800	950,000	3,448,000		1,398,000		
1922		47,000	250,000	3,295,000	600,000	948,000		
1923				944,000		78,000		
1924			1,000,000	3,890,000			70,000	260,000
1925			1,000,000	2,845,000	874,000			
1926		13,300	4,520,000	6,765,000		263,500		105,000
1927			5,300,000	1,672,470	285,400			
Total	529,513	233,910	49,468,591	42,598,221	5,265,016	6,593,464	80,598	365,000

Year ending June 30—	Chehalis River fry				Willapa River fry			
	Chinook	Silver, or coho	Chum	Steelhead	Chinook	Silver, or coho	Chum	Steelhead
1899	1,215,000							
1900	2,355,300				881,000			190,000
1901	1,909,800				653,400			
1903					2,163,019	1,800,000		500,000
1904	900,000				819,504	204,876		420,390
1905					630,000	1,800,000		288,000
1906		2,563,380	1,468,800		529,650	2,160,000		171,550
1907		2,250,000	900,000		393,660	2,250,000		526,500
1908	163,000	3,275,000	2,064,000		678,600	654,500		148,500
1909	148,000	1,800,000	1,757,000		322,200	504,000		399,000
1910	403,000	1,577,000	859,000		455,200	64,000		
1911	111,150	4,041,900	900,960	937,500	734,350	2,457,900		300,000
1912	118,750	3,575,700	1,052,760	93,752	748,600	3,111,750		303,825
1913	119,700	1,690,200	3,177,680	412,500	729,600	1,386,000		382,500
1914	139,000	2,977,260	497,300	701,118	3,247,345	1,785,580		248,555
1915	73,337	4,790,474	1,230,000	551,302	302,461	581,730	1,581,750	105,440
1916	854,170	6,811,315	4,218,930	638,733	2,570,105	108,550	1,181,720	
1917	495,350	120,000	2,590,000		2,178,185	595,000		
1918	2,978,288	12,275,990	17,725,949	967,975	5,411,725	1,809,901	2,359,805	771,600
1919	279,200	6,017,655	4,763,000	1,847,400	1,460,206	372,500	318,100	197,060
1920	1,928,839	13,134,755	27,694,449	1,182,500	294,604	4,885,268	5,613,783	1,666,500
1921	4,376,450	12,706,213		1,296,005	6,023,500	3,208,420	89,585	1,240,900
1922	1,599,530	17,218,000		1,499,870	2,536,780	10,865,300		1,909,000
1923	826,420	17,218,000	5,601,420	704,372	5,072,605	4,705,340		979,885
1924	313,519	9,720,231	3,640,000	600,640	3,784,325	3,591,000		631,790
1925	172,279	16,023,401	9,773,459	406,300	6,338,790	8,270,645		1,065,342
1926	458,700	19,209,590	1,131,000	726,550	8,989,450	2,820,165	205,265	530,535
1927	314,000	19,501,790	1,340,000	530,950	5,214,695	7,393,235	167,395	462,550
Total	22,252,782	178,497,854	92,385,707	13,097,467	63,163,559	67,385,660	11,517,403	13,459,422

Plants of salmon in the waters of Washington other than the Columbia River—Con.

Year ending June 30—	Total by species						Grand total
	Chinook	Sockeye	Silver, or coho	Humpback	Chum	Steelhead	
1878	[1] 3,000						3,000
1897		5,500,000					5,500,000
1898		5,400,000					5,400,000
1899	8,685,000		189,000				8,874,000
1900	3,236,300	10,683,000	6,749,280		10,301,760	1,762,560	32,732,900
1901	2,863,200	3,834,453	14,360,185		16,478,280	1,398,476	38,934,594
1902	2,141,322	3,371,000	23,161,069		9,937,390	2,591,371	41,202,152
1903	4,276,869	3,731,789	23,307,771		9,937,390	3,826,091	45,079,910
1904	3,585,437	3,855,000	14,276,721	471,797		3,938,866	26,127,821
1905	3,220,738		18,241,375			1,617,940	23,080,053
1906	5,348,940	3,582,630	34,493,794	969,990	3,268,800	3,348,724	51,012,878
1907	4,301,258		31,460,552	4,224,255	6,120,000	4,490,808	50,596,873
1908	9,198,309	8,514,305	41,542,966	9,420,662	4,342,350	4,714,991	77,733,583
1909	10,117,488	5,430,626	30,926,310		7,805,000	4,898,141	59,177,565
1910	12,539,260	4,554,825	38,478,125	1,887,600	8,607,500	6,292,338	72,359,648
1911	5,829,982	5,496,000	36,441,665	96,000	12,975,020	6,078,830	66,917,497
1912	5,513,604	4,692,573	46,476,064	5,432,110	4,578,930	7,131,382	73,824,663
1913	8,410,628	5,751,700	59,204,407	1,888	34,586,640	10,526,400	118,481,663
1914	10,779,171	2,803,261	46,976,751	22,651,415	16,032,346	5,393,944	104,636,888
1915	15,618,445	10,929,647	80,076,317	7,508,004	54,663,800	5,592,895	174,389,108
1916	26,283,919	18,403,728	51,173,801	14,923,627	47,942,599	6,632,299	165,359,973
1917	30,474,530	14,816,233	13,413,235	7,614,030	22,312,330	3,399,510	92,029,868
1918	44,339,439	22,902,035	53,684,416	12,955,086	72,760,506	10,111,087	216,752,569
1919	24,388,808	15,005,520	22,559,757	2,723,958	30,625,185	5,196,912	100,500,140
1920	5,160,357	24,526,000	47,376,687	64,700	46,103,332	6,517,400	129,748,476
1921	27,045,455	11,457,000	48,439,888	3,490,300	46,554,787	6,892,318	143,879,750
1922	13,527,908	12,159,800	57,424,506	17,224,027	17,926,760	7,905,464	126,168,465
1923	12,845,737	16,148,000	86,367,088	8,553,429	32,082,303	6,502,036	162,498,593
1924	11,221,419	4,892,840	77,482,344	30,506,675	33,971,894	7,839,220	165,914,392
1925	16,663,855	3,850,700	80,716,813	14,367,215	17,790,722	4,186,887	137,576,192
1926	26,082,544	16,774,360	61,673,722	2,144,600	19,569,665	5,961,800	132,206,691
1927	21,435,897	6,972,470	66,403,232	12,077,495	33,733,146	9,454,225	150,076,465
Total	375,138,819	256,039,496	1,213,077,841	179,308,863	621,008,435	154,202,915	2,798,776,270

[1] These were brought from the Clackamas (Oreg.) station and planted in some unnamed lake.

BRITISH COLUMBIA

Fraser River.—The first hatchery established by the Dominion of Canada on the Pacific coast was erected in 1884 at what is now Bon Accord, a point on the lower river some 4 miles above New Westminster, and on the opposite shore. The next built was in 1901 on Granite Creek, Shuswap Lake, which discharges into the Fraser through the South Thompson River, the lake being about 280 miles from New Westminster. In 1904 another hatchery was established on Harrison Lake on the Lillooet River, first large tributary of the Fraser on the north side; also one about 4 miles east of the lower extremities of Pemberton Meadows, at the junction of Owl Creek and the Birkenhead River, 4 miles above its confluence with the eastern branch of the Lillooet River, which in turn discharges into Lillooet Lake. In 1907 a hatchery was built on Stuart Lake, near the headwaters of the Fraser.

In 1914 the Bon Accord hatchery had to be abandoned, due to the laying out of a town site around it, and the equipment was transferred to Queen's Park, New Westminster.

The Province of British Columbia established the Seton Lake hatchery in 1903 on Lake Creek, on the north side, about half a mile from the outlet of Seton Lake; but it has not been operated since 1917.

Hatchery operations were commenced at Pitt Lake in 1916, when a small station was built to take care of 1,000,000 sockeye-salmon eggs. The remainder of the eggs collected there during that season

were transferred to the Harrison Lake hatchery. Since that time the Pitt Lake plant has been enlarged and is now a regular station.

In 1916 a subsidiary station was built by the Dominion on Cultus Lake to accommodate the surplus eggs which could not be handled in the Harrison and Pemberton hatcheries.

In 1913, the year of the quadrennially big run of sockeye salmon on the Fraser River, the contractors who were building the new Canadian Northern Railway, in blasting their way along the banks of the river, threw the rock and other débris into the stream until in the narrow part of the canyon south of North Bend at Whites Creek, Hells Gate, China Bar, and Scuzzy Rapids, all within a few miles of each other, the débris formed great sloping banks extending out into the stream at these points, and entirely changed the direction of the currents, and, of course, the velocity of the water. At best the salmon had a hard time getting through there, but the added obstructions rendered it practically impossible.

At a rather late hour the authorities woke up to the menace this work was to the run of salmon, and the dumping of débris into the river in such a manner as to obstruct their ascent was stopped.

How to clear the stream once more was now the problem, and this was seriously complicated by a slide of rock which took place in Hells Gate in February, 1914, which narrowed the channel of the stream considerably.

In March, 1914, the Dominion Marine and Fisheries Department contracted with a private concern to remove the obstructions, and this was done from Scuzzy Rapids, China Bar, and Whites Creek within a short period of time, but a couple of seasons' work were required to clear up Hells Gate so as to permit of passage for the fish. Some people claim that the fish still find it difficult to pass these obstructions.

Rivers Inlet.—A hatchery was established by the Dominion on McTavish Creek, one of the tributaries of Owikano Lake, about 20 miles up Rivers Inlet, in 1905, and has been operated ever since.

Skeena River.—In 1902 the Dominion established a hatchery on Lakelse Lake, in the Skeena River Basin, about 65 miles up the river from Port Essington. In 1919 a modern hatchery was commenced to replace the old one that was put out of commission by floods in 1917. In 1907 another was constructed on Babine Lake, the source of the Skeena River.

Vancouver Island.—In 1902 S. A. Spencer, of the Alert Bay cannery (now belonging to the British Columbia Packers Association), in return for certain special fishery privileges granted by the Dominion, established a hatchery on the Nimpkish River, which is located on the northeast shore of Vancouver Island. The hatchery was burned down in 1903, but was immediately rebuilt. Since its establishment operations were carried on by the Dominion, but it has not been operated since 1924.

In 1910 the Dominion put three new hatcheries into operation, all on Vancouver Island. They were located on Anderson Lake, Kennedy Lake, and Cowichan Lake, respectively. The two former are used for sockeyes and the latter for king and coho salmon and steelhead and other varieties of trout.

In 1915–16 the Draney Fisheries (Ltd.), operated a hatchery on a lake near by and hatched out 560,000 fry from eggs obtained from Rivers Inlet.

The following table shows the plantings made in the waters of British Columbia from the Dominion and provincial hatcheries:

Plants of salmon fry made in the waters of British Columbia

Year	Fraser River [1]						
	Chum	Coho, or silver	Spring, or king	Humpback	Sockeye	Steelhead trout	Total
1885					1,800,000		1,800,000
1886					2,625,000		2,625,000
1887					4,414,000		4,414,000
1888					5,807,000		5,807,000
1889					4,419,000		4,419,000
1890					6,640,000		6,640,000
1891					3,603,800		3,603,800
1892					6,000,000		6,000,000
1893					5,674,000		5,674,000
1894					6,300,000		6,300,000
1895					6,390,000		6,390,000
1896					10,393,000		10,393,000
1897					5,928,000		5,928,000
1898					5,850,000		5,850,000
1899					4,742,000		4,742,000
1900					6,200,000		6,200,000
1902 [2]		90,000			15,808,000	75,000	15,973,000
1903	75,000	1,750,000	22,000		12,521,000		14,368,000
1904		210,000		50,000	13,729,200	12,000	14,001,200
1905		5,576,100	4,381,400		9,244,300		19,201,800
1906		4,774,000	1,791,500		100,479,000	4,000	107,048,500
1907		3,219,200	1,814,900		36,965,900		42,000,000
1908		5,890,000	2,815,000	22,500,000	51,855,200		83,060,200
1909		7,375,400	5,772,400		41,909,500		55,057,300
1910		450,000	6,300,000		105,312,500		112,062,500
1911		5,318,800	2,129,500		24,146,300		31,594,600
1912		3,899,500	5,962,500	28,773,350	34,183,850		72,819,200
1913	1,100,000	1,995,600	4,533,550		41,062,700		48,691,850
1914		1,522,000	50,000	500,000	92,308,000		94,380,000
1915	125,000	2,196,000	2,614,700		27,496,000		32,431,700
1916		1,652,000	2,540,000	[3] 3,834,000	[4] 67,201,000		75,227,000
1917 [5]	5,256,000	1,971,900	1,645,200	4,788,000	27,903,600		41,564,700
1918 [6]	378,000	1,729,800	2,763,000	13,940,100	37,153,350		55,964,250
1919	383,000	1,800,625	2,291,200	40,000	[6] 42,071,825	30,000	46,616,650
1920	5,154,300	469,800	3,529,800		32,820,750	90,000	42,064,650
1921	5,256,000	1,971,900	843,300	4,063,500	33,425,320		45,560,020
1922	2,778,003	231,300	1,366,200		31,315,095		35,690,598
1923		295,200	629,100	3,603,510	47,271,600	22,815	51,822,225
1924	205,200	59,400	519,750		43,623,900	3,600	44,411,850
1925				3,600	41,179,500	5,400	41,188,500
1926					51,152,657	4,950	51,157,607
1927					41,498,100	61,128	41,559,228
Total	20,710,503	54,448,525	54,315,000	82,096,060	1,190,423,947	308,893	1,402,302,928

[1] Some of the reports from the provincial hatchery at Seton Lake show merely the take of eggs; it has been necessary to make an arbitrary reduction in order to show the loss of eggs and fry before planting.
[2] No plants made in 1901.
[3] 3,549,000 were eggs.
[4] 3,242,000 were eggs.
[5] All were given as eggs, and an arbitrary reduction was made in order to show the loss in eggs and fry before planting.
[6] 500,000 were eggs; of the eggs from which the total plantings were made, 8,096,000 were obtained from the Skeena River.

