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DEPARTMENT OF COMMERCE AND LABOR

BUREAU OF FISHERIES

GEORGE M. BOWERS, Commissioner

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THE SALMON FISHERIES OF THE  
PACIFIC COAST

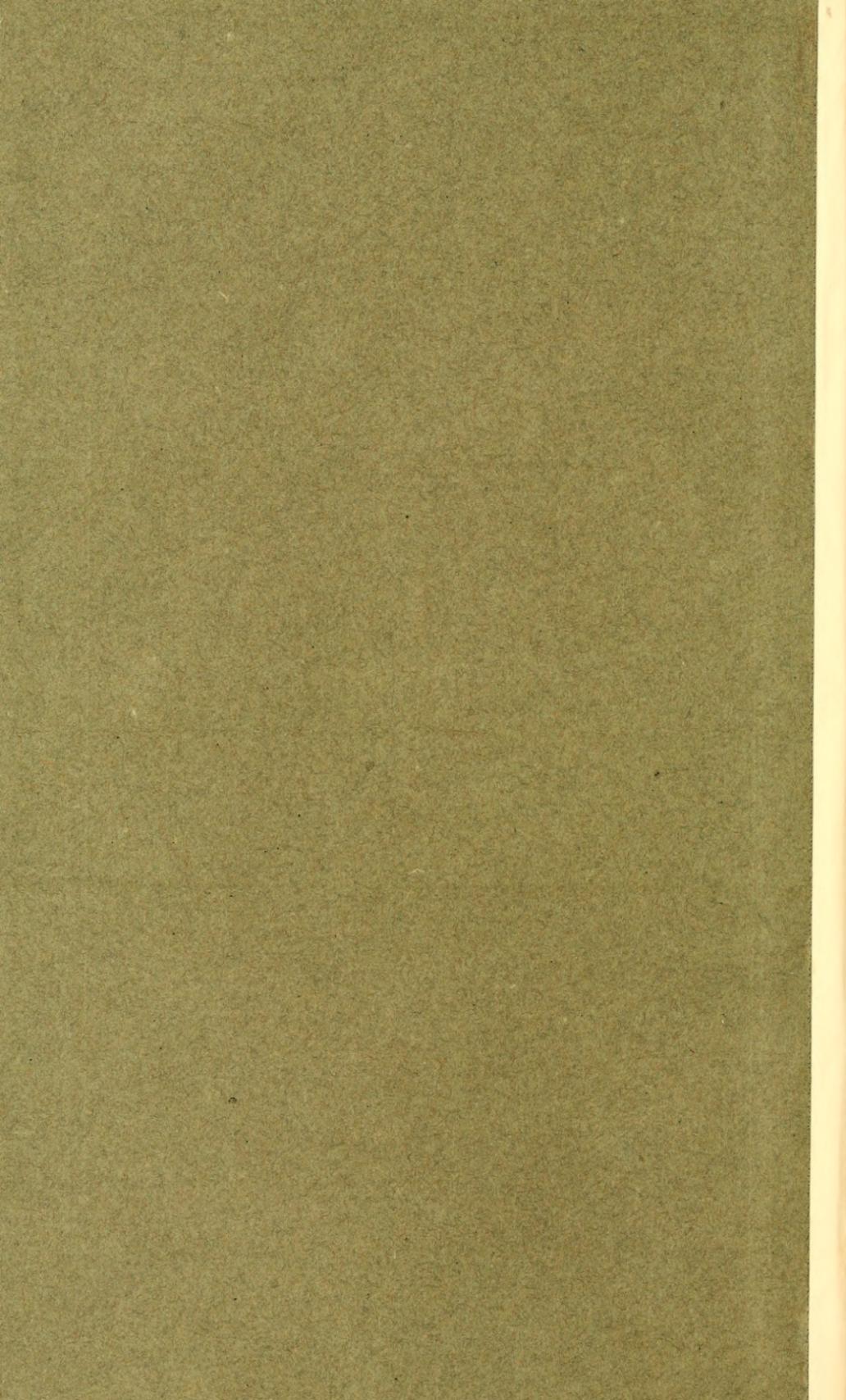
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1911



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BUREAU OF FISHERIES

GEORGE M. BOWERS, Commissioner

*Cobb, John Nathan, 1868-*

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# THE SALMON FISHERIES OF THE PACIFIC COAST

By JOHN N. COBB

*Assistant Agent at the Salmon Fisheries of Alaska*

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# THE SALMON FISHERIES OF THE PACIFIC COAST

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By JOHN N. COBB,

*Assistant Agent at the Salmon Fisheries of Alaska.*

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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. No published reports contain data for the entire coast, or have pertained to the same year for both Alaska and the States. In the following pages, containing the returns from a canvass occupying several months, the data are complete for the United States coast and Alaska for the year 1909, and to make the report more comprehensive, historical and geographical aspects of the subject, as well as methods of the fisheries and allied industries, are discussed at some length. Figures for British Columbia have been included also, so far as possible, the official reports of the Dominion of Canada and of the Province itself having been drawn upon for this purpose. The statistics for Alaska are taken from the already printed (1909) report of Mr. Millard C. Marsh and the present writer.<sup>a</sup>

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<sup>a</sup> The fisheries of Alaska in 1909. By M. C. Marsh and J. N. Cobb, agents at the salmon fisheries of Alaska. Bureau of Fisheries Document No. 730. 1910.

## I. 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 Krascheninikoy, 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 tshawytscha*, quinnat, tye, chinook, spring, or king salmon; (2) *Oncorhynchus nerka*, blueback, red, sukkegh, or sockeye salmon; (3) *Oncorhynchus kisutch*, silver, coho, or white salmon; (4) *Oncorhynchus keta*, dog or chum salmon; and (5) *Oncorhynchus gorbuscha*, humpback or pink salmon.

### CHINOOK, QUINNAT, OR KING SALMON.

The largest, best known, and most valuable of these is the chinook or king salmon (*O. tshawytscha*). It is found throughout the region from the Ventura River, Cal., 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 Nass 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 May and June, and the same is true of the Togiak, Kusko-kwim, and Yukon Rivers, although fish may be seen in the upper courses of the Yukon in July, the lateness here being due to the immense distance the fish have to cover.

On the Asiatic side the chinook is found in some of the rivers of Siberia.

#### SOCKEYE, BLUEBACK, OR RED SALMON.

The sockeye or blueback salmon (*O. nerka*), which forms the greatest part of the canned salmon of the world, 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<sup>a</sup> 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 Tangas was only 3.934 pounds. Evermann and Goldsborough<sup>b</sup> 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, these being especially noticeable in the Chignik lagoon, Alaska, run. This species usually enters streams with accessible lakes in their courses.

A few specimens of the sockeye have been taken as far south as the Sacramento River. In Humboldt County, Cal., small runs are said to occur in Mad and Eel Rivers. 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 numbers, entering the river with the spring run of chinooks. From here south the species is called blueback exclusively. A considerable run enters the Quinniault River, Wash., and there is also a small run in Ozette Lake, just south of Cape Flattery.

<sup>a</sup> 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.

<sup>b</sup> The fishes of Alaska. By B. W. Evermann and E. L. Goldsborough. Bulletin Bureau of Fisheries, vol. XXVI, p. 257.

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.

The greatest of all the sockeye streams is the Fraser River, British Columbia, and this stream has been 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 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 streams frequented are the Skeena, Rivers Inlet, Nass, 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, in southeast Alaska, the following are the most important: Boca de Quadra, Naha, Yes Bay, Thorne Bay, Karta Bay, Nowiskay, Peter Johnson, Hessa, Hetta, Hunter Bay, Klawak, Redfish Bay, Stikine, Taku, Chilkoot, Chilkat, Asek, Seetuck, Ankow, etc.; in central Alaska, Copper, Knik, Kenai, Sushitna, Afognak, Karluk, Alitak, Chignik; in the Bristol Bay region, the Ugashik, Ugaguk, Naknek, Kvichak, Nushagak, and Wood. It is also supposed to occur in the Togiak, Kuskokwim, and Yukon Rivers, which debouch into Bering Sea, and probably occurs in the Arctic streams of Alaska. The run in Alaska begins usually in June and extends usually to the middle of August. It begins earlier in Prince William Sound, and sometimes extends into September in southeast Alaska.

On the Asiatic side the species is known to occur at Bering Island and in all suitable streams south to Japan, where it is found landlocked in Lake Akan, in northern Hokkaido.

#### 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.

This species has a maximum weight of 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 July and August. 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.

On the Asiatic side the coho ranges down the coast to Japan.

#### HUMPBACK OR PINK SALMON.

The humpback or pink salmon (*O. gorbuscha*) is the smallest of the American species, weighing from 3 to 11 pounds, the average being about 4 pounds. In color it 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 softer than in the other species; it is pale in color, hence its canned name, "pink" salmon.

The southern limit of the fish is the Sacramento River, 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.

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 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 central and 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.

On the Asiatic side it is found in the rivers of Siberia (abundant in the Amur), but not in Japan.

In southeast Alaska the run begins in June and continues until September, or even later in some places. In western Alaska the period is somewhat shorter. In Puget Sound it continues until late in the fall.

## DOG OR CHUM SALMON.

The dog or chum 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 grid-ironlike bars. Later in the season the male is brick red or blackish, and its jaws are greatly distorted. Its flesh is quite pale, especially when canned, when also it is mushy in texture. It is especially good for freezing, salting, and smoking.

This species has a wide distribution. It is found as far south as San Francisco, 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 is utilized sparingly, except by the natives, with whom it is the favorite species dried for winter food.

This is the most abundant species of salmon in Japan, where it is called sake, and large quantities are dry-salted each year. In Siberia the species is abundant and is known as kaita or kita.

The run of dog 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. 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 market, 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, Cal., north to central Alaska, and possibly has an even wider range in Alaska. 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.

## II. FISHING GROUNDS AND HISTORY OF THE FISHERIES.

### 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 convenience sake, 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 especially 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 Skohomish, Quilcene, Dungeness, and Elwha.

The first fishing operations by white men were begun soon after the settlement at what is now known as Seattle, about 1852. For many years the catch was sold either fresh or salted. The first salmon cannery on Puget Sound was erected in 1877, at Mukilteo, in Snohomish County. The first pack was of 5,000 cases, composed wholly of silver or coho salmon. Later this plant put up the first humpbacks ever canned. In 1880 the cannery was removed to West Seattle. In 1885 other canneries were erected at Mukilteo, Seattle, Tacoma, and Clallam Bay, most of them packing silver and humpback salmon alone. The first sockeye salmon cannery was established at Semiahmoo, in Whatcom County, in 1892, from which time on the industry fluctuated considerably, 15 canneries being operated in 1910.

*Quillayute 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 catch some salmon and market them on Puget Sound.

*Quinault River.*—This river, which enters the ocean in the north-western part of Chehalis County, has a length from the ocean to Quinault Lake of about 40 miles, wholly within the boundaries of the Quinault Indian Reservation. Fishing is restricted to the Indians and the catch is generally shipped by rail to Hoquiam and Aberdeen, on Grays Harbor, and sold to the dealers at these places.

*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.

As early as 1878 there was a cannery on Grays Harbor, but from then until 1891 the data relating to this branch of the industry are very meager. In 1910 two canneries were in operation at Aberdeen and Hoquiam, respectively.

*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 on the western side being separated from the ocean by a spit varying in width from three-fourths to 1 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.

Data relating to the early history of the fisheries of this section are very meager. In 1887 there were four canneries in operation, probably the largest number ever operated. In 1910 there was but one—at South Bend.

#### 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 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. It was about the year 1833 that a small trading sloop, under the command of Capt. Lamont, came into the Columbia

River on one of her regular trips and dropped anchor near what is now known as St. Helens. While waiting several months for a return cargo the captain salted a number of barrels of chinook salmon, using old Jamaica rum kegs for the purpose. This is the first record of the export of this toothsome fish.

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 on the Columbia at Eagle Cliff, Wash., about 40 miles above Astoria. Then 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, who did all the work, from fishing to canning, himself. In 1868 a cannery was built near Eagle Cliff by one of the Humes, and from this time on for a number of years the industry grew by leaps and bounds.

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.

At the present time (1910) there are 10 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, on the Washington shore, and at Warrendale, Rooster Rock, 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.

*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. Since 1891 but one has been operated.

*Nestucca River.*—This stream enters the ocean in the southwestern part of Tillamook County. A cannery operated here in 1887 and the business has been carried on intermittently since then.

*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.

*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.

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, the only place on the ocean side of Oregon, except Tillamook, so situated.

*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 past but one has been in operation.

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.

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. At present there are two canneries in operation.

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 is now being built along this river and when this is completed there will doubtless be a large development of the fisheries of this region owing to the opportunities which will then be offered for shipping fresh fish.

As early as 1878 there were two canneries located on the Umpqua. The number has never been larger than this, and usually there has been but one operating. In 1910 there was but one, 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, and such being the case in 1910.

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 Moun-

tains 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 will be remedied, as the railroad to Coos Bay will eventually connect with a short line now in existence between the Coquille and Coos Bay.

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. In 1910 two canneries were operated, both at Prosper.

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 Fran-

cisco. In 1877 Mr. 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, since which date it has been 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 various parties, but the people of Oregon, upon an initiative and referendum petition, voted in 1910 to close Rogue River to all commercial fishing.

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 direction to the Pacific Ocean.

The river has only a spring run of salmon, and the early recorded history of the fisheries is fragmentary. The pickling of salmon was the main business at first and has been important ever since, as the cannery, which was first established in 1878, operated irregularly, and seems to have shut down entirely in 1895.

*Klamath River.*—This is the most important river in California north of the Sacramento. It issues from the Lower Klamath Lake in Klamath County, Oreg., and runs southwesterly across Siskiyou County, passes through the southeastern section of Del Norte County, keeping its southerly course into Humboldt County, where it forms a junction with the Trinity River, and thence its course is directed to the northwest until it reaches the Pacific Ocean.

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.

*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 to run from the north side of San Francisco Bay to Eureka is now nearing completion, and when in operation it will doubtless aid 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.

*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 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 Mountains. Flowing westerly and forming the boundary between Fresno and Madera Counties for a considerable distance, it then turns abruptly to the north just where it is joined by Fresno Slough, which drains Lake Tulare. From here its general course is northwesterly until it joins the Sacramento River, near the latter's mouth. The Chouchilla and Fresno Rivers are the principal tributaries of the San Joaquin.

The principal fishing grounds for salmon are Suisun Bay, the lower part of San Joaquin River, and the Sacramento River as high as the vicinity of Sacramento. Drift gill nets are used almost exclusively in this section. From Sacramento to Anderson there is considerable commercial fishing, more particularly with haul seines.

Owing to the early and excellent railroad facilities which the fisheries of the Sacramento River have enjoyed, they have not been handicapped so seriously as most of the other Pacific coast rivers in finding profitable outlets for the catch. Soon after the first trans-continental line was opened the shipping of fresh salmon to eastern points began and it has been an important feature of the industry ever since.

The chief event in the history of the salmon fisheries of this river is the fact that the canning of salmon on the Pacific coast had its inception here in 1864. The circumstances leading up to this event and its consummation are interestingly told by Mr. R. D. Hume in the following words:

The first salmon cannery of the United States was located at Washington, Yolo County, Cal. A part of the building was originally a cabin situated on the river bank outside of the levee just opposite the foot of K Street, Sacramento city. It was built in 1852 and occupied by James Booker, Percy Woodson, and William Hume. William Hume came to California in the spring of 1852, bringing with him a salmon gill net, which he had made before leaving his home at Augusta, Me. In company with James Booker and Percy Woodson, Mr. Hume began fishing for salmon in the Sacramento River just in front of the city of Sacramento. William Hume had been salmon fishing in the Kennebec River in the State of Maine with his father, where his father and grandfather had been engaged in the same business since 1780, and their ancestors in Scotland had for pleasure pursued the sportive salmon on the Tweed and Tay for centuries before. In 1856 William Hume went back to Maine, and on his return to California the same year was accompanied by his brothers, John and G. W. Hume, who also engaged in salmon fishing in the Sacramento River. Among the schoolmates of G. W. Hume was one Andrew S. Hapgood, who had learned the tinsmith's trade, and who a short time after G. W. Hume left for California went to Boston and entered the employ of J. B. Hamblen, a pioneer in the canning business, and was sent by him to Fox Island on the coast of Maine, to engage in canning lobsters. The canning of lobster was a new and growing industry, and Mr. Hamblen, to increase his business, a short time after sent Mr. Hapgood to the Bay of Chaleur, an arm of the sea which divides the Province of Quebec from that of New Brunswick,

where, in addition to the canning of lobster, they also canned a few salmon. I believe this was the first salmon canned on the American Continent, and I am informed that the business in a small way is still carried on in that section of the country. In 1863 G. W. Hume went back to Maine, and while there visited Mr. Hapgood at Fox Island, to which place he had been again sent by Mr. J. B. Hamblen to take charge of the works at that place. During the visit of Mr. G. W. Hume to his friend Hapgood a talk about salmon was had, and it was agreed that if salmon on the Pacific coast were as plentiful as represented by Mr. Hume much money could be made in a salmon-cannery business. The plan decided on was that Mr. G. W. Hume, on his return to California, should try and induce his brother William to engage in the business with them, and, if he succeeded in so doing, Mr. Hapgood should purchase the necessary machinery and come out to California in time for the spring season of 1864. Mr. William Hume being agreeable to take part in the enterprise, 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.<sup>a</sup>

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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.<sup>b</sup>

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, owing to the smaller quantity of fish available and the difficulty of competing with the mild-cure packers and the fresh-fish dealers.

*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.

#### ALASKA.

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, Ugagak, and Ugashik; in central Alaska the Chignik, Karluk, Alitak, Sushitna, and Copper

<sup>a</sup> The description of the machinery used and the methods of canning have been quoted in full under "Canning" elsewhere in this report.

<sup>b</sup> The first salmon cannery. By R. D. Hume. *Pacific Fisherman*, Seattle, Wash., vol. 11, no. 1, January, 1904, p. 19-21.

Rivers are the main streams, while in southeast Alaska are found, among many others, the Anklow, Seetuck, 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. The first two canneries in the District were built in the spring of 1878, both being located in southeast Alaska. One was built by the Cutting Packing Co. at the Redoubt, Old Sitka, on Baranof Island, while the other was constructed at Klawak, on Prince of Wales Island, by the North Pacific Trading & Packing Co., which latter company still operates at the same place.

The first cannery in central Alaska was built by Smith & Hirsch at Karluk, on Kodiak Island; in western Alaska the first was constructed on Nushagak Bay in 1884 by the Arctic Packing Co.

Owing to the increased demand for canned salmon and the inability of the coast States canneries to keep pace with it, the number of canneries in Alaska rapidly increased for some years until in 1890, when there were 38 in operation. The inevitable happened about this time, however, the production having far outstripped the demand, and canned salmon became a drug on the market.

Heretofore each cannery had operated without regard to the others, but with this condition of affairs prevailing it was soon perceived that steps to reduce the output would have to be taken, and a number of the companies pooled their packs, reduced the number of plants operated, and thus cut down the output nearly one-half. The first arrangement was only temporary, but in 1893 a number of the companies combined permanently and formed the Alaska Packers' Association, which was then, and is yet, the largest company operating in the District.

Since 1893 the industry has experienced periods of alternate prosperity and adversity. In 1910 there were in operation 23 canneries in southeast Alaska, 10 in central Alaska, and 19 in western Alaska, a total of 52. The high prices realized for salmon in 1910 have drawn more capital into the industry, and in 1911 13 new canneries will be constructed and operated.

### III. APPARATUS AND METHODS OF THE FISHERY.

#### 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  $7\frac{1}{2}$  to  $9\frac{1}{2}$  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 sought. On the Columbia River the nets average about 250 fathoms in length and have a stretch mesh for chinooks of 9 to  $9\frac{1}{2}$  inches. On the Willamette River, the principal tributary of the Columbia, they average about 75 fathoms in length, with meshes of 8 and  $9\frac{1}{2}$  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  $8\frac{1}{2}$  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 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 fishing 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 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 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 Kadiak Island, in Alaska. Here the seines are hauled upon the narrow sand pit 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 3-inch mesh. The foot line is heavily leaded and the bridles are about 10 feet long. The purse line is made of  $1\frac{1}{2}$ -inch hemp. The rings through which the purse line is rove measure about 5 inches in diameter and are made of galvanized iron.

On Puget Sound the purse seiners congregate mainly on what are known as the Salmon Banks, off the lower end of San Juan Island, during the run of sockeyes. After this run is over they go up the Sound and fish for dogs and cohos, and later go to the head of the Sound and fish for dogs, 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.

On Puget Sound special power boats, which are fitted with a power winch for hauling in the net, are used almost exclusively in operating the purse seines. As soon as a school of fish is sighted one end of the seine is attached to a dory, and while this remains stationary the seine boat starts off, the crew paying out the net over a roller in the stern. A circle is made around the fish, the boat returning to the dory. The purse line is then attached to the winch, and the line slowly hauled in by power. As the net comes in, the slack is neatly coiled up on a platform in the stern of the boat, the cork line lying on one side and the lead line on the other. As the circle gradually narrows a man stands at the davit with a long pole which he continually plunges into the circle and between the purse lines for the purpose of frightening the fish away from the center of the net, which is open for about a third of the time required to purse it. The poleman in time becomes very expert and is able to plunge the pole into almost any part of the center and have it return unaided to his hands. After the net has been pursed, the bag is either rolled into the boat or the fish dipped or gaffed from the net into the boat.

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. 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.

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

The "pot" is placed at right angles with 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, from 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 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 cross-ways 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 Uganuk, 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 Mr. 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 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,<sup>a</sup> "pound nets were introduced on the Columbia River in 1879. In May of that year Mr. 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."

According to the same authority<sup>b</sup> Mr. 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. 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 trap nets, 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 pounds, 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.

The location of sites for these nets is regulated by law in Oregon, Washington, and British Columbia, but in Alaska the procedure is not well defined and has proved rather confusing to strangers. Some acquire the necessary shore line by mineral location or by the use of scrip, while still others have merely a squatter's right. Within the bounds of the forest reserve no land can be acquired except by lease, which may be secured from the United States forestry agent, Ketchikan, Alaska.

#### 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

<sup>a</sup> Report on the fisheries of the Pacific Coast of the United States, by J. W. Collins. Report of Commissioner of Fish and Fisheries for 1888, p. 210. 1891.

<sup>b</sup> *Ibid.*, p. 257.

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, south-east 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 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  $3\frac{1}{2}$  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, but on a smaller scale, than the stationary wheel. 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.

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

An ingenious device is used by some of the wheelmen 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 and these 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, 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 River and its tributaries in order to secure a sufficient supply of salmon to sustain them through the succeeding winter. The favorite apparatus of these natives is a type of fish wheel of local invention, which has been in use by them for many years, probably long before the white man first saw the Yukon. A square framework of timbers is constructed in the water and moored to the bank by ropes. A wheel, composed of three dips, is placed in this, the axle resting upon the framework. The shape of the dip is such that the salmon caught roll off it into a trough, down which they slide into a boat moored between the wheel and the shore. Although crude in construction, it is 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, Messrs. S. W. Williams & Brother, 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 the natives of the Yukon River Basin had been using a precisely similar principle for an unknown number of years previously, while 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.

As the name indicates, this device is used around the reefs. Under natural conditions the reef is covered with kelp throughout its length, the kelp floating at the top of the water. A channel is cut through this, and in it is placed a tunnel of rope and netting, which flares at the outer end, in deep water, and into which is thatched grass, kelp leaves, or any other article resembling submarine growth, to hide the construction sufficiently to avoid frightening the fish. Short leads of kelp are also arranged on the sides so as to draw the fish to the tunnel, which is held in place by anchors. On the reef itself two boats are anchored parallel to each other and some feet apart. An apron of netting is fastened to the rear of the two boats, while the other end extends under the small end of the tunnel and is kept in place by men in the forward ends of the boats, who have lines fastened so the apron can be raised by them. The device can only be used with the tide entering the tunnel at the large end. When the fish have entered and passed through the tunnel upon the apron, the men raise the floating end of the latter and dump them into the boats.

At one time this was a favorite device of the Puget Sound natives for catching sockeye salmon. They attribute its origin to one of the Hudson Bay Company's employees, who, they say, taught them a long time ago how to catch salmon in this way. Owing to the large number of men required to work them, and the fact that they can be worked only at certain stages of tide and in favorable weather, these nets have gradually been supplanted by other devices. In 1909 but five were used and these were operated off the shores of San Juan, Henry, Stuart, and Lummi Islands, and in the vicinity of Point Roberts.

#### TROLLING.

Each year the catching of salmon by trolling becomes of increasing importance commercially. For some years sportsmen had this exciting and delightful occupation to themselves, but eventually the mild curers created such a persistent and profitable demand for king, or chinook, salmon that the fishermen, who had previously restricted

their operations 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.

The Monterey Bay, Cal., 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. 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 few 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.

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 1910, 204,823 king salmon and 6,000 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.

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 gamy.

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.

#### 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. The catch is sold to the cannery located on Chilkoot Inlet.

#### IV. FISHERMEN AND OTHER EMPLOYEES.

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 laborers 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 the watchmen alone being whites. 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 night and day 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 peculiar 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 full duty.

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.

The Japanese now compose about one-half of the cannery employees. While a few cannery men express themselves as well pleased with this class of labor, the majority find it troublesome.

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 workpeople, but are rather unreliable about remaining through the season.

The supplying of this kind of labor is done largely through the contract system. In the large cities along the coast are labor agencies, mainly owned by Chinese, which make a specialty of furnishing labor for this work. 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.

White men do the greater part of the fishing for salmon, many nationalities being represented, but Scandinavians and Italians predominating 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, except in Alaska, where the small number of 13 were occupied in 1909. A 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. Early in the year this organization enters into contracts with the salmon canneries and salt-eries, by which the rates of wages, duties, etc., of the fishermen are fixed in advance. 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 a few years ago, are now almost entirely absent.

## V. FISHERY REGULATIONS.

### CONTROVERSIAL FORMS OF APPARATUS.

From time immemorial the users of certain forms of fishing apparatus have complained of and condemned the use of other forms, which, either through disinclination, through lack of financial means, or because it was not suitable for use in the section in which they fished, they themselves have not seen fit to employ. In some instances these complaints are well founded, but an unprejudiced observer is apt to view with suspicion charges advanced under conditions when personal interest may so easily cloud or color the individual judgment. In a court of equity it is a well-established principle that the plaintiff must appear with clean hands, and that is a difficult matter for the users of any form of apparatus in the salmon fisheries of the Pacific coast. If in one section the fishermen live strictly within the letter and spirit of the law, the users of the same apparatus in another section may be the most persistent and destructive violators. And, again, while the law may be strictly observed, the law itself may be inadequate or purposely deficient, and the apparatus therefore be doing incalculable damage to the fisheries.

While all forms of apparatus in use in the salmon fisheries of the Pacific coast have been objected to in some one section or another, the principal complaints have been against fish wheels and trap or pound nets. The wheels are used only in the Columbia River. The traps are found in the Columbia River and in the other waters of the State of Washington and in Alaska.

To the objections of other fishermen the owners of wheels and traps retaliate by charging prejudice and self-interest, and with some justification. It is unquestioned that these costly forms of apparatus are beyond the financial means of the ordinary fishermen, that their use reduces the number of persons employed in the fisheries, and that the owners, who are usually the packers or others closely affiliated with them, can, if they so desire, render themselves largely independent of other fishermen, such as the gill netters and seiners, and thus keep down the cost of the fish to the packers. Although not often advanced publicly, this is the real basis of the most of the complaints. Publicly the objections are based upon higher grounds,

such as the waste through catching and killing in wheels and traps of enormous quantities of salmon which can not be handled in the limited time available, or of species which the packers have no use for, and which they find it easier or less expensive to kill by much handling than to release and in so doing lose a few salmon.

One thing should never be lost sight of, however. Fishery apparatus is set for the purpose of catching fish, and its value is dependent upon the degree of effectiveness with which it accomplishes the object sought with the least expenditure of money and time for construction and operation.

It is a question whether, under present conditions, if the use of traps were abolished, the other forms of apparatus would be able to keep pace with the demand for fish. But the question of whether traps should be allowed or not in any one section should be settled by reference solely to the conditions prevailing in that section, and not to theoretical or general objections to traps as traps or to objections based upon trap fishing in some other and, possibly, vastly different section. There are some regions on the Pacific coast where if traps were permitted they would soon destroy the run of salmon, while there are many other sections where they would not injure the fisheries at all, unless possibly by use in too great numbers. The latter is especially true in many parts of Alaska, where the chief objection is that in a few places too many of them are grouped together.

A considerable part of the objection to the use of traps is doubtless due to the generally shameless disregard of the laws in the past, and in some sections also to-day. In Alaska up to 1908 the trap owners paid practically no attention to the laws, and the same is true to a large extent to-day on Puget Sound, and to a lesser extent, possibly, in the Columbia River. Since the enactment and rigid enforcement of the excellent trap law of 1906 in Alaska, the objections to trap nets have decreased very noticeably, though the traps have probably caught more fish than they did under the old conditions, the only difference being that the catch has been distributed more equally, and not, as in former times, caught chiefly in those traps situated nearest to the ocean, while those in the upper reaches took but few.

The Washington law prescribes minutely the method to be followed in closing traps during the weekly closed season and appears on its face to be an excellent plan. In practice it is quite otherwise, however, for one person can close or open the trap in one or two minutes' time, and all the watchman has to do in the weekly closed season is to let the apron down whenever he sees a boat approaching, raising it again as soon as he is sure the visitor is not a fish warden. Thus it is practically impossible to detect any but the boldest or most careless violations of the law.

The provision in the Alaska fisheries law regulating the manner of closing traps during the weekly closed season is without question the best in the country, and Washington could adopt it with much profit. It requires that "the gate, mouth, or tunnel of all stationary or floating traps shall be closed, and 25 feet of the webbing or net of the 'heart' of such traps on each side next to the 'pot' shall be lifted or lowered in such manner as to permit the free passage of salmon and other fishes." With two men stationed on the trap at least 15 or 20 minutes of most strenuous work is required to open or close the trap in this manner, and the fishery agent has ample time to reach the scene before the operation is completed. This fact has been found to be an excellent deterrent.

At first the owners advanced the plea that the lowering of 25 feet of the web of the heart next to the pot would so weaken the trap that it might be carried away by the very strong and high tides which prevail in Alaska, but three years' actual trial has proved this fear to be groundless, and now no objections are heard to this feature of the law.

Although not used to as great an extent, wheels have probably occasioned more controversy than traps. While the traps are usually set in either bays, straits, and sounds, where the water is salt or brackish, or in the lower reaches of all the rivers, the wheels are set in the upper courses of the Columbia River only. After the fish have run the gauntlet of the almost countless gill nets, seines, and trap nets in the lower and middle river, and are approaching their spawning beds, they meet with the runways leading to the wheels, which in some instances are set in natural channels in the cascades or falls, or in artificial channels through which the greater part of the run must of necessity pass. Nearly all of the salmon hatcheries on the Columbia are located either on the main river below Cascade Locks, or on one of the tributaries entering the river below there, while above this point there were operated in 1909 17 stationary wheels and 5 scow wheels.

It may be maintained that a salmon which has successfully evaded the nets in the section of the river below Cascade Locks is of vastly more importance to the preservation and perpetuation of the fisheries than a number which have not yet crossed the bar at the mouth of the river. Thus, it has been argued, while wheels have not done anything like the damage to the fisheries ascribed to them, a regard for the perpetuation of the fisheries of the Columbia River demands that their use, as well as that of all other forms of apparatus for the taking of fish commercially, should be prohibited above Cascade Locks.

This brings up the question of the justice of such an arrangement from the standpoint of the owners of the wheels. When they put

in these wheels their use was lawful, and the same is true to-day. They are expensive apparatus, and many thousands of dollars are invested in them. In addition there is an important salmon cannery located at Seuferts, just above The Dalles, which would be absolutely worthless if the above action were taken. It would be no more than just, if the States of Oregon and Washington decided to abolish all commercial fishing above Cascade Locks, that a fair valuation for losses be fixed by arbitration and paid to those affected.

There is also no question but what too many gill nets and trap nets are now being fished in the lower part of the river, and some scheme ought to be devised by which the number of licenses annually granted can be reduced very materially.

Strict regulations of the forms of apparatus used in the salmon fisheries and the curtailment of certain or all forms when they become too numerous will be of greater efficacy in the perpetuation of the industry than any other method which has been so far recommended or tried except that of closed seasons.