Plants of salmon fry made in the waters of British Columbia—Continued

Year	Skeena River				Rivers Inlet			Nimpkish River, sockeye
	Coho	Humpback	Sockeye	Total	Spring, or king	Sockeye	Total	
1903			3,450,000	3,450,000				1,636,000
1904			4,000,000	4,000,000				2,496,000
1905			3,767,900	3,767,900				2,850,000
1906			3,784,450	3,784,450		8,000,000	8,000,000	4,873,400
1907			4,125,750	4,125,750		8,440,000	8,440,000	4,870,000
1908			8,946,950	8,946,950	4,706,000	8,594,000	13,300,000	4,800,000
1909			11,882,400	11,882,400		13,300,000	13,300,000	4,500,000
1910	80,000		11,441,700	11,521,700		12,750,000	12,750,000	5,055,000
1911			12,556,470	12,556,470		11,436,000	11,436,000	6,414,000
1912			12,367,500	12,367,500		11,791,000	11,791,000	5,114,500
1913			11,430,430	11,430,430		10,981,000	10,981,000	4,981,000
1914			11,843,200	11,843,200		12,397,000	12,397,000	5,053,000
1915		16,000	11,899,613	11,915,613		12,712,000	12,712,000	4,880,000
1916			11,202,257	11,202,257		12,594,100	12,594,100	4,980,000
1917			12,105,000	12,105,000		13,305,600	13,305,600	
1918			8,190,000	8,190,000		2,721,600	2,721,600	
1919			8,096,000	8,096,000		2,908,800	2,908,800	4,874,000
1920			15,393,600	15,393,600		10,869,300	10,869,300	5,180,000
1921			14,675,400	14,675,400		16,536,960	16,536,960	5,017,000
1922			14,728,500	14,728,500		13,131,090	13,131,090	5,017,000
1923			16,807,500	16,807,500		13,841,100	13,841,100	4,900,000
1924			15,350,400	15,350,400		14,389,200	14,389,200	(7)
1925	127,332		16,639,200	16,766,532		16,798,320	16,798,320	
1926			21,106,800	21,106,800		17,841,600	17,841,600	
1927			14,693,400	14,693,400		18,584,100	18,584,100	
Total	207,332	16,000	280,484,420	280,707,752	4,706,000	263,922,770	268,628,770	87,490,900

Year	Vancouver Island						
	Humpback	Chum	Coho, or silver	Spring, or king	Sockeye	Steelhead trout	Total
1911		40,000	4,550,000	425,000	7,862,000	145,200	13,022,200
1912			3,487,500	456,000	13,620,750	37,200	17,601,450
1913			3,180,000	712,500	15,031,750	173,900	19,098,150
1914			2,252,000	701,000	15,314,500	87,200	18,354,700
1915			2,229,220	250,600	15,911,000	55,000	18,445,820
1916			1,689,826	576,400	7,966,000	38,600	10,270,826
1917			1,426,860	1,209,600	2,862,000		5,498,460
1918			2,200,410	418,950	4,527,338		7,146,698
1919			2,152,194	[8] 431,760	[9] 4,589,250	[10] 33,798	7,207,002
1920			2,217,870	502,550	18,647,955	55,710	21,424,085
1921			1,179,675	1,364,670	10,698,480	85,410	13,328,235
1922			1,432,530	1,015,790	16,162,367	89,460	18,700,147
1923		2,610	1,512,000	336,600	12,427,290	16,470	14,294,970
1924				1,575,000	17,098,605	23,130	18,696,735
1925	3,240		743,300	638,550	15,477,840	149,130	17,012,060
1926				1,440,900	15,474,690	208,710	17,124,300
1927			472,500	1,020,600	10,666,503	170,280	12,329,883
Total	3,240	42,610	30,725,885	13,076,470	204,338,318	1,369,198	249,555,721

[7] Nimpkish hatchery closed, 1923.
[8] Includes 24,361 fingerlings.
[9] Includes 205,700 advanced fry and 26,000 fingerlings.
[10] Includes 5,357 fingerlings.

Plants of salmon fry made in the waters of British Columbia—Continued

Year	Total by species						Grand total
	Chum	Coho, or silver	Spring, or king	Humpback	Sockeye	Steelhead, trout	
1885					1,800,000		1,800,000
1886					2,625,000		2,625,000
1887					4,414,000		4,414,000
1888					5,807,000		5,807,000
1889					4,419,000		4,419,000
1890					6,640,000		6,640,000
1891					3,603,800		3,603,800
1892					6,000,000		6,000,000
1893					5,674,000		5,674,000
1894					6,300,000		6,300,000
1895					6,390,000		6,390,000
1896					10,393,000		10,393,000
1897					5,928,000		5,928,000
1898					5,850,000		5,850,000
1899					4,742,000		4,742,000
1900					6,200,000		6,200,000
1902		90,000			15,808,000	75,000	15,973,000
1903	75,000	1,750,000	22,000		17,607,000		19,454,000
1904		210,000		50,000	20,225,200	12,000	20,497,200
1905		5,576,100	4,381,400		15,862,200		25,819,700
1906		4,774,000	1,791,500		117,136,850	4,000	123,706,350
1907		3,219,200	1,814,900		54,401,650		59,435,750
1908		5,890,000	7,521,000	22,500,000	74,196,150		110,107,150
1909		7,375,400	5,772,400		71,591,900		84,739,700
1910		530,000	6,300,000		134,559,200		141,389,200
1911	40,000	9,868,800	2,554,500		62,414,770	145,200	75,023,270
1912		7,387,000	6,418,500	28,773,350	77,077,600	37,200	119,693,650
1913	1,100,000	5,175,600	5,246,050		83,486,880	173,900	95,182,430
1914		3,774,000	751,000	500,000	136,915,700	87,200	142,027,900
1915	125,000	4,425,220	2,865,300	16,000	72,898,613	55,000	80,385,133
1916		3,341,826	3,116,400	3,834,000	103,943,357	38,600	114,274,183
1917	5,256,000	3,398,760	2,854,800	4,788,000	56,176,200		72,473,760
1918	378,000	3,930,210	3,181,950	13,940,100	52,592,288		74,022,548
1919	383,000	3,952,819	2,722,900	40,000	62,539,875	63,798	69,702,452
1920	5,154,300	2,687,670	4,032,350		82,911,605	145,710	94,931,635
1921	5,256,000	3,151,575	2,207,970	4,063,500	80,353,160	85,410	95,117,615
1922	2,778,003	1,663,830	2,381,990		80,354,052	89,460	87,267,335
1923	2,610	1,807,200	965,700	3,603,150	95,247,490	39,285	101,665,795
1924	205,200	59,400	2,094,750		90,362,105	26,730	92,848,185
1925		870,732	638,550	6,840	90,094,860	154,530	91,765,412
1926			1,440,900		105,575,747	213,660	107,230,307
1927		472,500	1,020,600		85,442,103	231,408	87,166,611
Total	20,753,113	85,381,742	72,097,470	82,115,300	2,026,660,355	1,678,091	2,288,686,071

ALASKA

In 1891 several of the canneries operating at Karluk, on Kodiak Island, combined forces and built a hatchery on the lagoon at that place. As the cannery men were at swords points in regard to their fishing rights on the spit, in 1892 the hatchery was closed. In May, 1896, the Alaska Packers Association broke ground for a hatchery at the eastern end of the lagoon, near the outlet of Karluk River, a short distance from where the hatchery was located in 1891, and operated it until 1916, when it was abandoned as a hatchery.

In 1892 Capt. John C. Callbreath, manager of the Point Ellis cannery on Kuiu Island, operated a small hatchery on the left bank of Kutlakoo stream. It was a very primitive place, and an exceptionally high tide destroyed the whole plant in September. It was never rebuilt.

Captain Callbreath, however, after seeing to the operation of the hatchery, had returned to Wrangell during the summer, where his attention was again attracted to hatchery work, and in the fall of 1892 he built a small hatchery on Jadjeska stream, Etolin Island, about 200 yards from its mouth. The stream is about one-half mile

in length and is the outlet of a small lake. Finding the location unsuitable, Captain Callbreath removed the hatchery in 1893 to the northern side of the lake, about three-eighths of a mile from the head of the outlet, where it still stands. The owner's intention was to build up a stream which had a small natural run of red salmon until it had a large run, with the hope that the Government would then give him the exclusive right to take these fish from the stream for commercial purposes. The experiment was kept up until the end of the season of 1905, when Captain Callbreath's failing eyesight compelled the cessation of the actual hatching. Until 1910 a man was stationed on the stream during the run of spawning fish for the purpose of lifting them over the dam, so that they could reach the spawning beds at the head of the lake, and the project was abandoned entirely shortly thereafter. The owner's expectation of a big run as a result of hatching operations was never realized.

In 1896 the Baranof Packing Co., which operated a cannery on Redfish Bay, on the western coast of Baranof Island, built a small hatchery on the lake at the head of Redfish stream. The following winter was so cold that not only the flume but the whole cataract froze solid, and as the hatchery was thus left without water the eggs were put into the lake and left to their fate and the hatchery closed down permanently.

In 1897 the North Pacific Trading & Packing Co., at Klawak, Prince of Wales Island, established a hatchery near the head of Klawak stream, close to Klawak Lake. In 1898 the plant was moved to the mouth of a small stream entering the lake about halfway up the western shore. This hatchery was operated continuously until the end of 1917, since when it has been shut down. In 1909 the North Alaska Salmon Co. acquired a half interest in it, which it relinquished to the original owners a few years later.

The Pacific Steam Whaling Co. in 1898 erected a small hatchery on Hetta Lake, on the west side of Prince of Wales Island, which was operated until the close of the hatching season of 1903–4, when the Pacific Packing & Navigation Co., successor to the original owner, went into the hands of a receiver. In 1907 it was reopened by the Northwestern Fisheries Co., which had acquired the interests of the old company, and was operated each season until the summer of 1918, when operations were discontinued.

Up to 1900 the work of hatching salmon was entirely voluntary on the part of the packers. On May 2 of that year the following regulation was promulgated at the Treasury Department, which at that time had control of the Alaska salmon-inspection service:

7. Each person, company, or corporation taking salmon in Alaskan waters shall establish and conduct, at or near the fisheries operated by him or them, a suitable artificial propagating plant or hatchery, and shall produce yearly and place in the natural spawning waters of each fishery so operated red-salmon fry in such numbers as shall be equal to at least four times the number of mature fish taken from the said fisheries by or for him or them during the preceding fishing season. The management and operation of such hatcheries shall be subject to such rules and regulations as may hereafter be prescribed by the Secretary of the Treasury. They shall be open for inspection by the authorized official of this department; annual reports shall be made, giving full particulars of the number of male and female salmon stripped, the number of eggs treated, the number and percentage of fish hatched, and all other conditions of interest; and there shall be made a sworn yearly statement of the number of fry planted and the exact location where said planting was done.

On January 24, 1902, this regulation was amended so as to require the planting of "red-salmon fry in such numbers as shall be equal to at least ten times the number of salmon of all varieties taken from the said fisheries."