#### LAWS AND THEIR ENFORCEMENT.

The history of the enactment and enforcement of laws relating to the salmon fisheries of the Pacific coast (except possibly California) is not one that those earnestly and sincerely desirous of preserving and perpetuating the fisheries have reason to be proud of. In the first place, it has been and is yet exceedingly difficult to secure efficient laws, owing to the influence of the selfish interests which have no regard to the future. In the second place, it was and is yet difficult to secure the enforcement of even the laws that are on the statute books. In most States a change in the governorship almost invariably entails a change in fish commissioner, who is often more concerned with pleasing the interests that secured his appointment and retain him in office than in giving the affairs of his department the attention that they require. This condition, not peculiar to the Pacific Coast States alone, doubtless will eventually be removed to a great extent by divorcing the fisheries departments from politics. The Pacific Coast States have had in the past and still have some earnest men who have been and are doing good work, and this number can easily be increased by making the positions permanent. Under present conditions a fish commissioner scarcely has a comprehensive grasp of the intricate problems of his department and begins to be of value to the State before a change of administration occurs and he is compelled to give way to another man, who in turn must be taught all that his predecessor had learned.

The worst condition of affairs in regard to the making and enforcement of fishery laws is found to prevail in those waters which form the boundary between States or between Canada and the United States.

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 closed 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 were 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 by any means for salmon 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.

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 has made earnest efforts to preserve this run, but unfortunately the same can not be said of the State of Washington. The laws are fairly good, but owing partly to the small force and facilities available for executing them and partly to other reasons, they have not always been enforced as they should be.

This 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 Mr. 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  $48^{\circ} 10'$  and  $49^{\circ} 20'$ :

#### 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 fishes, 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.

In Alaska previous to 1906 the conditions prevailing were very similar to those in Oregon and Washington, but in that year Congress enacted a comprehensive and excellent law regulating the fisheries, the enforcement of which was entrusted to the Bureau of Fisheries. The force of agents is still inadequate, although materially increased in 1911, and its facilities for covering the territory are very meager. Conditions approaching the ideal will not prevail until these defects have been remedied; but respect for the fishery laws in Alaska obtains very generally now as a result of their persistent enforcement during the past five years.

## VI. 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 Messrs. 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, Cal. 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 Mr. 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: <sup>a</sup>

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.

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<sup>a</sup> The first salmon cannery. By R. D. Hume. *Pacific Fisherman*, vol. II, no. 1, January, 1904, p. 19-21.

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 gage 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 under side, 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, 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 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 es-

tablishments 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 1,500 to 2,000 cases in one day, and there are a few which have even greater capacity.

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 & Company.

#### 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.

At a few places tracks have been run down to the low-water stage and the steamers, launches, and scows come alongside these, small cars being run down to meet them, and be filled by men pitching the fish from the boats, the cars when filled being run up into the cutting room and dumped upon the floor. At other places men armed with pews (single-tined forks) pitch the fish up to the wharf, where other men pitch them to the cutters.

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, so that in "blowing," after cooking, light-weight 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.

The majority of the 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 into the water under the cannery, 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 whisklike 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. Several have been invented and work more or less satisfactorily. The one 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.

## 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. But few of the larger tail pieces are canned, the rest being thrown away, this forming a con-

siderable part of the tremendous annual waste of the salmon canneries. 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 in a few canneries, 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 under side 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 table top, when the salt drops through into the cans. This operation can be repeated four or five times in a minute.

#### FILLING THE CANS.

Most canneries now use filling machines, 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 the cans roll upon a long table and are picked up by a man stationed here, who strikes each one upon a square piece of lead set in the table, in order to settle the contents down into the can and for the purpose of detecting any deficiency in weight. If not quite full the cans are pushed to the other side of the table, where a man adds 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 an ounce. Occasionally a can is weighed in order to see that the machine is in perfect adjustment.

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 into the cans large pieces at first and then smaller pieces to occupy the vacant spaces.

#### WASHING THE CANS.

The cans are put upon an endless belt by a workman and pass from the filling-machine table to the washing machine. This is a rotating apparatus, consisting of an iron framework holding 10 rests or stands on which the cans sit. Immediately overhead are small perpendicular shafts with an iron cap, the diameter of a can, fixed to the end of each. Each can as it reaches the machine is caught by one of the washers and the cap brought down over the top, a tight-fitting flange preventing water from getting inside. Revolving rapidly as it goes, with a stream of water against it of sufficient force to remove the dirt and grease, the can is carried until the machine has revolved 180 degrees, when it is released and passes out on a belt. A more modern method is to use jets of steam for washing, while one of the latest devices is to clean the cans by a cold-air blast which strikes directly on the top edge. A set of brushes against which the cans revolve is used in a few canneries.

After being washed the cans continue on an endless belt and pass two children whose duty is to put a small piece of scrap tin on the top of each. These pieces are called "chips," are from 1½

to 2 inches, and are scraps from the sheet tin used in making the tops of the cans. The shape is of no particular importance so long as the pieces are long enough to cover the hole in the top of the can, or the cap as it is called.

#### CAPPING.

The endless belt delivers the can to the capping or topping machine. On reaching this the can passes under a cap holding a top, the latter being fed in through a separate aperture, and the cap immediately falls with just sufficient force to put the top on the can without injuring either. The can is then forced out from under the capper by the rotation of the machine, and the next capper is brought around to receive another can. As the cans revolve they are carried under a crimper, situated directly opposite the capper, which presses the edge firmly around the body. While one can is being topped another is being crimped, after which it rolls out upon a belt on its side, and is taken through the acid trough. Before the tops are sealed the edges must be treated with a solution of muriatic acid, which is in a glass receptacle and is applied as the cans are rolled through the acid trough on the endless belt.

#### SOLDERING.

For many years the tops and also all other parts of a can were soldered by hand, a long, tedious, and expensive process, which eventually gave way to the soldering machine. This is composed of an endless chain about 6 feet long, revolving around two shafts at either end of an iron trough. In the bottom of the trough is the solder, which is kept at molten heat by a row of oil blast jets underneath. Between the lower part of the chain and trough is just enough room for a can to pass without jamming, and they are forced along the trough by a chain in contact with their sides. They enter the trough at an angle, their bottoms slightly inclined, which causes the top rim to be submerged in solder, thus distributing it evenly all around the edge.

In passing through the trough the cans make about half a dozen revolutions, which cause the tops to become very hot, and it is to prevent them from being blown off by the pressure of the steam which quickly generates that the center hole in the top is made. The "chip" previously mentioned prevents the hole from being choked with salmon.

A soldering machine having, instead of the endless chain to give motion to the cans, a metal spiral running the length of the machine and revolving on an axle through the center, is used in some canneries. Each loop grasps a can and follows it to the end, thus giving the cans the proper motion and preventing them from rolling

side by side and lapping the solder over the ends, as is frequently the case with the chain machines.

A few canneries use a revolving cooler, which has a disk upon which the cans rest. This disk is filled with running water, and after it makes two revolutions the cans are forced into an inclined trough under a stream of water. The usual method, however, is for the cans on leaving the soldering machine to pass under several jets of water to set the solder and at the end of the belt to be transferred by workmen to coolers or crates, which are made of flat strap iron, square shaped, and hold about 96 cans. The crate having been filled, it is placed upon a square truck and rolled aside, where the vent holes are stopped with a drop of solder.

#### TESTING.

The testing tank is a square wooden tank filled with water heated almost to the boiling point by steam pipes arranged in a coil at the bottom. The crates are hoisted into the test tank by a block and tackle attached to an overhead track, which permits the coolers to be swung to any place desired.

This test is for the purpose of detecting leaks due to imperfect soldering and is conducted by two workmen skilled in this operation. The slightest leak is detected by the appearance of small bubbles issuing from the cans. The spots where the bubbles appear are marked with a small iron tool held in the hand, and the cans are taken out and placed in small wooden trays, in which they are carried to the bench men, whose duty it is to mend them. Cans that have been mended are again tested as before. The bench men are located in front of a long bench on which are numerous fire pots, supplied with oil and air led through small tubes, in which the soldering irons are kept heated, the heat and air being regulated by connecting valves. Kerosene oil and gasoline are the fuels generally used now.

#### COOKING.

The salmon are invariably cooked in rectangular retorts which rest in a bed and have a track running the long way. In front of each is a turntable for the purpose of receiving trucks coming from any direction. Four trucks each holding 6 crates of cans, piled one upon another, are run into the retort, which is then closed and steam turned on, entering at the bottom. The amount of pressure is from 6 to 12 pounds, the heat 250° F. In most establishments the first cooking is continued about 60 minutes.

After the first cooking the crates are taken out and placed on a long table called a "venting table," where the cans are pricked with a wooden-headed hammer fitted with a small brad, to allow the steam

and superfluous water to escape. After the venting has been done the holes are soldered up, the crates again loaded on a truck and rolled into the second retort, where they are subjected to the same pressure of steam and heat as in the first cooking and for a period of about 60 minutes.

In some canneries the retorts for first cooking are made of heavy plank, well bolted to resist the steam pressure.

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.

For many years cannery men believed that the double cooking of salmon was absolutely necessary, but in 1898 Mr. 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.

#### SANITARY, OR SOLDERLESS, CANS.

A recent improvement in the canning business, and one which accomplishes the same purpose as the single cooking in retorts, is that of "sanitary cans," so called. In order to use these cans a quite radical, but economical, change in machinery is necessary. As the cans leave the filling machine they pass into a steam exhauster, consisting 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 topper and crimper, the whole operation occupying five minutes' time. 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. 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 in general use.

The topper and crimper is a circular machine with six rests for the cans. The first work performed by the machine is to "true up" the upper edge of the can, which is done by a plunger that presses the upper flange of the can upon a shoulder. In the meantime the top, which is coated around the outer edge with cement, has been automatically fed into the machine, is now clamped on the can, and by another operation is crimped on tight. The cans then leave the machine on an endless conveyer and pass to the men who transfer them to the coolers, and these are immediately placed upon the trucks and run into the retort for the one cooking they are to receive. The time they are to remain here is somewhat variable, 70 to 125 minutes with a temperature of 242° F. being the common period.

By the use of these cans the soldering machine, and in fact all use of solder and acid, is done away with, a distinct sanitary improvement, for sometimes the substances would get into the can and cause a deleterious chemical change in the contents. It also does away with the first cooking and the subsequent venting and soldering, a saving both in labor and time consumed.

#### REPAIRING CANS.

Imperfect cans which are repaired before the first cooking are naturally in the same condition as if there had been no defects. If the leaks are discovered after cooking and are repaired at once and the contents recooked, they are still very good, the only difficulty being that by blowing or venting them a second time they lose weight. The above goods usually go in with the regular pack of their kind and are not classed as regular "do-overs."

When, however, a cannery is running at full capacity, defective cans can not always be repaired and recooked at once and are sometimes set aside for days. Decomposition follows, of course, as with any other meat that is exposed to the air, and the fish becomes unfit for food. When recooked the meat becomes mushy and the blowing or venting makes the cans very light, a defect which is frequently corrected by adding salt water. This, the "do-over," is the lowest class of goods. In the old days, and even yet to some extent, such cans are sold without labels to brokers, or else are given some indefinite label, perhaps with the name of some fictitious cannery, and sold in the lumber, mining, or negro districts, or shipped to foreign countries with less fastidious tastes in the matter of salmon. In 1910 one of the leading companies of Alaska adopted the policy of throwing overboard all "do-overs."

On coming from the second retort the crates 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, and 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.

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 invariably found in this one.

#### LACQUERING.

An almost universal 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 benzine 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 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.

#### 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

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.

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. None 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.

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 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.

## 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. Messrs. J. O. Hanthorn, M. J. Kinney, and J. W. Cook were persuaded to prepare some, and the plant of the Northwest Cold Storage Company, 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 Brothers, 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 Company and S. Schmidt & Sons putting up plants at Warrenton and Astoria, respectively.

In 1900 the Trescott Packing Company 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. Ellmore & Company started the industry in 1902 at Tillamook, and the business began on Puget Sound in 1901, when the San Juan Fishing & Packing Company and the Seattle Fish Company took it up.

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.

In mild curing the fish are split down the middle, the head, tail, and all fins except the pectorals removed, and the backbone cut out. The fish is then in two halves. Each of these halves, or sections, is then scored on the outside eight or nine times with the knife. They are then thrown into a cleaning vat, and here the inner side of each section is carefully scraped clear of blood and membrane with a knife, while the outside is thoroughly cleaned with a scrubbing brush. The sections are then laid carefully inner side up in another vat partly filled with clear, cold, running water, or into a tierce partly filled with fresh water and cracked ice, in which they remain for an hour. Formerly the fish were put into brine, but it has been found that ice water answers the purpose much better. After being thoroughly cooled, the sections are salted down in the tierces, each one being laid with its tail toward the center. Usually about 50 whole fish are required to fill a tierce. The fish are but lightly salted, and owing to this fact must be kept in cold storage until used.

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, dog, and humpback salmon, but he found so much difficulty in disposing of the product that he abandoned further efforts in this line.

The principal consumers of the mild-cured salmon are the smokers, who take them from the tierce, wash 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 shipments every year.

#### 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 of the increasing popularity of mild-cured salmon. All species of salmon are pickled, but the most popular is the red salmon.

In dressing salmon for pickling the heads are removed, the fish split along the belly, 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 salt to every 100 pounds of fish. The fish remain here about one week, when they are 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 dog 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.

#### DRY SALTING.

During the progress of the Russian-Japanese War the preparation of dry-salted dog 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 them the salmon are taken out of the barrel and soaked until as much as possible of the salt is removed. They are then put into the smokehouses 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 (alderwood 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.

A variation of the smoking process is known as "kippering." With this method the salmon are dried in a hot fire for about 20 hours and then smoked over another hot fire for about 24 hours. The "buckling" process is also similar to this.

Dog and king salmon are often cut into steaks and kippered. As the sale of white-meated king salmon is somewhat hampered by the whiteness, the smokers use a coloring preparation, known in the trade as Zanzibar carmine. This gives the outside of the fish a deep-colored red gloss, but leaves the inside its natural white color. The steaks are wrapped in paper and packed in baskets holding 10 pounds each.

A smoked product known locally as "beleke," is put up at Kodiak, Alaska, from red and coho salmon. 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 1 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, and the venture was so successful that the next year nearly all of the wholesale dealers on the Sound took up the business. In Alaska the preparing of frozen salmon began in 1902. The San Juan Fishing & Packing Company, soon to be succeeded by the Pacific Cold Storage Company, put up a cannery and cold-storage plant at Taku Harbor, in southeast Alaska, in 1901, though it did not operate the cold-storage portion until 1902. This is the only plant which has operated in Alaska, although the New England Fish Company erected in 1909 a large plant at Ketchikan for the freezing of halibut primarily, but will probably freeze salmon also.

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 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 dog, 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.

One of the most modern plants on the coast—that of the New England Fish Company, at Ketchikan, Alaska—has four freezers, each 25 feet by 10 feet 6 inches, 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 1½-inch pipe per cubic foot of freezing space. The bunkers in the freezers are in pairs, each nine pipes wide, spaced 10 inches apart. This leaves a 3½-foot passage through the center of each freezer opposite the 3½ by 6½ foot swing doors. The salmon are laid on pans, 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 the cold-storage cars and shipped.

#### 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.

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.

Every year immense quantities of salmon roe are thrown away in the fisheries of the west coast, though there is but little doubt that, if properly prepared, a market could 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, if not better, owing to its oiliness and attractive color, than the regular "rogue." 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 several Alaska firms are preparing to put it up in 1912. It should be prepared in the same manner as caviar.

Several establishments are putting up these eggs in jars and hermetically sealed cans for use as bait in sport fishing.

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.

#### OIL AND FERTILIZER.

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, but for some reason the industry has languished almost from the start.

In 1882 the Alaska Oil & Guano Company established a fertilizer plant at Killisnoo, Alaska, for the extraction of oil and fertilizer from herring, and has operated the plant 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.

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 most 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 here thrown overboard. This procedure, not only exceedingly wasteful, is also far from beneficial to the waters where deposited.

The great desideratum in the salmon fisheries of the Pacific coast at the present time is the invention of a small odorless-fertilizer plant, costing not more than \$2,500 or \$3,000, which can be installed at the various salmon canneries and salteries. The offal from the cannery could there be utilized and the product obtained would doubtless net a fair return on such an investment, while at the same time the present (in the aggregate) enormous waste would be stopped, and the waters adjacent to the canneries rendered far more agreeable to the fishes as well as to the people on shore. It is absolutely essential that the plant shall be odorless, as the smell of the ordinary fertilizer establishment would be very offensive to persons visiting the cannery and would not enhance the demand for canned salmon. At the present time the cheapest plant available costs about \$10,000, and very few canneries can afford to invest this sum of money in the disposal of their own offal alone.

## VII. STATISTICS OF THE PACIFIC SALMON INDUSTRY IN 1909.

This is the first report in which detailed statistics of the salmon fisheries of Washington, Oregon, California, and Alaska have been shown for the same year. Partial statistics of British Columbia and Yukon Territory of the Dominion of Canada are also included.

### PERSONS EMPLOYED.

The large army of 28,945 men, women, and children were employed in the salmon fisheries of Alaska and the three coast States. Alaska leads with 11,433, followed by Washington, Oregon, and California in the order named. Over two-thirds of the grand total is made up of whites. The Chinese and Japanese have almost the same number, while 2,803 Indians were employed.

### PERSONS ENGAGED IN THE SALMON FISHERIES OF THE PACIFIC COAST STATES AND ALASKA IN 1909.

Occupation and race.	Alaska.	Washing- ton.	Oregon.	Califor- nia.	Total.
<b>Fishermen:</b>					
Whites.....	2,486	4,426	4,179	2,114	13,205
Indians.....	1,176	221			1,397
Chinese.....				15	15
Japanese.....	13			168	181
Total.....	3,675	4,647	4,179	2,297	14,798
<b>Shoresmen:</b>					
Whites.....	1,911	2,091	404	276	4,682
Indians.....	1,246	115		15	1,376
Chinese.....	1,992	1,270	411		3,673
Japanese.....	2,136	1,102	256	5	3,499
Total.....	7,285	4,578	1,071	296	13,230
<b>Transporters:</b>					
Whites.....	443	292	70	82	887
Indians.....	30				30
Total.....	473	292	70	82	917
<b>Total:</b>					
Whites.....	4,840	6,809	4,653	2,472	18,774
Indians.....	2,452	336		15	2,803
Chinese.....	1,992	1,270	411	15	3,688
Japanese.....	2,149	1,102	256	173	3,680
Grand total.....	11,433	9,517	5,320	2,675	28,945

### INVESTMENT.

The total investment in the salmon fisheries was \$25,157,813, of which Alaska furnishes more than one-half. Gill nets are the principal form of apparatus in use, followed by stationary traps, or pounds, diver nets, haul seines, purse seines, etc.

## INVESTMENT IN THE SALMON FISHERIES OF THE PACIFIC COAST STATES AND ALASKA IN 1909.

Items.	Alaska.		Washington.		Oregon.	
	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:						
Power vessels.....	133	\$1,067,944	93	\$440,500	30	\$119,900
Tonnage.....	5,891		1,158		288	
Outfit.....		266,986		135,625		25,350
Sailing vessels.....	43	1,085,400				
Tonnage.....	59,761					
Outfit.....		108,540				
Power boats.....	17	24,840	5	3,950	15	28,900
Fishing boats, power.....	60	30,000	464	472,650	287	139,600
Fishing boats, sail and row.....	1,821	211,671	2,244	128,945	1,890	224,545
Scows and house boats.....	310	171,005	398	168,673	114	45,050
Pile drivers.....	43	90,555	62	124,350	2	1,800
Apparatus, shore fisheries:						
Purse seines.....	98	27,188	101	44,150		
Haul seines.....	94	27,731	246	28,955	48	16,280
Gill nets, drift.....	1,209	111,756	1,620	168,831	2,818	523,331
Gill nets, set.....			1,624	37,259	1,122	27,614
Diver nets.....			48	10,100	418	22,375
Traps, stationary.....	73	130,794	525	1,324,968	21	25,750
Traps, floating.....	15	21,250	1	2,000		
Reef nets.....			9	4,500		
Wheels, stationary.....			13	76,000	26	313,000
Wheels, scow.....			3	8,500	9	22,000
Spears.....	20	30				
Lines, trolling.....		523		261		
Lines, hand.....						
Shore and accessory property.....		5,601,259		1,730,030		1,554,750
Cash capital.....		4,970,799		1,424,500		551,500
Total.....		13,948,271		6,334,807		3,641,775

Items.	California.		Total.	
	Number.	Value.	Number.	Value.
Transporting vessels:				
Power vessels.....	4	\$37,748	260	\$1,666,092
Tonnage.....	56		7,393	
Outfit.....		3,920		431,881
Sailing vessels.....			43	1,085,400
Tonnage.....			59,761	
Outfit.....				108,540
Power boats.....	41	63,300	78	120,990
Fishing boats, power.....	171	91,050	982	733,300
Fishing boats, sail and row.....	1,158	128,245	7,113	693,406
Scows and house boats.....	50	13,925	872	398,653
Pile drivers.....			107	216,705
Apparatus, shore fisheries:				
Purse seines.....			a 199	71,338
Haul seines.....	47	5,650	b 435	78,616
Gill nets, drift.....	1,086	167,570	c 6,733	971,488
Gill nets, set.....			d 2,746	64,873
Diver nets.....			e 466	32,535
Traps, stationary.....			619	1,181,512
Traps, floating.....			16	23,250
Reef nets.....			9	4,500
Wheels, stationary.....			39	389,000
Wheels, scow.....			12	30,500
Spears.....			20	30
Lines, trolling.....		1,149		1,933
Lines, hand.....			10	10
Shore and accessory property.....		497,393		9,383,462
Cash capital.....		223,000		7,169,799
Total.....		1,232,960		25,157,813

a Aggregate length of 104,570 yards.

b Aggregate length of 111,558 yards.

c Aggregate length of 2,356,847 yards.

d Aggregate length of 151,655 yards.

e Aggregate length of 65,800 yards.

## PRODUCTS.

The total products amount to 365,336,482 pounds, which returned the fishermen \$7,224,024. Bluebacks, sockeyes, or red salmon were most numerous in Alaska and Washington, chinooks in California, coho or silver, dog or chum, and steelhead trout in Washington, while humpbacks were taken commercially in Alaska and Washington alone, being especially numerous in Alaska.

PRODUCTS OF THE SALMON FISHERIES OF ALASKA AND THE PACIFIC COAST STATES  
IN 1909.

Species.	Alaska.		Washington.		Oregon.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Blueback, sockeye or red.....	116,014,486	\$1,029,079	77,280,989	\$2,835,666	\$44,324	\$34,703
Chinook, king or spring.....	8,959,544	151,984	11,016,476	604,906	13,952,814	736,456
Coho, silver or white.....	3,526,404	41,233	21,328,466	554,157	5,184,520	127,204
Dog or chum.....	9,456,048	15,583	25,520,426	164,300	699,348	3,818
Humpback or pink.....	37,965,928	95,065	17,495,586	46,187		
Steelhead trout.....	11,650	400	2,427,251	130,486	1,510,285	66,802
Total.....	175,934,060	1,333,344	155,069,194	4,335,702	22,191,291	968,983

Species.	California.		Total.	
	Pounds.	Value.	Pounds.	Value.
Blueback, sockeye or red.....	21,000	\$689	194,160,799	\$3,900,137
Chinook, king or spring.....	11,902,248	580,094	45,891,082	2,073,440
Coho, silver or white.....	145,500	4,575	30,184,890	727,169
Dog or chum.....	4,200	84	35,680,022	183,785
Humpback or pink.....			55,461,514	141,252
Steelhead trout.....	8,989	553	3,958,175	198,241
Total.....	12,141,937	585,995	365,336,482	7,224,024

NOTE.—In addition to the above, British Columbia produced 89,852,089 pounds, which returned the fishermen \$1,832,573, and the Yukon Territory (Yukon River), 80,565 pounds, which returned the white fishermen \$10,209.

## PRODUCTS CANNED.

In order to show the total pack of the Pacific coast of the North American Continent, the pack of British Columbia has been included. The total pack reduced to a common basis of forty-eight 1-pound cans amounted to 5,392,306½ cases, valued at \$25,518,669. Alaska leads in the total pack, with Washington second. Alaska also leads in the pack of sockeyes, humpbacks, and chums. Washington leads in the pack of cohoes and Oregon in the pack of chinooks and steelhead trout.

## SALMON CANNED IN ALASKA, BRITISH COLUMBIA, WASHINGTON, OREGON, AND CALIFORNIA IN 1909.

Products.	Alaska.		British Columbia.		Washington.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
<b>Chinook, king, or spring:</b>						
½-pound flat.....			360	\$1,440	23,550	\$98,750
1-pound flat.....			1,214	7,314	40,730	208,849
1-pound flat exports.....					606	4,242
½-pound tall.....			176	516		
1-pound tall.....	48,034	\$207,624	17,613	94,110	21,426	116,593
½-pound oval.....						
1-pound oval.....			444	2,886	1,110	10,212
2-pound nominal.....						
Total.....	48,034	207,624	19,807	106,266	87,422	498,676
<b>Coho, silver, or silverside:</b>						
½-pound flat.....			2,132	5,969	34,292	94,417
1-pound flat.....	1,206	5,543	5,911	28,373	28,885	134,755
1-pound tall.....	55,350	225,486	61,520	258,400	137,008	570,030
2-pound nominal.....					427	2,562
Total.....	56,556	231,029	69,563	292,742	200,612	801,764
<b>Chum, or dog:</b>						
½-pound flat.....					1,300	1,950
1-pound flat.....					219	591
1-pound tall.....	120,712	274,110	16,573	39,775	83,664	197,932
Total.....	120,712	274,110	16,573	39,775	85,183	200,473
<b>Humpback, or pink:</b>						
1-pound flat.....			2,267	6,234	2,030	5,585
1-pound tall.....	464,873	1,114,839	27,722	66,581	368,963	896,757
Total.....	464,873	1,114,839	29,989	72,815	370,993	902,342
<b>Sockeye, blueback, or red:</b>						
½-pound flat.....	16,385	63,888	483,760	1,935,040	229,502	927,967
1-pound flat.....	85,193	236,609	314,706	1,888,236	456,712	2,746,667
½-pound tall.....			12,880	42,504		
1-pound tall.....	1,611,916	7,310,053	277,893	1,500,623	487,479	2,558,993
½-pound oval.....			17,650	75,013		
1-pound oval.....			106	2,639		
1-pound squats.....			8,312	49,872		
Total.....	1,713,494	7,610,550	1,115,607	5,493,927	1,173,693	6,233,627
<b>Steelhead trout:</b>						
½-pound flat.....					945	2,937
1-pound flat.....					3,794	19,422
1-pound tall.....					3,897	22,602
Total.....					8,636	44,961
Grand total.....	2,403,669	9,438,152	1,251,539	6,005,525	1,926,539	8,681,843

## SALMON CANNED IN ALASKA, BRITISH COLUMBIA, WASHINGTON, OREGON, AND CALIFORNIA IN 1909—Continued.

Products.	Oregon.		California.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
<b>Chinook, king, or spring:</b>						
½-pound flat.....	69,557	\$289,534			93,467	\$389,754
1-pound flat.....	54,591	396,809	5,663	\$28,315	102,198	701,287
1-pound flat exports.....					606	4,242
1-pound tall.....					176	516
1-pound tall.....	23,057	148,815			110,130	567,142
1-pound oval.....	534	2,670			534	2,670
1-pound oval.....	848	8,242			2,402	21,340
2-pound nominal.....	458	1,833			458	1,833
Total.....	149,045	847,903	5,663	28,315	309,971	1,688,784
<b>Coho, silver, or silverside:</b>						
½-pound flat.....	20,331	56,928			56,755	157,314
1-pound flat.....	11,755	51,702			47,757	220,373
1-pound tall.....	39,326	157,886			293,204	1,211,802
2-pound nominal.....	315	945			742	3,507
Total.....	71,727	267,461			398,458	1,592,996
<b>Chum, or dog:</b>						
½-pound flat.....					1,300	1,950
1-pound flat.....					219	591
1-pound tall.....	9,225	21,218			230,174	533,035
Total.....	9,225	21,218			231,693	535,576
<b>Humpback, or pink:</b>						
1-pound flat.....					4,297	11,819
1-pound tall.....	55	132			861,613	2,078,309
Total.....	55	132			865,910	2,090,128
<b>Sockeye, blueback, or red:</b>						
½-pound flat.....	32,071	133,095			761,718	3,059,990
1-pound flat.....	6,645	39,870			863,256	4,911,382
1-pound tall.....					12,880	42,504
1-pound tall.....					2,377,338	11,369,989
1-pound oval.....	50	320			17,650	75,013
1-pound oval.....					406	2,639
1-pound squats.....					8,312	49,872
Total.....	38,766	173,285			4,041,560	19,511,389
<b>Steelhead trout:</b>						
½-pound flat.....	7,064	22,084			8,009	25,021
1-pound flat.....	1,365	7,695			5,159	27,117
1-pound tall.....	4,320	25,056			8,217	47,658
Total.....	12,749	54,835			21,385	99,796
Grand total.....	281,567	1,364,834	5,663	28,315	5,868,977	25,518,669

<sup>a</sup> All 1-pound cases contain forty-eight 1-pound cans; the ½-pound cases contain forty-eight ½-pound cans. Reduced to a common basis of cases containing forty-eight 1-pound cans, the aggregate pack amounts to 5,392,306½ cases.

## MISCELLANEOUS PRODUCTS.

The total miscellaneous secondary products prepared amounted to 29,808,129 pounds, valued at \$2,096,030. Of these the largest quantity and value is represented in the mild-cured pack. The pickled pack is second in quantity but is exceeded in value by the frozen pack. Alaska leads Washington very slightly in the quantity of products prepared, but both are exceeded in value of products by Oregon.

## MISCELLANEOUS SECONDARY PRODUCTS PREPARED IN ALASKA AND THE PACIFIC COAST STATES IN 1909.

Products.	Alaska.		Washington.		Oregon.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Frozen:</b>						
Chinook, king, or spring.....			74,183	\$7,418	14,000	\$1,400
Coho, silver, or silverside.....	35,721	\$1,072	528,477	30,139	216,175	13,868
Dog, or chum.....	77,882	1,558	1,361,672	67,161		
Humpback, or pink.....			62,945	1,888		
Steelhead trout.....	9,450	473	504,165	46,615	1,446,685	144,658
Total.....	123,053	3,103	2,534,442	153,231	1,676,860	159,926
<b>Mild-cured:</b>						
Chinook, king, or spring.....	1,833,600	149,300	2,292,800	273,826	4,365,442	434,825
<b>Pickled:</b>						
Chinook, king, or spring.....	88,200	3,798	1,000	540	400	24
Chinook bellies.....	7,000	175	6,750	671		
Coho, silver, or silverside.....	63,600	2,485			2,600	130
Coho bellies.....	227,750	3,843				
Dog, or chum.....	7,000	190	50,000	175		
Humpback, or pink.....	311,400	9,405	1,615,000	48,450		
Humpback backs.....	11,200	224				
Humpback bellies.....	169,480	7,396	172,400	8,620		
Sockeye, blueback, or red.....	5,301,500	167,298				
Sockeye bellies.....	783,600	13,902				
Total.....	6,970,730	208,716	1,845,150	58,456	3,000	154
<b>Dry-salted and dried:</b>						
Chinook, king, or spring.....	800	45				
Coho, silver, or silverside, backs..	14,500	549				
Dog, or chum.....	71,600	1,038				
Humpback backs.....	51,500	545				
Sockeye, blueback, or red, backs..	83,000	2,302				
Total.....	221,400	4,479				
<b>Smoked:</b>						
Chinook, king, or spring.....			30,165	2,413	127,700	19,155
Chinook, white-meated, kippered.....			190,500	16,050		
Coho, silver, or silverside.....			30,000	1,800	20,000	2,000
Coho backs.....	4,000	400				
Dog, or chum.....	585	43	517,245	25,862		
Dog, kippered.....			5,000	500		
Humpback backs, kippered.....			100,000	5,000		
Sockeye, blueback, or red, backs..	40,300	2,780				
Total.....	44,885	3,223	\$72,910	51,625	147,700	21,155
Fertilizer.....	159,224	2,287	1,210,000	18,610		
Oil.....	120,113	3,216	380,648	14,161		
Grand total.....	9,473,005	374,324	9,135,950	569,909	6,193,002	616,060

## MISCELLANEOUS SECONDARY PRODUCTS PREPARED IN ALASKA AND THE PACIFIC COAST STATES IN 1909—Continued.

Products.	California.		Total.	
	Pounds.	Value.	Pounds.	Value.
<b>Frozen:</b>				
Chinook, king, or spring.....			88, 183	\$8, 818
Coho, silver, or silverside.....			780, 373	45, 089
Dog, or chum.....			1, 442, 554	68, 719
Humpback, or pink.....			62, 945	1, 888
Steelhead trout.....			1, 960, 300	191, 746
Total.....			4, 334, 355	316, 260
<b>Mild-cured:</b>				
Chinook, king, or spring.....	4, 887, 962	\$520, 468	13, 379, 804	1, 378, 419
<b>Pickled:</b>				
Chinook, king, or spring.....			89, 600	4, 362
Chinook bellies.....			13, 750	846
Coho, silver, or silverside.....			66, 200	2, 615
Coho bellies.....			227, 750	3, 843
Dog, or chum.....			57, 000	365
Humpback, or pink.....			1, 926, 400	57, 855
Humpback backs.....			11, 200	224
Humpback bellies.....			341, 880	16, 016
Sockeye, blueback, or red.....			5, 301, 500	167, 298
Sockeye bellies.....			783, 000	13, 902
Total.....			8, 818, 880	267, 326
<b>Dry-salted and dried:</b>				
Chinook, king, or spring.....			800	45
Coho, silver, or silverside backs.....			14, 500	549
Dog, or chum.....			71, 600	1, 038
Humpback backs.....			51, 500	545
Sockeye, blueback, or red, backs.....			83, 000	2, 302
Total.....			221, 400	4, 479
<b>Smoked:</b>				
Chinook, king, or spring.....	110, 550	14, 643	268, 415	36, 211
Chinook, white-meated, kippered.....			190, 500	16, 050
Coho, silver or silverside.....	7, 660	626	57, 660	4, 426
Coho backs.....			4, 000	400
Dog, or chum.....			517, 830	25, 905
Dog, kippered.....			5, 000	500
Humpback backs, kippered.....			100, 000	5, 000
Sockeye, blueback, or red, backs.....			40, 300	2, 780
Total.....	118, 210	15, 269	1, 183, 705	91, 272
Fertilizer.....			1, 369, 224	20, 897
Oil.....			a 500, 761	17, 377
Grand total.....	5, 006, 172	535, 737	29, 808, 129	2, 096, 030

a Represents 66,728 gallons.