Although the regulation was mandatory, but few of the packers obeyed it, some because no suitable place was to be found within a reasonable distance of their plants, others because the establishment and operation of such a hatchery would cost more than their returns from the industry justified, and others because of lack of knowledge required in hatchery work. The greater number of them absolutely ignored it, and as a result those who conformed to the regulation were placed under a heavy financial handicap. The injustice of this arrangement was patent on its face, and in 1906, when a comprehensive revision of the law was made by Congress, provision was made for reimbursing in the future those cannery men who operated salmon hatcheries. The section covering this point reads as follows:

SEC. 2. That the catch and pack of salmon made in Alaska by the owners of private salmon hatcheries operated in Alaska shall be exempt from all license fees and taxation of every nature at the rate of ten cases of canned salmon to every one thousand red or king salmon fry liberated, upon the following conditions:

That the Secretary of Commerce and Labor may from time to time, and on the application of the hatchery owner shall, within a reasonable time thereafter, cause such private hatcheries to be inspected for the purpose of determining the character of their operations, efficiency, and productiveness, and if he approve the same shall cause notice of such approval to be filed in the office of the clerk or deputy clerk of the United States district court of the division of the District of Alaska wherein any such hatchery is located, and shall also notify the owners of such hatchery of the action taken by him. The owner, agent, officer, or superintendent of any hatchery the effectiveness and productiveness of which has been approved as above provided shall, between the thirtieth day of June and the thirty-first day of December of each year, make proof of the number of salmon fry liberated during the twelve months immediately preceding the thirtieth day of June by a written statement under oath. Such proof shall be filed in the office of the clerk or deputy clerk of the United States district court of the division of the District of Alaska wherein such hatchery is located, and when so filed shall entitle the respective hatchery owners to the exemption as herein provided; and a false oath as to the number of salmon fry liberated shall be deemed perjury and subject the offender to all the pains and penalties thereof. Duplicates of such statements shall also be filed with the Secretary of Commerce and Labor.

It shall be the duty of such clerk or deputy clerk in whose office the approval and proof heretofore provided for are filed to forthwith issue to the hatchery owner, causing such proofs to be filed, certificates which shall not be transferable and of such denominations as said owner may request (no certificate to cover fewer than one thousand fry), covering in the aggregate the number of fry so proved to have been liberated; and such certificates may be used at any time by the person, company, corporation, or association to whom issued for the payment pro tanto of any license fees or taxes upon or against or on account of any catch or pack of salmon made by them in Alaska; and it shall be the duty of all public officials charged with the duty of collecting or receiving such license fees or taxes to accept such certificates in lieu of money in payment of all license fees or taxes upon or against the pack of canned salmon at the ratio of one thousand fry for each ten cases of salmon. No hatchery owner shall obtain the rebates from the output of any hatchery to which he might otherwise be entitled under this act unless the efficiency of said hatchery has first been approved by the Secretary of Commerce and Labor in the manner herein provided for.

In 1901 the Pacific Steam Whaling Co. established two small hatcheries—one on Nagel Stream, which enters the northern side of Quadra Lake, on the mainland of southeast Alaska, and one on a stream entering Freshwater Lake Bay, Chatham Strait. Both were closed down in 1904 when the company failed. In 1908 the Northwestern Fisheries Co., which had acquired the Quadra plant, removed it to a small stream entering the head of the lake and has operated it ever since.

In 1901 the Alaska Packers Association erected a hatchery on Heckman Lake, the third of a series of lakes on Naha Stream, Revillagigedo Island, and about 8 miles from Loring, where the association has a cannery. This, known as Fortmann hatchery, was the largest and costliest salmon hatchery in the world, having a capacity of 110,000,000 eggs. Its operation was discontinued in 1927.

The Union Packing Co., at Kell Bay, on Kuiu Island, and F. C. Barnes, at Lake Bay, on Prince of Wales Island, in 1902 built and operated small hatcheries, both of which were abandoned after one season's work.

Up to 1905 the work of hatching salmon in Alaska was confined to the salmon cannery men. In that year, however, the United States Bureau of Fisheries erected a hatchery on Yes Lake, which empties through a short stream into Yes Bay, on Cleveland Peninsula. In 1907 the bureau constructed another hatchery, on Afognak Lake, near Litnik Bay, Afognak Island.

The eruption of Katmai volcano, on the Alaska Peninsula, June 6, 1912, covered the island of Afognak with volcanic ash and sand to an average depth of 9 inches. It is estimated that 20,000 salmon perished at the head of Litnik Lake, while thousands were driven back into the ocean. As a result of these conditions the work at the Afognak station was much hampered and curtailed. Even as late as 1915 work at this station was still being hampered by the volcanic ash and sand which fell in 1912.

In 1913 collecting stations were established at Eagle Harbor and Uganik Lake, on Kodiak Island. In 1915 another was established at Seal Bay, on Afognak Island. These were subsidiary to the Afognak hatchery.

In 1913 a collecting station was established on Ketchikan Creek, but, owing to the objections of the citizens of the town against the taking away of the eggs, the station was abandoned in 1915.

The tables following show the eggs and fry distributed by the Government and privately owned hatcheries in Alaska.

Output of the salmon hatcheries in Alaska owned by the United States Bureau of Fisheries, 1906 to 1928

McDONALD LAKE OR YES BAY HATCHERY

Year ending June 30—	Red or sockeye		Coho or silver fry	Steelhead fry	Pink or humpback		Total	
	Eggs	Fry and fingerlings			Eggs	Fry and fingerlings	Eggs	Fry and fingerlings
1906		6,638,550						6,638,550
1907		54,610,800		143,500				54,754,300
1908		61,369,000						61,369,000
1909		48,653,000	9,900					48,662,900
1910		69,879,600						69,879,600
1911	[1] 1,500,000	68,239,900			100,000		1,600,000	68,239,900
1912	[1] 2,000,000	68,335,000					2,000,000	68,335,000
1913	[1] 2,000,000	60,422,100					2,000,000	60,422,100
1914	[1] 2,000,000	42,726,400				4,500,000	2,000,000	47,226,400
1915	[1] 3,000,000	37,445,000			[2] 2,000,000		5,000,000	37,445,000
1916	[3] 18,100,000	52,317,500				325,000	18,100,000	52,642,500
1917	[1] 2,000,000	51,175,000					2,000,000	51,175,000
1918		32,539,200						32,539,200
1919	[4] 4,500,000	32,650,000			[2] 406,000	930,000	4,906,000	33,580,000
1920		9,387,000						9,387,000
1921 [5]		4,025,000						4,025,000
1922	150,000	47,640,000				210,000	150,000	47,850,000
1923		24,099,045				393,600		24,492,645
1924		21,817,800						21,817,800
1925		27,382,000						27,382,000
1926	[6] 8,645,760	27,392,200					8,645,760	27,392,200
1927	[7] 6,958,890	20,467,000					6,958,890	20,467,000
1928		18,784,715						18,784,715
Total	50,854,650	887,995,810	9,900	143,500	2,506,000	6,358,600	53,360,650	894,507,810

AFOGNAK HATCHERY

Year ending June 30—	Red or sockeye		Coho or silver fry	Steelhead fry	Pink or humpback		Total	
	Eggs	Fry and fingerlings			Eggs	Fry and fingerlings	Eggs	Fry and fingerlings
1909		39,325,870				10,000		39,335,870
1910		71,647,170				363,740		72,010,910
1911		26,755,000				364,150		27,119,150
1912		18,394,700				5,829,300		24,224,000
1913		12,551,100	214,000			151,800		12,916,900
1914	3,970,000	7,761,705	50,000			12,034,399	3,970,000	19,846,104
1915		6,387,080			[8] 12,500,000	343,480	12,500,000	6,730,560
1916		[9] 22,933,640				6,736,500		29,670,140
1917		21,116,000			[10] 16,000,000	19,343,000	16,000,000	40,459,000
1918	[11] 18,000,000	31,427,000				1,326,000	18,000,000	32,753,000
1919	[12] 25,700,000	25,583,000			[13] 5,760,000	2,142,000	31,460,000	27,725,000
1920	[14] 10,000,000	61,524,000					10,000,000	61,524,000
1921	[15] 10,340,500	47,808,000					10,340,500	47,808,000
1922	[1] 5,200,000	32,580,000					5,200,000	32,580,000
1923	[16] 10,678,400	46,333,000			[2] 278,616	240,000	10,957,016	46,573,000
1924 [17]								
1925 [17]								
1926		10,075,000		[18] 850,000				10,925,000
1927	[19] 3,402,000	14,400,000		(20)	[21] 3,617,000		7,019,000	14,400,000
1928		3,675,000						3,675,000
Total	97,290,900	500,277,265	264,000	850,000	38,155,616	48,884,369	125,446,516	550,275,634

See footnotes at end of table.

Output of the salmon hatcheries in Alaska owned by the United States Bureau of Fisheries, 1906 to 1928—Continued

SUMMARY

Year ending June 30—	Total, by species, both hatcheries						Grand total	
	Red or sockeye		Coho or silver fry	Steelhead fry	Humpback			
	Eggs	Fry and fingerlings			Eggs	Fry and fingerlings	Eggs	Fry and fingerlings
1906		6,638,550						6,638,550
1907		54,610,800		143,500				54,754,300
1908		61,369,000						61,369,000
1909		87,978,870	9,900			10,000		87,998,770
1910		141,526,770				363,740		141,890,510
1911	1,500,000	94,994,900			100,000	364,150	1,600,000	95,359,050
1912	2,000,000	86,729,700				5,829,300	2,000,000	92,559,000
1913	2,000,000	72,973,200	214,000			151,800	2,000,000	73,339,000
1914	5,970,000	50,488,105	50,000			16,534,399	5,970,000	67,072,504
1915	3,000,000	43,832,080			14,500,000	343,480	17,500,000	44,175,560
1916	3,100,000	75,251,140				7,061,500	[22] 3,100,000	82,312,640
1917	2,000,000	72,291,000			16,000,000	19,343,000	18,000,000	91,634,000
1918	18,000,000	63,966,200				1,326,000	18,000,000	65,292,200
1919	30,200,000	58,233,000			6,166,000	3,072,000	36,366,000	61,305,000
1920	10,000,000	70,911,000					10,000,000	70,911,000
1921	10,340,500	51,833,000					10,340,500	51,833,000
1922	5,350,000	80,220,000				210,000	5,350,000	80,430,000
1923	10,678,400	70,432,045			278,616	633,600	10,957,016	71,065,645
1924		21,817,800						21,817,800
1925		27,382,000						27,382,000
1926	8,645,760	37,467,200		850,000			8,645,760	38,317,200
1927	10,360,890	34,867,000		([23])	3,617,000		13,977,890	34,867,000
1928		22,459,715						22,459,715
Total	123,145,550	1,388,273,075	273,900	993,500	40,661,616	55,242,969	163,807,166	1,444,783,444

[1] Shipped to Oregon Fish Commission.
[2] Shipped to bureau's hatchery at Birdsview, Wash.
[3] 15,000,000 eggs were transferred to the bureau's hatchery at Afognak, 100,000 to the Quinault (Wash.) hatchery, and 3,000,000 to Oregon Fish Commission.
[4] 1,059,000 were shipped to the Little White Salmon hatchery and 3,440,100 to the Oregon Fish Commission.
[5] No eggs were collected in 1920 owing to repair work which could be done only in summer months.
[6] 5,645,000 were shipped to the bureau's station at Baker Lake, Wash., and 3,000,760 to the Oregon Fish Commission.
[7] 5,241,130 were shipped to Seattle and 1,717,760 to the Territorial hatchery at Ketchikan.
[8] 7,000,000 were shipped to Government hatcheries in Maine and 5,500,000 to bureau's stations in Washington.
[9] Of the eggs from which these fry and fingerlings were hatched, 15,000,000 came from Yes Bay hatchery.
[10] Shipped to bureau's stations in New England States and in Washington—8,000,000 to each region.
[11] Shipped to Seattle for distribution; 10,000,000 to the Province of British Columbia, 5,000,000 to the bureau's station at Quinault, Wash., and 3,000,000 to the Oregon Fish Commission.
[12] 5,000,000 were shipped to the bureau's Quinault (Wash.) hatchery and 20,700,000 to the Province of British Columbia.
[13] Shipped to the bureau's Puget Sound hatcheries.
[14] 7,000,000 were shipped to the bureau's Quinault (Wash.) station and 3,000,000 to the Oregon State hatchery at Bonneville.
[15] 5,000,000 were shipped to McDonald Lake, 2,340,500 to Quinault, Wash., and 3,000,000 to the Oregon State hatchery at Bonneville.
[16] 5,098,936 were shipped to Alaska Territorial Fish Commission at Juneau, 5,045,000 to Oregon Fish Commission at Bonneville, and 534,464 to the State fish commission at Seattle, Wash.
[17] Hatchery being rebuilt.
[18] 1,023,360 eyed eggs were shipped to Puget Sound hatcheries.
[19] Shipped to Seattle for distribution.
[20] 1,090,000 eggs were collected and the resulting 790,400 eyed eggs were shipped to Seattle for distribution.
[21] Shipped to Quilcene (Wash.) station.
[22] 15,000,000 of the red salmon eggs shown under Yes Bay were transferred to Afognak, hatched out there and the fry counted under the "Fry" column of that hatchery.
[23] Eggs taken were shipped to Seattle for distribution.

Take of eggs and output of private salmon hatcheries of Alaska, 1893 to 1919

[Unless otherwise stated in footnotes, all of the fry liberated were red salmon.]

Year ending June 30—	Callbreath's hatchery		Karluk hatchery		Klawak hatchery	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1893	900,000	600,000				
1894	3,000,000	2,204,000				
1895	6,300,000	5,291,000				
1896	6,200,000	5,475,000				
1897	4,400,000	4,390,000	3,236,000	2,556,440		
1898	3,400,000	2,526,000	8,454,000	6,340,000	2,023,000	800,000
1899	3,000,000	2,050,000	4,491,000	3,369,000	3,600,000	3,000,000
1900	3,400,000	2,335,000	10,496,900	7,872,000	3,600,000	[1] 1,000,000
1901	(2)		19,334,000	15,566,800	(2)	
1902	6,000,000	5,500,000	32,800,000	28,700,000	3,500,000	2,800,000
1903	6,000,000	5,000,000	23,400,000	17,555,000	3,500,000	1,500,000
1904	6,000,000	5,000,000	28,113,000	22,000,000	3,000,000	1,700,000
1905	6,050,000	5,250,000	45,500,000	33,670,000	2,800,000	2,000,000
1906	7,700,000	6,500,000	36,933,000	28,236,412	2,800,000	2,300,000
1907	(3)	(4)	38,679,200	36,846,000	3,600,000	1,187,000
1908	(5)	(5)	47,808,200	43,655,000	3,500,000	2,776,000
1909	(5)	(5)	40,320,000	37,105,000	3,500,000	3,200,000
1910	(5)	(5)	45,228,000	40,620,000	5,800,000	5,300,000
1911	(5)	(5)	49,626,000	37,722,000	6,786,500	6,200,000
1912	(5)	(5)	41,026,800	37,495,100	5,600,000	3,530,000
1913	(5)	(5)	45,600,000	41,803,155	3,835,000	3,675,000
1914	(5)	(5)	34,629,160	31,546,080	3,645,000	3,465,000
1915	(5)	(5)	[7] 30,240,000	27,704,000	3,816,000	3,653,000
1916	(5)	(5)	41,135,000	23,948,000	4,180,000	4,020,000
1917	(5)	(5)	[8] 1,016,000	(5)	8,160,000	7,822,000
1918	(5)	(5)	(5)	(5)	(5)	(5)
1919	(5)	(5)	(5)	(5)	(5)	(5)
Total	[9] 62,350,000	52,121,000	628,066,260	524,309,987	77,245,500	59,928,000

Year ending June 30—	Hetta hatchery		Quadra Bay hatchery		Freshwater Bay hatchery	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1899	2,800,000	2,600,000				
1900	2,000,000	1,500,000				
1901	1,800,000	[1] 500,000				
1902	2,500,000	1,700,000	4,500,000	3,500,000	1,500,000	1,000,000
1903	4,800,000	4,000,000	5,500,000	4,000,000	(2)	(2)
1904	5,127,500	3,750,000	600,000	[2] 400,000	(4)	(4)
1905	(5)	(5)	(5)	(5)	(5)	(5)
1906	(5)	(5)	(5)	(5)	(5)	(5)
1907	(5)	(5)	(5)	(5)	(5)	(5)
1908	8,000,000	6,125,000	(5)	(5)	(5)	(5)
1909	8,400,000	8,134,000	3,325,000	3,025,750	(5)	(5)
1910	10,313,000	9,000,000	10,863,000	9,850,000	(5)	(5)
1911	9,141,000	8,552,500	11,200,000	10,350,000	(5)	(5)
1912	2,585,000	2,342,000	11,000,000	10,166,000	(5)	(5)
1913	3,780,000	3,592,000	10,000,000	8,127,000	(5)	(5)
1914	4,082,000	3,590,500	18,400,000	17,054,000	(5)	(5)
1915	7,438,500	7,142,500	21,300,000	20,300,000	(5)	(5)
1916	7,408,000	7,092,000	8,114,000	7,598,000	(5)	(5)
1917	3,247,000	3,120,000	16,125,000	15,003,000	(5)	(5)
1918	4,826,000	4,587,000	13,600,000	12,990,000	(5)	(5)
1919	(5)	(5)	20,400,000	19,852,000	(5)	(5)
1920	(5)	(5)	11,710,000	11,357,000	(5)	(5)
1921	(5)	(5)	19,450,000	18,913,000	(5)	(5)
1922	(5)	(5)	9,985,000	9,647,000	(5)	(5)
1923	(5)	(5)	6,195,000	6,007,000	(5)	(5)
1924	(5)	(5)	17,885,000	17,234,000	(5)	(5)
1925	(5)	(5)	20,050,000	19,430,000	(5)	(5)
1926	(5)	(5)	20,240,000	19,345,000	(5)	(5)
1927	(5)	(5)	20,000,000	19,340,000	(5)	(5)
1928	(5)	(5)	20,240,000	19,360,000	(5)	(5)
Total	88,248,000	77,327,500	300,682,000	282,848,750	1,500,000	1,000,000

[1] Many eggs frozen.
[2] No run of fish.
[3] Hatchery was not used, the eggs being hatched out in the lake.
[4] No report.
[5] Fish coming in to spawn were lifted over the dam.
[6] Not operated.
[7] A collection of 7,400,000 humpback eggs was made for Afognak, and these appear in the report of that hatchery.
[8] These eggs were turned over to the Afognak hatchery and the hatchery shut down.
[9] A considerable portion of these are coho eggs.

Take of eggs and output of private salmon hatcheries of Alaska, 1893 to 1919—Continued

Year ending June 30—	Fortmann hatchery		Kell Bay hatchery		Total	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1893					900,000	600,000
1894					3,000,000	2,204,000
1895					6,300,000	5,291,000
1896					6,200,000	5,475,000
1897					7,636,000	6,946,440
1898					13,877,000	9,666,000
1899					13,891,000	11,019,000
1900					19,496,900	12,707,000
1901					21,134,000	16,066,800
1902	11,460,000	10,300,000			62,260,000	53,500,000
1903	40,050,000	29,005,000	2,500,000	2,000,000	85,750,000	63,060,000
1904	22,203,000	13,780,000	(6)	(6)	65,043,500	46,630,000
1905	65,010,000	63,181,000	(6)	(6)	119,360,000	104,101,000
1906	68,715,000	67,643,000	(6)	(6)	116,148,000	104,679,412
1907	105,450,000	80,973,000	(6)	(6)	147,729,200	119,006,000
1908	[10] 41,280,000	33,920,000	(6)	(6)	100,588,200	86,476,000
1909	24,465,000	22,785,000	(6)	(6)	80,010,000	74,249,750
1910	53,340,000	50,725,000	(6)	(6)	125,544,000	115,495,000
1911	34,920,000	30,245,000	(6)	(6)	111,673,500	93,069,500
1912	107,520,000	100,335,000	(6)	(6)	167,731,800	153,868,100
1913	23,160,000	20,800,000	(6)	(6)	86,375,000	77,997,155
1914	9,480,000	8,700,000	(6)	(6)	70,236,160	64,355,580
1915	22,500,000	20,820,000	(6)	(6)	85,294,500	79,619,500
1916	26,520,000	[11] 25,615,000	(6)	(6)	87,357,000	68,273,000
1917	62,580,000	57,405,000	(6)	(6)	91,128,000	83,350,000
1918	[12] 4,240,000	[13] 7,980,000	(6)	(6)	22,666,000	25,557,000
1919	[14] 23,280,000	15,205,000	(6)	(6)	43,680,000	35,057,000
1920	18,420,000	17,070,000	(6)	(6)	30,130,000	28,427,000
1921	[15] 18,600,000	[16] 17,720,000	(6)	(6)	38,050,000	36,633,000
1922	[17] 14,280,000	[18] 13,715,000	(6)	(6)	24,265,000	23,362,000
1923	[19] 18,000,000	[20] 17,205,000	(6)	(6)	24,195,000	23,212,000
1924	[21] 16,680,000	[22] 15,025,000	(6)	(6)	34,565,000	32,259,000
1925	[23] 12,540,000	[24] 11,810,000	(6)	(6)	32,590,000	31,240,000
1926	[25] 21,600,000	[26] 20,173,000	(6)	(6)	41,840,000	39,518,000
1927	[27] 24,060,000	[28] 21,320,384	(6)	(6)	44,060,000	40,660,384
1928	(6)	(6)	(6)	(6)	20,240,000	19,360,000
Total	890,353,000	793,455,384	2,500,000	2,000,000	2,050,944,760	1,792,990,621

[6] Not operated.
[10] Includes 30,000 coho eggs taken and 27,000 fry liberated.
[11] Includes 600,000 humpback eggs taken and 560,000 fry liberated.
[12] Includes 2,400,000 humpback eggs taken.
[13] Includes 1,845,000 humpback fry planted.
[14] Includes 3,660,000 humpback eggs.
[15] Includes 360,000 humpback eggs.
[16] Includes 345,000 humpback fry.
[17] Includes 900,000 humpback eggs.
[18] Includes 830,000 humpback fry.
[19] Includes 240,000 humpback eggs.
[20] Includes 220,000 humpback fry.
[21] Includes 1,200,000 humpback eggs.
[22] Includes 1,150,000 humpback fry.
[23] Includes 900,000 humpback eggs.
[24] Includes 805,000 humpback fry.
[25] Includes 4,680,000 humpback eggs.
[26] Includes 4,183,000 humpback fry.
[27] Includes 2,640,000 humpback eggs.
[28] Includes 2,490,000 humpback fry.

Take of eggs and output of salmon hatcheries in Alaska owned by the Territorial government

JUNEAU [1]

Year ending Mar. 31—	Red or sockeye		Coho or silver		Chum	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1920			10,540,000	[2] 9,175,000	3,425,000	[3] 3,250,000
1921	670,000	[2] 134,000	6,460,000	[2] 5,730,000	5,250,000	[3] 5,000,000
1922		500,000	5,300,000	[5] 5,450,000		
1923	[6] 6,043,936	5,712,000		[6] 100,000		

Year ending Mar. 31—	Humpback		Chinook		Total	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1920	890,000	[3] 840,000			14,855,000	[8] 13,265,000
1921	4,640,000	[3] 3,410,000			17,020,000	[4] 14,274,000
1922	1,000,000	[6] 1,950,000			6,300,000	[7] 7,900,000
1923	250,000	121,000			6,293,936	5,933,000

KETCHIKAN

Year ending Mar. 31—	Red or sockeye		Coho or silver		Chum	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1925					2,640,000	
1926	165,000				320,000	[9] 2,501,000
1927	3,337,760	[9] 100,000			451,000	265,000
1928 [15]		[9] 2,625,000				[14] 225,000

Year ending Mar. 31—	Humpback		Chinook		Total	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1924	13,167,000	[10] 1,800,000	[11] 1,000,000		14,167,000	1,800,000
1925	3,447,000	9,401,000	[12] 2,000,000	985,000	8,087,000	10,386,000
1926	11,415,000	[9] 2,946,000	[12] 2,000,000	[9] 1,930,000	13,900,000	7,377,000
1927	1,660,000	9,729,000	[12] 2,000,000	[9] 1,789,000	7,448,760	11,883,000
1928 [13]		1,524,000		[9] 1,819,000		6,193,000

OTHER DISTRICTS

Year	Eyak Lake, Cordova				Seward, red or sockeye	
	Red or sockeye		Chinook			
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1922	4,800,000	[15] 4,600,000				
1923	3,134,000	[15] 3,078,000				
1924	4,504,000	4,120,000				
1925	5,250,000	[16] 1,700,000	[12] 571,000		1,015,000	
1926	7,530,300	3,242,150		523,500	4,460,544	[9] 846,360
1927		7,300,000			3,164,000	4,085,727
1928						(17)
Total	25,218,300	24,040,150	571,000	523,500	8,639,544	4,932,087

See footnotes at end of table.