## WASHINGTON.

Owing to the quadrennially heavy run of sockeye salmon and the biennial run of humpback salmon into Puget Sound occurring in 1909, the catch of both species of salmon was very heavy. The purse seiners made exceptionally heavy catches of sockeye salmon, while the traps had so many humpbacks in them that the greater part were turned out, it being impossible to find a market for them. In many places people were allowed to take away with them, free of charge, as many humpbacks as they wished.

In Grays Harbor the run of salmon was fairly good. On the Quinault River the Indians made very successful catches. Early in the season a meeting of the tribe was held, and it was decided that a

50-foot runway in the center of the stream should be kept clear of nets so as to allow the fish an opportunity to reach the spawning beds in the lake.

In Willapa Harbor the run was fair.

On the Columbia River the catch was not as large as in 1908, which was due partly to the shortening of the open fishing season.

## STATISTICS BY COUNTIES.

*Persons employed.*—The total number of persons employed was 9,517, of which the large majority were whites.

## PERSONS EMPLOYED IN THE SALMON FISHERIES OF WASHINGTON, BY COUNTIES AND NATIONALITIES, IN 1909.

Counties.	Fishermen.			Shoresmen.				
	Whites.	Indians.	Total.	Whites.	Chinese.	Japanese.	Indians.	Total.
Whatcom.....	643		643	1,056	631	488	55	2,230
San Juan.....	193	12	205	42	40	40		122
Skagit.....	303		303	569	290	414	40	1,313
Island.....	273		273	2				2
Snohomish.....	284		284	6				6
King.....	527		527	55				55
Pierce.....	276		276	12				12
Thurston.....	50		50					
Mason.....	67		67					
Kitsap.....	241		241					
Clallam.....	56	176	232	63	20	12		95
Jefferson.....	68		68	163	70	50	20	303
Chehalis.....	112	33	145	16	45	15		76
Pacific.....	616		616	18	40	20		78
Wahkiakum.....	533		533	80	134	63		277
Cowlitz.....	61		61	6				6
Clarke.....	13		13					
Skamania.....	82		82	2				2
Klickitat.....	28		28	1				1
Total.....	4,426	221	4,647	2,091	1,270	1,102	115	4,578

Counties.	Trans- porters.	Total employed.				Grand total.
		Whites.	Whites.	Chinese.	Japanese.	
Whatcom.....	129	1,828	631	488	55	3,002
San Juan.....	9	244	40	40	12	336
Skagit.....	75	947	290	414	40	1,691
Island.....		275				275
Snohomish.....		290				290
King.....	19	601				601
Pierce.....	2	290				290
Thurston.....		50				50
Mason.....		67				67
Kitsap.....		241				241
Clallam.....	6	125	20	12	176	333
Jefferson.....	12	243	70	50	20	383
Chehalis.....	3	131	45	15	33	224
Pacific.....	11	645	40	20		705
Wahkiakum.....	25	638	134	63		835
Cowlitz.....	1	68				68
Clarke.....		13				13
Skamania.....		84				84
Klickitat.....		29				29
Total.....	292	6,809	1,270	1,102	336	9,517

*Investment, apparatus, etc.*—The total investment in the fisheries amounted to \$6,334,807. Whatcom County has the largest investment, nearly one-third of the total.

INVESTMENT IN THE SALMON FISHERIES OF WASHINGTON, BY COUNTIES, IN 1909.

Items.	Whatcom.		San Juan.		Skagit.		Island.		Snohomish.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:										
Power vessels.....	36	\$192,500	3	\$15,500	18	\$108,900				
Tonnage.....	517		48		293					
Outfit.....		60,500		4,600		32,400				
Fishing boats, power....	40	59,850	8	21,250	43	37,250	22	\$13,900	26	\$16,400
Fishing boats, sail and row.....	247	8,210	73	3,190	207	7,410	85	3,210	203	6,380
Scows and house boats..	188	101,350	47	15,833	31	9,150	63	18,200	17	3,800
Pile drivers.....	13	61,000	5	23,600			2	9,000		
Apparatus, shore fisheries:										
Purse seines.....	9	3,900	7	2,550	4	1,500	1	500	4	1,000
Haul seines.....	9	1,100			17	1,285	27	2,010	20	3,005
Gill nets, drift.....	71	12,250	3	225	338	26,270	1	300	130	1,036
Gill nets, set.....	96	6,200	18	310	336	5,700	1	10	537	6,317
Trap nets, stationary	72	372,540	23	116,178	12	46,500	29	176,500	8	35,000
Reef nets.....	2	1,000	7	3,500						
Lines, trolling.....										15
Shore and accessory property.....		600,003		37,350		382,044		5,250		6,245
Cash capital.....		679,000		45,000		309,900				
Total.....		2,159,403		289,086		967,409		228,850		79,198

Items.	King.		Pierce.		Thurston.		Mason.		Kitsap.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:										
Power vessels.....	7	\$23,300	1	\$2,500						
Tonnage.....	56		5							
Outfit.....		11,400		800						
Power boats.....			1	200						
Fishing boats, power....	60	107,900	23	60,200	1	\$2,500	4	\$3,800	26	\$36,900
Fishing boats, sail and row.....	234	7,350	88	3,300	27	880	29	1,310	85	3,055
Scows and house boats..									6	850
Pile drivers.....									1	2,000
Apparatus, shore fisheries:										
Purse seines.....	37	18,500	22	8,500	2	1,000	1	500	12	5,700
Haul seines.....	52	4,650	25	1,950	8	600	13	1,025	36	2,930
Gill nets, drift.....	193	8,760	73	1,900	4	100	1	300	7	1,950
Gill nets, set.....	82	820	143	3,600	16	400	22	600	8	88
Trap nets, stationary									4	13,500
Shore and accessory property.....		166,800		15,375		200		300		850
Cash capital.....		60,000				5,000				
Total.....		409,480		103,325		5,680		7,835		67,823

## INVESTMENT IN THE SALMON FISHERIES OF WASHINGTON, BY COUNTIES, IN 1909—Continued.

Items.	Clallam.		Jefferson.		Chehalis.		Pacific.		Wahkiakum.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:										
Power vessels.....	3	\$12,000	4	\$29,000	1	\$3,000	6	\$16,700	13	\$36,100
Tonnage.....	27		50		8		48		101	
Outfit.....		4,000		6,100		500		4,315		10,660
Power boats.....	1	1,500					2	1,800	1	450
Fishing boats, power.....	2	1,600	5	2,200	5	2,500	88	46,800	72	43,500
Fishing boats, sail and row.....	212	9,580	29	940	115	8,350	317	22,820	191	38,735
Scows and house boats.....	2	1,000	16	5,050	1	400	9	3,300	16	8,990
Pile drivers.....			1	5,000	3	450	37	23,300		
Apparatus, shore fisheries:										
Purse seines.....							2	500		
Haul seines.....	8	900	11	800			2	350	11	5,500
Gill nets, drift.....	70	700	5	340	100	8,000	207	36,000	417	70,700
Gill nets, set.....	8	100	25	430	189	9,724	46	1,340	33	615
Trap nets, stationary.....			2	8,000	15	3,400	280	506,400	52	36,800
Trap nets, floating.....			1	2,000						
Lines, trolling.....		246								
Shore and accessory property.....		20,325		60,345		36,753		59,625		310,455
Cash capital.....		20,000		50,000		20,000		38,000		190,500
Total.....		71,951		170,205		93,077		761,250		753,005

Items.	Cowlitz.		Clarke.		Skamania.		Klickitat.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:										
Power vessels.....	1	\$1,000							93	\$440,500
Tonnage.....	5								1,158	
Outfit.....		350								135,625
Power boats.....									5	3,450
Fishing boats, power.....	28	11,700	1	\$400	10	\$4,000			404	472,650
Fishing boats, sail and row.....	29	1,200	12	360	46	1,945	15	\$720	2,244	128,945
Scows and house boats.....					2	750			398	168,673
Pile drivers.....									62	124,350
Apparatus, shore fisheries:										
Purse seines.....									a 101	44,150
Haul seines.....	1	150			4	1,500	2	1,200	b 246	28,955
Gill nets, drift.....									c 1,620	168,831
Gill nets, set.....	18	350	12	180	32	455	2	20	d 1,624	37,259
Diver nets.....	29	5,300	6	1,210	13	3,650			e 48	10,160
Trap nets, stationary.....	21	8,400			3	750	4	1,000	525	1,324,968
Trap nets, floating.....									1	2,000
Reef nets.....									9	4,500
Wheels, stationary.....					10	44,000	3	32,000	13	76,000
Wheels, scow.....					2	7,000	1	1,500	3	8,500
Lines, trolling.....										261
Shore and accessory property.....		21,800		10		5,075		1,225		1,730,030
Cash capital.....		8,000								1,424,500
Total.....		58,250		2,160		69,125		37,665		6,334,807

a Aggregate length of 68,900 yards.

b Aggregate length of 44,824 yards.

c Aggregate length of 429,115 yards.

d Aggregate length of 92,030 yards.

e Aggregate length of 19,200 yards.

*Products.*—The total catch amounted to 155,069,194 pounds, valued at \$4,335,702. Whatcom County leads in the catch. Sockeye salmon constitute about one-half of the total catch.

PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES, AND COUNTIES, IN 1909.

Apparatus and species.	Whatcom.		San Juan.		Skagit.		Island.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>PURSE SEINES.</b>								
Chinook, or king.....	37,568	\$1,514	24,094	\$840	12,000	\$540	2,000	\$100
Coho, or silver.....	346,000	8,880	280,008	7,000	200,000	5,000	42,000	1,050
Dog, or chum.....	496,000	2,480	280,000	1,400	160,000	800	112,000	560
Humpback, or pink.....			175,000	350	30,000	300		
Sockeye, or blueback.....	1,146,000	43,600	973,000	35,000	650,000	26,000	140,000	5,666
Steelhead trout.....					2,000	100	800	40
Total.....	2,025,568	56,474	1,732,102	44,590	1,054,000	32,740	296,800	7,416
<b>HAUL SEINES.</b>								
Chinook, or king.....					154,400	7,060		
Coho, or silver.....	21,000	630			110,000	2,750	560,000	16,800
Dog, or chum.....	39,000	195			590,000	2,950	1,280,000	7,710
Humpback, or pink.....	14,000	35			20,000	50		
Steelhead trout.....	7,000	350			2,428	121		
Total.....	81,000	1,210			876,828	12,931	1,840,000	24,510
<b>GILL NETS.</b>								
Chinook, or king.....	22,332	967	47,300	1,880	617,362	25,753		
Coho, or silver.....	1,122,000	29,200	79,200	1,980	602,376	20,873	1,500	45
Dog, or chum.....	70,000	350	4,800	24	673,838	3,573	3,000	30
Humpback, or pink.....					17,800	221		
Sockeye, or blueback.....	1,328,450	51,158	44,500	1,780	384,750	12,510	30,000	1,200
Steelhead trout.....					124,200	8,004		
Total.....	2,542,782	81,675	175,800	5,664	2,480,326	70,934	34,500	1,275
<b>REEF NETS.</b>								
Chinook, or king.....	5,000	250	40,000	2,000				
Coho, or silver.....	27,000	810	109,000	3,270				
Dog, or chum.....	6,000	50	90,000	450				
Sockeye, or blueback.....	75,000	3,000	290,000	11,600				
Total.....	113,000	4,110	529,000	17,320				
<b>TRAP NETS.</b>								
Chinook, or king.....	1,378,391	66,229	574,072	25,697	354,929	18,270	1,272,680	111,735
Coho, or silver.....	3,387,624	73,940	718,124	17,967	482,116	12,271	1,615,314	42,876
Dog, or chum.....	570,412	2,852	229,408	1,148	1,227,536	6,457	857,760	4,789
Humpback, or pink.....	8,440,850	21,102	4,205,320	11,585	1,613,188	4,179	2,381,428	5,954
Sockeye, or blueback.....	41,032,910	1,558,804	7,665,005	187,312	2,881,185	108,398	4,574,145	168,468
Steelhead trout.....			272	13	4,000	260	45,310	2,266
Total.....	54,810,187	1,722,927	13,392,201	243,722	6,562,954	149,835	10,746,637	336,088
<b>TOTAL.</b>								
Chinook, or king.....	1,443,291	68,960	685,466	30,417	1,138,691	51,623	1,274,680	111,835
Coho, or silver.....	4,903,624	113,460	1,180,332	30,217	1,454,492	40,894	2,218,814	60,771
Dog, or chum.....	1,181,412	5,927	604,208	3,022	2,631,374	13,780	2,252,760	13,089
Humpback, or pink.....	8,454,850	21,137	4,380,320	11,935	1,680,988	4,750	2,381,428	5,954
Blueback, or sockeye.....	43,582,300	1,656,562	8,972,505	235,692	3,915,935	146,908	4,744,145	175,334
Steelhead trout.....	7,000	350	272	13	132,628	8,485	46,110	2,306
Grand total.....	59,572,537	1,866,396	15,829,103	311,296	10,974,108	266,440	12,917,937	369,289

## PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES, AND COUNTIES, IN 1909—Continued.

Apparatus and species.	Snohomish.		King.		Pierce.		Thurston.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>PURSE SEINES.</b>								
Chinook, or king.....	8,000	\$400			82,285	\$4,400	1,250	\$50
Coho, or silver.....	159,998	4,400	766,000	\$21,175	513,340	13,833	54,396	1,510
Dog, or chum.....	350,000	1,700	1,640,000	14,500	2,482,000	12,410	570,000	3,600
Sockeye, or blueback.....	800,000	28,800	7,050,000	282,000	4,394,995	158,220	125,000	5,000
Steelhead trout.....			14,100	987	10,400	520	400	20
Total.....	1,317,998	35,300	9,470,100	318,662	7,483,020	189,383	751,046	10,180
<b>HAUL SEINES.</b>								
Chinook, or king.....			65,500	4,585	18,743	1,312		
Coho, or silver.....	155,250	3,125	364,000	11,000	462,000	13,000	60,000	2,000
Dog, or chum.....	399,000	1,995	808,000	10,100	1,293,060	8,750	340,000	6,800
Humpback, or pink.....	202,000	503						
Total.....	756,250	5,623	1,237,500	25,685	1,773,743	23,062	400,000	8,800
<b>GILL NETS.</b>								
Chinook, or king.....	337,900	12,164	49,500	3,960	30,000	2,400		
Coho, or silver.....	438,256	16,480	555,000	18,500	246,000	10,250	90,000	3,000
Dog, or chum.....	101,380	731	70,400	440	32,000	200	48,000	240
Humpback, or pink.....			42,000	525				
Sockeye, or blueback.....			335,500	13,420				
Steelhead trout.....	142,243	9,293	205,000	12,300	100,000	10,000	30,000	1,500
Total.....	1,019,779	38,668	1,257,400	49,145	408,000	22,850	168,000	4,740
<b>TRAP NETS.</b>								
Chinook, or king.....	385,150	16,716						
Coho, or silver.....	968,734	23,167						
Dog, or chum.....	843,200	4,000						
Humpback, or pink.....	354,060	1,383						
Steelhead trout.....	27,060	1,350						
Total.....	2,488,114	46,682						
<b>LINES.</b>								
Coho, or silver.....	281,250	7,500						
<b>TOTAL.</b>								
Chinook, or king.....	731,050	29,280	115,000	8,545	131,028	8,112	1,250	50
Coho, or silver.....	1,943,518	54,672	1,685,000	50,675	1,221,340	37,083	204,396	6,510
Dog, or chum.....	1,663,580	8,492	2,518,400	25,040	3,807,000	21,360	958,000	10,640
Humpback, or pink.....	556,000	1,886	42,000	525				
Blueback, or sockeye.....	800,000	28,800	7,385,500	295,420	4,394,995	158,220	125,000	5,000
Steelhead trout.....	169,243	10,643	219,100	13,287	110,400	10,520	30,400	1,520
Grand total.....	5,893,391	133,773	11,965,000	393,492	9,664,763	235,295	1,319,046	23,720

PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES,  
AND COUNTIES, IN 1909—Continued.

Apparatus and species.	Mason.		Kitsap.		Clallam.		Jefferson.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
PURSE SEINES.								
Chinook, or king.....			40,000	\$2,000				
Coho, or silver.....	108,000	\$2,700	613,990	15,350				
Dog, or chum.....	400,000	2,000	2,540,000	13,700				
Sockeye, or blueback.....	100,000	4,000	2,045,000	81,800				
Steelhead trout.....	600	42	4,900	245				
Total.....	608,600	8,742	5,243,890	113,095				
HAUL SEINES.								
Chinook, or king.....			12,000	600	31,000	\$1,550	21,000	\$1,050
Coho, or silver.....	437,998	11,480	378,000	9,990	110,000	3,300	122,000	3,760
Dog, or chum.....	756,000	4,370	1,129,000	8,970	39,000	330	227,600	2,488
Sockeye, or blueback.....							8,000	400
Steelhead trout.....	3,000	210	17,080	854	14,200	710	5,200	260
Total.....	1,196,998	16,060	1,536,080	20,414	194,200	5,890	383,800	7,958
GILL NETS.								
Chinook, or king.....					75,000	3,750	17,000	970
Coho, or silver.....	40,000	1,200	18,000	490	60,515	1,578	74,000	2,220
Dog, or chum.....	81,000	640	33,000	395	30,000	150	48,000	240
Sockeye, or blueback.....	25,000	1,000	154,000	6,140			24,500	980
Steelhead trout.....	4,000	240	2,300	115	33,055	1,653	7,000	350
Total.....	150,000	3,080	207,300	7,140	198,570	7,131	170,500	4,760
TRAP NETS.								
Chinook, or king.....			106,225	5,305			4,282	199
Coho, or silver.....			504,074	13,020			265,662	6,642
Dog, or chum.....			1,333,704	6,669			1,036,472	5,182
Steelhead trout.....							1,735	87
Total.....			1,944,003	24,994			1,308,151	12,110
LINES.								
Chinook, or king.....					110,880	4,800		
Coho, or silver.....					571,284	17,649		
Dog, or chum.....					4,000	20		
Total.....					686,164	22,469		
TOTAL.								
Chinook, or king.....			158,225	7,905	216,880	10,100	42,282	2,219
Coho, or silver.....	585,998	15,380	1,514,064	38,850	741,799	22,527	461,662	12,622
Dog, or chum.....	1,237,000	7,010	5,035,704	29,734	73,000	500	1,312,072	7,910
Blueback, or sockeye.....	125,000	5,000	2,199,000	87,940			32,500	1,380
Steelhead trout.....	7,000	492	24,280	1,214	47,255	2,363	13,935	697
Grand total.....	1,955,598	27,882	8,931,273	165,643	1,078,934	35,490	1,862,451	24,828

## PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES, AND COUNTIES, IN 1909—Continued.

Apparatus and species.	Chehalis.		Pacific.		Wahkiakum.		Cowlitz.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>PURSE SEINES.</b>								
Chinook, or king.....			8,919	\$535				
Coho, or silver.....			2,184	44				
Sockeye, or blueback.....			1,090	49				
Steelhead trout.....			4,742	190				
Total.....			16,935	\$818				
<b>HAUL SEINES.</b>								
Chinook, or king.....			11,500	345	312,616	\$18,957	50,000	\$3,000
Coho, or silver.....					42,417	848		
Sockeye, or blueback.....					19,722	888	12,000	600
Steelhead trout.....					112,221	5,411	28,000	1,400
Total.....			11,500	345	486,976	26,104	90,000	5,000
<b>GILL NETS.</b>								
Chinook, or king.....	571,586	\$15,840	813,978	47,253	1,100,511	66,031		
Coho, or silver.....	641,858	16,571	187,000	5,500	316,274	6,325		
Dog, or chum.....	306,256	1,889	57,800	432	400,224	2,354		
Sockeye, or blueback.....	638,000	23,200	4,500	203				
Steelhead trout.....	118,000	4,066	45,142	2,328	139,877	6,994	13,000	620
Total.....	2,275,706	61,566	1,108,420	55,716	1,956,886	81,704	13,000	620
<b>DIVER NETS.</b>								
Chinook, or king.....							172,667	10,820
Steelhead trout.....							76,533	3,827
Total.....							249,200	14,647
<b>TRAP NETS.</b>								
Chinook, or king.....	49,000	1,113	1,208,963	67,996	31,669	492	69,690	303
Coho, or silver.....	165,000	3,875	620,461	9,649	458,571	9,172	203,000	4,290
Dog, or chum.....	36,000	225	725,652	8,996	634,384	3,490	65,600	410
Sockeye, or blueback.....			113,195	5,093				
Steelhead trout.....			431,615	21,779	32,416	1,621	6,800	290
Total.....	250,000	5,213	3,099,886	113,513	1,157,040	14,775	345,090	5,293
<b>TOTAL.</b>								
Chinook, or king.....	620,586	16,953	2,043,360	116,129	1,444,796	85,480	292,357	14,123
Coho, or silver.....	806,858	20,446	809,645	15,193	817,262	16,345	203,000	4,290
Dog, or chum.....	342,256	2,114	783,452	9,428	1,034,608	5,844	65,600	410
Blueback, or sockeye.....	638,000	23,200	118,785	5,345	19,722	888	12,000	600
Steelhead trout.....	118,000	4,066	481,499	24,297	284,514	14,026	124,333	6,137
Grand total.....	2,525,706	66,779	4,236,741	170,392	3,600,902	122,583	607,290	25,560

PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES,  
AND COUNTIES, IN 1909—Continued.

Apparatus and species.	Clarke.		Skamania.		Klickitat.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
PURSE SEINES.								
Chinook, or king							216, 116	\$10, 379
Coho, or silver							3, 085, 916	80, 942
Dog, or chum							9, 030, 000	53, 150
Humpback, or pink							295, 000	650
Sockeye, or blueback							17, 425, 085	670, 135
Steelhead trout							37, 942	2, 144
Total							30, 000, 059	\$17, 400
HAUL SEINES.								
Chinook, or king			180, 000	\$12, 600			856, 759	51, 059
Coho, or silver					200, 000	\$6, 000	3, 022, 665	84, 683
Dog, or chum							6, 990, 600	54, 658
Humpback, or pink							236, 000	588
Sockeye, or blueback			24, 000	1, 200			63, 722	3, 088
Steelhead trout			18, 000	900	300, 480	15, 024	507, 609	25, 240
Total			222, 000	14, 700	500, 480	21, 024	11, 587, 355	219, 816
GILL NETS.								
Chinook, or king	3, 000	\$210	15, 944	1, 115	800	50	3, 702, 213	182, 343
Coho, or silver	8, 015	244	6, 216	186	1, 000	30	4, 547, 210	134, 672
Dog, or chum							1, 959, 698	11, 688
Humpback, or pink							59, 800	746
Sockeye, or blueback			2, 850	143			2, 972, 050	111, 734
Steelhead trout	9, 700	485	9, 150	458	600	36	983, 267	58, 442
Total	20, 715	939	34, 160	1, 902	2, 400	116	14, 224, 238	499, 625
DIVER NETS.								
Chinook, or king	14, 000	980	77, 614	5, 433			264, 281	17, 233
Coho, or silver			2, 000	60			2, 000	60
Steelhead trout	3, 000	150	3, 000	150			82, 533	4, 127
Total	17, 000	1, 130	82, 614	5, 643			348, 814	21, 420
REEF NETS.								
Chinook, or king							45, 090	2, 250
Coho, or silver							136, 000	4, 080
Dog, or chum							96, 000	500
Sockeye, or blueback							365, 000	14, 600
Total							642, 000	21, 430
TRAP NETS.								
Chinook, or king			4, 200	294	14, 600	1, 022	5, 453, 851	315, 371
Coho, or silver			3, 060	99	17, 600	528	9, 349, 310	217, 487
Dog, or chum							7, 530, 128	44, 284
Humpback, or pink							16, 994, 786	44, 203
Sockeye, or blueback			800	40	2, 250	128	56, 269, 490	2, 028, 243
Steelhead trout			3, 600	180	6, 600	366	559, 348	28, 212
Total			11, 600	604	41, 050	2, 044	96, 156, 913	2, 677, 800
WHEELS.								
Chinook, or king			261, 736	16, 039	105, 640	5, 432	367, 376	21, 471
Coho, or silver			18, 751	665	314, 080	6, 418	332, 831	7, 084
Sockeye, or blueback			173, 842	7, 358	11, 800	508	185, 642	7, 866
Steelhead trout			52, 552	2, 081	204, 000	10, 240	256, 552	12, 321
Total			506, 881	26, 144	635, 520	22, 598	1, 142, 401	48, 742
LINES.								
Chinook, or king							110, 880	4, 800
Coho, or silver							852, 534	25, 149
Dog, or chum							4, 000	20
Total							967, 414	29, 969

## PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES, AND COUNTIES, IN 1909—Continued.

Apparatus and species.	Clarke.		Skamania.		Klickitat.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
TOTAL.								
Chinook, or king.....	17,060	\$1,190	533,494	\$35,481	121,040	\$6,504	11,016,476	\$604,906
Coho, or silver.....	8,015	244	29,967	1,002	532,680	12,976	21,328,466	554,157
Dog, or clum.....							25,520,426	164,300
Humpback, or pink.....							17,495,586	46,187
Blueback, or sockeye.....			201,492	8,741	14,050	636	77,280,989	2,835,666
Steelhead trout.....	12,700	635	86,302	3,769	511,680	25,666	2,427,251	130,486
Grand total.....	37,715	2,069	857,255	48,993	1,179,450	45,782	155,069,194	4,335,702

## STATISTICS BY WATERS.

*Persons employed.*—Puget Sound leads in the number of persons employed in all branches of the industry, followed by Columbia River, Grays Harbor, and Willapa Harbor in the order named.

## PERSONS EMPLOYED IN THE SALMON FISHERIES OF WASHINGTON, BY WATERS AND NATIONALITIES, IN 1909.

Occupation and race.	Puget Sound.	Grays Harbor.	Willapa Harbor.	Columbia River.	Total.
<b>Fishermen:</b>					
Whites.....	2,981	112	130	1,203	4,426
Indians.....	188	33			221
Total.....	3,169	145	130	1,203	4,647
<b>Shoresmen:</b>					
Whites.....	1,968	16	10	97	2,091
Indians.....	115				115
Chinese.....	1,051	45	10	164	1,270
Japanese.....	1,004	15	10	73	1,102
Total.....	4,138	76	30	334	4,578
<b>Transporters:</b>					
Whites.....	252	3	4	33	292
<b>Total:</b>					
Whites.....	5,201	131	144	1,333	6,809
Indians.....	303	33			336
Chinese.....	1,051	45	10	164	1,270
Japanese.....	1,004	15	10	73	1,102
Grand total.....	7,559	224	164	1,570	9,517

*Investment, apparatus, etc.*—Puget Sound leads in the total investment. The principal forms of apparatus used in the waters of Washington are gill nets, haul and purse seines, traps, and wheels.

INVESTMENT IN THE SALMON FISHERIES OF WASHINGTON, BY WATERS, IN 1909.

Items.	Puget Sound.		Grays Harbor.		Willapa Har- bor.		Columbia River.		Total.	
	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.
Transporting vessels:										
Power vessels.....	72	\$383,700	1	\$3,000	2	\$8,500	18	\$45,300	93	\$440,500
Tonnage.....	996		8		19		135		1,158	
Outfit.....		119,860		500		2,190		13,075		135,625
Power boats.....	2	1,700					3	2,250	5	3,950
Fishing boats, power..	260	363,750	5	2,500	24	7,800	175	98,600	464	472,650
Fishing boats, sail and row.....	1,519	54,815	115	8,350	48	6,340	562	59,440	2,244	128,945
Scows and house boats.	370	155,233	1	400	8	2,800	19	10,240	398	168,673
Pile drivers.....	22	100,600	3	450	2	1,800	35	21,500	62	124,350
Apparatus, shore fish- eries:										
Purse seines.....	<i>a</i> 99	43,650					<i>b</i> 2	500	101	44,150
Haul seines.....	<i>c</i> 225	20,255			<i>d</i> 2	350	<i>e</i> 18	8,350	246	28,955
Gill nets, drift.....	<i>f</i> 896	54,131	<i>g</i> 100	8,000	<i>h</i> 80	5,600	<i>i</i> 544	101,100	1,620	168,831
Gill nets, set.....	<i>j</i> 1,292	24,575	<i>k</i> 189	9,724	<i>l</i> 12	360	<i>m</i> 131	2,600	1,624	37,259
Diver nets.....							<i>n</i> 48	10,160	48	10,160
Trap nets, station- ary.....	150	768,218	15	3,400	35	16,400	325	536,950	525	1,324,968
Trap nets, floating.	1	2,000							1	2,000
Reef nets.....	9	4,500							9	4,500
Wheels, stationary							13	76,000	13	76,000
Wheels, scow.....							3	8,500	3	8,500
Lines, trolling.....		261								261
Shore and accessory property.....		1,295,087		36,753		50,000		348,190		1,730,030
Cash capital.....		1,168,000		20,000		18,000		218,500		1,424,500
Total.....		4,500,335		93,077		120,140		1,561,255		6,334,807

*a* Aggregate length of 68,100 yards.

*b* Aggregate length of 800 yards.

*c* Aggregate length of 35,841 yards.

*d* Aggregate length of 300 yards.

*e* Aggregate length of 8,683 yards.

*f* Aggregate length of 112,915 yards.

*g* Aggregate length of 20,000 yards.

*h* Aggregate length of 28,000 yards.

*i* Aggregate length of 288,300 yards.

*j* Aggregate length of 57,980 yards.

*k* Aggregate length of 27,960 yards.

*l* Aggregate length of 720 yards.

*m* Aggregate length of 5,370 yards.

*n* Aggregate length of 19,200 yards.

*Products.*—The total catch amounted to 155,069,194 pounds, valued at \$4,335,702, of which Puget Sound produced 141,934,141 pounds, valued at \$3,853,544. Trap nets were the most effective. No humpbacks were taken commercially elsewhere than in Puget Sound, while no sockeyes or bluebacks were taken commercially in Willapa Harbor.

## PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES, AND WATERS, IN 1909.

Apparatus and species.	Puget Sound.		Grays Harbor.		Willapa Harbor.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>PURSE SEINES.</b>						
Chinook, or king.....	267,197	89,844				
Coho, or silver.....	3,083,732	80,898				
Dog, or chum.....	9,030,000	53,150				
Humpback, or pink.....	205,000	650				
Sockeye, or blueback.....	17,423,995	670,086				
Steelhead trout.....	33,200	1,954				
Total.....	29,983,124	816,582				
<b>HAUL SEINES.</b>						
Chinook, or king.....	302,643	16,157			11,500	\$345
Coho, or silver.....	2,780,248	77,865				
Dog, or chum.....	6,900,600	54,658				
Humpback, or pink.....	236,000	588				
Sockeye, or blueback.....	8,000	400				
Steelhead trout.....	48,908	2,905				
Total.....	10,276,399	152,143			11,500	345
<b>GILL NETS.</b>						
Chinook, or king.....	1,196,394	51,844	571,586	\$15,840	40,000	1,200
Coho, or silver.....	3,386,847	105,816	641,858	16,571	22,000	2,200
Dog, or chum.....	1,195,418	7,013	306,256	1,889	9,800	162
Humpback, or pink.....	59,800	746				
Sockeye, or blueback.....	2,326,700	88,188	638,000	23,200		
Steelhead trout.....	647,798	43,455	118,000	4,066	16,000	800
Total.....	8,812,957	297,062	2,275,700	61,566	87,800	4,362
<b>REEF NETS.</b>						
Chinook, or king.....	45,000	2,250				
Coho, or silver.....	136,000	4,080				
Dog, or chum.....	96,000	500				
Sockeye, or blueback.....	365,000	14,600				
Total.....	642,000	21,430				
<b>TRAP NETS.</b>						
Chinook, or king.....	4,075,729	214,151	49,000	1,113	187,799	6,890
Coho, or silver.....	7,881,678	189,883	165,000	3,875	262,271	2,485
Dog, or chum.....	6,068,492	31,163	36,000	225	643,332	8,482
Humpback, or pink.....	16,994,786	44,203				
Sockeye, or blueback.....	56,153,245	2,022,982				
Steelhead trout.....	78,317	3,976			170	7
Total.....	91,252,247	2,536,358	250,000	5,213	1,093,572	17,864
<b>LINES.</b>						
Chinook, or king.....	110,880	4,800				
Coho, or silver.....	52,534	25,149				
Dog, or chum.....	4,000	20				
Total.....	967,414	29,969				
<b>TOTAL.</b>						
Chinook, or king.....	5,937,843	329,046	620,586	16,953	239,299	8,435
Coho, or silver.....	18,121,039	483,661	806,858	20,446	284,271	4,685
Dog, or chum.....	23,294,510	146,504	342,256	2,114	653,132	8,644
Humpback, or pink.....	17,495,586	46,187				
Sockeye, or blueback.....	76,276,940	2,796,256	638,000	23,200		
Steelhead trout.....	808,223	51,890	118,000	4,066	16,170	807
Grand total.....	141,934,141	3,853,544	2,525,700	66,779	1,192,872	22,571

PRODUCTS OF THE SALMON FISHERIES OF WASHINGTON, BY APPARATUS, SPECIES,  
AND WATERS, IN 1909—Continued.

Apparatus and species.	Columbia River.		Total.	
	Pounds.	Value.	Pounds.	Value.
PURSE SEINES.				
Chinook, or king.....	8,919	\$535	216,116	\$10,379
Coho, or silver.....	2,184	44	3,085,916	80,942
Dog, or chum.....			9,030,000	53,150
Humpback, or pink.....			295,000	650
Sockeye, or blueback.....	1,090	49	17,425,085	670,135
Steelhead trout.....	4,742	190	37,942	2,144
Total.....	16,935	\$18	30,000,059	817,400
HAUL SEINES.				
Chinook, or king.....	542,616	34,557	856,759	51,059
Coho, or silver.....	242,417	6,848	3,022,665	84,683
Dog, or chum.....			6,900,000	54,658
Humpback, or pink.....			236,000	588
Sockeye, or blueback.....	55,722	2,088	63,722	3,088
Steelhead trout.....	458,701	22,735	507,609	25,240
Total.....	1,299,456	66,828	11,587,355	219,316
GILL NETS.				
Chinook, or king.....	1,894,233	113,459	3,702,213	182,343
Coho, or silver.....	496,505	10,085	4,547,210	134,672
Dog, or chum.....	448,224	2,624	1,959,698	11,688
Humpback, or pink.....			59,800	746
Sockeye, or blueback.....	7,350	346	2,972,050	111,734
Steelhead trout.....	201,469	10,121	983,267	58,442
Total.....	3,047,781	136,635	14,224,238	499,625
DIVER NETS.				
Chinook, or king.....	264,281	17,233	264,281	17,233
Coho, or silver.....	2,000	60	2,000	60
Steelhead trout.....	82,533	4,127	82,533	4,127
Total.....	348,814	21,420	348,814	21,420
REEF NETS.				
Chinook, or king.....			45,000	2,250
Coho, or silver.....			130,000	4,080
Dog, or chum.....			96,000	500
Sockeye, or blueback.....			365,000	14,600
Total.....			642,000	21,430
TRAP NETS.				
Chinook, or king.....	1,141,323	63,217	5,453,851	315,371
Coho, or silver.....	1,040,361	21,244	9,349,310	217,487
Dog, or chum.....	782,304	4,414	7,530,128	44,284
Humpback, or pink.....			16,994,786	44,203
Sockeye, or blueback.....	116,245	5,261	56,299,490	2,028,243
Steelhead trout.....	480,861	24,229	559,348	28,212
Total.....	3,561,094	118,365	96,156,913	2,677,800
WHEELS.				
Chinook, or king.....	367,376	21,471	367,376	21,471
Coho, or silver.....	332,831	7,084	332,831	7,084
Sockeye, or blueback.....	185,642	7,866	185,642	7,866
Steelhead trout.....	250,552	12,321	256,552	12,321
Total.....	1,142,401	48,742	1,142,401	48,742
LINES.				
Chinook, or king.....			110,880	4,800
Coho, or silver.....			852,534	25,149
Dog, or chum.....			4,000	20
Total.....			967,414	29,969
TOTAL.				
Chinook, or king.....	4,218,748	250,472	11,016,476	604,906
Coho, or silver.....	2,116,298	46,365	21,328,466	554,157
Dog, or chum.....	1,230,528	7,038	25,520,426	164,300
Humpback, or pink.....			17,495,586	46,187
Sockeye, or blueback.....	366,049	16,210	77,280,989	2,835,666
Steelhead trout.....	1,484,858	73,723	2,427,251	130,486
Grand total.....	9,416,481	392,808	155,069,194	4,335,702

*Products canned.*—Of the total pack of 1,926,539 cases, valued at \$8,681,843, 1,757,539 cases, valued at \$7,917,608, were packed on Puget Sound. One of the canneries operating on the Columbia River brought some sockeyes from Puget Sound, and the Puget Sound packers could have packed many more humpbacks than they did, but refrained from doing so because of the low prices prevailing at the time for canned humpbacks.

## PACK OF CANNED SALMON IN WASHINGTON IN 1909.

Products.	Puget Sound.		Grays Harbor.		Willapa Harbor.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
Chinook, or king, red:						
½-pound flat.....	655	\$2,620				
1-pound flat.....	8,278	49,668			197	\$837
1-pound flat exports.....						
1-pound tall.....	2,003	10,817	3,544	\$15,594	1,258	5,032
Total.....	10,936	63,105	3,544	15,594	1,455	5,869
Chinook, or king, white:						
1-pound flat.....	2,033	8,210				
1-pound tall.....	378	1,289	2,177	5,225		
Total.....	2,411	9,499	2,177	5,225		
Coho, or silver:						
½-pound flat.....	24,061	65,771	1,088	3,040		
1-pound flat.....	21,431	103,268	1,176	5,174		
1-pound tall.....	109,249	458,845	7,299	29,926	4,822	17,359
2-pound nominal.....	427	2,562				
Total.....	155,168	630,446	9,563	38,146	4,822	17,359
Chum, or dog:						
½-pound flat.....					1,300	1,950
1-pound flat.....	219	591				
1-pound tall.....	53,469	128,325	5,047	11,608	5,097	11,213
Total.....	53,688	128,916	5,047	11,608	6,397	13,163
Humpback, or pink:						
1-pound flat.....	2,030	5,585				
1-pound tall.....	308,963	896,757				
Total.....	370,993	902,342				
Sockeye, or blueback:						
½-pound flat.....	224,455	906,770				
1-pound flat.....	454,381	2,728,186	244	1,364		
1-pound tall.....	485,507	2,548,344	1,405	7,587		
Total.....	1,164,343	6,183,300	1,649	9,051		
Grand total.....	1,757,539	7,917,608	21,980	79,624	12,674	36,391

## PACK OF CANNED SALMON IN WASHINGTON IN 1909—Continued.

Products.	Columbia River.		Total.	
	Cases.	Value.	Cases.	Value.
<b>Chinook, or king, red:</b>				
½-pound flat.....	22,895	\$96,160	23,550	\$98,780
1-pound flat.....	30,222	210,134	38,697	260,639
1-pound flat exports.....	606	4,242	606	4,242
1-pound tall.....	12,066	78,636	18,871	110,079
1-pound oval.....	1,110	10,212	1,110	10,212
Total.....	66,899	399,384	82,834	483,952
<b>Chinook, or king, white:</b>				
1-pound flat.....			2,033	8,210
1-pound tall.....			2,555	6,514
Total.....			4,588	14,724
<b>Coho, or silver:</b>				
½-pound flat.....	9,143	25,600	34,292	94,417
1-pound flat.....	6,278	20,313	28,885	134,755
1-pound tall.....	15,638	63,900	137,008	570,030
2-pound nominal.....			427	2,562
Total.....	31,059	115,813	200,612	801,764
<b>Chum, or dog:</b>				
½-pound flat.....			1,300	1,950
1-pound flat.....			219	591
1-pound tall.....	20,051	46,786	83,664	197,932
Total.....	20,051	46,786	85,183	200,473
<b>Humpback, or pink:</b>				
1-pound flat.....			2,030	5,585
1-pound tall.....			368,963	896,757
Total.....			370,993	902,342
<b>Sockeye, or blueback:</b>				
½-pound flat.....	a 5,047	21,197	229,502	927,967
1-pound flat.....	2,087	17,017	456,712	2,746,667
1-pound tall.....	567	3,062	487,479	2,558,993
Total.....	7,701	41,276	1,173,693	6,233,627
<b>Steelhead trout:</b>				
½-pound flat.....	945	2,937	945	2,937
1-pound flat.....	3,794	19,422	3,794	19,422
1-pound tall.....	3,897	22,602	3,897	22,602
Total.....	8,636	44,961	8,636	44,961
<b>Grand total.....</b>	<b>134,346</b>	<b>648,220</b>	<b>b 1,926,539</b>	<b>8,681,843</b>

a Includes 997 cases, valued at \$4,187, packed with sockeyes from Puget Sound.

b All 1-pound cases contain 48 1-pound cans; the ½-pound cases contain 48 ½-pound cans. Reduced to a common basis of cases containing 48 1-pound cans, the pack is 1,781,317½ cases.

*Miscellaneous products.*—By far the greater part of the miscellaneous secondary products were prepared on Puget Sound. Pickled salmon predominate in quantity, but mild-cured salmon represent the greatest value.

## MISCELLANEOUS SECONDARY PRODUCTS PACKED IN WASHINGTON IN 1909.

NOTE.—Mild-cured salmon have been figured on a basis of 800 pounds to the tierce and pickled fish on a basis of 200 pounds to the barrel.

Products.	Puget Sound.		Grays Harbor.		Willapa Harbor.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Frozen:</b>						
Coho, or silver, round.....	396,477	\$21,989				
Coho, or silver, dressed.....	60,000	4,200				
Dog, or chum, round.....	1,099,985	55,250				
Dog, or chum, dressed.....	264,687	11,911				
Humpback, round.....	62,945	1,888				
King, or spring, round.....	70,183	7,018				
King, or spring, dressed.....	4,000	400				
Steelhead trout, round.....	202,165	18,195	70,000	\$6,300		
Total.....	2,160,442	120,851	70,000	6,300		
<b>Mild cured:</b>						
King, or spring.....	1,687,200	210,770	60,000	9,000	23,200	\$1,856
<b>Pickled:</b>						
King, or spring.....			1,000	540		
King, or spring, bellies.....						
Dog, or chum.....	50,000	175				
Humpback.....	1,615,000	48,450				
Humpback bellies.....	172,400	8,620				
Total.....	1,837,400	57,245	1,000	540		
<b>Smoked:</b>						
Coho, or silver.....	30,000	1,800				
Dog, or chum.....	517,245	25,862				
Dog, or chum, kippered.....	5,000	500				
Humpback backs, kippered.....	100,000	5,000				
King, or spring.....	30,165	2,413				
King, or spring, white, kippered.....	190,500	16,050				
Total.....	872,910	51,625				
<b>Fertilizer.....</b>	1,210,000	18,610				
<b>Oil.....</b>	380,648	14,161				
<b>Grand total.....</b>	8,148,600	473,262	131,000	15,840	23,200	1,856

MISCELLANEOUS SECONDARY PRODUCTS PACKED IN WASHINGTON IN 1909—Continued.

Products.	Columbia River.		Total.	
	Pounds.	Value.	Pounds.	Value.
<b>Frozen:</b>				
Coho, or silver, round.....	72,000	\$3,960	468,477	\$25,949
Coho, or silver, dressed.....			60,000	4,200
Dog, or chum, round.....			1,099,985	55,250
Dog, or chum, dressed.....			264,687	11,911
Humpback, round.....			62,945	1,888
King, or spring, round.....			70,183	7,018
King, or spring, dressed.....			4,000	400
Steelhead trout, round.....	232,000	22,120	504,165	46,615
<b>Total.....</b>	<b>304,000</b>	<b>26,080</b>	<b>2,534,442</b>	<b>153,231</b>
<b>Mild cured:</b>				
King, or spring.....	522,400	52,200	2,292,800	273,826
<b>Pickled:</b>				
King, or spring.....			1,000	540
King, or spring, bellies.....	6,750	671	6,750	671
Dog, or chum.....			50,000	175
Humpback.....			1,615,000	48,450
Humpback bellies.....			172,400	8,620
<b>Total.....</b>	<b>6,750</b>	<b>671</b>	<b>1,845,150</b>	<b>58,456</b>
<b>Smoked:</b>				
Coho, or silver.....			30,000	1,800
Dog, or chum.....			517,245	25,862
Dog, or chum, kippered.....			5,000	500
Humpback backs, kippered.....			100,000	5,000
King, or spring.....			30,165	2,413
King, or spring, white, kippered.....			190,500	16,050
<b>Total.....</b>			<b>872,910</b>	<b>51,625</b>
Fertilizer.....			1,210,000	18,610
Oil.....			<sup>a</sup> 380,648	14,161
<b>Grand total.....</b>	<b>833,150</b>	<b>78,951</b>	<b>9,135,950</b>	<b>569,909</b>

<sup>a</sup> Represents 50,713 gallons.

COLUMBIA RIVER.

As the Columbia River forms the boundary between Oregon and Washington and the citizens of both States operate in the river, for convenience tables showing persons employed, investment, catch, and the packs of canned salmon and miscellaneous secondary products on both sides of the river are combined in the tables given below, in addition to showing most of these data in the regular state tables.

PERSONS EMPLOYED IN THE SALMON FISHERIES OF THE COLUMBIA RIVER IN 1909.

Occupation and race.	Number.	Occupation and race.	Number.
Fishermen: Whites.....	4,443	Transporters: Whites.....	80
<b>Shoresmen:</b>		<b>Total:</b>	
Whites.....	426	Whites.....	4,949
Chinese.....	417	Chinese.....	417
Japanese.....	268	Japanese.....	268
<b>Total.....</b>	<b>1,111</b>	<b>Grand total.....</b>	<b>5,634</b>

INVESTMENT IN THE SALMON FISHERIES OF THE COLUMBIA RIVER IN 1909.

Items.	Number.	Value.	Items.	Number.	Value.
Transporting vessels:			Apparatus, shore fisheries—Con.		
Power vessels.....	39	\$118,400	Gill nets, drift.....	2,755	\$571,305
Tonnage.....	335		Gill nets, set.....	443	8,163
Outfit.....		29,875	Diver nets.....	166	32,535
Power boats.....	14	26,550	Trap nets.....	346	562,700
Fishing boats, power.....	425	222,700	Wheels, stationary.....	39	389,000
Fishing boats, sail and row.....	1,923	254,395	Wheels, scow.....	12	30,500
Scows and house boats.....	110	51,950	Shore and accessory property.....		1,577,300
Pile drivers.....	37	23,300	Cash capital.....		647,000
Apparatus, shore fisheries:			Total.....		4,567,423
Haul seines.....	52	21,250			
Purse seines.....	2	500			

CATCH, BY APPARATUS AND SPECIES, IN THE SALMON FISHERIES OF THE COLUMBIA RIVER IN 1909.

Apparatus and species.	Pounds.	Value.	Apparatus and species.	Pounds.	Value.
PURSE SEINES.			TRAP NETS.		
Chinook, or king.....	8,919	\$535	Blueback, or sockeye.....	141,265	\$6,387
Coho, or silver.....	2,184	44	Chinook, or king.....	1,198,383	65,823
Blueback, or sockeye.....	1,090	49	Dog, or chum.....	931,564	5,188
Steelhead trout.....	4,742	190	Silver, or coho.....	1,602,581	32,888
Total.....	16,935	818	Steelhead trout.....	527,071	26,540
HAUL SEINES.			Total.....		
Blueback, or sockeye.....	110,503	5,183		4,400,864	136,826
Chinook, or king.....	1,392,377	85,261	WHEELS.		
Dog, or chum.....	24,000	150	Blueback, or sockeye.....	949,165	38,898
Silver, or coho.....	506,439	12,135	Chinook, or king.....	1,091,751	64,082
Steelhead trout.....	1,078,118	52,562	Silver, or coho.....	603,453	12,683
Total.....	3,111,437	155,291	Steelhead trout.....	592,819	27,835
GILL NETS.			Total.....		
Blueback, or sockeye.....	8,350	396		3,237,188	143,498
Chinook, or king.....	11,958,512	667,221	TOTAL.		
Dog, or chum.....	542,472	3,223	Blueback, or sockeye.....	1,210,373	50,913
Silver, or coho.....	792,774	16,504	Chinook, or king.....	16,534,480	938,808
Steelhead trout.....	515,940	25,292	Dog, or chum.....	1,498,036	8,561
Total.....	13,818,048	712,636	Silver, or coho.....	3,509,431	74,314
DIVER NETS.			Steelhead trout.....		
Chinook, or king.....	884,538	55,886		2,803,023	136,636
Silver, or coho.....	2,000	60	Grand total.....		
Steelhead trout.....	84,333	4,217		25,555,343	1,209,232
Total.....	970,871	60,163			

## CANNED PACK ON BOTH SIDES OF THE COLUMBIA RIVER IN 1909.

Products.	Cases. <sup>a</sup>	Value.	Products.	Cases. <sup>a</sup>	Value.
Blueback, or sockeye:			Humpback, or pink:		
½-pound flat.....	<i>b</i> 37,118	\$154,292	1-pound tall.....	<i>d</i> 55	\$132
1-pound flat.....	8,732	56,887	Silverside, coho, or white:		
1-pound tall.....	<i>c</i> 617	3,382	½-pound flat.....	12,447	34,852
Total.....	46,467	214,561	1-pound flat.....	14,498	62,468
Chinook, or king:			1-pound tall.....	21,455	87,750
½-pound flat.....	90,281	379,181	Total.....	48,400	185,070
1-pound flat.....	84,212	603,651	Steelhead trout:		
1-pound flat exports.....	606	4,242	½-pound flat.....	8,009	25,021
1-pound tall.....	29,519	193,827	1-pound flat.....	5,159	27,117
½-pound oval.....	534	2,670	1-pound tall.....	8,217	47,658
1-pound oval.....	1,919	18,142	Total.....	21,385	99,796
2-pound nominal.....	458	1,833	Grand total.....	348,378	1,760,220
Total.....	207,529	1,203,546			
Chum, or dog:					
1-pound tall.....	24,542	57,115			

*a* All 1-pound cases contain 48 1-pound cans; the ½-pound cases contain 48 ½-pound cans.

*b* Of these, 5,592 cases, valued at \$22,883, were filled with sockeyes brought from Puget Sound, Wash.

*c* Of these, 50 cases, valued at \$320, were filled with sockeyes brought from Puget Sound, Wash.

*d* Filled with fish brought from Puget Sound, Wash.

## PACK OF MISCELLANEOUS PRODUCTS ON BOTH SIDES OF THE COLUMBIA RIVER IN 1909.

Products.	Pounds.	Value.	Products.	Pounds.	Value.
Frozen:			Smoked:		
Chinook.....	14,000	\$1,400	Chinook.....	127,700	\$19,155
Silverside.....	288,175	17,828	Silverside.....	20,000	2,000
Steelhead trout.....	1,646,662	163,887	Total.....	147,700	21,155
Total.....	1,948,837	183,115	Grand total.....	6,535,533	648,125
Mild-cured:					
Chinook.....	4,432,246	443,184			
Pickled:					
Chinook bellies.....	6,750	671			

## OREGON.

The catch of salmon in the Columbia River in 1909 was only fair, owing partly to the shortening of the open fishing season. On the coast streams conditions were far from favorable. Low water at one time kept the salmon from entering the streams; afterwards freshets and storms made fishing impossible at times. A few places, however, show increases over the previous year.

## STATISTICS BY COUNTIES.

*Persons employed.*—The total number of persons employed was 5,320. All of the fishermen and transporters were whites. Clatsop County, in which Astoria is located, has more than half of the persons employed.

## PERSONS EMPLOYED IN THE SALMON FISHERIES OF OREGON, BY COUNTIES AND NATIONALITIES, IN 1909.

Counties.	Fisher- men.	Shoresmen				Trans- porters.	Total.			
	Whites.	Whites.	Chi- nese.	Japa- nese.	Total.	Whites.	Whites.	Chi- nese.	Japa- nese.	Total.
Wasco.....	48	21	33	8	62	.....	69	33	8	110
Hood River.....	6	.....	.....	.....	.....	.....	6	.....	.....	6
Multnomah.....	88	29	68	42	139	2	119	68	42	229
Clackamas.....	86	.....	.....	.....	.....	.....	86	.....	.....	86
Columbia.....	149	21	.....	.....	21	8	178	.....	.....	178
Clatsop.....	2,863	258	152	145	555	37	3,158	152	145	3,455
Tillamook.....	154	11	50	9	70	4	169	50	9	228
Lincoln.....	144	9	19	14	42	.....	153	19	14	186
Lane.....	121	7	30	14	51	2	130	30	14	174
Douglas.....	100	5	19	10	34	2	107	19	10	136
Coos.....	276	26	36	14	76	10	312	36	14	362
Curry.....	33	15	4	.....	19	5	53	4	.....	57
Josephine.....	111	2	.....	.....	2	.....	113	.....	.....	113
Total.....	4,179	404	411	256	1,071	70	4,653	411	256	5,320

*Investment, apparatus, etc.*—The total investment amounted to \$3,641,775, of which more than one-half is contributed by Clatsop County. The gill net is the principal form of apparatus used in most counties.

## INVESTMENT IN THE SALMON FISHERIES OF OREGON, BY COUNTIES, IN 1909.

Items.	Wasco.		Hood River.		Multnomah.		Clackamas.		Columbia.	
	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.
Transporting vessels:										
Power vessels.....					1	\$4,000			4	\$10,900
Tonnage.....					11				26	
Outfit.....						600				1,570
Power boats.....					1	1,000			2	1,800
Fishing boats, power.....	1	\$2,000			16	7,900			76	17,100
Fishing boats, sail and row.....	16	800	6	\$240	53	2,300	43	\$1,290	33	1,810
Scows and house boats.....					5	1,350			4	1,500
Apparatus, shore fisheries:										
Haul seines.....	1	500			1	400			4	1,400
Gill nets, drift.....					8	560	72	3,470		
Gill nets, set.....	4	70	20	360	52	871	71	792	50	920
Diver nets.....					26	6,250			89	15,825
Pound nets.....									10	6,750
Wheels, stationary.....	14	260,000			12	53,000				
Wheels, scow.....	4	6,000			5	16,000				
Shore and accessory property.....		261,600				123,015		115		69,565
Cash capital.....		45,000				103,500				15,000
Total.....		575,970		600		320,746		5,667		144,140

INVESTMENT IN THE SALMON FISHERIES OF OREGON, BY COUNTIES, IN 1909—  
Continued.

Items.	Clatsop.		Tillamook.		Lincoln.		Lane.		Douglas.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
Transporting vessels:										
Power vessels.....	16	\$58,200	2	\$7,300			1	\$3,000	1	\$2,000
Tonnage.....	163		16				7		5	
Outfit.....		14,630		1,750				950		400
Power boats.....	8	21,500	1	2,000	2	\$600	6	1,200		
Fishing boats, power.....	157	97,100	3	600	3	1,500		2,670	50	2,100
Fishing boats, sail and row.....	1,210	188,515	74	5,550	73	5,925	90	1,020		
Scows and house boats.....	82	38,860					7			
Pile drivers.....	2	1,800								
Apparatus, shore fisheries:										
Haul seines.....	28	10,600					1	130		
Gill nets, drift.....	2,131	466,175	63	8,230	112	10,400	51	6,195	30	2,125
Gill nets, set.....	115	2,550	151	4,530	153	4,490	108	1,502	116	4,420
Diver nets.....	3	300								
Pound nets.....	11	19,000								
Shore and accessory property.....		774,815		69,883		41,848		17,100		21,589
Cash capital.....		265,000		28,000		12,500		13,500		12,000
Total.....		1,959,045		127,843		77,263		47,267		44,634

Items.	Coos.		Curry.		Josephine.		Total.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
Transporting vessels:								
Power vessels.....	4	\$24,500	1	\$10,000			30	\$119,900
Tonnage.....	31		26				288	
Outfit.....		4,100		1,350				25,350
Power boats.....			1	2,000			15	28,900
Fishing boats, power.....	25	12,200					287	139,600
Fishing boats, sail and row.....	164	8,125	22	3,300	56	\$1,920	1,890	224,545
Scows and house boats.....	16	2,320					114	45,050
Pile drivers.....							2	1,800
Apparatus, shore fisheries:								
Haul seines.....	8	2,350	1	300	4	600	a 48	16,280
Gill nets, drift.....	279	23,176	6	800	66	2,200	b 2,818	523,331
Gill nets, set.....	166	4,720	102	2,305	14	84	c 1,122	27,614
Diver nets.....							d 418	22,375
Pound nets.....							21	25,750
Wheels, stationary.....							26	313,000
Wheels, scow.....							9	22,000
Shore and accessory property.....		67,400		100,400		7,450		1,554,780
Cash capital.....		42,000		15,000				551,500
Total.....		190,891		135,455		12,254		3,641,775

a Aggregate length of 22,855 yards.

b Aggregate length of 1,187,832 yards.

c Aggregate length of 59,625 yards.

d Aggregate length of 46,600 yards.

*Products.*—The total catch amounted to 22,191,291 pounds, valued at \$968,983, of which Clatsop County contributed more than one-half. Gill nets catch more than two-thirds of the total. Chinook salmon constitute more than one-half of the total catch.

PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY SPECIES AND APPARATUS, IN 1909.

Apparatus and species.	Wasco.		Hood River.		Multnomah.		Clackamas.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Blueback.....					6,000	\$300		
Chinook, fresh.....					41,000	2,870		
Silver.....	206,000	\$1,120						
Steelhead trout.....	105,280	4,120			4,000	200		
Total.....	311,280	8,240			51,000	3,370		
GILL NETS.								
Blueback.....					1,000	50		
Chinook, fresh.....	1,800	144	9,700	\$679	18,000	770	208,000	\$8,320
Silver.....	2,600	78	14,700	521	17,100	513	7,000	210
Steelhead trout.....	800	48	5,500	306	20,900	975	24,000	720
Total.....	5,200	270	29,900	1,506	57,000	2,308	239,000	9,250
DIVER NETS.								
Chinook.....					131,757	9,223		
Steelhead trout.....					1,800	90		
Total.....					133,557	9,313		
WHEELS.								
Blueback.....	534,555	21,382			228,968	9,650		
Chinook, fresh.....	497,805	28,998			226,570	13,613		
Silver.....	243,000	4,860			27,622	739		
Steelhead trout.....	272,835	13,232			63,432	2,282		
Total.....	1,548,195	68,472			546,592	26,284		
TOTAL.								
Blueback.....	534,555	21,382			235,968	10,000		
Chinook, fresh.....	499,605	29,142	9,700	679	417,327	26,476	208,000	8,320
Silver.....	451,600	9,058	14,700	521	44,722	1,252	7,000	210
Steelhead trout.....	378,915	17,400	5,500	306	90,132	3,547	24,000	720
Grand total.....	1,864,675	76,982	29,900	1,506	788,149	41,275	239,000	9,250

## PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY SPECIES AND APPARATUS, IN 1909—Continued.

Apparatus and species.	Columbia.		Clatsop.		Tillamook.		Lincoln.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.								
Blueback.....			48,781	\$2,195				
Chinook, fresh.....	64,115	\$3,506	744,646	44,328				
Dog.....			24,000	150				
Silver.....	5,419	108	52,603	1,039				
Steelhead.....	83,073	4,154	427,064	21,333				
Total.....	152,607	7,768	1,297,094	69,085				
GILL NETS.								
Chinook, fresh.....			9,826,779	543,849	417,827	\$11,916	255,268	\$12,073
Dog.....			94,248	599	323,480	1,617	72,300	453
Silver.....			254,869	5,097	421,587	12,244	580,182	16,755
Steelhead.....	129,200	6,460	134,071	6,662	5,000	100	6,200	248
Total.....	129,200	6,460	10,309,967	556,207	1,167,894	23,877	914,010	29,529
DIVER NETS.								
Chinook.....	476,500	28,710	12,000	720				
POUND NETS.								
Blueback.....			25,020	1,136				
Chinook, fresh.....	13,450	59	43,610	2,547				
Dog.....	145,100	748	4,160	26				
Silver.....	544,000	11,280	18,220	364				
Steelhead.....	13,600	680	32,610	1,631				
Total.....	716,150	12,767	123,620	5,694				
TOTAL.								
Blueback.....			73,801	3,321				
Chinook, fresh.....	554,065	32,275	10,627,035	591,444	417,827	11,916	255,268	12,073
Dog.....	145,100	748	122,408	775	323,480	1,617	72,300	453
Silver.....	549,419	11,388	325,692	6,520	421,587	12,244	580,182	16,755
Steelhead trout.....	225,873	11,294	593,745	29,646	5,000	100	6,200	248
Grand total.....	1,474,457	55,705	11,742,681	631,706	1,167,894	23,877	914,010	29,529

Apparatus and species.	Lane.		Douglas.		Coos.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.						
Chinook, fresh.....	5,000	\$125			16,200	\$466
Silver.....	8,000	200			176,452	4,411
Steelhead.....					3,900	78
Total.....	13,000	325			196,552	4,955
GILL NETS.						
Chinook, fresh.....	82,304	2,057	62,912	\$1,573	127,581	3,497
Chinook, salted.....	12,000	480				
Dog.....			36,000	225		
Silver.....	970,348	24,256	351,072	8,728	1,210,048	30,251
Steelhead.....			13,000	260	55,000	1,100
Total.....	1,064,652	26,793	462,984	10,786	1,392,629	34,848
TOTAL.						
Chinook, fresh.....	87,304	2,182	62,912	1,573	143,781	3,963
Chinook, salted.....	12,000	480				
Dog.....			36,000	225		
Silver.....	978,348	24,456	351,072	8,728	1,386,500	34,662
Steelhead trout.....			13,000	260	58,900	1,178
Grand total.....	1,077,652	27,118	462,984	10,786	1,589,181	39,803

## PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY SPECIES AND APPARATUS, IN 1909—Continued.

Apparatus and species.	Curry.		Josephine.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.						
Blueback.....					54,781	\$2,495
Chinook, fresh.....	25,652	\$292	5,248	\$330	901,861	51,917
Dog.....					24,000	350
Silver.....					418,474	9,898
Steelhead.....					623,317	29,905
Total.....	25,652	292	5,248	330	2,052,433	94,365
GILL NETS.						
Blueback.....					1,000	50
Chinook, fresh.....	462,000	4,620	165,030	10,691	11,637,261	600,189
Chinook, salted.....					12,000	480
Dog.....					526,088	2,894
Silver.....	72,000	1,200	1,698	210	3,903,204	100,063
Steelhead.....	107,100	2,018	1,920	85	502,691	18,982
Total.....	641,100	7,838	168,708	10,986	16,582,244	722,658
DIVER NETS.						
Chinook, fresh.....					620,257	38,653
Steelhead.....					1,800	90
Total.....					622,057	38,743
POUND NETS.						
Blueback.....					25,020	1,120
Chinook, fresh.....					57,060	2,606
Dog.....					149,260	774
Silver.....					562,220	11,644
Steelhead.....					46,210	2,311
Total.....					839,770	18,461
WHEELS.						
Blueback.....					763,523	31,032
Chinook, fresh.....					724,375	42,611
Silver.....					270,622	5,599
Steelhead.....					336,267	15,514
Total.....					2,094,787	94,756
TOTAL.						
Blueback.....					844,324	34,703
Chinook, fresh.....	487,652	4,912	170,338	11,021	13,940,814	735,976
Chinook, salted.....					12,000	480
Dog.....					699,348	3,818
Silver.....	72,000	1,200	1,698	210	5,184,520	127,204
Steelhead trout.....	107,100	2,018	1,920	85	1,510,285	66,802
Grand total.....	666,752	8,130	173,956	11,316	22,191,291	968,983

## STATISTICS BY WATERS.

*Persons employed.*—The Columbia River furnishes about four-fifths of the total number of persons employed. The Coquille River is second and the Siuslaw River third in this respect.