Take of eggs and output of salmon hatcheries in Alaska owned by the Territorial government—Continued

Year	Seward—Continued, chinook		Total Cordova and Seward		Grand total	
	Eggs	Fry	Eggs	Fry	Eggs	Fry
1920					14, 855, 000	13, 265, 000
1921					17, 020, 000	14, 274, 000
1922			4, 800, 000	4, 600, 000	11, 100, 000	12, 500, 000
1923			3, 134, 000	3, 078, 000	9, 427, 936	9, 011, 000
1924			4, 504, 000	4, 120, 000	18, 671, 000	5, 920, 000
1925	[13] 1, 429, 000		8, 265, 000	1, 700, 000	16, 352, 000	12, 086, 000
1926		[9] 1, 387, 000	11, 990, 844	5, 999, 010	25, 890, 844	13, 376, 010
1927			3, 164, 000	11, 385, 727	10, 612, 760	23, 268, 727
1928						6, 193, 000
Total	1, 429, 000	1, 387, 000	35, 857, 844	30, 882, 737	123, 929, 540	109, 893, 737

[1] Hatchery transferred from Juneau to Ketchikan in summer of 1923.
[2] Includes planting of eyed eggs and fertilized as well as fry.
[3] Includes 6,815,000 eyed eggs, 5,250,000 fertilized eggs, and 1,200,000 fry.
[4] Includes 4,885,000 eyed eggs, 6,470,000 fertilized eggs, and 2,919,000 fry.
[5] Includes planting of 1,000,000 eyed eggs.
[6] Includes planting of 450,000 eyed eggs.
[7] Includes 500,000 red, 400,000 coho, 1,000,000 humpback fry held in hatchery from 1920.
[8] Includes 5,098,936 eggs received from Afognak, and 945,000 from Auk Lake.
[9] Fingerlings.
[10] 1,800,000 eyed eggs transferred to State of Oregon.
[11] 500,000 eggs received from State of Oregon, and 500,000 from U. S. Bureau of Fisheries.
[12] Eggs received from State of Washington.
[13] Territorial hatcheries closed by Territorial legislature at end of year 1928.
[14] 200,000 fry lost because of accidental shut-off of water supply.
[15] Fertilized eggs.
[16] Eggs planted at Eshamy.
[17] Fire, Mar. 9, 1927, destroyed hatchery with all stock on hand.

THE SALMON FISHERIES OF SIBERIA

As on the Alaska coast, the aborigines of Siberia must have learned early of the excellent food qualities of the salmon which each year frequented the rivers of that country for spawning purposes, and not only ate them fresh but also dried large quantities for winter use for themselves and their dogs.

Owing to the inaccessibility of the Siberian coast, due mainly to the lack of transportation facilities for many years and the decided objection of the Russian Government to travelers roaming over the country, partly because of the presence of political and criminal convicts and partly because of a fear that they might learn too much of its resources, there has been but little written, especially with regard to its fishery resources, about this remote section of the Russian Empire, and what little has been published is usually filled with inaccuracies, due, doubtless, in many instances to the fact that the writer generally had to get most of his information at second and third hand and was also unfamiliar with fishery subjects.

Most of the data given below were obtained directly from persons living in Siberia or Japan, most of whom are engaged in the fishing industry of Siberia, or from Americans who have on various occasions visited the country in order to view its fishing possibilities at first hand.

SPECIES OF SALMON

All five species of salmon are to be found along the Siberian coast, and the schools appear to run about the same as they do on the American side. Although we have very little authentic data relating to their movements, these are doubtless similar to the runs on the Alaska coast, where climatic and other conditions are very similar. Nearly all streams from the Arctic Ocean to North China seem to have runs of one or more species. The steelhead does not appear to be an inhabitant of the Asian coast.

The fishing carried on by the Russians has usually been along the rivers of the mainland, principally in the Amur and on Sakhalin Island.

From very early times Japanese fishermen have frequented the Siberian coast and Sakhalin Island (the southern portion of which they at one time owned, exchanging it to Russia for the Kurile Islands in 1875 and again acquiring it in 1905, as a result of the Russian-Japanese war), being drawn here mainly by the rich stores of salmon which could be secured easily and quickly, and were so necessary to eke out the vast quantity needed to supply such a fish-eating nation as Japan.

FISHING DISTRICTS

The Priamur fishing district is subdivided into several districts as follows:

Nikolaevsk district.—This district comprises the whole lower part of the Amur River from the village Zimmermanovka down to the mouth of the river, about 300 miles; the River Amgun, 200 miles; the Amur estuary, about 150 miles on the mainland and about 130 miles on the coast of Sakhalin Island, and about 865 miles of the coast line on the southwestern shore of the Okhotsk Sea. In 1913 there were 139 fishing stations operated in this district, and this number had been materially increased since. Humpbacks and chums were the principal species of salmon taken.

Sakhalin district.—The Sakhalin district includes the entire coast line of Sakhalin Island with the exception of that facing the Amur estuary, which belongs to the Nikolaevsk district. It is the smallest district, and at present is of little importance. In 1913 there were 14 stations on the island and they produced chum and humpback salmon.

Okhotsk-Kamchatka district.—The Okhotsk section covers the coast line of the northern part of the Okhotsk Sea from Port Ayan to Penjin Promontory, about 1,620 miles. Chum, humpback, coho, and red salmon, and Dolly Varden trout are found here. The West Kamchatka section includes the coast line from the Sopotshnaya River down to the southern Ozernof shore fishing stations, a distance of about 335 miles. The Ozernaya River is, so far as known, the only river in this section that the red salmon visit in any quantities. In 1913 there were 152 fishing stations in this section, most of which were leased to Japanese. The number has since been increased. All five species of salmon and the Dolly Varden trout are found here. The East Kamchatka section covers the coast line of eastern Kamchatka and Anadir Peninsulas, about 1,843 miles. The majority of the fishing stations are concentrated around Karaginsky (Count Litka) Bay, in the straits from the Malo-Voyam River to Kitchigin

River, about 135 miles long, and in the region of Kamchatka River. All five species of salmon and Dolly Varden trout are taken here and most of the canneries are located here and in the West Kamchatka section.

Southwestern district.—This district covers the waters from the southern boundary of the Amur River estuary (the line between Capes Lazarev and Pogibi) down to the Chosen frontier, including Vanina Bay, Imperial Harbor, Peter the Great Bay, and other bays. The total length of the shore line is about 1,350 miles. The northern part, from Lazarev-Pogibi line to Cape Povorotni, with the exception of various bays, includes the conventional waters, while the southern part, composed of Peter the Great Bay and Posiet Bay, are excluded from the conventional waters. In the first-named section chum and humpback salmon are caught to some extent. In the southern section chum and humpback salmon are taken and marketed fresh.

Amur River.—The Amur River is subdivided into two districts—the Marinsk, or the Lower Amur, district and the Khabarovsk district. The first named includes the area from the village Troitskoe to the village Sophiskoe, or a tract about 278 miles long. The Khabarovsk district includes the river line from the northern boundary of the Maryinsk district up the river to Khabarovsk, about 127 miles. Chum salmon form the bulk of the catch in this district.

APPARATUS EMPLOYED

In the river districts somewhat primitive fishing apparatus is employed. Spears, dip nets, and the other simple forms which seem to be common to all savage tribes depending upon the water for the greater part of their subsistence, are all in use by the natives living along the upper reaches.

Weirs of a primitive type known as "zaezdka," are also used. These have a lead consisting of willow poles and branches built from the river bank or a sand bank out into the stream. At the outer end is attached a net compartment with a lead, into which the fish, which have been following the lead in the search for an opening, pass. Two men in a boat are anchored close by, and as soon as 30 or 40 salmon have passed into the compartment, it is hauled up and the fish emptied into the boat, after which the net is reset.

Haul seines of varying lengths and depths are used in connection with the more important river fishing stations.

Along the coast the Japanese use a floating trap net somewhat similar to the type used in Alaska, also haul seines and a few gill nets.

ABUNDANCE OF SALMON

It is exceedingly difficult to secure even approximate statistics of the Siberian catch of salmon, owing to the wide extent of coast, the totally inadequate means of transportation preventing close supervision, the presence of so many foreigners who go directly home with their catches at the end of the season, and the crude system of control in operation by the authorities.

The following table shows the catch of salmon in the four districts for the year 1898:

District	Spring	Summer	Autumn
Nikolaevsk		7,464,896	4,685,480
Okhotsk	60,000	873,000	2,662,000
Kamchatka	1,067,000	316,950	665,500
Sakhalin	666,000	635,000	748,000
Total	1,793,000	9,289,846	8,760,980

In the Anadir district the catch in 1909 was as follows: Cape St. Michael, 91,616; above Cape Neuman, 8,234; Anadir River, 150,746; Anadir River estuary, 9,864; Hanchelar River, 6,121; Cape Observation, 270,000; total, 536,581. The catch by natives and small Russian fishermen is estimated at about 3,000,000 and 500,000 fish, respectively. In addition to this, 130 barrels of caviar, weighing 14 tons, were prepared, and there were 20 tons from Cape Observation.

According to the statistics of the Fisheries Control, the catch of salmon in the Amur River in 1910 was as follows: Spring salmon, 7,701,344; summer salmon, 21,384,549; autumn salmon, 9,546,254; in all, 38,632,147. Of this number 34,649,025 fish were marketed and the balance consumed locally. Japan bought 23,228,481 fish, valued at $473,800; the balance was valued at $681,345. In addition there were 4,766,784 pounds of salmon caviar, valued at an average price of $0.114 per pound, totaling $543,413, which brings the total value of the salmon catch and by-products up to $1,698,558. During the same year, in Peter the Great Bay, 8,263 salmon were caught.

The number of salmon caught in eastern and western Kamchatka and in the bays and rivers in this region not included in the Russo-Japanese Fishing Convention of 1907, and at the Russian river stations, in 1911, was as follows:

Species	Western Kamchatka	Eastern Kamchatka	River stations	Bays and river outlets	Total
Chavitch (king)	5,421	7,818	207	590	14,036
Keta (chum)	3,082,300	2,675,000	297,300	890,790	6,945,390
Krasnaia (red)	2,136,800	747,000	689,000	236,240	3,809,040
Garbusha (humpback)	39,448,500	1,411,000	1,320,200	175,980	42,355,680
Kishutch (coho)	327,200	179,000	114,200	7,770	628,170
Total	45,000,221	5,019,818	2,420,907	1,311,370	53,752,316

In the Okhotsk district the catch amounted to 827,274 keta and 37,790 krasnaia. Of salmon caviar 489 tons were prepared by the Japanese and 60 tons by the Russians.

In 1915 about 50,000 barrels of pickled salmon were prepared on the Amur River. In the sections covered by the Fishing Convention 6,000,000 salmon, mostly keta with a few krasnaia, were dry-salted, while 80,000,000 humpback salmon, called "salmon trout" in Japan, were so prepared. No fish were frozen for the European market, due to the war. A considerable quantity of caviar was prepared, but the quantity is unknown. The pack of canned salmon is shown elsewhere.

In the "Pacific Fisherman" (February, 1917), Seattle, Wash., its Hakodate (Japan) correspondent reports the following particulars of the 1916 salmon season:

During the year 1916 the salmon catches in the States of Kamchatka and Okhotsk, Siberia, varied greatly according to districts. On the west coast of Kamchatka and Okhotsk there was a big run all season, but the run on the east coast of Kamchatka was extremely poor, except in the Kamchatka River. The distribution of salmon varieties is always limited to about the following districts:

Chums are present in large quantities on the east coast of Kamchatka and Okhotsk, but on the west coast of Kamchatka they are never plentiful.

Red salmon are almost entirely limited to two districts, the Kamchatka and Ozernaya Rivers, being very scarce in other districts.

Humpbacks are found all along the coast, but most especially in the district of Boliskreska [Bolsheryetzk], where there is always a large run.

Silver salmon are found in small quantities on the west and east coasts of Kamchatka at certain seasons of every year.

King salmon are present in very limited quantities, early in the season on the west and east coast of Kamchatka.

There were 17 canneries operated in 1916, and they packed about 470,000 cases. There were 218 fishing places on the shores, and the number of salmon caught during the season was 94,582,228.

All the salmon packers and fishermen in Siberia have used steamers for the transportation of their goods for several years past, but owing to the high rates now prevailing on steamer tonnage they were obliged again to make use of sailing vessels. Prices of all equipment and outfits for the canneries and salting stations were from 30 per cent to 50 per cent higher than for the previous year, but as a result of the strong demand for salmon products due to the European war, all the markets are in good condition. Accordingly, preparations for the coming season are expected to be on a more extensive scale, both as to number and size of canneries and development of the fisheries.