## PERSONS EMPLOYED IN THE SALMON FISHERIES OF OREGON, BY WATERS AND NATIONALITIES, IN 1909.

Occupation and nationality.	Colum- bia River.	Nehalem River.	Tilla- mook Bay.	Nestueca River.	Siletz River.	Yaquina Bay and River.	Alsea Bay and River.
Fishermen: Whites.....	3,240	48	46	60	16	63	65
Shoresmen:							
Whites.....	329	5	6		2	2	5
Chinese.....	253	23	27			5	14
Japanese.....	195	6	3			5	9
Total.....	777	34	36		2	12	28
Transporters: Whites.....	47		4				
Total:							
Whites.....	3,616	53	56	60	18	65	70
Chinese.....	253	23	27			5	14
Japanese.....	195	6	3			5	9
Grand total.....	4,064	82	86	60	18	75	93

Occupation and nationality.	Siuslaw River.	Umpqua River.	Coos Bay.	Coquille River.	Rogue River.	Total.
Fishermen: Whites.....	121	100	114	162	144	4,179
Shoresmen:						
Whites.....	7	5	14	12	17	404
Chinese.....	30	19	14	22	4	411
Japanese.....	14	10	4	10		256
Total.....	51	34	32	44	21	1,071
Transporters: Whites.....	2	2	10		5	70
Total:						
Whites.....	130	107	138	174	166	4,653
Chinese.....	30	19	14	22	4	411
Japanese.....	14	10	4	10		256
Grand total.....	174	136	156	206	170	5,320

*Investment, apparatus, etc.*—More than two-thirds of the investment is found on the Columbia River, and this is the only river on which diver nets, pound or trap nets, and wheels are employed.

## INVESTMENT IN THE SALMON FISHERIES OF OREGON, BY WATERS, IN 1909.

Items.	Columbia River.		Nehalem River.		Tillamook Bay.		Nestucca River.		Siletz River.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:										
Power vessels.....	21	\$73,100			2	\$7,300				
Tonnage.....	200				16					
Outfit.....		16,500				1,750				
Power boats.....	11	24,300			1	2,000			1	\$200
Fishing boats, power.....	250	124,100			3	600				
Fishing boats, sail and row.....	1,361	194,955	24	\$1,800	20	1,500	30	\$2,250	9	1,425
Scows and house boats.....	91	41,710								
Pile drivers.....	2	1,800								
Apparatus, shore fisheries:										
Haul seines.....	34	12,900								
Gill nets, drift.....	2,211	470,205	17	1,980	26	3,250	20	3,000	3	300
Gill nets, set.....	312	5,563	70	2,100	31	930	50	1,500	8	240
Diver nets.....	118	22,375								
Pound, or trap, nets.....	21	25,750								
Wheels, stationary.....	26	313,000								
Wheels, scow.....	9	22,000								
Shore and accessory property.....		1,229,110		53,078		16,605		200		17,174
Cash capital.....		128,500		10,000		18,000				1,000
Total.....		3,006,168		68,958		51,935		6,950		20,339

Items.	Yaquina Bay and River.		Alsea Bay and River.		Siuslaw River.		Umpqua River.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:								
Power vessels.....					1	\$3,000	1	\$2,000
Tonnage.....					7		5	
Outfit.....						950		400
Power boats.....			1	\$400				
Fishing boats, power.....	3	\$1,500			6	1,200		
Fishing boats, sail and row.....	30	2,600	34	1,900	90	2,670	50	2,100
Scows and house boats.....					7	1,020		
Apparatus, shore fisheries:								
Haul seines.....					1	130		
Gill nets, drift.....	60	5,200	49	4,900	51	6,195	30	2,125
Gill nets, set.....	80	2,300	65	1,950	108	1,502	116	4,420
Shore and accessory property.....		5,500		19,174		17,100		21,589
Cash capital.....		1,000		10,500		13,500		12,000
Total.....		18,100		38,824		47,367		44,834

Items.	Coos Bay.		Coquille River.		Rogue River.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:								
Power vessels.....	4	\$24,500			1	\$10,000	30	\$119,900
Tonnage.....	34				26		288	
Outfit.....		4,100				1,350		25,350
Power boats.....					1	2,000	15	28,900
Fishing boats, power.....	22	11,600	3	\$600			287	139,600
Fishing boats, sail and row.....	26	3,325	138	4,800	78	5,220	1,892	224,545
Scows and house boats.....	5	890	11	1,430			114	45,050
Pile drivers.....							2	1,800
Apparatus, shore fisheries:								
Haul seines.....	2	550	6	1,800	5	900	48	16,280
Gill nets, drift.....	165	14,176	114	9,000	72	3,000	2,818	523,331
Gill nets, set.....	46	1,120	120	3,600	116	2,389	1,122	27,614
Diver nets.....							418	22,375
Pound, or trap, nets.....							21	25,750
Wheels, stationary.....							26	313,000
Wheels, scow.....							9	22,000
Shore and accessory property.....		46,000		21,400		107,850		1,554,780
Cash capital.....		17,000		25,000		15,000		551,500
Total.....		123,261		67,630		147,709		3,641,775

*Catch.*—The Columbia River produces more than two-thirds of the total catch, the Siuslaw River is second, and Coos Bay third. Bluebacks are taken on the Columbia River alone. The gill net is the only form of apparatus employed in most of the rivers.

PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY APPARATUS, SPECIES, AND WATERS, IN 1909.

Apparatus and species.	Columbia River.		Nehalem River.		Tillamook Bay.		Nestucca River.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>HAUL SEINES.</b>								
Blueback, or sockeye.....	54,781	\$2,495	.....	.....	.....	.....	.....	.....
Chinook, or king, fresh.....	849,761	50,704	.....	.....	.....	.....	.....	.....
Dog, or chum.....	24,000	150	.....	.....	.....	.....	.....	.....
Silver, or coho.....	264,022	5,287	.....	.....	.....	.....	.....	.....
Steelhead trout.....	619,417	29,827	.....	.....	.....	.....	.....	.....
Total.....	1,811,981	88,463	.....	.....	.....	.....	.....	.....
<b>GILL NETS.</b>								
Blueback, or sockeye.....	1,000	50	.....	.....	.....	.....	.....	.....
Chinook, or king, fresh.....	10,064,279	553,762	50,284	\$1,509	314,810	\$7,870	52,733	\$2,537
Dog, or chum.....	94,248	599	.....	.....	259,856	1,299	.....	.....
Silver, or coho.....	296,269	6,419	206,826	5,171	146,592	3,665	68,169	3,408
Steelhead trout.....	314,471	15,171	63,624	318	5,000	100	.....	.....
Total.....	10,770,267	576,001	320,734	6,998	726,258	12,934	120,902	5,945
<b>DIVER NETS.</b>								
Chinook, or king, fresh.....	620,257	38,653	.....	.....	.....	.....	.....	.....
Steelhead trout.....	1,800	90	.....	.....	.....	.....	.....	.....
Total.....	622,057	38,743	.....	.....	.....	.....	.....	.....
<b>POUND NETS.</b>								
Blueback, or sockeye.....	25,020	1,126	.....	.....	.....	.....	.....	.....
Chinook, or king, fresh.....	57,060	2,606	.....	.....	.....	.....	.....	.....
Dog, or chum.....	149,260	774	.....	.....	.....	.....	.....	.....
Silver, or coho.....	562,220	11,644	.....	.....	.....	.....	.....	.....
Steelhead trout.....	46,210	2,311	.....	.....	.....	.....	.....	.....
Total.....	839,770	18,461	.....	.....	.....	.....	.....	.....
<b>WHEELS.</b>								
Blueback, or sockeye.....	763,523	31,032	.....	.....	.....	.....	.....	.....
Chinook, or king, fresh.....	724,375	42,611	.....	.....	.....	.....	.....	.....
Silver, or coho.....	270,622	5,599	.....	.....	.....	.....	.....	.....
Steelhead trout.....	336,267	15,514	.....	.....	.....	.....	.....	.....
Total.....	2,094,787	94,756	.....	.....	.....	.....	.....	.....
<b>TOTAL.</b>								
Blueback, or sockeye.....	844,324	34,703	.....	.....	.....	.....	.....	.....
Chinook, or king, fresh.....	12,315,732	688,336	50,284	1,509	314,810	7,870	52,733	2,537
Dog, or chum.....	267,508	1,523	.....	.....	259,856	1,299	.....	.....
Silver, or coho.....	1,393,133	28,949	206,826	5,171	146,592	3,665	68,169	3,408
Steelhead trout.....	1,318,165	62,913	63,624	318	5,000	100	.....	.....
Grand total.....	16,138,862	816,424	320,734	6,998	726,258	12,934	120,902	5,945

## PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY APPARATUS, SPECIES, AND WATERS, IN 1909—Continued.

Apparatus and species.	Siletz River.		Yaquina Bay and River.		Alsea Bay and River.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.						
Chinook, or king, fresh.....	53,690	\$2,148	33,722	\$1,532	167,856	\$8,393
Dog, or chum.....			42,640	267	29,720	186
Silver, or coho.....			246,738	6,752	333,444	10,003
Steelhead trout.....					6,200	248
Total.....	53,690	2,148	323,100	8,551	537,220	18,830
TOTAL.						
Chinook, or king, fresh.....	53,690	2,148	33,722	1,532	167,856	8,393
Dog, or chum.....			42,640	267	29,720	186
Silver, or coho.....			246,738	6,752	333,444	10,003
Steelhead trout.....					6,200	248
Grand total.....	53,690	2,148	323,100	8,551	537,220	18,830
Apparatus and species.	Siuslaw River.		Umpqua River.		Coos Bay.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
HAUL SEINERS.						
Chinook, or king, fresh.....	5,000	\$125			12,100	\$363
Silver, or coho.....	8,000	200			39,000	975
Steelhead trout.....					3,900	78
Total.....	13,000	325			55,000	1,416
GILL NETS.						
Chinook, or king, fresh.....	82,304	2,057	62,912	\$1,573	100,181	2,812
Chinook, or king, salted.....	12,000	480				
Dog, or chum.....			36,000	225		
Silver, or coho.....	970,348	24,256	351,072	8,728	660,240	16,506
Steelhead trout.....			13,000	260	49,000	980
Total.....	1,064,652	26,793	462,984	10,786	809,421	20,298
TOTAL.						
Chinook, or king, fresh.....	87,304	2,182	62,912	1,573	112,281	3,175
Chinook, or king, salted.....	12,000	480				
Dog, or chum.....			36,000	225		
Silver, or coho.....	978,348	24,456	351,072	8,728	699,240	17,481
Steelhead trout.....			13,000	260	52,900	1,058
Grand total.....	1,077,652	27,118	462,984	10,786	864,421	21,714

PRODUCTS OF THE SALMON FISHERIES OF OREGON, BY APPARATUS, SPECIES, AND WATERS, IN 1909—Continued.

Apparatus and species.	Coquille River.		Rogue River.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>HAUL SEINES.</b>						
Blueback, or sockeye.....					54,781	\$2,495
Chinook, or king, fresh.....	4,100	\$103	30,900	\$622	901,861	51,917
Dog, or chum.....					24,000	150
Silver, or coho.....	137,452	3,436			448,474	9,898
Steelhead trout.....					623,317	29,905
Total.....	141,552	3,539	30,900	622	2,052,433	94,365
<b>GILL NETS.</b>						
Blueback, or sockeye.....					1,000	50
Chinook, or king, fresh.....	27,400	685	627,090	15,311	11,637,261	600,189
Chinook, or king, salted.....					12,000	480
Dog, or chum.....					526,088	2,894
Silver, or coho.....	549,808	13,745	73,698	1,410	3,903,204	100,063
Steelhead trout.....	6,000	120	109,020	2,103	502,691	18,982
Total.....	583,208	14,550	809,808	18,824	16,582,244	722,658
<b>DIVER NETS.</b>						
Chinook, or king, fresh.....					620,257	38,653
Steelhead trout.....					1,800	90
Total.....					622,057	38,743
<b>POUND NETS.</b>						
Blueback, or sockeye.....					25,020	1,126
Chinook, or king, fresh.....					57,060	2,606
Dog, or chum.....					149,260	774
Silver, or coho.....					562,220	11,644
Steelhead trout.....					46,210	2,311
Total.....					839,770	18,461
<b>WHEELS.</b>						
Blueback, or sockeye.....					763,523	31,032
Chinook, or king, fresh.....					724,375	42,611
Silver, or coho.....					270,622	5,599
Steelhead trout.....					336,267	15,514
Total.....					2,094,787	94,756
<b>TOTAL.</b>						
Blueback, or sockeye.....					844,324	34,703
Chinook, or king, fresh.....	31,500	788	657,990	15,933	13,940,814	735,976
Chinook, or king, salted.....					12,000	480
Dog, or chum.....					635,724	3,500
Silver, or coho.....	687,260	17,181	73,698	1,410	5,184,520	127,204
Steelhead trout.....	6,000	120	109,020	2,103	1,573,909	67,120
Grand total.....	724,760	18,089	840,708	19,446	22,191,291	968,983

*Products canned.*—As in other branches of the industry the Columbia River leads, producing more than two-thirds of the pack of canned salmon. But little was done on the Rogue River, owing to the recent death of Mr. R. D. Hume, owner of the principal cannery. Bluebacks and steelheads were packed on the Columbia River alone. All of the humpbacks and part of the sockeyes packed on the Columbia River were brought from Puget Sound, Wash.

## PACK OF CANNED SALMON IN OREGON, BY WATERS, IN 1909.

Products.	Columbia River.		Nehalem River.		Tillamook Bay.		Yaquina River and Bay.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
Blueback, or sockeye:								
½-pound flat.....	a 42,071	\$133,005						
1-pound flat.....	6,645	39,870						
1-pound tall.....	b 50	320						
Total.....	38,766	173,285						
Chinook, or king:								
½-pound flat.....	67,386	283,021	228	\$684	965	\$2,895		
1-pound flat.....	53,990	301,517						
1-pound tall.....	17,453	115,191	1,643	9,858	2,128	12,768		
2-pound oval.....	544	2,670						
1-pound oval.....	809	7,330						
2-pound nominal.....	458	1,833						
Total.....	140,630	804,162	1,871	10,542	3,093	15,663		
Chum, or dog:								
1-pound tall.....	4,491	10,329	909	2,091	3,712	8,538	33	876
Humpback, or pink:								
1-pound tall.....	c 55	132						
Silverside, coho, or white:								
½-pound flat.....	3,304	9,252	2,546	7,129	2,119	5,933		
1-pound flat.....	8,220	36,155						
1-pound tall.....	5,817	23,850	3,281	13,124	3,969	15,876	1,139	4,556
Total.....	17,341	69,257	5,827	20,253	6,088	21,809	1,139	4,556
Steelhead trout:								
½-pound flat.....	7,064	22,984						
1-pound flat.....	1,365	7,995						
1-pound tall.....	4,320	25,056						
Total.....	12,749	54,835						
Grand total.....	214,032	1,112,000	8,607	32,886	12,893	46,010	1,172	4,632

Products.	Asea River and Bay.		Siuslaw River.		Umpqua River.		Coos Bay.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
Chinook, or king:								
½-pound flat.....	928	\$2,784					50	\$150
1-pound flat.....							211	1,013
1-pound tall.....	655	3,930	632	\$3,792	500	\$3,000	39	312
1-pound oval.....								
Total.....	1,583	6,714	632	3,792	500	3,000	300	1,475
Chum, or dog:								
1-pound tall.....	80	184						
Silverside, coho, or white:								
½-pound flat.....	2,601	7,283	4,017	11,248			2,088	5,846
1-pound flat.....							1,841	8,100
1-pound tall.....	4,186	16,744	5,427	21,708	7,753	31,012	759	3,036
2-pound nominal.....							315	945
Total.....	6,787	24,027	9,444	32,956	7,753	31,012	5,003	17,927
Grand total.....	8,450	30,925	10,076	36,748	8,253	34,012	5,303	19,402

a Of these, 4,595 cases, valued at \$18,696, were filled with sockeyes brought from Puget Sound, Wash.

b Packed with sockeye salmon from Puget Sound, Wash.

c Packed with humpback salmon from Puget Sound, Wash.

## PACK OF CANNED SALMON IN OREGON, BY WATERS, IN 1909—Continued.

Products.	Coquille River.		Rogue River.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
Blueback, or sockeye:						
½-pound flat .....					32,071	\$133,095
1-pound flat .....					6,045	39,870
1-pound tall .....					59	320
Total .....					38,766	173,285
Chinook, or king:						
½-pound flat .....					69,557	289,534
1-pound flat .....	204	\$973	186	\$1,300	54,591	396,869
1-pound tall .....	46	276			23,057	148,815
½-pound oval .....					534	2,670
1-pound oval .....					848	8,242
2-pound nominal .....					458	1,833
Total .....	250	1,255	186	1,300	149,045	847,903
Chum, or dog:						
1-pound tall .....					9,225	21,218
Humpback, or pink:						
1-pound tall .....					55	132
Silverside, coho, or white:						
½-pound flat .....	3,656	10,237			20,331	56,928
1-pound flat .....	1,226	5,394	468	2,053	11,755	51,702
1-pound tall .....	6,764	27,056	231	924	39,326	157,886
2-pound nominal .....					315	945
Total .....	11,646	42,687	699	2,977	71,727	267,461
Steelhead trout:						
½-pound flat .....					7,064	22,084
1-pound flat .....					1,365	7,695
1-pound tall .....					4,320	25,056
Total .....					12,749	54,835
Grand total .....	11,896	43,942	885	4,277	<sup>a</sup> 281,567	1,364,834

<sup>a</sup> All 1-pound cases contain 48 1-pound cans; the ½-pound cases contain 48 ½-pound cans. Reduced to a common basis of 48 1-pound cans the pack is 216,788½ cases.

*Miscellaneous secondary products.*—The Columbia River produces a large part of the miscellaneous secondary products. Mild-cured salmon form the greater part of the pack, followed by frozen, smoked, and pickled salmon in the order named.

## PACK OF MISCELLANEOUS SECONDARY PRODUCTS IN OREGON, BY WATERS, IN 1909.

Products.	Columbia River.		Nehalem River.		Tillamook Bay.		Siletz River.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Frozen:								
Chinook .....	14,000	\$1,400						
Silverside .....	216,175	13,868						
Steelhead trout .....	1,414,662	141,767						
Total .....	1,644,837	157,035						
Mild-cured:								
Chinook .....	3,909,846	390,984	15,485	\$1,239	59,595	\$4,768	41,575	\$4,003
Smoked:								
Chinook .....	127,700	19,155						
Silverside .....	20,000	2,000						
Total .....	147,700	21,155						
Grand total .....	5,702,383	569,174	15,485	1,239	59,595	4,768	41,575	4,003

## PACK OF MISCELLANEOUS SECONDARY PRODUCTS IN OREGON, BY WATERS, IN 1909—Continued.

Products.	Alsea River and Bay.		Siuslaw River.		Umpqua River.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Mild-cured: Chinook.....	32,386	\$3,158	12,000	\$960	4,002	\$240
Pickled: Chinook.....			400	24		
Silverside.....			2,600	130		
Total.....			3,000	154		
Grand total.....	32,386	3,158	15,000	1,114	4,002	240

Products.	Coos Bay.		Rogue River.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Frozen: Chinook.....					14,000	\$1,400
Silverside.....					216,175	13,868
Steelhead trout.....			32,023	\$2,891	1,446,685	144,658
Total.....			32,023	2,891	1,676,860	159,926
Mild-cured: Chinook.....	48,000	\$4,800	242,553	24,673	4,365,442	434,825
Pickled: Chinook.....					400	24
Silverside.....					2,600	130
Total.....					3,000	154
Smoked: Chinook.....					127,700	19,155
Silverside.....					20,000	2,000
Total.....					147,700	21,155
Grand total.....	48,000	4,800	274,576	27,564	6,193,002	616,060

## CALIFORNIA.

In Eel River the runs of all species of salmon were very poor. For the first few days of the season the catch was very heavy, after which the run dwindled down to almost nothing. Nearly all of these were shipped fresh to San Francisco, where the dealers claimed that most of them arrived in bad condition.

In the Sacramento River the run was a very fair one, and all of the product was marketed in either a fresh, mild-cured, or smoked condition, none being canned. The interesting table following shows the daily deliveries of chinook salmon to one of the mild-curing plants on the river, and the total and average weights of same.

## DAILY DELIVERIES OF CHINOOK SALMON TO A MILD-CURING PLANT ON THE SACRAMENTO RIVER, SEASON OF 1909.

Date.	Number.	Total weight.	Average.	Date.	Number.	Total weight.	Average.
SPRING, 1909.				FALL, 1909.			
Apr. 16	21	421	20.0	Aug. 17	279	6,658	23.8
17	13	297	22.0	18	325	8,021	24.6
19	109	2,411	22.0	19	147	4,018	27.3
20	305	7,512	24.6	20	185	4,954	26.7
21	111	2,826	25.4	21	39	1,011	25.9
22	183	4,510	24.6	23	1,731	42,829	24.7
23	331	7,708	23.2	24	458	11,888	26.0
24	163	3,919	24.0	25	279	7,444	26.7
26	284	5,918	23.8	26	315	8,250	26.0
27	75	1,788	23.8	27	145	3,747	25.8
28	104	2,391	23.0	28	86	2,309	28.0
29	116	2,716	23.2	30	1,300	32,926	25.3
30	358	8,059	23.0	31	812	21,018	25.8
May 1	251	5,739	22.8	Sept. 1	628	16,331	26.0
3	171	4,016	23.4	2	356	9,654	27.1
4	175	4,128	23.5	3	242	6,582	27.1
5	107	2,490	22.6	4	105	2,885	27.4
6	66	1,680	25.4	6	1,176	31,640	26.9
7	132	2,957	22.4	7	915	24,277	26.5
8	96	2,287	23.8	8	758	19,874	26.2
10	308	7,302	23.3	9	704	18,851	26.7
12	152	3,717	24.4	10	677	18,204	26.8
13	89	2,056	23.1	11	369	9,592	26.0
14	274	6,635	24.2	13	1,917	49,781	25.9
15	254	6,201	24.4	14	1,343	35,555	26.4
17	310	7,378	23.8	15	751	20,097	26.7
18	323	7,844	24.2	16	647	17,328	26.7
19	210	5,037	23.9	17	1,493	35,883	24.0
20	226	5,246	23.2	Total	18,182	471,607	25.9
21	154	3,778	24.5	Grand total	26,201	661,699	25.45
22	166	4,150	25.0				
24	315	7,290	23.1				
25	422	9,917	23.5				
26	342	7,767	22.7				
27	245	5,900	24.0				
28	268	6,496	24.2				
29	197	4,826	24.5				
30	330	7,529	22.8				
June 1	299	7,250	24.2				
Total	8,019	190,092	23.7				

The southernmost point on our coast where salmon are taken commercially is in Monterey Bay, and it is here that trolling was first engaged in to any extent. Yearly the chinooks come into Monterey and Santa Cruz Bays, where they sometimes remain feeding for months. When they strike in, which in numbers they usually do the latter part of April, they are in the pursuit of squid, sardines, anchovies, and other small fish, and their presence is first indicated to the fishermen by the occasional disturbances of the surface by the small fish. It is a signal for the fishermen and sportsmen, who go out in both sail and row boats.

During 1909 most of the catch was made in the vicinity of Monterey, the salmon appearing in but small numbers in Santa Cruz Bay.

While evidently coming in schools at first, salmon soon scatter about in pursuit of their prey, thus making the use of nets unprofitable. In a dead calm troll fishing practically ceases, but with the return of the breeze the fish resume biting.

The silver salmon come into Monterey Bay in July and are usually taken in that one month alone. Some of them run as large as 12 to 13 pounds each and all are feeding.

During 1909 the dealers had an agreement with their fishermen, who are mostly Japanese, under which they kept back a certain percentage of the price until the end of the season. This was done in order to make certain that the fishermen would not go off and sell to some one else the better fish and bring them the poorer quality.

The following table shows the daily receipts of chinook salmon at the mild-curing plant of one of the companies operating at Monterey during 1909. The table also shows the number of boats fishing, the number of fish caught, and the total weight of same, and the average weight per fish:

DAILY DELIVERIES OF CHINOOK SALMON AT A MILD-CURING PLANT ON MONTEREY BAY, SEASON OF 1909.

Date.	Number of boats.	Number of fish.	Total weight.	Average weight.	Date.	Number of boats.	Number of fish.	Total weight.	Average weight.
1909.					1909.				
Apr. 30.....	70	966	10,002	18.3	June 21.....	106	1,808	30,090	16.6
May 1.....	69	319	4,096	12.8	22.....	110	1,678	20,576	12.2
3.....	12	20	369	18.4	23.....	104	1,135	15,964	14.0
4-5.....	30	152	2,512	16.5	24.....	111	1,811	26,826	14.5
6.....	41	126	1,758	14.0	25.....	100	595	9,549	16.0
7.....	35	93	1,084	11.6	26.....	108	615	9,645	15.0
8.....	23	47	602	13.0	27.....	46	142	1,831	12.7
10.....	15	47	633	13.0	28.....	44	212	2,719	12.8
11.....	28	56	770	13.4	29.....	88	566	7,030	12.5
12.....	82	642	8,210	12.5	30.....	101	1,175	14,499	13.0
13.....	83	613	6,250	10.2	July 1.....	111	1,416	18,363	13.0
14.....	93	847	9,993	11.8	2.....	100	634	8,576	13.5
15.....	103	615	7,835	12.7	3.....	108	1,313	16,060	12.2
16.....	16	26	429	16.0	6.....	113	1,687	24,508	15.0
17.....	107	1,152	14,612	12.7	7.....	114	1,568	20,054	13.0
18.....	87	318	4,607	15.0	8.....	116	1,428	20,401	14.25
19.....	63	135	1,673	12.5	9.....	80	971	13,350	14.0
22.....	31	46	667	15.0	10.....	114	973	13,236	13.5
23.....	82	476	6,013	12.7	11.....	88	581	8,184	14.0
24.....	107	1,652	23,600	14.3	12.....	79	400	5,196	13.0
25.....	114	3,390	50,621	15.0	13.....	62	407	4,847	12.0
26.....	118	1,190	17,590	12.0	14.....	91	466	5,469	11.7
27.....	54	94	1,619	17.0	15.....	98	513	6,166	12.0
28.....	68	222	3,458	15.5	16.....	85	495	5,713	11.6
29.....	93	650	9,874	15.5	17.....	85	506	5,697	11.25
30.....	118	2,852	38,567	13.5	19.....	55	257	3,187	12.4
31.....	119	1,005	14,625	14.0	20.....	91	422	5,565	13.1
June 1.....	95	493	8,273	17.0	21.....	62	205	3,252	15.75
2.....	115	1,245	20,256	17.0	22.....	68	356	5,178	15.0
3.....	109	1,000	14,304	14.0	23.....	79	460	6,237	13.5
4.....	112	724	10,437	14.0	24.....	95	1,284	15,391	12.0
5.....	96	1,615	22,571	14.0	26.....	108	1,176	16,437	14.0
6.....	114	988	12,901	13.0	27.....	104	1,487	22,766	15.30
7.....	95	485	7,042	14.5	28.....	105	961	18,576	19.5
8.....	80	307	4,804	16.0	29.....	88	267	5,521	20.7
9.....	68	200	3,437	17.0	30.....	59	114	2,548	22.7
10.....	66	243	4,786	22.0	31.....	47	144	2,832	19.0
11.....	83	348	6,187	19.0	Aug. 2.....	79	287	4,908	17.0
12.....	95	623	10,218	16.0	3.....	43	78	1,574	20.0
13.....	106	499	7,965	16.0	4.....	21	71	1,366	19.0
14.....	89	390	6,655	18.0	5.....	43	170	3,546	20.9
15.....	112	1,729	27,524	16.0	6.....	70	274	4,845	18.0
16.....	115	3,092	48,138	15.4	7.....	52	114	2,156	19.0
17.....	105	1,395	24,436	17.6	9-12.....	12	20	502	25.0
18.....	117	3,725	61,789	16.7					
19.....	112	2,083	35,265	17.0	Total.....		71,619	1,043,358	14.6
20.....	111	1,442	23,335	16.2					

## STATISTICS BY COUNTIES.

*Persons employed.*—The total number of persons employed was 2,675, Contra Costa County leading with 774 persons.

## PERSONS ENGAGED IN THE CALIFORNIA SALMON FISHERIES, BY COUNTIES, IN 1909.

Counties.	Fishermen.				Shoresmen. <sup>a</sup>				Transporters (whites).	Grand total.
	Whites.	Japa- nese.	Chi- nese.	Total.	Whites.	Indians.	Japa- nese.	Total.		
Del Norte.....	84			84	17	15		32	3	119
Humboldt.....	339			339	19			19		358
Alameda.....					25			25		25
Marin.....	8			8						8
San Francisco.....	60			60	60			60	8	128
Solano.....	420			420	50			50	24	494
Contra Costa.....	654			654	78			78	42	774
San Joaquin.....	64	24		88						88
Yolo.....	42			42						42
Sacramento.....	178			178						178
Sutter.....	12			12						12
Butte.....	45			45				1	5	50
Glenn.....	20			20	1					21
Tehama.....	45			45			5	5		50
Shasta.....	10			10						10
Monterey.....	65	144	15	224	26			26		250
Santa Cruz.....	68			68						68
Total.....	2,114	168	15	2,297	276	15	5	296	82	2,675

<sup>a</sup> All the shoresmen reported for Alameda County and part of those reported for San Francisco County are employed by one of the Alaskan canning companies and have been reported here, as they are employed here the whole year.

*Investment, apparatus, etc.*—The total investment amounts to \$1,232,960. The shore property reported for Alameda County belongs to one of the companies operating in Alaska. Contra Costa leads in the total investment. Gill nets, haul seines, and trolling lines are the principal forms of apparatus in use.

## INVESTMENT IN THE SALMON FISHERIES OF CALIFORNIA, BY COUNTIES, IN 1909.

Items.	Del Norte.		Humboldt.		Alameda.		Marin.		San Francisco.	
	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.	Num- ber.	Value.
Transporting vessels:										
Power vessels.....	1	\$3,248							1	\$25,000
Tonnage.....	9								32	
Outfit.....		750								1,240
Power boats.....									4	7,000
Fishing boats, power.....									15	18,000
Fishing boats, sail and row.....	54	2,640	253	\$6,625			4	\$400	15	1,500
House boats and scows.....			2	100						
Apparatus, shore fisheries:										
Haul seines.....	4	550	17	2,450						
Gill nets, drift.....	50	11,300	286	19,375			4	1,050	30	7,875
Shore and accessory property.....		17,020		7,750		\$159,550		50		155,320
Cash capital.....		10,000		4,500						43,500
Total.....		45,508		40,800		159,550		1,500		259,435

INVESTMENT IN THE SALMON FISHERIES OF CALIFORNIA, BY COUNTIES, IN 1909—Continued.