The above statement is accompanied by the following estimate of the number of salmon caught in 1916 in the States of Kamchatka and Okhotsk, except in the rivers:

Species	Okhotsk	East Kamchatka	West Kamchatka	Total
	Number	*Number*	*Number*	*Number*
Chum	1, 482, 312	2, 318, 964	1, 669, 056	5, 470, 332
Humpback	3, 710, 320	1, 776, 112	79, 926, 512	85, 412, 944
King		3, 276		3, 276
Red		308, 502	3, 311, 304	3, 619, 806
Silver			75, 870	75, 870
Total	5, 192, 632	4, 406, 854	84, 982, 742	94, 582, 228

FREEZING SALMON

As when the Russians owned Alaska, the exploitation of Siberia was carried on for many years by trading companies with large powers granted by the Government. In 1892 a very enterprising company was in charge, judging from the following extract from a letter written on February 2, 1893, by the late Eugene G. Blackford, the well-known fish dealer of New York, to the late Col. Marshall McDonald, then United States Commissioner of Fish and Fisheries:

I have just learned of the arrival in Chicago of 60,000 pounds of frozen salmon. They were caught in Petropavlovsk, Kamchatka. These fish are a new venture undertaken by a commercial trading company who control that country, and these salmon have been taken from a river where none have been caught before, and my information is that they catch fish weighing as much as 150 pounds each. The above lot of fish was brought frozen to Tacoma and then shipped by refrigerator car to Chicago, where they were sold to Mr. Booth, of the Booth Packing Co., Chicago. Mr. Booth has declined to pay for them because of their not being in satisfactory condition.

Nothing further appears to have been done in this line until in 1903, when a Berlin fish merchant outfitted and sent to the Siberian coast a refrigerator steamer with a capacity of 2,500 tons. The fish were caught mainly in the Amur River and were frozen immediately after being brought aboard. In all, 160,000 salmon were obtained, and these were in excellent condition when landed at Hamburg, Germany.

In 1907 the Salmon Steam Fishing Co., a combined British and Japanese company, chartered the steamers *Zenobia* and *Zephyrus*. These vessels were fitted with refrigerating apparatus and cold-storage chambers and sent to the Kamchatkan Peninsula to get a cargo. Both secured good cargoes.

In 1909 two refrigerating steamers visited the coast and froze salmon for the European market. One vessel was outfitted by a British company and the other by a German company, J. Lindenberger (Inc.). The latter reported that the chum salmon, the principal species frozen, were large and very bright. The British steamer left England in April and arrived home again late in December.

CANNING SALMON

In 1900 the Kamchatka Commercial & Industrial Co. (Ltd.), was organized at St. Petersburg, Russia, by A. T. Prozoraf, president of the St. Petersburg Chamber of Commerce; P. M. Grunwalt; H. T. M. Court, and A. A. Prozoraf, secretary. A complete canning outfit was purchased in the United States, and the first cannery in Siberia established at Petropavlovsk, Avacha Bay, Kamchatka.

The San Francisco Trade Journal, under date of December 19, 1902, printed the following item relating to the operations of this cannery:

> On December 8 the Russian barkentine *Bitte* arrived from Petropavlovsk, Siberia, with 10,436 cases canned salmon. This is the first consignment of salmon received from them.

The greater part of the pack comprised chum salmon, although they were labeled "pink" salmon, the rest being reds and kings.

In 1903 the company did not operate, the fishing season being devoted to moving the plant to Ust-Kamchatka, at the mouth of the Kamchatka River, where, after being in use altogether for two or three years, it was abandoned.

In 1907 two canneries were established in the estuary of the Amur River, near Nikolaevsk, but beyond getting out samples they were never operated.

In 1910 A. G. Denbigh, an Englishman, built a modern cannery near the second site of the Kamchatkan Commercial & Industrial Co. That year the cannery produced only about 10,000 cases, but each year since the equipment of the plant has been enlarged and improved until in 1913 the pack amounted to 60,000 cases. Early in 1914 a complete two-line plant of American can-packing machinery was installed.

In 1912 Mr. Denbigh built another cannery 1½ miles away from the above plant. This plant was first operated with German and Norwegian sanitary machinery, but in 1914 a two-line American sanitary can-packing plant was installed, the can-making plant at the first plant making all the cans needed at the two canneries.

In 1915 a number of additions were made to both plants in the line of flat fillers, etc., while still more were in contemplation for 1916.

Mr. Denbigh also operated a hand cannery at Kompakova, on the west side of the Kamchatka Peninsula.

Up to 1912 very few canneries, and these very primitive affairs, had been built by the Japanese, owing to the uncertainty of tenure. The "canneries" were mere sheds or shelters where the cans—which were brought from Japan, made or half made—were filled, closed, and cooked, furnace-heated, vertical retorts being used for the latter purpose. If the owner lost his concession at the end of the fishing season he simply took his retorts away with him and the buildings were left to his successor.

In 1912 a Tokyo company (Ichigumi & Co.) put up two canneries near the Ozernaya River in Kamchatka, while a Japanese from Niigata, Japan, also put up a small plant in the same vicinity. Both plants were cheaply built and operated with hand-power machinery and small vertical retorts. That year the two companies together packed about 13,500 cases of salmon.

The same season Ichigumi & Co. put up another hand-power cannery, and Tsutsumi & Co., of Hakodate, Japan, built two others of the same type near the Kamchatka River, on the east coast.

In 1913 Tsutsumi & Co. built a modern cannery at Ozernaya and installed a complete line of American sanitary can-making and can-packing machinery.

The same year Ichigumi & Co. put up two hand-power canneries near the Kamchatka River, having succeeded to the concessions formerly held here by Tsutsumi & Co. In 1914 they built a modern plant and installed a complete line of American sanitary can-making and can-packing machinery.

The St. Petersburg firm of S. Grooshetsky & Co., which has been engaged for a number of years in the freezing of salmon and in the preparation of salmon caviar, under the name of the Pacific Ocean Sea Industry Association, erected a cannery near Ozernaya in 1914, and installed in it a full line of American sanitary can-making and can-packing machinery. This plant will compare favorably with most of our Alaska canneries. The buildings are of iron.

In 1915 a number of extensive improvements in the way of new buildings, machinery, etc., were made to the various plants, and during the winter of 1915–16 several of the canning firms had representatives in this country selecting much additional machinery for use during the 1916 season. During the latter season Tsutsumi & Co. erected a large new plant at Kiseka and a one-line plant above Kiseka. This company also operates a can-making plant at Hakodate, equipped with American Can Co. machinery and with a capacity of 800,000 cans per day. Owing to the heavy demand, caused by the war, a number of small hand-pack canneries also operated.

In 1917 A. G. Denbigh built a cannery at Javino, on the west coast of Kamchatka Peninsula. All the machinery in this plant is electric driven.

In 1918 the ravages occasioned by the war so far as personnel, transportation, tinplate shortage, and market conditions were concerned had come to a head, and as a result the Grooshetsky & Co. and some of the smaller canneries did not operate, while Tsutsumi & Co. operated only those of its canneries which packed red salmon.

In 1919 conditions were much more favorable in Siberia, and as a result the three Russian plants which were shut down in 1918 re-

opened. Tsutsumi & Co. erected and operated a new cannery in Ust-Kamchatka. The Nichiro Gyogyo Kabushi Kaisha, or Russo-Japanese Fisheries Co. (Ltd.), built and operated two additional one-line canneries at Kompakova and Kiseka.

The following table shows the detailed pack of canned salmon made by the various companies operating in Siberia in 1915:

Siberia canned salmon pack in 1915 [1]

Name and cannery location [2]	Canneries	One-pound flats					Total
		Reds	Springs	Silvers	Chums [3]	Humpbacks	
		Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
A. G. Denbigh, Kamchatka River (2) and Kompakova	3	58,000		26,000	38,000		122,000
Food Products Exp. Co	4	[4] 35,000					35,000
S. Grooshetsky & Co., Bolsheryetzk	1	6,000			23,000		29,000
Minard & Co	1				7,000		7,000
Nichiro Fishing Co. (Ltd.), Kamchatka River	1	14,703	3,334	2,191	11,981		32,209
Sugamiya	1	2,200					2,200
Tsutsumi & Co., Ozernaya	1	[5] 37,800			8,800		46,600
Hand-pack canneries, East and West Kamchatka	2	1,000			4,000	10,000	15,000
Total	10	154,703	3,334	28,191	92,781	10,000	289,009

[1] From Pacific Fisherman Yearbook for 1916, p. 44.
[2] There were also a couple of small canneries operated on the Amur River which are not shown here.
[3] Called "Pinks" in Siberia.
[4] Includes 10,000 cases one-half pound flats of 8 dozen each.
[5] Includes 10,800 cases one-half pound flats of 8 dozen each.

In order to show the changes which have occurred since 1915 the detailed pack made by the various companies for 1919 is given.

Siberia canned salmon pack in 1919 [1]

Name	Cannery location	Number of canneries operated	Spring	Red		
			1-lb. flats	1-lb. talls	1-lb. flats	½-lb. flats
Grooshetsky, S., & Co	Ozernaya, Bolsheryetzk	2			8,363	
Hakama, S., & Co	Opala	1			7,550	
Hokuyo-Gyogyo Kabushiki Kaisha (Ltd.).	Ust-Kamchatka [2]	2			73,058	
Nichiro Gyogyo Kabushiki Kaisha (Ltd.).	Bolsheryetzk, Opala, and Ust-Kamchatka.	3	1,533		56,877	
Shindo, S., & Co	Narachefsky	1			888	
Suda, K., & Co	Palana R	1			900	
Tsutsumi & Co	Ust-Kamchatka, Ozernaya, Javino, Koshegochinsky, Bolsheryetzk (2) and Kuftoi.	7	3,575	557	112,396	18,266
Yushutsu-Shokuhin Kabushiki Kaisha (Ltd.)	Opala Goluiginsky, Koshegochinsky, Javino.[3]	4			80,832	17,604
Total		21	5,108	557	340,863	35,870

[1] From Pacific Fisherman Yearbook for 1920, p. 86.
[2] Formerly Denbigh canneries at Nerpichr and Seaside.
[3] Javino cannery bought from A. G. Denbigh & Co.

The close of the World War found political conditions in Siberia in a badly demoralized condition, with the coast held for several years by the Japanese. As a result of this most of the Siberian-owned canneries fell into the hands of Japanese operators. Finally the

Soviet and Japanese got together and made a new fisheries agreement—the old one having expired some time before—and as the latter's troops were moved out of Siberia, full control was once more vested in the forces controlling Russia. Since then the Russians have been gradually expanding their interests until to-day they own and control the majority of the salmon canneries.

Siberia pack of canned salmon since the inception of the industry [1]

Year	Canneries operated	Kings	Reds	Silvers	Pinks	Chums	Total
		Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*
1910	1		5,500	2,500		2,000	10,000
1911	1		15,000	6,000		4,000	25,000
1912			43,500	18,000		16,000	77,500
1913			102,900	7,000	2,500	21,000	133,400
1914			85,000	22,500	2,000	27,000	136,500
1915	10	3,334	154,703	28,191	10,000	92,781	289,009
1916	18		177,800	50,000	117,000	81,000	425,800
1917	18	2,556	275,212	29,980	137,197	66,056	511,001
1918	15	2,027	296,960	43,588	15,177	23,585	381,337
1919	21	5,108	377,290	106,364	157,766	101,983	748,511
1920	23	10,249	361,539	128,158	75,950	19,875	595,771
1921		15,233	433,243	74,721	83,567	98,729	705,493
1922	22	332	538,587	51,457	103,614	24,194	718,184
1923	13		585,338	22,035	66,869	29,427	703,669
1924	18		546,866	39,483	190,571	22,200	799,120
1925	16		386,175	82,407	104,551	13,530	586,663
1926	20		540,294	87,901	307,558	10,435	946,188
1927	17		588,724	84,121	138,589	6,401	817,835
1928	29		939,216	84,791	439,609	9,353	1,472,969
Total		38,839	6,453,847	969,197	1,952,518	669,549	10,083,950

[1] From the Pacific Fisherman, annual statistical number, January, 1929, p. 86.