Items.	Solano.		Contra Costa.		San Joaquin.		Yolo.		Sacramento.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
Transporting vessels:										
Power vessels.....	1	\$4,000	1	\$5,500						
Tonnage.....	10		5							
Outfit.....		1,000		930						
Power boats.....	14	19,500	23	36,800						
Fishing boats, power.....	30	10,400	32	21,000	28	\$8,400	4	\$1,600	17	\$6,800
Fishing boats, sail and row.....	183	36,400	300	58,500	16	2,900	17	990	77	5,170
House boats and scows.....	10	4,000	11	4,800			5	1,000	19	3,650
Apparatus, shore fisheries:										
Gill nets, drift.....	210	39,500	322	64,400	44	6,600	21	2,550	113	14,320
Haul lines.....				10						
Shore and accessory property.....		29,900		117,113		580		145		815
Cash capital.....		50,000		85,000						
Total.....		194,700		394,053		18,480		6,285		30,755

Items.	Sutter.		Butte.		Glenn.		Tehama.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
Apparatus, shore fisheries:								
Fishing boats, sail and row.....	6	\$375	20	\$840	6	\$300	20	\$1,000
House boats and scows.....	3	375						
Haul seines.....			10	1,000	4	400	10	1,020
Gill nets, drift.....	6	600						
Shore and accessory property.....		50		2,075		600		2,150
Total.....		1,400		3,915		1,300		4,170

Items.	Shasta.		Monterey.		Santa Cruz.		Total.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
Transporting vessels:								
Power vessels.....							4	\$37,748
Tonnage.....							36	
Outfit.....								3,920
Power boats.....							41	63,360
Fishing boats, power.....			24	\$13,850	21	\$11,000	171	91,050
Fishing boats, sail and row.....	4	\$200	170	7,805	13	2,600	1,158	128,245
House boats and scows.....							50	13,925
Apparatus, shore fisheries:								
Haul seines.....	2	230					a 47	5,650
Gill nets, drift.....							b 1,086	167,570
Trolling lines.....				886			263	1,149
Haul lines.....								10
Shore and accessory property.....		275		3,900		100		497,393
Cash capital.....				30,000				223,000
Total.....		705		56,441		13,963		1,232,960

a Aggregate length of 13,449 yards.

b Aggregate length of 438,120 yards.

*Catch.*—The total catch amounts to 12,141,937 pounds, valued at \$585,995. Contra Costa County leads in catch, followed closely by Solano County. Nearly four-fifths of the catch was made with gill nets, while chinook salmon comprise almost all of the catch.

PRODUCTS OF THE SALMON FISHERIES OF CALIFORNIA, BY APPARATUS AND SPECIES, IN 1909.

Apparatus and species.	Del Norte.		Humboldt.		Marin.		San Francisco.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>GILL NETS.</b>								
Blueback.....			9,300	\$317				
Chinook, fresh.....	524,225	\$8,532	463,649	16,970	5,380	\$310	91,063	\$4,055
Chinook, salted.....	27,000	1,220						
Silver, fresh.....	50,000	900	23,000	690				
Silver, salted.....	20,000	1,000						
Steelhead trout.....			4,700	235				
<b>Total.....</b>	<b>621,225</b>	<b>11,652</b>	<b>500,649</b>	<b>18,212</b>	<b>5,380</b>	<b>310</b>	<b>91,063</b>	<b>4,055</b>
<b>SEINES.</b>								
Blueback.....			11,700	372				
Chinook, fresh.....			301,600	12,064				
Chinook, salted.....	10,000	400	32,049	2,932				
Silver, fresh.....			12,000	360				
Silver, salted.....	24,000	800	2,000	100				
Dog.....			4,200	84				
<b>Total.....</b>	<b>34,000</b>	<b>1,200</b>	<b>363,549</b>	<b>15,912</b>				
<b>TOTAL.</b>								
Blueback.....			21,000	689				
Chinook, fresh.....	524,225	8,532	765,249	29,034	5,380	310	91,063	4,055
Chinook, salted.....	37,000	1,620	32,049	2,932				
Silver, fresh.....	50,000	900	35,000	1,050				
Silver, salted.....	44,000	1,800	2,000	100				
Dog.....			4,200	84				
Steelhead trout.....			4,700	235				
<b>Grand total.....</b>	<b>655,225</b>	<b>12,852</b>	<b>864,198</b>	<b>34,124</b>	<b>5,380</b>	<b>310</b>	<b>91,063</b>	<b>4,055</b>

Apparatus and species.	Solano.		Contra Costa.		San Joaquin.		Yolo.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>GILL NETS.</b>								
Chinook, fresh.....	3,238,788	\$168,713	3,944,902	\$210,855	61,187	\$2,585	197,520	\$10,852
Steelhead trout.....			678	41				
<b>Total.....</b>	<b>3,238,788</b>	<b>168,713</b>	<b>3,945,580</b>	<b>210,896</b>	<b>61,187</b>	<b>2,585</b>	<b>197,520</b>	<b>10,852</b>
<b>LINES.</b>								
Steelhead trout.....			3,500	270				
<b>Total.....</b>			<b>3,500</b>	<b>270</b>				
<b>TOTAL.</b>								
Chinook, fresh.....	3,238,788	168,713	3,944,902	210,855	61,187	2,585	197,520	10,852
Steelhead trout.....			4,178	311				
<b>Grand total.....</b>	<b>3,238,788</b>	<b>168,713</b>	<b>3,949,080</b>	<b>211,166</b>	<b>61,187</b>	<b>2,585</b>	<b>197,520</b>	<b>10,852</b>

PRODUCTS OF THE SALMON FISHERIES OF CALIFORNIA, BY APPARATUS AND SPECIES,  
IN 1909—Continued.

Apparatus and species.	Sacramento.		Sutter.		Butte.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.						
Chinook, fresh.....	599,723	\$32,690	62,119	\$1,917		
Total.....	599,723	32,690	62,119	1,917		
SEINES.						
Chinook, fresh.....					163,022	\$8,285
Total.....					163,022	8,285
TOTAL.						
Chinook, fresh.....	599,723	32,690	62,119	1,917	163,022	8,285
Grand total.....	599,723	32,690	62,119	1,917	163,022	8,285

Apparatus and species.	Glenn.		Tehama.		Shasta.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
SEINES.						
Chinook, fresh.....	72,547	\$3,627	314,102	\$16,905	46,475	\$2,789
Total.....	72,547	3,627	314,102	16,905	46,475	2,789
TOTAL.						
Chinook, fresh.....	72,547	3,627	314,102	16,905	46,475	2,789
Grand total.....	72,547	3,627	314,102	16,905	46,475	2,789

Apparatus and species.	Monterey.		Santa Cruz.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.						
Blueback.....					9,300	\$317
Chinook, fresh.....					9,188,556	457,479
Chinook, salted.....					27,000	1,220
Silver, fresh.....					73,000	1,590
Silver, salted.....					20,000	1,000
Steelhead trout.....					5,378	276
Total.....					9,323,234	461,882
SEINES.						
Blueback.....					11,700	372
Chinook, fresh.....					897,746	43,670
Chinook, salted.....					42,049	3,332
Silver, fresh.....					12,000	360
Silver, salted.....					26,000	900
Dog.....					4,200	84
Total.....					993,695	48,718
LINES.						
Chinook.....	1,769,524	\$72,634	37,373	\$1,759	1,806,897	74,393
Silver.....	10,000	500	4,500	225	14,500	725
Steelhead trout.....			111	7	3,611	277
Total.....	1,779,524	73,134	41,984	1,991	1,825,008	75,395
TOTAL.						
Blueback.....					21,000	689
Chinook, fresh.....					11,893,199	575,542
Chinook, salted.....					69,049	4,552
Silver, fresh.....					99,500	2,675
Silver, salted.....	10,000	500	4,500	225	46,000	1,900
Dog.....					4,200	84
Steelhead trout.....			111	7	8,989	553
Grand total.....	1,779,524	73,134	41,984	1,991	12,141,937	585,995

## STATISTICS BY WATERS.

*Persons employed.*—Of the 2,675 persons employed in the industry, 1,880 were on the Sacramento River. The next largest number was employed on Monterey Bay.

## PERSONS ENGAGED IN THE SALMON FISHERIES OF CALIFORNIA, BY WATERS AND NATIONALITIES, IN 1909.

Occupation and race.	Smith River.	Klamath River.	Mad River.	Eureka Bay.	Eel River.	Sacramento River.	Monterey Bay.	Total.
<b>Fishermen:</b>								
Whites.....	47	37	41	7	291	1,558	133	2,114
Chinese.....							15	15
Japanese.....						24	144	168
Total.....	47	37	41	7	291	1,582	292	2,297
<b>Shoresmen:</b>								
Whites.....	17			6	13	214	26	276
Indians.....	15							15
Japanese.....						5		5
Total.....	32			6	13	219	26	296
<b>Transporters:</b>								
Whites.....		3				79		112
<b>Total:</b>								
Whites.....	64	40	41	13	304	1,851	159	2,472
Indians.....	15							15
Chinese.....							15	15
Japanese.....						29	144	173
Grand total....	79	40	41	13	304	1,880	318	2,675

*Investment, apparatus, etc.*—More than nine-tenths of the total investment is represented in the Sacramento River. Trolling lines are used in Monterey Bay.

## INVESTMENT IN THE SALMON FISHERIES OF CALIFORNIA, BY WATERS, IN 1909.

Items.	Smith River.		Klamath River.		Mad River.		Eureka Bay.	
	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.	Num-ber.	Value.
<b>Transporting vessels:</b>								
Power vessels.....			1	\$3,248				
Tonnage.....			9					
Outfit.....				750				
Fishing boats, sail and row.....	23	\$770	31	1,870	33	\$865	7	\$175
<b>Apparatus, shore fisheries:</b>								
Haul seines.....	4	550			4	500		
Gill nets, drift.....	15	800	35	10,500	37	1,800	7	525
Shore and accessory property.....		420		16,600		100		900
Cash capital.....				10,000				1,500
<b>Total.....</b>		2,540		42,968		3,265		3,100

## INVESTMENT IN THE SALMON FISHERIES OF CALIFORNIA, BY WATERS, IN 1909—Continued.

Items.	Eel River.		Sacramento River.		Monterey Bay.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:								
Power vessels.....			3	\$34,500			4	\$37,748
Tonnage.....			47				56	
Outfit.....				3,170				3,923
Power boats.....			41	63,300			41	63,300
Fishing boats, power.....			126	66,200	45	\$24,850	171	91,050
Fishing boats, sail and row.....	213	\$5,585	668	108,575	183	10,405	1,158	128,245
Scows and house boats.....	2	100	48	13,825			50	13,925
Apparatus, shore fisheries:								
Haul seines.....	13	1,950	26	2,650			47	5,650
Gill nets, drift.....	242	17,050	750	136,895			1,086	167,570
Trolling lines.....						1,149		1,149
Hand lines.....				10				10
Shore and accessory property.....		6,750		408,623		4,000		497,393
Cash capital.....		3,000		178,500		30,000		223,000
Total.....		34,435		1,076,248		70,404		1,232,960

*Catch.*—About four-fifths of the total catch was made on the Sacramento River; Monterey Bay was second and Eel River third. With the exception of Monterey Bay, gill nets take the largest part of the catch on all the waters. The catch of species other than chinook is very small.

## PRODUCTS OF THE SALMON FISHERIES OF CALIFORNIA, BY APPARATUS, SPECIES, AND WATERS, IN 1909.

Apparatus and species.	Smith River.		Klamath River.		Mad River.		Eureka Bay.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Blueback.....					3,800	\$152		
Chinook, fresh.....	40,000	\$1,200	484,225	\$7,332	50,000	2,000	28,000	\$840
Chinook, salted.....	20,000	800	7,000	420				
Silver, fresh.....			50,000	900	12,000	360		
Silver, salted.....			20,000	1,000				
Total.....	60,000	2,000	561,225	9,652	65,800	2,512	28,000	840
HAUL SEINES.								
Blueback.....					2,100	84		
Chinook, fresh.....					28,000	1,120		
Chinook, salted.....	10,000	400			6,000	360		
Silver, fresh.....					7,000	210		
Silver, salted.....	24,000	800						
Total.....	34,000	1,200			43,100	1,774		
TOTAL.								
Blueback.....					5,900	236		
Chinook, fresh.....	40,000	1,200	484,225	7,332	78,000	3,120	28,000	840
Chinook, salted.....	30,000	1,200	7,000	420	6,000	360		
Silver, fresh.....			50,000	900	19,000	570		
Silver, salted.....	24,000	800	20,000	1,000				
Grand total.....	94,000	3,200	561,225	9,652	108,900	4,286	28,000	840

## PRODUCTS OF THE SALMON FISHERIES OF CALIFORNIA, BY APPARATUS, SPECIES, AND WATERS, IN 1909—Continued.

Apparatus and species.	Eel River.		Sacramento River.		Monterey Bay.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
GILL NETS.								
Blueback.....	5,500	\$165					9,300	\$327
Chinook, fresh.....	385,649	14,130	8,200,682	\$431,977			9,188,556	457,479
Chinook, salted.....							27,000	1,220
Silver, fresh.....	11,000	330					73,000	1,550
Silver, salted.....							20,000	1,000
Steelhead trout.....	4,700	235	678	41			5,378	276
Total.....	406,849	14,800	8,201,360	432,018			9,323,234	461,892
HAUL SEINES.								
Blueback.....	9,600	288					11,700	372
Chinook, fresh.....	273,600	10,944	506,146	31,606			897,746	43,670
Chinook, salted.....	26,049	2,572					42,049	3,332
Dog, or chum.....	4,200	84					4,200	84
Silver, fresh.....	5,000	150					12,000	360
Silver, salted.....	2,000	100					26,000	900
Total.....	320,449	14,138	506,146	31,606			993,695	48,718
LINES.								
Chinook.....					1,806,897	\$74,393	1,806,897	74,393
Silver.....					14,500	725	14,500	725
Steelhead trout.....			3,500	270	111	7	3,611	277
Total.....			3,500	270	1,821,508	75,125	1,825,008	75,395
TOTAL.								
Blueback.....	15,100	453					21,000	689
Chinook, fresh.....	659,249	25,074	8,796,828	463,583	1,806,897	74,393	11,893,199	575,542
Chinook, salted.....	26,049	2,572					69,049	4,552
Dog, or chum.....	4,200	84					4,200	84
Silver, fresh.....	16,000	480			14,500	725	99,500	2,675
Silver, salted.....	2,000	100					46,000	1,900
Steelhead trout.....	4,700	235	4,178	311	111	7	8,989	553
Grand total.....	727,298	28,998	8,801,005	463,894	1,821,508	75,125	12,141,937	585,995

*Products canned.*—But one cannery was operated in 1909, and that at Requa, on the Klamath River. The pack of this cannery was 5,663 cases of 1-pound flat chinooks, which sold for \$28,315.

*Miscellaneous secondary products.*—Mild-cured and smoked salmon comprise the secondary products prepared.

## PACK OF MISCELLANEOUS SECONDARY PRODUCTS IN CALIFORNIA, BY WATERS, IN 1909.

Products.	Eel River.		Sacramento River.		Monterey Bay.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<i>Mild-cured:</i>								
Chinook.....	64,000	\$6,400	4,095,162	\$450,019	728,800	\$64,049	4,887,962	\$520,468
<i>Smoked:</i>								
Chinook.....	50,000	5,000	56,550	8,943	4,000	700	110,550	14,643
Silver.....	3,000	300	4,660	326			7,660	626
Total.....	53,000	5,300	61,210	9,269	4,000	700	118,210	15,269
Grand total.....	117,000	11,700	4,156,372	459,288	732,800	64,749	5,006,172	535,737

## ALASKA.

The season of 1909 was a very quiet one in Alaska. Owing to the expected quadrennial heavy run of sockeye salmon on Puget Sound, several cannery men who operate there and in Alaska shut down their Alaska plants and devoted all their energies to the Sound, which materially reduced the amount of fishing gear used in Alaska, and as a consequence the total quantity of products produced. In western Alaska the ice hampered operations in the early part of the season, but, with the exception of the Ugashik and Ugaguk Rivers, the runs were fairly good. The weather was very severe on Nushagak Bay and as a result eight fishermen lost their lives there by drowning. In Central Alaska the run of salmon in the neighborhood of Karluk fell off very materially as compared with 1908, but in Chignik the usual good run appeared. In southeast Alaska, except in the lower portion, the run was very good, but the cannery men packed no more of the cheaper grades than they felt could be disposed of at the then unremunerative prices prevailing.

*Persons engaged.*—The total number of persons engaged in the Alaska salmon fisheries was 11,433. Western Alaska leads in the total number, followed by southeast and central Alaska in the order named. A large number of Indians are employed in this industry.

PERSONS ENGAGED IN THE ALASKA SALMON FISHERIES IN 1909.

Occupation and race.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
<b>Fishermen:</b>				
Whites.....	662	400	1,424	2,486
Indians.....	982	184	10	1,176
Japanese.....	13			13
Total.....	1,657	584	1,434	3,675
<b>Shoresmen:</b>				
Whites.....	442	277	1,192	1,911
Indians.....	815	124	307	1,246
Chinese.....	546	377	1,069	1,992
Japanese.....	348	356	1,432	2,136
Total.....	2,151	1,134	4,000	7,285
<b>Transporters:</b>				
Whites.....	148	108	187	443
Indians.....	13	17		30
Total.....	161	125	187	473
<b>Total:</b>				
Whites.....	1,252	785	2,803	4,840
Indians.....	1,810	325	317	2,452
Chinese.....	546	377	1,069	1,992
Japanese.....	361	356	1,432	2,149
Grand total.....	3,969	1,843	5,621	11,433

*Investments, apparatus, etc.*—The total investment amounted to \$13,948,271. Gill nets predominate, while purse and haul seines and stationary traps are important.

## INVESTMENT IN THE ALASKA SALMON FISHERIES IN 1909.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Transporting vessels:								
Power vessels.....	69	\$263,256	25	\$213,019	39	\$591,669	133	\$1,067,944
Tonnage.....	1,173		1,482		3,236		5,891	
Outfit.....		65,814		53,255		147,917		266,986
Sailing vessels.....	5	158,000	9	289,000	29	638,400	43	1,085,400
Tonnage.....	7,431		14,270		38,057		59,761	
Outfit.....		15,800		28,900		63,840		108,540
Power boats.....	11	11,760	4	8,400	2	4,680	17	24,840
Fishing boats, power.....	60	30,000					60	30,000
Fishing boats, sail and row.....	766	25,981	300	21,215	755	164,475	1,821	211,671
Scows and house boats.....	98	38,175	79	30,930	133	101,900	310	171,005
Pile drivers.....	13	34,405	15	29,850	15	26,300	43	90,555
Apparatus, shore fisheries:								
Haul seines.....	45	12,451	49	15,280			a 94	27,731
Purse seines.....	98	27,188					b 98	27,188
Gill nets, drift.....	256	34,030	57	11,020	896	66,706	c 1,209	111,756
Traps, stationary.....	36	79,700	20	29,450	17	21,644	73	130,794
Traps, floating.....	14	19,750	1	1,500			15	21,250
Lines.....		523						523
Spears.....	20	30					20	30
Shore and accessory property.....		1,788,902		1,200,716		2,611,641		5,601,259
Cash capital.....		2,224,463		800,531		1,856,775		4,970,799
<b>Total.....</b>		<b>4,829,258</b>		<b>2,823,066</b>		<b>6,295,947</b>		<b>13,948,271</b>

a Aggregate length of 30,450 yards.

c Aggregate length of 301,450 yards.

b Aggregate length of 35,070 yards.

*Catch.*—The total catch amounted to 175,934,060 pounds, valued at \$1,333,344. Red or sockeye salmon comprise almost two-thirds of the total catch. As compared with 1908, the catch of all species, except king salmon, decreased very materially, due to causes described elsewhere.

## CATCH, BY SPECIES AND APPARATUS, IN THE SALMON FISHERIES OF ALASKA IN 1909.

Apparatus and species.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>SEINES.</b>								
Coho, or silver.....	991,062	\$13,214	313,548	\$2,090			1,304,610	\$15,304
Dog, or chum.....	3,102,192	5,817					3,102,192	5,817
Humpback, or pink.....	22,288,020	55,720	510,196	957			22,798,216	56,677
King, or spring.....	6,146	193	85,954	195			92,400	388
Red, or sockeye.....	6,426,325	102,821	10,194,165	\$1,553			16,620,490	184,374
<b>Total.....</b>	<b>32,814,045</b>	<b>177,765</b>	<b>11,103,863</b>	<b>84,795</b>			<b>43,917,908</b>	<b>262,560</b>
<b>TRAPS.</b>								
Coho, or silver.....	673,278	8,977	539,508	3,597	59,580	\$397	1,272,366	12,971
Dog, or chum.....	2,699,160	5,061			811,648	1,015	3,510,808	6,076
Humpback, or pink.....	14,515,760	36,289	14,960	28	60	1	14,530,780	36,318
King, or spring.....	112,354	3,371	981,904	2,232	68,112	155	1,162,370	5,758
Red, or sockeye.....	5,362,896	71,505	10,762,775	86,102	2,540,055	20,320	18,665,726	177,927
<b>Total.....</b>	<b>23,363,448</b>	<b>125,203</b>	<b>12,299,147</b>	<b>91,959</b>	<b>3,479,455</b>	<b>21,888</b>	<b>39,142,050</b>	<b>239,050</b>

## CATCH, BY SPECIES AND APPARATUS, IN THE SALMON FISHERIES OF ALASKA IN 1909—Continued.

Apparatus and species.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>GILL NETS.</b>								
Coho, or silver.....	473,070	\$6,308	.....	.....	428,358	\$6,010	901,428	\$12,318
Dog, or chum.....	72,328	136	.....	.....	2,770,720	3,554	2,843,048	3,690
Humpback, or pink.....	509,688	1,274	.....	.....	127,244	796	636,932	2,070
King, or spring.....	1,510,498	45,315	397,298	\$902	2,835,646	10,781	4,743,442	56,998
Red, or sockeye.....	2,391,990	38,272	2,439,920	19,519	75,669,360	605,355	80,501,270	663,146
Total.....	4,957,574	91,305	2,837,218	20,421	81,831,328	626,496	89,626,120	738,222
<b>LINES.</b>								
Coho, or silver.....	48,000	640	.....	.....	.....	.....	48,000	640
King, or spring.....	2,961,332	88,840	.....	.....	.....	.....	2,961,332	88,840
Steelhead trout.....	11,650	400	.....	.....	.....	.....	11,650	400
Total.....	3,020,982	89,880	.....	.....	.....	.....	3,020,982	89,880
<b>SPEARS.</b>								
Red, or sockeye.....	227,000	3,632	.....	.....	.....	.....	227,000	3,632
<b>TOTAL.</b>								
Coho, or silver.....	2,185,410	29,139	853,056	5,687	487,938	6,407	3,526,404	41,233
Dog, or chum.....	5,873,680	11,014	.....	.....	3,582,368	4,569	9,456,048	15,583
Humpback, or pink.....	37,313,468	93,283	525,166	985	127,304	797	37,965,928	95,065
King, or spring.....	4,590,630	137,719	1,465,156	3,329	2,903,758	10,936	8,959,544	151,984
Red, or sockeye.....	14,408,216	216,230	23,396,860	187,174	78,209,415	625,675	116,014,486	1,029,979
Steelhead trout.....	11,650	400	.....	.....	.....	.....	11,650	400
Grand total.....	64,383,049	487,785	26,240,228	197,175	85,310,783	648,384	175,934,060	1,333,344

*Products canned.*—The total canned pack amounted to 2,403,669 pound and half-pound cases, valued at \$9,438,152. More than two-thirds of the pack was composed of red salmon. Three canneries were not operated, which very materially reduced the size of the pack.

OUTPUT OF SALMON FROM THE CANNERIES IN ALASKA IN 1909, BY SPECIES AND SIZE OF CANS.<sup>a</sup>

Products.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
Coho, or silver:								
1-pound flat.....	1,206	\$5,543	.....	.....	.....	.....	1,206	\$5,543
1-pound tall.....	38,714	155,431	10,275	\$43,155	6,361	\$26,900	55,350	225,486
Total.....	39,920	160,974	10,275	43,155	6,361	26,900	56,556	231,029
Dog, or chum:								
1-pound tall.....	83,001	186,454	.....	.....	37,711	87,656	120,712	274,110
Humpback, or pink:								
1-pound tall.....	455,999	1,092,389	5,581	13,394	3,293	9,056	464,873	1,114,839
King, or spring:								
1-pound tall.....	857	3,598	16,913	74,418	30,264	129,608	48,034	207,624
Red, or sockeye:								
1-pound flat.....	14,898	58,535	.....	.....	1,487	5,353	16,385	63,888
1-pound tall.....	80,200	209,962	2,936	15,539	2,057	11,108	85,193	236,609
1-pound tall.....	185,444	825,926	355,349	1,625,371	1,071,123	4,858,756	1,611,916	7,310,053
Total.....	280,542	1,094,423	358,285	1,640,910	1,074,667	4,875,217	1,713,494	7,610,550
Grand total.....	860,319	2,537,838	391,054	1,771,877	1,152,296	5,128,437	2,403,669	9,438,152

<sup>a</sup>All 1-pound cases contain forty-eight 1-pound cans; the 1-pound cases contain forty-eight 1/2-pound cans. Reduced to a common basis of cases containing forty-eight 1-pound cans the pack is 2,395,471 cases.

*Miscellaneous products.*—The total miscellaneous products prepared amounted to 9,473,005 pounds, valued at \$374,324. Owing to the low prices prevailing for pickled salmon, the pack of such very materially declined. Restrictive regulations in regard to the pickling of salmon bellies also aided in reducing the pack. The mild-cured pack shows a gratifying increase over 1908.

## MISCELLANEOUS SECONDARY SALMON PRODUCTS PREPARED IN ALASKA IN 1909.

Products.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Frozen:</b>								
Coho, or silver.....	35,721	\$1,072					35,721	\$1,072
Dog, or chum.....	77,882	1,558					77,882	1,558
Steelhead trout.....	9,450	473					9,450	473
Total.....	123,053	3,103					123,053	3,103
<b>Mild-cured:</b>								
King, or spring.....	1,833,600	149,300					1,833,600	149,300
<b>Pickled:</b>								
Coho, or silver.....	40,400	1,405	17,800	\$810	5,400	\$270	63,600	2,485
Coho bellies.....			227,750	3,843			227,750	3,843
Dog, or chum.....	3,000	90			4,000	100	7,000	190
Humpback.....	311,400	9,405					311,400	9,405
Humpback backs.....	11,200	224					11,200	224
Humpback bellies.....	123,480	6,896	46,000	500			169,480	7,396
King, or spring.....	6,200	248			82,000	3,550	88,200	3,798
King bellies.....	7,000	175					7,000	175
Red, or sockeye.....			437,800	17,319	4,863,700	149,979	5,301,500	167,298
Redbellies.....			783,600	13,902			783,600	13,902
Total.....	502,680	18,443	1,512,950	36,374	4,955,100	153,899	6,970,730	208,716
<b>Dry-salted and dried:</b>								
Coho backs.....			14,500	549			14,500	549
Dog.....	71,600	1,038					71,600	1,038
Humpback backs.....	50,000	500	1,500	45			51,500	545
King.....	800	45					800	45
Redbacks.....			83,000	2,302			83,000	2,302
Total.....	122,400	1,583	99,000	2,896			221,400	4,479
<b>Smoked:</b>								
Coho backs.....			4,000	400			4,000	400
Dog.....	585	43					585	43
Redbacks.....			28,300	1,580	12,000	1,200	40,300	2,780
Total.....	585	43	32,300	1,980	12,000	1,200	44,885	3,223
<b>Fertilizer.....</b>	159,224	2,287					159,224	2,287
<b>Oil.....</b>	120,113	3,216					<sup>a</sup> 120,113	3,216
<b>Grand total.....</b>	<b>2,862,202</b>	<b>177,975</b>	<b>1,644,250</b>	<b>41,250</b>	<b>4,967,100</b>	<b>155,099</b>	<b>9,473,005</b>	<b>374,324</b>

<sup>a</sup> Represents 16,015 gallons.

As the fisheries of Alaska are carried on almost wholly in innumerable bays, straits, and sounds, but little being done in the rivers, it does not seem desirable to show them by waters, owing to the amount of space required for the tables.

## BRITISH COLUMBIA.

The canned salmon pack of British Columbia was the only branch of the salmon industry of the Province which could be shown by species. Owing to the quadrennially heavy run occurring in the Fraser River in 1909, the pack of British Columbia is quite large. The pack is shown by water areas.

## PACK OF CANNED SALMON IN BRITISH COLUMBIA, CANADA, IN 1909.

Species.	Fraser River.		Skeena River.		Rivers Inlet.		Nass River.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
<b>Coho, or silver:</b>								
½-pound flat.....	710	\$1,988	1,158	\$3,242	264	\$739		
1-pound flat.....	5,735	27,528			176	845		
1-pound tall.....	15,459	64,928	11,671	49,034	1,092	4,586	6,818	\$28,636
Total.....	21,904	94,444	12,829	52,276	1,532	6,170	6,818	28,636
<b>Dogs, or chums:</b>								
1-pound tall.....	725	1,740	12,000	28,800				
<b>Humphack, or pink:</b>								
1-pound flat.....	227	624	40	110				
1-pound tall.....	1,053	2,527	16,080	38,640			3,589	8,614
Total.....	1,280	3,151	16,120	38,750			3,589	8,614
<b>King, or spring:</b>								
½-pound flat.....					304	1,216	56	224
1-pound flat.....	1,167	7,032			47	282		
1-pound tall.....	176							
1-pound tall.....	173	934	12,025	64,935	388	1,095	2,309	12,469
1-pound oval.....			444	2,886				
Total.....	1,516	8,482	12,469	67,821	739	2,593	2,365	12,693
<b>Sockeye, or red:</b>								
½-pound flat.....	309,634	1,238,536	72,838	291,352	51,520	206,080	11,162	44,648
1-pound flat.....	243,697	1,462,182	19,789	118,734	28,750	172,500	2,070	12,420
½-pound tall.....			2,600	8,580	10,280	33,924		
1-pound tall.....	126,597	683,624	30,393	164,122	29,377	158,636	20,189	109,021
½-pound oval.....	17,650	75,013						
1-pound oval.....							406	2,639
1-pound squats.....	8,312	49,872						
Total.....	705,890	3,509,227	125,620	582,788	119,927	571,140	33,827	168,728
<b>Grand total.....</b>	<b>731,315</b>	<b>3,617,044</b>	<b>181,038</b>	<b>770,435</b>	<b>122,198</b>	<b>579,903</b>	<b>46,599</b>	<b>218,671</b>

## PACK OF CANNED SALMON IN BRITISH COLUMBIA, CANADA, IN 1909—Continued.

Species.	Northern miscellaneous waters.		Vancouver Island.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
Coho, or silver:						
$\frac{1}{2}$ -pound flat.....					2,132	\$5,969
1-pound flat.....					5,911	28,373
1-pound tall.....	13,071	\$54,898	13,409	\$56,318	61,520	258,400
Total.....	13,071	54,898	13,409	56,318	69,563	292,742
Dogs, or chums:						
1-pound tall.....	1,568	3,763	2,280	5,472	16,573	39,775
Humpback, or pink:						
1-pound flat.....			2,000	5,500	2,267	6,234
1-pound tall.....	3,000	7,200	4,000	9,600	27,722	66,581
Total.....	3,000	7,200	4,000	15,100	29,989	72,815
King, or spring:						
$\frac{1}{2}$ -pound flat.....					360	1,440
1-pound flat.....					1,214	7,314
$\frac{1}{2}$ -pound tall.....					176	516
1-pound tall.....	2,218	11,977	500	2,700	17,613	94,110
1-pound oval.....					444	2,886
Total.....	2,218	11,977	500	2,700	19,807	106,266
Sockeye, or red:						
$\frac{1}{2}$ -pound flat.....	18,806	75,234	19,800	79,200	483,760	1,935,040
1-pound flat.....			20,400	122,400	314,706	1,888,236
1-pound tall.....					12,880	42,504
1-pound tall.....	29,694	160,348	41,643	224,872	277,893	1,500,623
$\frac{1}{2}$ -pound oval.....					17,650	75,013
1-pound oval.....					406	2,639
1-pound squats.....					8,312	49,872
Total.....	48,500	235,572	81,843	426,472	1,115,607	5,493,927
Grand total.....	68,357	313,410	102,032	506,062	<sup>a</sup> 1,251,539	6,005,525

<sup>a</sup> All pound cases contain forty-eight 1-pound cans; the  $\frac{1}{2}$ -pound cases contain forty-eight  $\frac{1}{2}$ -pound cans. Reduced to a common basis of cases containing forty-eight 1-pound cans the pack is 993,060 cases.

## VIII. STATISTICAL DATA FOR OTHER YEARS.

### CANNING INDUSTRY OF PACIFIC COAST FROM 1864 TO 1910.

From the beginning of the canning of salmon on this coast it has been the most important branch of the industry, and the table below 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 1910.