Siberia canned salmon pack, 1919 to 1928 [1]

Name	Cannery location	Canneries operated	Spring		Red				Silver			Pink			Chum		Total cases
			1-lb. flats	½-lb. flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	¼-lb. flats, 16-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. flats	½-lb. flats, 8-doz.	
1919																	
Grooshetsky, S., & Co	Ozernaya, Bolsheryetzk									5,337			20,248				33,948
Hakama, S., & Co	Opala																7,550
Hokuyo-Gyogyo Kabushiki Kaisha (Ltd.).	Ust-Kamchatka [2]									31,484					78,589		183,131
Nichiro Gyogyo Kabushiki Kaisha (Ltd.).	Bolsheryetzk, Opala, and Ust-Kamchatka.									20,941			12,200		11,018		102,569
Shindo, S., & Co	Narachefsky									177							1,065
Suda, K., & Co	Palana R																900
Tsutsumi & Co	Ust-Kamchatka, Ozernaya, Javino, Koshegochinsky, Bolsheryetzk (2), and Kuftoi.								17,909	30,516		50,027	60,807		12,376		306,429
Yushutsu-Shokuhin Kabushiki Kaisha (Ltd.).	Opala, Goluiginsky, Koshegochinsky, Javino [3].												14,484				112,920
Total									17,909	88,455		50,027	107,739		101,983		748,512
1920																	
Grooshetsky, S., & Co	Ozernaya, Bolsheryetzk	2				16,690				5,430			23,845				45,965
Hokuyo-Gyogyo, K. K	Ust-Kamchatka	2	3,327			59,156				33,253					18,449		114,167
Kamchatka Gyogyo, K. K	Narachefsky, Opala Bolsheretsk, Worofskoi (2).	5	48			33,356				16,368			2,700				52,472
Nichiro-Gyogyo, K. K	Bolsheretsk, Opala and Ust-Kamchatka.	3	4,961			43,553				12,837			13,340		1,378		76,069
Suda, K., & Co	Palana River	1				7,938									48		7,986
Yushutsu Shokuhin, K. K	Opala, Koshegochinsky (2) Javino (2), Ust.-Kamchatka, Ozernayo (2), Bolsheretsk (2) [4].	10	3,494			148,900				40,723		36,065					281,128
Total		23	11,830			309,593				108,611		36,065	39,885		19,875		577,787
1922																	
EAST COAST																	
Hokuyo-Gyogyo, K. K	Nerpichr and Seaside	2	204	128		81,084	42,136			35,712					24,086	108	183,458

Nichiro-Gyogyo, K. K	Kamchatka River and Narachef.	3				15,479	93,125			11,560	248						120,412
Total east coast		5	204	128		96,563	135,261			47,272	248				24,086	108	303,870
WEST COAST																	
Nichiro-Gyogyo, K. K	Ozernoi, Javino, Koshegotic, Opala, South Bolsheretsk, North Bolsheretsk, and Worofskoi.	11				67,394	238,304			3,937		59,231	15,519				384,385
Grooshetsky, S., & Co	North Bolsheretsk	1				369						28,587					28,956
Suda & Co	Palana	1				696											696
Kodama & Co	Ozernoi	1										277					277
Total west coast		14				68,459	238,304			3,937		88,095	15,519				414,314
1923																	
EAST COAST																	
Nichiro-Gyogyo, K. K	Narachef	1				908	4,322			926			24				6,180
Taihoku-Gyogyo, K. K	Kamchatka River	2				166,310	18,579			575	20,534				27,531	1,896	235,425
Total east coast		3				167,218	22,901			1,501	20,534		24		27,531	1,896	241,605
WEST COAST																	
Grooshetsky, S. & Co	Ozernoi and North Bolsheretsk.	1				43,570							18,797				62,367
Kitaro-Nishino	Palana	2				8,786	2,918										11,704
Nichiro-Gyogyo, K. K	Ozernoi, Javino, Koshegotic Opala, South Bolsheretsk, North Bolsheretsk, and Worofskoi.	10				242,558	97,387						46,594	1,454			387,993
Total west coast		13				294,914	100,305						65,391	1,454			462,064
Grand total		16				462,132	123,206			1,501	20,534		65,415	1,454	27,531	1,896	703,669
1924																	
EAST COAST																	
Nichiro-Gyogyo, K. K	Narachef	1				985	64						191	796			2,036
Taihoku-Gyogyo, K. K	Ust-Kamchatka	3				183,978	18,825			39,143					22,200		264,146
Total east coast		4				184,963	18,889			39,143			191	796	22,200		266,182

[1] A list of the individual operators could not be obtained for 1921 but the pack follows: King, 15,233 cases; red, 433,243; silver, 74,721; pink, 83,567; and chum, 98,729.
[2] Formerly Denbigh Canneries at Nerpichr and Seaside.
[3] Javino Cannery bought from A. G. Denbigh & Co

Siberia canned salmon pack, 1919 to 1928—Continued

Name	Cannery location	Canneries operated	Spring		Red				Silver			Pink			Chum		Total cases
			1-lb. flats	½-lb flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats 8-doz.	¼-lb. flats, 16-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. flats	½-lb. flats, 8-doz.	
WEST COAST																	
Grooshetsky, S. & Co.	Ozernoi	1				24,159											24,159
Kitaro Nishino	Palana	1				10,290	1,068										11,358
Nichiro-Gyogyo, K. K.	Ozernoi, Javino, Koshegotic, Opala, South Bolsheretsk, North Bolsheretsk, Kefta, and Worofskoi.	11				258,924	48,573				340		188,776	38			496,651
Total west coast		13				293,373	49,641				340		188,776	38			532,168
North Saghalien: Keinojyo Sato.	Nanaisky	1											770				770
Grand total		18				478,336	68,530			39,143	340		189,737	834	22,200		799,120
1925																	
EAST COAST																	
Nichiro-Gyogyo-Kaisha (Ltd.).	Narachef	3				40,887	148,488			48,367	26,852				12,129		276,723
WEST COAST																	
Nichiro-Gyogyo-Kaisha (Ltd.).	Ozernoi	1					59,974										59,974
	Yavina	2					63,139										63,139
	Koshegotic	1					32,622				79						32,701
	Opala	1					17,240							808			18,048
	South Bolsheretsk	2				16,606	420				284		6,168	107			23,591
	North Bolsheretsk	1				1,030	1,050				1,064		7,812	584			11,540
	Puiruta	1								1,225		977	21,814				24,016
	Kefta	1				542				1,069			18,181				19,792
	Worofskoi	2				2,303				3,467			48,100				53,870
Total Nichiro-Gyogyo-Kaisha pack (east and west coasts).		15				61,368	322,939			54,128	28,279	977	102,075	1,499	12,129		583,394

Kichitaro-Nishino	Palana	1				1,368									1,401		3,269
Total west coast		13				22,349	174,451			5,761	1,427	977	102,075	1,499	1,401		309,940
Grand total		16				63,236	322,939			54,128	28,279	977	102,075	1,499	13,530		586,633
1926																	
EAST COAST																	
Nichiro-Gyogyo-Kaisha (Ltd.).	Narachef and Kamchatka River.	3				116,556	185,765			39,670	36,269				10,435		388,695
WEST COAST																	
Nichiro-Gyogyo Kaisha (Ltd.)	Ozernoi	1					65,776							7,224			73,000
	Yavina	2					69,585							7,145			76,730
	Koshegotic	1					31,980							13,058			45,038
	Opala	1					22,837							13,389			36,226
	South Bolsheretsk	2					14,281							35,945			50,226
	North Bolsheretsk	1				3,684	1,060			811	2,269		45,430				53,254
	Puimta	1				929				245		1,014	43,727				45,915
	Kefta	1				1,096				350			25,050				26,496
	Worofskoi	2				10,684	1,030			1,736	1,065		90,891				105,406
Total Nichiro-Gyogyo-Kaisha (east and west coasts).		15				132,949	392,314			42,812	39,603	1,014	205,098	76,761	10,435		900,986
Lyuri & Co	Kuikchik [4]	1					581			401	4,247		19,500	396			25,125
M. V. Chulyu Kin	Obrukovina [4]	1								330	416		2,235	1,007			3,988
H. Yashima	Yicha [4]	1				95				92			1,510				1,697
Matsuda Shoji & Co	Palana	1				14,355											14,355
S. Saito	Muhina [4]	1											37				37
Total west coast		17				30,843	207,130			3,965	7,997	1,014	228,380	78,164			557,493
Grand total		20				147,399	392,895			43,635	44,266	1,014	228,380	78,164	10,435		946,188
1927																	
EAST COAST																	
Nichiro-Gyogyo-Kaisha (Ltd.).	Narachef and Kamchatka River.	3				105,313	184,933			4,034	24,478				3,317		322,075
AKO [5]	Kamchatka River	1				19,400	41,148			10,828	10,876				4,100		86,352
Total east coast		4				124,713	226,081			14,862	35,354				7,417		408,427

[4] New cannery.

[5] Known during the packing season as Dalgostybtrust, formerly "Okaro"; a Russian "State trust."

Siberia canned salmon pack, 1919 to 1928—Continued

Name	Cannery location	Canneries operated	Spring		Red				Silver			Pink			Chum		Total cases
			1-lb. flats	½-lb. flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	¼-lb. flats, 16-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. talls	1-lb. flats	½-lb. flats, 8-doz.	1-lb. flats	½-lb. flats, 8-doz.	
WEST COAST																	
Nichiro-Gyogyo-Kaisha	Ozernoi	1					29,941							533			30,474
	Yavina	2					51,937							757			52,694
	Koshegotik	1					44,875				13			259			45,147
	Opala	1					35,324				213			2,771	606		38,914
	South Bolsheretsk	2					38,469				728			4,477		205	43,879
	North Bolsheretsk	1			2,418	6,272	287			4,676		17,866	1,733				33,252
	Puimta	1				2,583				3,278		31,298			787		37,946
	Kefta	1				962				1,267			25,205		399		27,833
	South Worofski	1				2,233				4,010			19,597		741		26,581
	North Worofski	1				2,306				2,502			18,642		346		23,796
	Kolpakofsky	1					2,231				9,545			6,628			18,404
	Sopochinaya	1					236				763						999
Total Nichiro-Gyogyo-Kaisha pack (east and west coasts).		17			2,418	119,669	388,233			19,767	35,740	49,164	65,177	15,425	6,196	205	701,994
Hatakeyama & Co	South Bolsheretsk	1					3,800						1,000				4,800
Lyuri & Co	Kuikchik	1					7,300			1,577	1,965			3,723			14,565
	Palana	1				2,000	3,500										5,500
Matsuda Shoji (Ltd.)	do	1				880	2,094										2,974
Taiyo-Gyogyo-Kaisha (Ltd.)	Yavina (floating)[4]	2					700										700
Yashima, H	Yicha	1									950						950
Total west coast		21			2,418	17,236	220,694			17,310	14,177	49,164	66,177	19,148	2,879	205	409,408
Grand total		25			2,418	141,949	446,775			32,172	49,531	49,164	66,177	19,148	10,296	205	817,835

1928																	
EAST COAST																	
AKO (Kamchatka Co. (Ltd.)).	Kamchatka River No. 1	1				38,115	30,141			7,520	33,790					4,445	114,020
	Kamchatka River No. 2 [4]	1				1,667	20,698				3,046					3,500	28,911
Nichiro-Gyogyo-Kaisha (Ltd.).	Narachef and Kamchatka River.	3				158,362	165,602			9,093	16,850						349,907
Total east coast		5				198,144	216,441			16,613	53,695					7,945	492,838
WEST COAST																	
Nichiro-Gyogyo-Kaisha (Ltd.)	Ozernoi	1					81,518							4,239			85,757
	Yavina	2				41,603	52,020							5,492			99,115
	Kochegochik	1				43,846	13,732							3,797			61,375
	Opala	1				21,651	69,387	13,072									104,110
	South Bolsheretsk	2				9,968	58,399							679		910	69,956
	North Bolsheretsk	1				4,220				1,738		50,492	10,245		498		67,193
	Puimta	1			33		1,448	2,013			949	48,686	917				54,046
	Utka [4]	1			364		1,408	965		139	1,017	42,106					45,999
	Kefta	1				1,496				281			46,907				48,684
	Worofskoi	2				7,809				1,377			96,981				106,167
	South Kolpakova	1					4,904				426			21,516			26,846
	North Kolpakova	1				2,885				159			43,623				46,667
	Sopochinaya	1					1,392				494						1,886
Total Nichiro-Gyogyo-Kaisha pack east-west coasts.		19			397	291,840	449,810	16,050		12,787	19,736	141,284	198,673	35,723	498	910	1,167,708
AKO (Kamchatka Co. (Ltd.)).	Ozernaia River [4]	1				19,132	11,178						250				30,560
Hatakeyama & Co.	South Bolsheretsk	1				1,290	4,470						120	4,200			10,080
Hayashikane Shoten (Ltd.)	Krutogorowa [4]	1				434	418						15,148	706			16,706
Lyuri & Co. (Ltd.)	Kulkchik	1				1,779	923			4,364	1,920	14,494	15,086	2,051			40,617
Do.	Palana	1				11,996	1,759										13,755
Nishino & Co.	do	1				10,900		5,200									16,100
Ogawa Gomei	South Bolsheretsk	1				17,889	2,510				1,205	5,109	2,508	2,914			32,135
Yashima, H.	Yicha	1					620			414				1,343			2,377
Total west coast		24			397	196,898	306,086	21,250		8,472	6,011	160,887	231,785	46,937	498	910	980,131
Grand total		29			397	395,042	522,527	21,250		25,085	59,706	160,887	231,785	46,937	498	8,855	1,472,969

[4] New cannery.