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.	Grays Harbor.	Willapa Harbor.	Columbia River.	Coastal streams of Oregon.	Smith River, Cal.
	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>
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	16,634	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	16,156	
1884.....	5,500			620,000	12,376	
1885.....	12,000			553,800	9,310	
1886.....	17,000			448,500	49,147	
1887.....	22,000			356,000	73,996	
1888.....	21,975	37,000	22,500	372,477	92,863	2,317
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	1,500
1894.....	95,400	21,400	15,100	490,100	54,815	1,500
1895.....	179,968	11,449	22,600	634,696	77,878	2,250
1896.....	195,664	21,274	24,941	481,697	87,360	
1897.....	494,026	13,300	29,600	552,721	60,158	
1898.....	400,200	12,100	21,420	487,944	75,679	
1899.....	919,611	24,240	21,314	352,774	82,041	
1900.....	469,450	30,800	26,500	358,772	12,237	
1901.....	1,780,590	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	54,801	
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	253,341	52,478	
1909.....	1,632,949	19,787	12,024	274,087	58,169	
1910.....	567,883	51,130	14,508	391,415	103,617	
Total.....	10,548,380	459,509	418,013	16,960,199	1,829,942	19,374

## PACK OF CANNED SALMON ON THE PACIFIC COAST, BY YEARS AND WATERS—CON

Year.	Klamath River, Cal.	Eel River, Cal.	Sacramento River.	Alaska.	British Columbia.	Total.
	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.</i>	<i>Cases.<sup>a</sup></i>
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	629,191
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.....			123,000	48,337	163,438	981,831
1884.....			81,450	64,886	123,706	907,918
1885.....			90,000	83,415	108,517	857,042
1886.....			39,300	142,065	152,964	848,976
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.....			2,281	474,717	248,721	1,354,083
1893.....	1,600		23,336	643,654	610,202	1,876,915
1894.....	1,700		28,463	686,440	492,232	1,887,150
1895.....	1,600		25,185	626,530	587,692	2,169,848
1896.....			13,387	966,707	617,782	2,408,812
1897.....			38,543	909,078	1,027,183	3,124,609
1898.....			29,731	965,097	492,551	2,484,722
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	473,847	3,607,073
1904.....	3,400		14,407	1,953,756	465,894	3,276,882
1905.....			2,780	1,894,516	1,167,822	4,607,087
1906.....				2,219,044	629,460	3,817,776
1907.....				2,169,873	547,459	3,522,506
1908.....				2,606,973	566,303	3,962,317
1909.....	5,633			2,395,477	993,060	5,393,670
1910.....	8,016	6,000		2,413,054	760,830	4,316,453
Total.....	30,449	31,250	1,352,855	33,569,671	15,695,756	80,593,711

<sup>a</sup> Reduced to a common basis of forty-eight 1-pound cans to the case.

## CANNING INDUSTRY, BY SPECIES AND WATERS.

The tables below 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 1910. 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.

## PACK OF CANNED SALMON ON PUGET SOUND FROM 1877 TO 1910.

Year.	Number of canneries.	Chinook.		Blueback.		Silver.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877.....	1					5,800	
1878.....	1					238	
1879.....	1					1,300	\$5,000
1880.....	1						
1881.....	1						
1882.....	1						
1883.....	1						
1884.....	1						
1885.....	1						
1886.....	1						
1887.....	1						
1888.....	4						
1889.....	2	240	\$1,200			7,480	37,400
1890.....	1	1,000	5,000			3,000	15,000
1891.....	2	282	2,401	5,538	\$24,921	5,809	19,368
1892.....	2	86	474	2,954	11,816	7,206	24,500
1893.....	3	1,200	6,480	47,852	103,371	11,812	50,060
1894.....	3			41,781	188,014	22,418	89,672
1895.....	7	1,512	7,325	65,143	273,108	50,805	154,218
1896.....	11	13,445	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	98,400	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.....	21						
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	4,952,718	79,335	337,174
1906.....	16	8,139	48,834	178,748	1,251,236	94,497	472,485
1907.....	14	1,814	10,326	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	1,073,035	162,755	895,153

## PACK OF CANNED SALMON ON PUGET SOUND FROM 1877 TO 1910—Continued.

Year.	Number of canneries.	Dog.		Humpback.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877.....	1			500		5,500	
1878.....	1					238	
1879.....	1					1,300	\$5,600
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.....						1,380,590	
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	1,205,328
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.....	11	50,249	150,847	433,423	1,300,269	698,080	2,642,146
1908.....	11	47,607	142,821	6,075	18,225	448,765	2,669,095
1909.....	24	53,688	128,916	370,993	902,342	1,632,949	7,917,608
1910.....	15	146,942	514,297	108	388	567,883	3,143,256

## PACK OF CANNED SALMON ON GRAYS HARBOR FROM 1878 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog or chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1878.....	1							5,420	\$29,268
1879.....	1								
1880.....									
1881.....									
1882.....									
1883.....									
1884.....									
1885.....									
1886.....									
1887.....									
1888.....	4							37,000	\$212,750
1889.....									
1890.....									
1891.....	1			500	\$1,500			500	1,500
1892.....	1	4,500	\$15,990	9,000	30,750	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	7,202	8,870	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
1903.....									
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	<sup>a</sup> 19,787	70,573
1910.....	3	15,495	90,718	21,768	108,840	13,867	48,534	<sup>b</sup> 51,130	248,092

<sup>a</sup> Also 1,649 cases, valued at \$9,051, with sockeyes brought from Puget Sound.<sup>b</sup> Also 4,350 cases of "Quinault," or sockeye salmon.

## PACK OF CANNED SALMON ON WILLAPA HARBOR FROM 1887 TO 1910.

Year.	Number of canneries.	Chinook or Black.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887	4								
1888	3							22,500	\$129,375
1889									
1890									
1891	1			8,000	\$24,000			8,000	24,000
1892	1	3,000	\$10,200	9,000	30,780	2,500	87,745	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								31,000	
1902	2	5,836	29,180	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	5,809	4,822	17,359	5,747	13,163	12,024	36,391
1910	1	2,923	15,077	5,096	25,480	3,189	22,711	14,508	63,268

PACK OF CANNED SALMON ON THE COLUMBIA RIVER FROM THE INCEPTION OF THE INDUSTRY TO 1910.

Year.	Chinook.		Blueback.		Silversides.		Dog or chum.		Steelhead trout.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1876											4,000	\$24,000
1877											18,000	288,000
1878											28,000	392,000
1879											100,000	1,350,000
1880											150,000	2,100,000
1881											200,000	2,100,000
1882											250,000	2,325,000
1883											250,000	2,250,000
1884											375,000	2,625,000
1885											450,000	2,950,000
1886											450,000	2,475,000
1887											380,000	2,052,000
1888											400,000	2,300,000
1889											480,000	2,640,000
1890											520,000	2,650,000
1891											550,000	2,475,000
1892											541,300	2,600,000
1893											620,400	3,147,000
1894											915,000	2,915,000
1895											553,800	2,500,000
1896											418,500	2,135,000
1897											356,000	2,124,000
1898											372,477	2,234,832
1899	31	966,697	\$1,600,182	17,797	\$101,051				95,301	\$108,587	309,855	1,809,820
1900	31	255,094	2,336,965	57,935	284,301				1,825	17,300	435,771	2,407,155
1901	32	353,907	2,038,560	15,482	584,242				90,563	118,156	398,053	2,440,964
1902	34	344,267	1,996,388	66,947	972,900	4,176	\$20,880		72,248	988,802	487,338	2,679,660
1903	34	288,773	1,529,574	20,459	224,500	46,777	1,053		65,945	200,088	471,265	1,793,931
1904	34	351,106	1,836,970	46,814	294,500	42,788	171,052		52,122	504,088	494,100	2,504,126
1905	34	411,969	2,428,008	18,015	36,353	49,108	111,145		224,495	304,583	734,305	2,710,967
1906	34	370,943	1,840,511	16,983	81,518	44,108	111,145		49,063	198,632	481,697	2,331,826
1907	32	452,753	1,804,221	12,972	51,888	60,880	197,702		46,146	105,440	582,721	2,919,311
1908	25	329,596	1,446,394	66,670	36,431	66,431	175,955		36,547	39,182	329,774	1,777,075
1909	17	255,824	1,438,173	23,069	134,723	29,008	112,053		11,894	39,186	328,772	2,382,202
1910	16	262,592	1,824,258	13,162	92,484	44,925	202,163		20,897	102,985	390,152	1,642,660
1911	14	270,580	1,428,743	12,055	86,495	10,322	41,732		8,595	32,065	317,242	1,444,309
1912	16	391,752	1,616,611	8,483	41,807	49,869	10,000		7,251	46,255	317,242	1,777,154
1913	20	326,378	1,944,660	12,911	78,048	31,294	118,337		20,663	8,808	395,104	2,112,675

1905.....	19	327,106	1,902,636	7,708	46,098	26,826	114,011	25,751	65,206	9,822	\$49,110	397,273	2,237,571
1906.....	19	311,334	1,898,007	7,816	54,712	41,446	124,338	27,802	69,505	6,560	52,560	394,898	2,149,062
1907.....	19	358,353	.....	5,504	.....	31,757	.....	22,556	.....	5,921	.....	324,171	1,703,490
1908.....	14	210,090	.....	8,581	.....	31,432	.....	16,884	.....	10,726	.....	253,311	1,380,708
1909.....	19	402,131	1,206,340	<sup>a</sup> 27,998	214,591	42,178	185,070	24,512	57,115	17,382	99,796	<sup>b</sup> 274,087	1,700,088
1910.....	15	244,285	1,882,137	6,234	34,287	68,922	363,688	65,593	237,883	5,436	31,203	391,415	2,544,193
Total.....												16,960,199	94,792,931

<sup>a</sup> Of these, 2,816 cases, valued at \$23,293, were packed with sockeyes brought from Puget Sound.

<sup>b</sup> 55 cases of humpbacks, valued at \$132, were also packed with humpbacks brought from Puget Sound.

## PACK OF CANNED SALMON ON THE NEHALEM RIVER, OREG., FROM 1887 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887.....	1							5,000	\$30,000
1888.....									
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	2,669	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	
1904.....	1	500	2,500	5,000	20,000	6,000	12,000	11,500	34,500
1905.....		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		6,600		2,000		12,600	
1908.....	1	5,000		6,100		2,016			
1909.....	1	1,985	10,542	4,554	20,253	909	2,091	7,448	32,880
1910.....	1	3,500		5,400		1,500		10,400	

## PACK OF CANNED SALMON ON TILLAMOOK BAY, OREG., FROM 1886 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
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	10,322	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		3,410		2,314		7,724	
1908.....	1	2,300		6,000		4,000			
1909.....	1	2,615	15,663	5,029	21,800	3,712	8,538	11,356	46,010
1910.....	1	2,900		4,500		2,000		9,400	

## PACK OF CANNED SALMON ON NESTUCA RIVER, OREG., FROM 1887 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		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
1890.....									
1891.....	1								
1892.....									
1893.....									
1894.....									
1895.....									
1896.....									
1897.....									
1898.....									
1899.....	1	1,100	\$1,498	3,014	\$10,922	515	\$1,539	1,656	16,897
1900.....	1								
1901.....	1	279	1,116	3,553	13,823	396	1,009	4,228	15,528
1902.....									
1903.....									
1904.....									
1905.....	1	3,000	18,600	1,000	4,250	400	1,000	4,300	23,250
1906.....	1	2,622	15,732	2,368	7,404	165	413	5,255	23,549
1907.....	1	2,100		3,500		150		5,790	
1908.....	1	2,000		3,000		100			
1909.....									
1910.....	1	2,000		3,300		140		5,440	

## PACK OF CANNED SALMON ON SILETZ RIVER, OREG., FROM 1896 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
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	875	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
1903.....									
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		5,333		200		6,833	
1908.....	1	2,100		4,700		300		7,100	
1909.....									
1910.....	1	2,200		4,900		250		7,050	

## PACK OF CANNED SALMON ON YAQUINA BAY AND RIVER, OREG., FROM 1887 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887.....	2								
1888.....	3							5,088	\$29,256
1889.....								5,000	27,500
1890.....									
1891.....	1								
1892.....									
1893.....									
1894.....									
1895.....									
1896.....	1	1,714	\$5,142	615	\$1,845			2,329	6,987
1897.....									
1898.....	1	170	442	1,530	5,202			1,700	5,644
1899.....	2	315	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
1902.....									
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		1,000		49		1,883	
1908.....	1			4,000				4,000	
1909.....	1			1,139	4,556	33	76	1,172	4,632
1910.....	1			2,669	13,345			2,669	13,345

## PACK OF CANNED SALMON ON ALSEA RIVER AND BAY, OREG., FROM 1886 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Dog.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1886.....	1								
1887.....	2							11,180	\$64,285
1888.....	3							9,620	55,315
1889.....								10,000	55,000
1890.....									
1891.....	1								
1892.....	1			3,600	\$14,400			3,600	11,400
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	6,560	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.....								6,250	
1908.....								7,600	
1909.....	1	1,119	6,714	5,486	21,027	80	184	6,685	30,925
1910.....	1	2,560		5,500		160		2,560	



PACK OF CANNED SALMON ON COOS BAY AND RIVER, OREG., FROM 1887 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		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
1890							
1891	2						
1892							
1893	1			3,125	\$12,500	3,125	12,500
1894	1	163	\$815	8,423	33,712	8,586	44,527
1895	1	5,119	13,133	2,322	8,934	7,441	28,097
1896	1	13,680	39,000	2,000	6,000	15,680	45,000
1897	1	6,200	18,600	2,200	6,600	8,400	25,200
1898	1	3,142	8,169	7,180	24,412	10,322	42,581
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	22,463
1902	1	412	2,175	2,640	11,220	3,052	13,395
1903							
1904	1	2,033	7,725	7,200	24,480	9,233	32,205
1905							
1906	1	2,043	12,258	1,755	5,265	3,798	17,523
1907							
1908							
1909	1	275	1,475	3,959	17,927	4,234	19,402
1910	1	500		5,500		6,000	

PACK OF CANNED SALMON ON THE COQUILLE RIVER, OREG., FROM 1883 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1883	1						
1884							
1885							
1886	2						
1887	3						
1888	2					11,000	\$63,250
1889						8,600	47,300
1890							
1891	1						20,000
1892	1			6,000	\$20,000	5,000	20,000
1893	1			6,500	26,000	6,500	26,000
1894	2			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
1897							
1898	2	541	1,407	7,485	25,499	8,026	26,906
1899	2	950	3,800	7,559	28,560	8,509	32,300
1900	1	2,636	13,180	9,693	38,494	12,327	51,584
1901	1	133	665	5,066	20,384	5,200	21,049
1902	1	286	1,510	5,877	24,327	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		13,220		13,526	
1908	2			16,174		16,174	
1909	2	250	1,255	9,818	42,687	10,068	43,942
1910	2	420		16,637		17,057	

a Burned.

## PACK OF CANNED SALMON ON ROGUE RIVER, OREG., FROM 1877 TO 1910.

Year.	Number of canneries.	Chinook.		Silver.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877.....	1					7,804	
1878.....	1					8,534	
1879.....	1					8,371	
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					12,117	
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.....	<sup>a</sup> 1	3,200	16,000			3,200	16,000
1894.....	<sup>(b)</sup> 1						
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		1,796		9,333	
1908.....	1	4,354		2,650		6,004	
1909.....	1	186	1,300	699	2,977	885	4,277
1910.....	1	232		2,711		1,943	

<sup>a</sup> Burned down during season.<sup>b</sup> Not operated.

## PACK OF CANNED SALMON ON SMITH RIVER, CAL., IN SPECIFIED YEARS.

Years.	Number of canneries.	Chinook salmon.		Silver salmon.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1878.....	1	4,277	\$23,096			4,277	\$23,096
1880.....	1	7,500				7,500	
1888.....	1	2,347	14,082			2,347	14,082
1893.....	1	1,500		500		2,000	
1894.....	1	1,500		500		2,000	
1895.....	1	2,250	9,990			2,250	9,990

## PACK OF CANNED SALMON ON KLAMATH RIVER, CAL., IN SPECIFIED YEARS.

Year.	Number of canneries.	Chinook.		Silver.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1888.....	1	4,400	\$26,400			4,400	\$26,400
1893.....	1	1,600				1,600	
1894.....	1	1,700				1,700	
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				2,500	
1904.....	1	3,400	18,360			3,400	18,360
1909.....	1	5,633	28,315			5,633	28,315
1910.....	1	8,016				8,016	

## PACK OF CANNED SALMON ON EEL RIVER, CAL., IN SPECIFIED YEARS.

Year.	Number of canneries.	Chinooks.	
		Cases.	Value.
1877.....	1	8,500	\$51,000
1878.....	1	10,500	56,700
1880.....	1	6,250	.....
1910.....	1	6,000	.....

## PACK OF CANNED SALMON ON THE SACRAMENTO RIVER, FROM 1864 TO 1905.

Year.	Number of canneries.	Cases packed. <sup>a</sup>	Value.	Year.	Number of canneries.	Cases packed. <sup>a</sup>	Value.
1864.....	1	2,000	.....	1886.....	.....	30,300	.....
1865.....	1	2,000	.....	1887.....	.....	36,500	.....
1866.....	.....	.....	.....	1888.....	6	68,075	842,750
1867.....	.....	.....	.....	1889.....	3	57,300	.....
1868.....	.....	.....	.....	1890.....	.....	25,065	.....
1869.....	.....	.....	.....	1891.....	.....	10,353	.....
1870.....	.....	.....	.....	1892.....	.....	2,281	.....
1871.....	.....	.....	.....	1893.....	.....	23,336	.....
1872.....	.....	.....	.....	1894.....	.....	28,463	.....
1873.....	.....	.....	.....	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.....	.....	181,200	.....	1903.....	3	8,200	.....
1882.....	19	200,000	.....	1904.....	2	14,407	68,936
1883.....	21	123,000	.....	1905.....	1	2,780	.....
1884.....	.....	81,450	.....	Total.....	.....	1,352,855	.....
1885.....	6	90,000	.....				

<sup>a</sup> All were quinnat or chinook salmon.

## PACK OF CANNED SALMON IN ALASKA, BY DISTRICTS, FROM THE INCEPTION OF THE INDUSTRY.

Year.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.
		<i>Cases.</i>		<i>Cases.</i>		<i>Cases.</i>		<i>Cases.</i>
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	10,241	.....	.....	3	21,742
1883.....	4	20,040	2	28,297	.....	.....	6	48,337
1884.....	4	22,189	2	42,297	1	6,400	7	81,886
1885.....	3	16,728	.....	52,687	1	14,000	6	83,415
1886.....	4	18,000	2	71,583	3	48,822	9	142,065
1887.....	5	31,402	2	102,515	3	72,700	10	206,677
1888.....	7	81,128	6	241,101	4	89,886	16	471,115
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	511,397	5	133,418	30	801,400
1892.....	7	115,722	6	295,496	2	63,490	15	474,714
1893.....	8	136,053	11	399,815	3	107,786	22	643,657
1894.....	7	142,544	10	435,052	4	108,844	21	686,440
1895.....	7	148,476	10	327,919	6	150,135	23	628,530
1896.....	9	262,381	12	485,990	8	218,336	29	968,707
1897.....	9	271,867	13	382,899	7	254,312	29	909,078
1898.....	9	251,385	14	395,609	7	318,703	30	965,097
1899.....	9	310,219	14	356,095	9	411,832	32	1,078,146
1900.....	16	356,639	11	492,223	12	599,277	42	1,548,139

<sup>a</sup> Experimental pack.

## PACK OF CANNED SALMON IN ALASKA, BY DISTRICTS, FROM THE INCEPTION OF THE INDUSTRY—Continued.

Year.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.	Canneries.	Pack.
		<i>Cases.</i>		<i>Cases.</i>		<i>Cases.</i>		<i>Cases.</i>
1901.....	21	735,449	13	562,142	21	719,243	55	2,016,804
1902.....	26	906,676	12	583,600	26	1,016,458	64	2,536,824
1903.....	21	642,205	12	417,175	27	1,186,730	60	2,246,210
1904.....	12	569,003	11	409,485	32	885,268	55	1,953,756
1905.....	13	433,607	9	371,755	25	1,089,151	47	1,894,516
1906.....	20	767,285	8	478,024	19	978,735	47	2,219,044
1907.....	22	887,503	8	522,836	18	759,534	48	2,169,873
1908.....	23	1,011,648	8	425,721	19	1,160,004	50	2,606,973
1909.....	19	852,870	8	391,054	18	1,151,553	45	2,395,477
1910.....	23	1,066,399	10	432,517	19	914,138	52	2,413,054
Total.....		10,647,220		19,195,739		12,726,712		33,569,671

## PACK OF CANNED SALMON IN ALASKA FROM 1898 TO 1910, BY SPECIES.

Year.	Coho, or silver.		Dog, or chum.		Humpback, or pink.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
1898.....	74,741		5,484		100,000	
1899.....	39,402		1,931		149,159	
1900.....	50,984		30,012		232,022	
1901.....	65,509		47,464		541,427	
1902.....	87,724		159,849		539,602	
1903.....	120,506		35,052		355,799	
1904.....	85,741		21,178		299,333	
1905.....	67,394	\$215,875	41,972	\$113,056	168,597	\$498,191
1906.....	109,141	382,109	254,812	730,235	348,297	1,046,951
1907.....	85,199	337,384	184,173	547,757	561,973	1,799,250
1908.....	68,827	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

Year.	King, or spring.		Red, or sockeye.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
1898.....	1,807		782,991		965,097	
1899.....	23,400		804,254		1,078,146	
1900.....	37,715		1,197,906		1,548,139	
1901.....	43,069		1,319,335		2,016,804	
1902.....	54,193		1,685,706		2,398,824	
1903.....	47,066		1,687,244		2,246,210	
1904.....	41,956		1,505,548		1,953,756	
1905.....	42,125	\$141,959	1,574,428	\$5,335,547	1,894,516	\$6,394,671
1906.....	30,834	116,222	1,475,931	5,620,875	2,219,044	7,896,392
1907.....	43,424	181,718	1,255,113	5,915,227	2,169,873	8,781,366
1908.....	23,730	99,867	1,651,770	7,524,251	2,606,973	10,185,783
1909.....	48,034	207,624	1,705,292	7,616,550	2,395,477	9,438,152
1910.....	49,221	214,802	1,450,267	7,774,390	2,413,054	11,086,322

## PACK OF CANNED SALMON IN BRITISH COLUMBIA SINCE THE INCEPTION OF THE INDUSTRY, BY WATERS.

Year.	Number of canneries.	Fraser River.	Skeena River.	Rivers inlet.	Nass River.	Vancouver Island.	Northern miscellaneous waters.	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	10,693					61,093
1880.	9	45,155	19,494					64,649
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		163,458
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	11,293		4,200		204,083
1888.	21	76,616	70,106	29,000	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	11,060	6,000	411,257
1891.	38	177,989	77,057	36,500	11,058	3,850	8,057	314,511
1892.	36	98,491	90,750	14,955	26,100	4,300	14,125	248,721
1893.	44	474,237	59,021	35,416	15,680	8,098	17,750	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	3,300	3,000	587,692
1896.	56	375,344	97,863	107,473	14,649	7,903	14,550	617,782
1897.	65	879,776	61,310	40,090	20,000	13,807	12,200	1,027,183
1898.	67	264,225	89,102	105,362	20,000	12,539	10,323	492,551
1899.	68	527,396	112,502	76,428	19,442	12,150	17,541	705,519
1900.	69	331,371	135,421	74,196	20,200	17,102	28,247	606,540
1901.	78	998,913	125,845	66,794	15,004	11,005	29,651	1,247,212
1902.	69	327,197	155,936	76,298	23,212	16,432	34,086	627,161
1903.	61	237,162	98,688	69,389	18,094	12,360	38,154	473,847
1904.	51	128,903	154,869	94,292	29,587	14,888	43,355	465,894
1905.	64	846,998	114,085	83,122	32,725	50,975	39,917	1,167,822
1906.	59	226,744	162,420	122,878	32,534	40,511	44,343	629,460
1907.	42	163,116	159,255	94,064	31,832	76,616	22,576	547,459
1908.	50	89,184	209,177	75,090	46,998	83,918	62,026	566,303
1909.		567,230	142,740	91,014	40,990	58,954	92,122	993,060
1910.		223,148	222,035	129,398	39,720	53,964	92,565	760,830
Total.		9,402,095	2,891,557	1,623,718	579,494	560,794	638,098	15,695,756

## 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 1909.

## PACK OF SALTED SALMON IN ALASKA, 1868 TO 1909.

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	83,300		
1881.	1,760	15,840				
1882.	5,800	53,010				

## PACK OF SALTED SALMON IN ALASKA, 1868 TO 1909—Continued.

Year.	Salmon.		Salmon bellies.		Dry-salted salmon.	
	Barrels.	Value.	Barrels.	Value.	Pounds.	Value.
1883.....	7,251	\$63,259				
1884.....	6,106	54,954				
1885.....	3,230	29,070				
1886.....	4,861	43,749				
1887.....	3,978	35,502				
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.....	21,005	120,083				
1894.....	32,011	176,060				
1895.....	11,234	\$5,494				
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	238,800	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	1,399	11,355	7,289,234	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.....	31,472	266,713	7,600	85,994	20,800	416
1909.....	28,423	183,400	1,970	25,358	71,600	1,038
1910.....	12,779	111,634	1,626	19,007	22,178	554
Total.....	517,231	3,883,988	28,231	299,926	10,388,284	168,033

## 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:

NUMBER OF TIERCES OF MILD-CURED SALMON PACKED ON THE PACIFIC COAST FROM 1897 TO 1910.<sup>a</sup>

Year.	Alaska.	British Columbia.	Puget Sound, Wash.	Grays Harbor, Wash.	Willapa Harbor, Wash.	Columbia River, (both sides).	Coastal rivers, Ore.	Eel River, Cal.	Sacramento River, Cal.	Monterey Bay, Cal.	Total.
1897.....						400					400
1898.....	70					700					770
1899.....	130				375	1,250					1,755
1900.....						1,275			950		2,225
1901.....	67		600			3,090		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	75		7,922	1,398		5,516	75	22,408
Total.....	10,375	8,383	12,703	537	129	68,948	4,041	595	37,822	3,746	147,279

<sup>a</sup> 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.

## IX. 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, and in 1900 two islands of the Samoan group were acquired by a partition agreement with Great Britain and Germany. The trade with the Philippine 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.		All other, fresh or cured.
	Pounds.	Value.	
1907.....	1,126,217	\$80,286	<i>Value.</i> \$64,232
1908.....	965,020	89,025	67,143
1909.....	1,440,410	121,716	73,848
1910.....	1,381,398	113,526	72,194

### PORTO RICO.

Of recent years, the following shipments of domestic salmon have been made to this island:

Year.	Canned.		All other, fresh or cured.
	Pounds.	Value.	
1907.....	604,627	\$53,916	<i>Value.</i> \$2,893
1908.....	512,038	48,195	1,425
1909.....	381,171	34,777	3,810
1910.....	511,055	43,494	6,243

## 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, however, the United States has secured the advantage. The following table shows the extent of the trade, which is made up almost entirely of salted or pickled salmon:

Year and country.	Pickled salmon.		Fresh salmon.	
	Pounds.	Value.	Pounds.	Value.
1905.				
United States.....	1,415	\$71		
Japan.....	16,526	1,221		
1907.				
United States.....	1,000	1,000		
Japan.....	19,862	1,601		
1908.				
United States.....	7,406	623	900	\$92
Japan.....	6,119	400		
1909.				
United States.....	10,779	740		
Japan.....	3,295	344		
1910.				
United States.....	10,000	1,000		
Japan.....	10,000	1,000		

## 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.

## X. 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 and Japan. The latter has not yet become much of a factor in the canned-salmon market, though she will as her fishing operations are extended. 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.

### EXPORTS OF 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, taking about nine-tenths of all sent to European ports. 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, Panama, and the British West Indies, in the order named. In South America, Peru, Argentina, and British Guiana were the leading markets in 1910. In 1908 Chile imported 4,196,060 pounds; in 1909 the importations dropped to 97,993 pounds, but increased in 1910 to 1,556,629 pounds. In Asia, Hongkong and China import canned salmon, although neither buys great quantities. The islands of the Pacific and Indian Oceans are large consumers. British Australasia took 5,474,818 pounds, valued at \$551,312, in 1910, and other good customers were the British East Indies and British, French, and German Oceania. 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.

The following table shows the yearly exports of domestic canned salmon and the countries to which exported for the period from 1900 to 1910, inclusive:

## EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1910.

Countries.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>North America:</b>						
<b>Dominion of Canada—</b>						
Nova Scotia, New Brunswick, etc.					10	\$1
Quebec, Ontario, Manitoba, etc.	24,137	\$2,514	101	\$10	22,442	2,493
British Columbia.	382,811	33,454	1,725,251	223,230	1,866,272	159,682
<b>Newfoundland and Labrador.</b>					810	73
Miquelon, Langley, etc.	240	29				
Mexico.	162,785	14,806	160,425	14,967	387,905	31,041
<b>Central American States—</b>						
British Honduras.	16,488	1,604	19,331	2,054	23,467	2,370
Costa Rica.	70,458	6,114	69,135	6,768	70,036	5,954
Guatemala.	2,666	277	11,361	1,151	15,325	1,324
Honduras.	7,193	677	7,681	776	4,924	498
Nicaragua.	26,647	2,684	21,543	2,256	17,125	1,635
Salvador.	550	60	550	55	1,828	161
Bermuda.	59,672	6,158	63,786	7,398	76,456	7,768
<b>West Indies—</b>						
British.	259,249	25,651	315,209	33,635	242,099	24,191
Danish.	9,085	873	8,612	929	14,526	1,390
Dutch.	13,303	1,610	16,591	1,944	13,112	1,506
French.	432	45	1,084	127	960	96
Haiti.	468	44	595	65	920	88
Santo Domingo.	2,764	297	1,899	192	1,531	140
Cuba.	8,406	786	20,407	1,883	20,196	1,618
Porto Rico.	4,394	390				
<b>South America:</b>						
Argentina.	104,367	8,822	127,751	10,916	88,622	7,816
Bolivia.			240	37	15,110	1,147
Brazil.	637,638	76,152	207,033	23,506	87,800	8,350
Chile.	647,328	61,800	645,323	64,059	384,766	28,529
Colombia.	92,868	9,075	97,163	9,975	86,046	7,451
Ecuador.	50,387	5,631	10,387	1,037	24,937	1,868
<b>Guiana—</b>						
British.	168,718	16,197	136,192	14,807	146,502	14,604
Dutch.	43,096	3,553	61,334	6,542	92,971	8,718
French.	3,240	299	2,248	261	8,316	850
Peru.	75,621	7,392	124,823	12,526	313,476	24,444
Uruguay.	2,837	285	9,408	933	1,016	104
Venezuela.	42,125	3,712	66,911	6,913	42,436	4,026
<b>Europe:</b>						
Austria-Hungary.	2,208	309			250	25
<b>Azores, and Madeira Islands.</b>						
Belgium.	31,118	3,186	5,800	600	336	39
Denmark.	24,492	2,455	3,168	326	860	92
France.	22,544	2,130	61,790	6,565	23,956	1,889
Germany.	16,110	1,431	77,921	7,567	10,905	1,068
Italy.	120	10	2,496	244		
Malta, Gozo, etc.			141	21		
Netherlands.	3,048	299	288	30	4,800	400
Portugal.	19,776	1,779			336	35
<b>Russia, on Baltic and White Seas.</b>					8,400	932
Spain.			1,536	151	675	67
Sweden and Norway.	1,168	112	720	70	72	8
Switzerland.	24	3				
United Kingdom.	18,820,453	1,870,004	31,722,853	3,219,196	30,632,961	2,620,729
<b>Asia and Oceania:</b>						
Aden.	216	22				
Chinese Empire.	40,960	4,255	149,295	15,263	117,043	8,716
China—Russian.			20,634	2,058	9,460	772
Hongkong.	63,210	6,488	78,960	8,056	551,860	40,261
Japan.	11,560	1,200	285,036	28,990	14,578	1,220
Korea.			1,105	115	2,208	179
Russia, Asiatic.			1,495	145	6,572	521
Turkey in Asia.			144	16		
<b>East Indies—</b>						
British.	538,180	55,976	312,805	31,528	733,685	56,912
Dutch.			3,960	400	161,940	12,093

## EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1910—Continued.

Countries.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Asia and Oceania—Continued.</b>						
British Australasia.....	2,804,004	\$283,110	3,442,085	\$343,540	7,131,641	\$599,671
British Oceania.....					151,998	10,555
French Oceania.....	103,940	10,732	118,355	12,026	142,570	11,355
German Oceania.....			8,480	874	12,900	997
Guam <sup>a</sup> .....	480	50				
Hawaii <sup>b</sup> .....	860,682	84,808				
Philippine Islands.....	1,160	120	39,316	3,925	718,876	46,712
Tonga, Samoa, and all other.....	112,380	11,646	73,040	7,168		
Tutuila.....					21,176	1,451
<b>Africa:</b>						
British Africa.....	632,012	57,887	816,433	79,063	2,581,088	219,233
Canary Islands.....			656	66		
French Africa.....	4,320	421	4,080	415	200	21
Liberia.....	312	30				
Portuguese Africa.....	47,812	4,696	35,384	3,459	52,726	4,931
All other Africa.....					6,200	582
<b>Total.....</b>	<b>27,082,370</b>	<b>2,693,648</b>	<b>41,289,500</b>	<b>4,230,271</b>	<b>47,173,114</b>	<b>3,991,402</b>
<b>RECAPITULATION.</b>						
Europe.....	18,941,109	1,881,725	31,877,663	3,234,862	30,683,551	2,625,284
North America.....	1,051,808	98,064	2,443,561	297,440	2,780,844	242,029
South America.....	1,868,225	192,918	1,577,013	160,862	1,291,998	107,907
Asia.....	654,126	67,941	853,434	86,571	1,597,346	120,674
Oceania.....	3,882,046	390,466	3,681,276	367,533	8,179,161	670,741
Africa.....	684,456	62,534	856,553	83,003	2,640,214	224,767

Countries.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>North America:</b>						
Dominion of Canada.....					290,850	\$21,121
Nova Scotia, New Brunswick, etc.....			40	\$4		
Quebec, Ontario, Manitoba, etc.....	43,107	\$5,171	153,697	9,558		
British Columbia.....	3,246,982	287,212	1,086,370	95,021		
Newfoundland and Labrador.....					240	25
Mexico.....	356,951	26,787	538,949	38,691	493,371	40,697
<b>Central American States—</b>						
British Honduras.....	24,187	2,316	28,044	2,534	28,959	2,534
Costa Rica.....	36,806	3,072	58,823	4,668	93,580	8,179
Guatemala.....	3,527	295	15,732	1,131	20,498	1,583
Honduras.....	7,455	716	12,428	1,090	14,434	1,221
Nicaragua.....	20,089	1,771	28,159	2,394	42,103	3,146
Panama <sup>d</sup> .....			18,466	1,671	112,320	9,211
Salvador.....	3,360	252	4,304	326	2,296	184
Bermuda.....	64,264	6,792	36,022	3,778	33,821	3,634
<b>West Indies—</b>						
British.....	418,636	38,434	409,219	37,389	366,747	34,262
Danish.....	9,647	903	7,442	752	9,474	965
Dutch.....	22,981	2,480	17,878	1,999	13,051	1,419
French.....	892	92	984	86	660	64
Haiti.....	2,496	238	2,115	228	1,611	164
Santo Domingo.....	3,290	335	7,660	719	4,855	452
Cuba.....	21,636	1,789	24,677	2,324	36,903	3,373
<b>South America:</b>						
Argentina.....	72,445	6,808	66,275	6,612	120,586	11,263
Bolivia.....	384	40	672	80	170	17
Brazil.....	88,740	8,481	114,033	11,742	188,134	17,908
Chile.....	1,044,490	59,354	1,218,266	72,205	821,171	56,160
Colombia.....	149,272	11,194	118,269	10,104	81,239	7,491
Ecuador.....	45,126	3,115	59,266	4,041	121,894	7,941
<b>Guiana—</b>						
British.....	172,300	16,829	112,360	11,226	135,424	13,617
Dutch.....	52,138	4,959	78,464	8,280	45,231	4,797
French.....	18,752	1,805	11,169	1,307	11,684	1,228
Peru.....	89,440	7,309	214,982	15,530	151,832	11,369
Uruguay.....	2,140	185	2,246	225	3,250	325
Venezuela.....	20,987	1,839	59,857	5,981	28,005	2,825

<sup>a</sup> Guam was annexed to the United States in 1898.