SALTING SALMON

By far the greater part of the salmon catch of Siberia is either pickled or dry salted. This was the earliest commercial method initiated on the coast and has been followed for a number of years, mainly by the Japanese. The coast is dotted with concessions worked by Japanese, while there are large numbers in operation along the rivers, these being restricted to Russians. An idea of the extent of this branch of the industry may be gathered when it is stated that in 1915 there were 50,000 barrels of pickled salmon prepared in the Amur region, while the Japanese dry salted about 6,000,000 chum salmon, including also a few reds, and 80,000,000 humpbacks, or "salmon trout, "as they are called in Japan.

In pickling salmon the fish are split down the back, the sides being held together by the belly. The roe, gills, and viscera are removed and the fish are then washed, and after salting are placed in large tanks for seven or more days, or until they are thoroughly struck, after which they are packed in barrels, flesh side up, except the two top layers, which have the skin side up. To about 700 pounds of fish 180 pounds of salt are used.

The dry salting, next to drying, is the most primitive method employed in preserving salmon. The process consists simply in splitting the fish up the belly, removing the gills and entrails, and then filling the belly with salt. The fish are then placed in rows on matting and covered with salt, and other rows are placed on top of them until the pile is from 8 to 10 feet high, when the entire lot is covered with matting and left for about seven days, after which they are relaid and again covered with salt. For shipping, the fish are packed in mats.

A very odd feature in connection with the operation of most of the Japanese plants is that the salt to be used in curing the fish is usually dumped loose onto some level spot, with absolutely no covering over it and exposed to the elements.

The Japanese consume enormous quantities of these dry-salted salmon. During the Russian-Japanese war the latter country's fishermen were cut off from access to their usual fishing grounds, with the result that they were forced to look elsewhere for fish. During 1905 and 1906 large quantities were prepared in Alaska, British Columbia, and Washington for this trade, but as soon as the war ended and the Japanese got access once more to their old fishing grounds, the Japanese duty on salt fish, which had been suspended during and for a short period after the war, was reimposed. As a result our fishermen soon quit the business, and since then operations on this coast have been almost wholly restricted to Japanese operating in British Columbia waters.

At the height of the production on this coast Mr. King, the American consular agent at Hakodate, Japan, made the following suggestions to preparers and shippers of dry-salted salmon for the Japanese trade:

The salmon should arrive in Japan by December 1. Most of these fish are used among the Japanese for New Year's presents. After the new year the price invariably declines 20 to 30 per cent, and for a month or two the fish are difficult to dispose of, as the consumers always stock up before the new year.

The salmon should weigh not less than 5 pounds when thoroughly cured. They should be free from spots, which are usually found on the salmon if caught in fresh

or brackish water. No Japanese would think of giving a salmon with red and black spots to a friend for a New Year's present, and spotted fish never realize more than half the price obtainable for clean white fish. The salmon should be split up the belly and should be salted with fine salt. Coarse salt always tears the flesh of the fish when being rubbed in. Care should be taken that the salmon are not oversalted.

Semga salting is a more improved and sanitary method than that of straight pickling and is used when the fish are being prepared for the European market. Selected fish are cut open along the belly and the viscera and gills are carefully removed. In order that the salt may penetrate the flesh more thoroughly, the flesh on the inside is scored several times. The fish are then carefully washed and rubbed with brushes, after which they are kept on ice for 24 hours. The brine is carefully prepared and very strong. When properly struck the fish are repacked into barrels.

"Kolodka" is a very crude and cheap method of salting. The fish are half salted and half dried without being cut open, and are sold at the place where prepared.

The natives prepare a great many salmon for the winter use of themselves and their dogs, the same as do the Alaskan natives. The fish are dried without the use of salt. The product is known as "youkala."

Some salmon bellies are also cut out and salted, although this has never attained to prominence.

Some fresh salmon, as well as salted, are smoked for local consumption.

Barrels, or tierces, for packing salmon are made from cedar, larch, or fir, with a net capacity of 900 to 1,000 pounds of fish, and are bound with wooden and iron hoops.

THE SALMON FISHERIES OF JAPAN

Outside of Karafuto (that portion of Sakhalin Island, south of 50° north latitude, which belongs to Japan) and the Kuril Islands, the salmon fisheries of Japan are comparatively small, the principal portion of the immense catches made by Japanese fishermen being along the coasts of Siberia and Karafuto.

All of the five species of salmon found on the American side are to be found in the waters of Sakhalin during the usual spawning periods.

The chum salmon (*O. keta*), which is known in Japan as "sake," and when canned as "pink" salmon, is to be found on Hokushu Island, running up the various streams for spawning purposes from September to December.

On the same island is to be found also the masu (*O. masou*), a salmon, according to Doctor Jordan,[44] very similar to the humpback, the scales being a little larger, the caudal fin without black spots, and the back usually immaculate. It is fairly abundant in the streams of Kokushu, the island formerly known as Yezo, and is found nowhere else in the world. The author had an opportunity to examine a dry-salted masu (it might be well to state here that in Japanese masu means "trout") at the fish house of the Royal Fish Co., in Vancouver, British Columbia, in January, 1916. The manager, Mr. Emy, had imported the fish from his own country. Both in

[44] Fishes, p. 296. By David Starr Jordan. New York, 1907.

size and general appearance it closely resembled a humpback salmon, and when cut open the flesh had the same coloring observable in our humpback. This species, and the true humpback found in more northern waters, especially in Siberia, are dry salted in immense numbers and are generally marketed under the name of "white trout" or "salmon trout."

In Japan the "red trout" seem to be our rainbow and brook trouts, which were introduced into Japanese waters some years ago. The red salmon (*O. nerka*) is to be found landlocked in Lake Akan in the northern part of the island. It is smaller in size than the sea species. This species has been introduced into the waters of Honshu.

The section of this report devoted to the salmon fisheries of Siberia treats quite fully of the activities of the Japanese in that quarter.

In Sakhalin, or Karafuto, as it is called in Japan, the Japanese have had a rather checkered career. At one time this island belonged to the Chinese Empire. Early in the nineteenth century the southern portion was occupied by the Japanese. In 1875 she bartered it to Russia in exchange for some small islands in the Kuril group. As a result of the Russo-Japanese war the southern half, or all that portion south of 50° north latitude, was in 1905 ceded to Japan.

The salmon fisheries of this island are of much importance. For many years the Japanese had a virtual monopoly of them, but very early in the present century the Russians attempted to restrict considerably the activities of the Japanese fishermen, and encouraged her own subjects to compete with them. Many hundreds of Russians and Koreans were encouraged to migrate to the island and engage in its fisheries. Despite these handicaps, the operations of the Japanese fishermen, according to the statistics shown below, do not seem to have suffered.

Year	Salmon [1]	Spring salmon	Total	Year	Salmon [1]	Spring salmon	Total
	Koku [2]	*Koku* [2]	*Koku* [2]		*Koku* [2]	*Koku* [2]	*Koku* [2]
1897	8,589	34,246	42,835	1900	7,719	8,797	16,516
1898	6,335	11,228	17,563	1901	3,089	12,735	15,824
1899	8,379	22,959	31,338	1902			24,726

[1] Species not specified.
[2] Koku equals about 5½ bushels.

Considerable fishing is carried on around the island of Yetorofu, one of the Kuril group. Here are found red (*O. nerka*), silver (*O. kisutch*), and chum salmon (*O. keta*), also either the humpback or Doctor Jordan's masu.

CANNING INDUSTRY

The salmon canning industry in Japan proper was inaugurated by the Hokushu Colonization Department, a local branch of the Federal Government. For some time this department had operated a fishery school on Hokushu Island, at which experimental work in the canning of salmon and other fishery products was carried on. This establishment canned considerable salmon during the Russo-Japanese War.

This same department also established a fishery school on Yetorofu Island, one of the Kuril group, which was, in 1908, taken over by Suhara Kakubei, a fisherman and graduate of the school, and used as a salmon cannery.

Some years earlier, however, about 1892 or 1893, Fujino Shirobei started canneries in Shibetsu and Bekkai, Nemuro Province, Hokushu Island, and a short time later Idzumi Shozo also started a plant at Nemuro. For a number of years these three canneries were the only producers. The plants were quite primitive, the product small, and most of it was consumed by the Japanese navy. A demand for the product was gradually worked up, however, and as a result there are now a number of small canning plants on Hokushu Island proper, the Kuril Islands, and Japanese Sakhalin. Most of these plants devote the major part of their energies to the packing of crab meat, the canning of salmon being in most cases a side issue. A few of the plants have been equipped with machinery, but the large majority are hand-pack plants, employing but a few persons.

Most of these plants pack what is called "white trout," which is really the humpback or masu salmon. In 1912 there were in Hokushu and adjacent islands 21 canneries which packed 730 cases (48 one-pound flat cans each) of red (*O. nerka*) and 72,770 cases (48 one-pound cans each) of "white trout," a total of 73,500 cases.

On the Japanese portion of Sakhalin Island 4 canneries packed 10,120 cases (48 one-pound cans each) of "white trout" in 1912.

The pack of canned salmon in Japanese territory in recent years has been as follows:

Year	Hokkaido and Kurils	Karafuto (Japanese Sakhalin)	Total	Year	Hokkaido and Kurils	Karafuto (Japanese Sakhalin)	Total
	Cases	*Cases*	*Cases*		*Cases*	*Cases*	*Cases*
1912	73,500	10,120	83,620	1919	50,500	18,000	[1] 68,500
1913	46,000		46,000	1920	18,500	6,500	25,000
1914	50,450	15,000	65,450	1924 [2]			10,000
1915	55,000	15,000	70,000	1925			90,000
1916	37,800	1,800	39,600	1926	25,000	1,500	26,500
1917	39,545	16,607	56,152	1927			132,000
1918	21,490	5,000	26,490	1928	37,000	10,000	[3] 203,100

[1] Composed of 2,500 cases of 1-pound flat red salmon and 66,000 cases of 1-pound flat chum salmon.
[2] No figures given from 1921 to 1923, inclusive.
[3] Includes 156,100 cases of humpback salmon brought to Aomori from Siberia in refrigerator vessels and then canned.

The following table shows the quantities and value of salmon and trout taken by the Japanese fishermen in certain years:

Year	Salmon		Trout	
	Pounds	Yen	Pounds	Yen
1902	5,722,475	454,662	923,025	121,499
1907	9,286,267	892,879	4,500,008	332,316
1912	26,438,017	1,594,230	44,038,383	928,513

FISHERY METHODS

In Japanese waters salmon are taken by means of trap nets, haul seines, and gill nets.

The haul seines used along the seashore have a length of about 500 fathoms. Each is carried by a boat of 9 feet beam with 30 men, and the right wing, called the "outing wing," is first paid out as the boat heads out from the beach. When the pocket, or bunt, is cast the boat turns its course toward the right and steers gradually landward, casting the left wing. When the school is encircled the seine is hauled ashore by the seine ropes.

The floating trap net used for salmon is known as "kaku-ami," or square trap net. This consists of a main net and lead. The main net, or heart, is 70 fathoms long, 10 fathoms wide, and 10 fathoms deep, and the lead is 120 fathoms long. The latter guides the fish toward the main net. When being fished the pot is hauled up by a boat crew and the fish transferred to the boat by means of a dip net.

FISH CULTURE

The artificial culture of salmon is carried on in 56 hatcheries, which are distributed in Hokkaido and the prefectures of Aomori, Akita, Yamagata, Niigata, Toyama, Kyoto, Iwate, and Miyagi. Nine of these belong to the government of Hokkaido and other prefectures, while the rest are owned by fishing associations, individuals, or corporations. The number of young salmon distributed by these hatcheries amounts to over 80,000,000 a year.

The largest hatchery is the one at Chitose, under the supervision of the Hokkaido Fishery Experimental Station. It was established in 1887, and it is estimated that the fish distributed by it number from 20,000,000 to 30,000,000 yearly.

The salmon hatchery of Murakami, Niigata prefecture, dates as far back as 1881, when a regulation pertaining to the preservation of young salmon in the River Miomote was enacted by the prefecture of Niigata. This was first called the "Murakami Salmon Raising Plant," but in 1891 it was turned into a hatchery, and is now distributing 2,000,000 young salmon a year. The salmon hatchery of Nitta River, Fukushima prefecture, is very similar in its history and organization to the above.

The industry has during the last few years become very popular in Yamagata prefecture, where 22 hatcheries are in operation as private enterprises.

In the prefectures of Shiga, Miye, Shizuoka, Nagano, Yamanashi, Kanagawa, Akita, Niigata, Hyogo, Miyazaki, and Hokkaido, the masu (*O. masou*) and the landlocked hime-masu (*O. nerka*) are raised and distributed in the lakes and rivers. There are eight hatcheries working on these species. The hatchery of Lake Towada, Akita prefecture, first transplanted hime-masu from Hokkaido in 1902, and it is now hatching from 5,000,000 to 10,000,000 eggs a year for the purpose of distributing the fish among the different districts.

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