<sup>b</sup> Hawaii was annexed to the United States in 1898.

<sup>c</sup> Tutuila was acquired in 1898.

<sup>d</sup> Panama separated from Colombia in 1903.

## EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1910—Continued.

Countries.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Europe:</b>						
Austria-Hungary.....	400	\$25	384	\$36		
Azores, and Madeira Is-lands.....			48	5	384	\$41
Belgium.....	788	73	480	53	9,760	1,019
Denmark.....	80	8	100	8		
France.....	2,400	260	4,800	600	21,995	2,262
Germany.....	32,268	2,470	18,790	1,747	1,210	122
Italy.....	1,120	114	5,232	556	5,760	465
Netherlands.....	1,072	124	4,072	414	3,250	349
Norway <sup>a</sup> .....	96	10	1,440	150		
Spain.....	3,108	316	1,400	140	2,700	249
Sweden <sup>a</sup> .....			70	7	96	10
Switzerland.....	240	24				
United Kingdom.....	35,369,196	3,121,774	33,555,080	3,505,102	21,026,108	1,872,992
<b>Asia and Oceania:</b>						
Aden.....					2,520	180
Chinese Empire.....	166,522	13,602	218,142	18,779	249,386	17,587
China—Russian.....	53,368	5,111	40,000	3,932		
Hongkong.....	814,008	56,225	190,367	11,870	518,423	36,635
Japan.....	13,536	1,015	11,817,343	841,461	2,437,484	162,524
Korea.....	2,152	179	3,888	292	2,572	186
Russia, Asiatic.....	48	4	482	41		
Siam.....					384	31
<b>East Indies—</b>						
British.....	473,740	39,367	636,320	44,669	673,897	55,599
French.....					720	69
Dutch.....	235,680	19,256	119,216	9,018	109,476	7,893
All other Asia.....	240	24	10	1		
British Australasia.....	4,268,652	360,720	3,136,728	290,307	4,075,094	389,518
British Oceania.....	36,018	2,290	28,670	1,911	42,624	3,645
French Oceania.....	153,696	12,179	185,848	15,305	133,204	11,414
German Oceania.....	451,824	26,614	340,464	19,326	324,888	20,651
Philippine Islands.....	601,324	42,702	206,896	14,970	681,636	42,700
<b>Africa:</b>						
British Africa.....	1,454,226	127,021	794,758	77,911	1,259,269	121,120
Canary Islands.....	144	15			900	90
French Africa.....	2,220	207	3,200	320	4,800	460
Liberia.....	384	41	140	14	140	14
Portuguese Africa.....	167,964	17,043	137,640	13,906	200,826	20,365
Turkey in Africa—Egypt.....			388	30	2,448	204
All other Africa.....	5,200	506				
<b>Total.....</b>	<b>50,353,334</b>	<b>4,350,791</b>	<b>55,924,278</b>	<b>5,224,598</b>	<b>35,066,555</b>	<b>3,035,469</b>
<b>RECAPITULATION.</b>						
Europe.....	35,410,768	3,125,197	33,591,896	3,508,818	21,071,263	1,877,509
North America.....	4,285,406	378,655	2,446,023	204,363	1,565,773	132,134
South America.....	1,756,214	121,918	2,055,859	147,333	1,798,828	134,941
Asia.....	1,759,294	134,783	12,995,708	930,051	3,994,862	280,704
Oceania.....	5,511,514	444,505	3,898,606	341,849	5,257,446	467,928
Africa.....	1,630,138	145,733	936,126	92,181	1,468,383	142,253

Countries.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>North America:</b>						
Dominion of Canada.....	236,664	\$14,814	793,247	\$65,356	7,320	\$587
Mexico.....	699,002	56,747	877,989	73,582	1,068,824	94,278
<b>Central American States—</b>						
British Honduras.....	43,155	3,639	36,020	3,214	32,632	3,080
Costa Rica.....	106,879	8,968	148,157	12,260	138,421	12,260
Guatemala.....	26,925	1,989	31,242	2,535	29,777	2,319
Honduras.....	15,148	1,319	23,508	2,048	33,955	3,202
Nicaragua.....	39,940	3,022	41,106	3,335	27,721	2,302
Panama <sup>b</sup> .....	308,624	25,965	443,687	38,642	487,079	46,883
Salvador.....	2,880	197	4,092	331	5,854	467
Bermuda.....	24,679	2,406	29,139	2,711	25,183	2,579
<b>West Indies—</b>						
British.....	471,814	43,368	515,664	46,510	687,620	64,275
Danish.....	9,713	1,011	13,336	1,340	15,604	1,658
Dutch.....	11,643	1,230	24,275	2,428	21,368	2,234
French.....	200	20	100	9	96	11
Haiti.....	2,953	291	914	91	864	85
Santo Domingo.....	11,688	1,137	9,278	891	13,887	1,371
Cuba.....	57,441	5,823	60,904	5,855	57,970	5,288

<sup>a</sup> Sweden and Norway separated in 1905.<sup>b</sup> Panama separated from Colombia in 1903.

## EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1910—Continued.

Countries.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>South America:</b>						
Argentina.....	200,206	\$20,339	262,667	\$25,801	394,306	\$30,759
Bolivia.....	1,720	181	18,951	1,577	11,762	1,217
Brazil.....	188,278	18,975	150,592	14,880	146,826	14,055
Chile.....	4,462,147	154,396	4,168,876	286,229	4,196,060	295,194
Colombia.....	51,987	4,667	41,964	3,850	51,786	4,880
Ecuador.....	80,876	5,855	203,930	15,599	174,920	12,486
Guiana—						
British.....	120,016	12,391	116,120	12,202	140,514	16,014
Dutch.....	65,654	6,246	66,530	6,494	59,390	6,053
French.....	12,650	1,305	17,950	1,829	23,218	2,599
Peru.....	269,858	20,342	551,160	40,431	316,701	22,229
Uruguay.....	10,436	1,075	16,124	1,546	17,934	1,693
Venezuela.....	35,775	3,280	44,826	4,336	37,583	3,564
<b>Europe:</b>						
Austria-Hungary.....	1,260	135	1,220	112		
Azores, and Madeira Is- lands.....			883	89		
Belgium.....	500	60				
Denmark.....	40,200	4,112				
France.....	29,980	3,000			10,575	961
Germany.....	4,896	420	9,150	976	45,977	4,572
Italy.....	4,920	413	10,230	861		
Malta, Gozo, etc.....	420	36				
Netherlands.....	8,280	959	11,098	850		
Norway.....	40,200	3,981			17,670	1,860
Portugal.....					7,377	731
Spain.....	1,930	193	3,208	303	27,900	2,735
Sweden.....	10,000	1,050			10,500	1,000
United Kingdom.....	31,918,816	2,739,284	7,720,991	788,245	13,200,887	1,193,516
<b>Asia and Oceania:</b>						
Aden.....	480	50				
Chinese Empire.....	32,189	2,321	59,110	4,386	23,126	2,154
Hongkong.....	105,581	7,652	122,482	9,959	144,624	13,367
Japan.....	9,051	713	22,881	1,775	2,472	269
Korea.....	1,632	128	1,500	129	1,156	126
Russia, Asiatic.....	1,440	102	770	84	582	65
Siam.....			1,440	90	3,264	282
Turkey in Asia.....	750	90			290	30
East Indies—						
British.....	477,234	38,263	1,043,618	75,001	702,169	59,254
French.....	16,262	1,162			720	75
Dutch.....	134,796	9,692	167,590	13,940	126,168	11,286
British Australasia.....	5,230,076	426,814	5,451,378	462,648	3,654,756	330,029
British Oceania.....	11,952	923	40,080	2,958	14,669	1,278
French Oceania.....	125,998	10,274	137,472	11,494	185,608	15,732
German Oceania.....	214,920	14,503	156,939	11,267	105,096	8,345
Philippine Islands.....	757,400	56,743	933,288	63,838	1,171,834	84,533
<b>Africa:</b>						
British Africa.....	1,029,787	87,881	504,848	47,748	454,892	43,883
Canary Islands.....	782	76	144	17		
French Africa.....	144	14			48	6
German Africa.....			600	60		
Liberia.....					5,079	482
Portuguese Africa.....	161,178	16,001	104,837	10,307	83,640	8,325
Turkey in Africa—Egypt.....	2,400	200				
<b>Total.....</b>	<b>45,944,414</b>	<b>3,847,943</b>	<b>25,218,105</b>	<b>2,183,049</b>	<b>28,226,045</b>	<b>2,438,518</b>
<b>RECAPITULATION.</b>						
Europe.....	32,061,402	2,753,643	7,756,780	791,436	13,321,086	1,205,375
North America.....	2,069,357	171,946	3,052,658	261,138	2,654,175	242,870
South America.....	3,499,603	249,052	5,650,690	414,774	5,571,000	410,743
Asia.....	779,415	60,173	1,419,391	105,364	1,004,571	86,908
Oceania.....	6,340,346	509,257	6,719,157	552,205	5,131,554	439,017
Africa.....	1,194,291	103,872	610,429	58,132	543,659	52,696

<sup>a</sup> Sweden and Norway separated in 1905.

## EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1910—Continued.

Countries.	1909		1910	
	Pounds.	Value.	Pounds.	Value.
<b>North America:</b>				
Dominion of Canada.....	229,934	\$21,773	99,022	\$7,570
Mexico.....	756,052	58,124	697,217	50,782
Central American States—				
British Honduras.....	35,195	3,261	28,310	2,606
Costa Rica.....	118,266	9,828	157,946	12,237
Guatemala.....	13,957	1,117	16,821	1,361
Honduras.....	14,112	1,179	16,240	1,361
Nicaragua.....	21,534	1,656	28,116	2,066
Panama <sup>a</sup> .....	528,228	50,940	482,717	45,404
Salvador.....	9,184	754	5,498	423
Bermuda.....	23,774	2,401	26,484	2,383
West Indies—				
British.....	358,114	36,644	548,561	53,939
Danish.....	14,848	1,568	14,655	1,512
Dutch.....	16,621	1,883	9,838	1,160
French.....	564	69	196	18
Haiti.....	2,184	203	2,038	185
Santo Domingo.....	13,258	1,306	22,120	2,058
Cuba.....	53,580	5,277	68,737	6,486
<b>South America:</b>				
Argentina.....	259,192	17,030	229,461	15,690
Bolivia.....	6,184	647	33,502	2,941
Brazil.....	176,150	17,109	267,354	28,241
Chile.....	97,493	6,918	1,556,629	92,259
Colombia.....	58,518	5,767	114,274	9,494
Ecuador.....	139,868	10,952	272,411	16,487
Guiana—				
British.....	255,039	25,981	222,398	22,133
Dutch.....	100,259	9,906	57,509	6,297
French.....	22,816	2,164	17,724	1,784
Peru.....	295,885	22,640	367,676	24,817
Uruguay.....	15,140	1,330	11,730	1,167
Venezuela.....	34,618	3,058	43,144	4,887
<b>Europe:</b>				
Azores, and Madeira Islands.....			100	12
Denmark.....	192	18		
France.....			1,878	223
Germany.....	17,096	1,757	424	51
Italy.....	5,148	500		
Netherlands.....	11,612	1,017	9,744	1,020
Russia on Baltic and White Seas.....	2,050	205	11,580	1,210
Spain.....	3,160	311	5,100	506
Sweden <sup>b</sup> .....	20,000	1,940		
United Kingdom.....	22,969,218	2,201,446	44,737,072	4,709,160
<b>Asia and Oceania:</b>				
Chinese Empire.....	53,448	4,887	28,522	2,688
China—British leased territory.....			3,120	345
Hongkong.....	103,448	9,707	121,558	12,234
Japan.....	15,078	1,245	3,716	352
Korea.....	2,652	266	2,016	220
Russia, Asiatic.....	5,380	394		
Siam.....	14,880	1,025	1,008	93
East Indies—				
British.....	989,592	85,094	1,246,751	101,619
French.....	528	56		
Dutch.....	201,696	16,908	189,604	15,920
All other Asia.....			480	45
British Australasia.....	5,704,960	590,094	5,474,818	551,312
British Oceania.....	109,936	7,437	66,826	5,160
French Oceania.....	162,336	14,570	241,200	22,589
German Oceania.....	279,792	18,311	369,576	22,554
Philippine Islands.....	1,126,470	74,792	5,425,404	396,604
<b>Africa:</b>				
British Africa.....	484,196	48,220	357,051	37,707
Canary Islands.....	510	51		
German Africa.....	350	36	910	92
Portuguese Africa.....	162,314	14,604	151,470	14,674
Turkey in Africa—Egypt.....			1,440	129
<b>Total.....</b>	<b>36,117,109</b>	<b>3,416,436</b>	<b>63,869,696</b>	<b>6,314,258</b>
<b>RECAPITULATION.</b>				
Europe.....	23,028,476	2,207,194	44,765,898	4,712,182
North America.....	2,209,405	198,043	2,224,516	191,551
South America.....	1,461,662	123,502	3,193,812	226,197
Asia.....	1,386,702	119,582	1,596,775	133,516
Oceania.....	7,383,494	705,204	11,568,824	998,219
Africa.....	617,370	62,911	510,871	52,593

<sup>a</sup> Panama separated from Colombia in 1903.<sup>b</sup> Sweden and Norway separated in 1898.

The table following shows for the past 11 years the customs districts from which the canned salmon was exported. 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, however, the exports from Puget Sound exceeded those from San Francisco. 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, 1900 TO 1910.

Customs districts from which exported.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Atlantic ports:</b>						
Baltimore, Md.....	648	\$65	334,580	\$33,053	324	\$34
Bangor, Me.....					10	1
Boston and Charlestown, Mass.....	222,770	20,488	192,676	27,372	172,110	20,224
New York, N. Y.....	3,485,326	340,538	7,900,104	847,294	4,365,074	407,009
Philadelphia, Pa.....	110,500	9,100	77,000	9,050		
Savannah, Ga.....	1,012	81	582	72	480	60
St. Johns, Fla.....					75	7
Norfolk and Portsmouth, Va.....			269,380	30,888		
Charleston, S. C.....	400	30				
<b>Gulf ports:</b>						
Key West, Fla.....			400	43		
Mobile, Ala.....	10,536	958	7,340	816	11,032	1,055
New Orleans, La.....	28,332	2,472	47,685	4,567	39,084	3,910
<b>Mexican border ports:</b>						
Arizona.....	6,253	706	18,104	1,869	23,879	2,350
Brazos de Santiago, Tex.....	168	21	816	115	300	29
Paso del Norte, Tex.....	23,843	2,134	1,220	98	164,167	13,119
<b>Pacific ports:</b>						
Alaska.....	289	38	4,859	291	3,636	558
Hawaii.....					48	4
Puget Sound, Wash.....	1,477,232	144,059	2,271,306	282,441	9,864,259	872,912
San Diego, Cal.....	3,094	220	3,574	293	6,202	487
San Francisco, Cal.....	21,611,030	2,164,904	30,014,055	2,983,982	32,327,572	2,654,020
Willamette, Oreg.....	76,800	5,320	43,318	3,517	155,500	11,250
<b>Northern border and Lake ports:</b>						
Detroit, Mich.....			26,200	2,700		
Minnesota, Minn.....			101	10		
Vermont, Vt.....	129	12				
Duluth, Minn.....	24,000	2,500	16,200	1,800	39,312	4,368
Memphremagog, Vt.....	17	2			50	5
<b>Total.....</b>	<b>27,082,370</b>	<b>2,693,648</b>	<b>41,289,500</b>	<b>4,230,271</b>	<b>47,173,114</b>	<b>3,991,402</b>
<b>RECAPITULATION.</b>						
<b>Atlantic ports.....</b>	<b>3,820,656</b>	<b>370,302</b>	<b>8,834,322</b>	<b>947,729</b>	<b>4,538,073</b>	<b>427,335</b>
<b>Gulf ports.....</b>	<b>38,868</b>	<b>3,430</b>	<b>55,425</b>	<b>5,426</b>	<b>50,116</b>	<b>4,965</b>
<b>Mexican border ports.....</b>	<b>30,264</b>	<b>2,861</b>	<b>20,140</b>	<b>2,082</b>	<b>188,346</b>	<b>15,498</b>
<b>Pacific ports.....</b>	<b>23,168,445</b>	<b>2,314,544</b>	<b>32,337,112</b>	<b>3,270,521</b>	<b>42,357,217</b>	<b>3,539,231</b>
<b>Northern border and Lake ports.....</b>	<b>24,137</b>	<b>2,514</b>	<b>42,501</b>	<b>4,510</b>	<b>39,362</b>	<b>4,373</b>



## EXPORTS, BY CUSTOMS DISTRICTS, OF CANNED SALMON, 1900 TO 1910—Continued.

Customs districts from which exported.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
<b>Northern border and Lake ports:</b>						
Huron, Mich.....	177,734	\$13,107	7,000	\$570		
Minnesota, Minn.....			48	5		
Oswegatchie, N. Y.....			780	71	400	\$46
Vermont, Vt.....	35	3				
<b>Total.....</b>	<b>45,944,414</b>	<b>3,847,943</b>	<b>25,218,105</b>	<b>2,183,049</b>	<b>28,226,045</b>	<b>2,438,518</b>
<b>RECAPITULATION.</b>						
Atlantic ports.....	3,277,571	318,321	2,314,535	227,779	2,334,663	227,113
Gulf ports.....	127,255	10,910	165,050	14,450	206,120	19,245
Mexican border ports.....	455,413	36,130	570,343	47,775	723,689	65,119
Pacific ports.....	41,900,406	3,469,472	22,160,349	1,892,398	24,961,173	2,126,995
Northern border and Lake ports.....	177,769	13,110	7,828	646	400	46

Customs districts from which exported.	1909		1910	
	Pounds.	Value.	Pounds.	Value.
<b>Atlantic ports:</b>				
Baltimore, Md.....		192		\$22
Bangor, Me.....		216		25
Boston and Charlestown, Mass.....		162,024		16,837
New York, N. Y.....		3,848,870		390,266
Philadelphia, Pa.....		405		44
Norfolk and Portsmouth, Va.....		32,100		2,739
Perth Amboy, N. J.....				214
<b>Gulf ports:</b>				
Galveston, Tex.....		876		88
Key West, Fla.....		40		4
Mobile, Ala.....		13,565		1,247
New Orleans, La.....		92,537		7,615
Tampa, Fla.....				66
<b>Mexican border ports:</b>				
Arizona.....		27,735		2,733
Brazos de Santiago, Tex.....		138		13
Corpus Christi, Tex.....		26,220		2,450
Paso del Norte, Tex.....		150,636		14,850
Saluria, Tex.....		14,399		1,528
<b>Pacific ports:</b>				
Alaska.....		66,020		6,263
Los Angeles, Cal.....		13,370		934
Puget Sound, Wash.....		7,858,552		716,370
San Diego, Cal.....		5,546		460
San Francisco, Cal.....		23,761,656		2,247,957
Willamette, Oreg.....				78
<b>Northern border and Lake ports:</b>				
Detroit, Mich.....		42,000		3,990
North and South Dakota.....		12		1
Duluth, Minn.....				33,200
Montana and Idaho.....				600
<b>Total.....</b>	<b>36,117,109</b>	<b>3,416,436</b>	<b>63,860,696</b>	<b>6,314,258</b>
<b>RECAPITULATION.</b>				
Atlantic ports.....	4,043,807	409,933	3,003,430	306,122
Gulf ports.....	107,018	8,954	118,559	9,554
Mexican border ports.....	219,128	21,574	254,717	21,503
Pacific ports.....	31,705,144	2,971,984	60,450,190	5,974,196
Northern border and Lake ports.....	42,012	3,991	33,800	2,883

## EXPORTS OF FRESH AND CURED SALMON.

The following table shows, by countries, the value of the exports of fresh and cured salmon for the period 1900 to 1910, inclusive. As with the canned salmon, the greater part of these exports go to European countries, Germany taking by far the largest quantity. A small portion of this is salmon caught in eastern waters.

## EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1910.

Exported to—	1900	1901	1902	1903	1904	1905
<b>North America:</b>						
Bermuda.....	\$88	\$14	\$11	\$21		\$246
British Honduras.....	7	9		22	\$120	94
Dominion of Canada—						
Nova Scotia, New Brunswick, etc.....					418	3
Quebec, Ontario, Manitoba, etc.....	1,516	2,555	1,051	6,083	3,572	7,499
British Columbia.....	80,652	53,922	125,916	53,592	25,913	10,299
<b>Central American States—</b>						
Costa Rica.....	220	703	218	178	340	192
Guatemala.....			27	11	1	208
Honduras.....		5		1	2	26
Nicaragua.....	53	26	30	78	40	75
Panama.....					167	315
Salvador.....		22		7		
Mexico.....	1,350	664	1,925	1,397	1,266	1,136
<b>West Indies</b>						
British.....	943	939	2,348	5,150	3,867	4,999
Cuba.....	129	376	273	114	194	162
Danish.....	12	31	38	84	13	67
Dutch.....	195	167	294	177	197	238
French.....	126	122	315	199	273	100
Haiti.....	181	191	164	54	11	124
Porto Rico.....	1,214					
Santo Domingo.....	998	670	85	57	14	26
<b>South America:</b>						
Argentina.....					143	1,641
Bolivia.....			1,200			
Brazil.....	172	38	449	385	227	1,160
Chile.....	142			70	164	
Colombia.....	116	224	657	141	17	
Ecuador.....			65			15
Guiana.....						
British.....	30	82	30	262	60	161
Dutch.....	400	226	286	11	766	176
French.....	420	200	134	434	251	65
Peru.....	26		27	62	194	112
Venezuela.....	96	42	245	25		108
<b>Europe:</b>						
Azores, and Madeira Islands.....	3				123	85
Belgium.....		1,062	88		4,750	
Denmark.....	378	15,285	16,904	653	2,315	22,952
France.....	180	300			57	
Germany.....	300,291	320,369	470,657	741,634	1,061,944	1,666,787
Greece.....						188
Italy.....						100
Malta, Gozo, etc.....	475	55	280	28		
Netherlands.....	50	184	3,023	4,127	3,105	300
Norway.....				12,765	12,295	7,896
Russia in Europe.....	300					2,574
Spain.....						56
Sweden and Norway <sup>a</sup> .....	7	5,995	5,685			
Sweden.....					1,838	17,776
United Kingdom.....	38,959	1,528		990	8,523	29,355
<b>Asia:</b>						
Chinese Empire.....		400	25	9	54	201
China—Russian.....				15		
East Indies—						
British.....		121	71	30	115	135
Dutch.....					275	
Hongkong.....	507		519	1,840	462	4,797
Japan.....	2,807	14,516	25,228	3,499	476	25,037
Russia—Asiatic.....	10					
<b>Oceania:</b>						
British Australasia.....	39,867	618	33,785	31,503	25,208	21,595
All other British Oceania.....			346	29	27	22
French Oceania.....	1,938	1,729	1,325	1,877	1,838	2,299
German Oceania.....			13	948	977	861
Guam.....	57	3,420				
Hawaii.....	58,870					

<sup>a</sup>Sweden and Norway separated in 1898.

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON,  
1900 TO 1910—Continued.

Exported to—	1900	1901	1902	1903	1904	1905
Oceania—Continued.						
Philippine Islands.....			\$384	\$478	\$13	\$308
Tonga, Samoa, and all other.....	\$636	\$215				
Tutuila.....			10			
Africa:						
British Africa—						
West.....			304			
South.....	170	24	21	12	859	114
French Africa.....	85					
Liberia.....					5	
Total.....	535,276	426,738	694,435	869,352	1,163,489	1,832,655

## RECAPITULATION.

North America.....	\$7,964	60,416	132,704	67,225	36,408	25,809
South America.....	1,702	901	3,063	1,690	1,822	3,438
Europe.....	340,643	344,368	496,637	760,197	1,004,950	1,748,039
Asia.....	3,324	15,037	25,843	5,393	1,382	30,170
Oceania.....	101,388	5,982	35,863	34,835	28,063	25,055
Africa.....	255	24	325	12	864	114

Exported to—	1906	1907	1908	1909	1910
North America:					
Bermuda.....	\$173	\$20	\$23	\$68	\$630
British Honduras.....	14		1,036		
Dominion of Canada—Nova Scotia, New Brunswick, etc.....	32,925	18,785	16,964	21,973	23,559
Central American States—					
Costa Rica.....	46	213	189	217	197
Guatemala.....	40		902	18	62
Honduras.....		92	2,451		
Nicaragua.....	39	27	1,317	31	11
Panama.....	380	2,211	1,878	175	775
Mexico.....	1,231	528	460	199	555
West Indies—					
British.....	1,646	208	975	4,890	3,067
Cuba.....	128	371	104	121	97
Danish.....	30	108	39	165	42
Dutch.....	94	93		49	78
French.....		16	19	14	19
Haiti.....	97	277	678	335	283
Santo Domingo.....	100	255	228	128	313
South America:					
Argentina.....	85	500			
Brazil.....	308			120	3,029
Chile.....	15	20	56		
Colombia.....	105	67	90	22	167
Ecuador.....		391		290	
Guiana—					
British.....	218	5	48	76	823
Dutch.....	287	133	130	271	217
French.....	57	36	75	21	695
Peru.....	1,317	1,163	118	555	
Venezuela.....	208	36			311
Uruguay.....				10	
Europe:					
Azores, and Madeira Islands.....		95			
Belgium.....	114			410	
Denmark.....	36,623	108,269	99,015	81,195	83,580
France.....		130		250	415
Germany.....	1,670,366	1,601,166	1,422,846	1,038,530	1,223,595
Italy.....	137				
Netherlands.....	793	264	2,947		
Norway.....	9,303	11,390	22,104	22,917	45,885
Portugal.....		1,650			
Russia in Europe.....		140		14,735	5,260
Spain.....		55		289	
Sweden.....	32,554	23,469	21,540	23,670	42,725
United Kingdom.....	26,196	48,237	28,083	43,952	66,555
Asia:					
Chinese Empire.....	3,391	293	170	41	89
East Indies—					
British.....	63		66	18	60
Dutch.....					41
Hongkong.....	1,339	687	13	809	10
Japan.....	88,068	18,395	3,592	2,772	90
Korea.....		3			3
Russia, White.....		6			
Turkey in Asia.....					55

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON,  
1900 TO 1910—Continued.

Exported to—	1906	1907	1908	1909	1910
<b>Oceania:</b>					
British Australasia.....	\$15,169	\$23,186	\$26,591	\$25,466	\$22,826
All other British Oceania.....	21		11		89
French Oceania.....	2,154	2,136	1,792	1,528	1,886
German Oceania.....	749	1,112	373	1,229	1,189
Philippine Islands.....	821	12,287		712	2,089
<b>Africa:</b>					
British Africa—South.....	20				1,268
Liberia.....	40				
Portuguese Africa.....			198		
Spanish Africa.....				289	
<b>Total.....</b>	<b>1,927,464</b>	<b>1,878,743</b>	<b>1,648,044</b>	<b>1,288,560</b>	<b>1,532,640</b>
RECAPITULATION.					
North America.....	36,943	23,204	27,263	28,383	29,688
South America.....	2,600	2,351	517	1,365	5,242
Europe.....	1,776,086	1,794,885	1,587,535	1,225,948	1,468,015
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

The exports of domestic fresh and cured salmon from 1900 to 1910, inclusive, are shown below, by customs districts. The greater part of the shipments pass through the New York City customs district:

EXPORTS, BY CUSTOMS DISTRICTS, OF DOMESTIC PICKLED, FRESH, ETC., SALMON,  
1900 TO 1910.

Customs districts from which exported.	1900	1901	1902	1903	1904	1905
<b>Atlantic ports:</b>						
Baltimore, Md.....			\$158			\$8
Bangor, Me.....						3
Belfast, Me.....	\$12	\$17	12	\$19	\$7	
Boston and Charlestown, Mass.....	16		34	52	418	
New York, N. Y.....	346,853	330,805	503,219	766,128	1,102,542	1,757,742
Philadelphia, Pa.....	10			1,151	7	
Portland and Falmouth, Me.....	11	68	16	47	60	79
Savannah, Ga.....	22					
<b>Gulf ports:</b>						
Mobile, Ala.....				30	8	96
New Orleans, La.....		5	143		116	63
<b>Mexican border ports:</b>						
Arizona.....	18	85	416	115		14
Brazos de Santiago, Tex.....				19	4	
Corpus Christi, Tex.....	414	13		30	208	
Paso del Norte, Tex.....	760	67	13		80	206
Saluria, Tex.....		370	1,428	1,063	868	777
<b>Pacific ports:</b>						
Alaska.....	2,377	12,422	293	4,375	1,003	1,184
Oregon, Oreg.....		17,500				
Puget Sound, Wash.....	80,493	55,727	150,906	58,278	29,212	36,145
San Diego, Cal.....	108	19	20	34	73	4
San Francisco, Cal.....	102,666	7,030	36,958	36,331	25,851	27,939
Willamette, Oreg.....					28	1,500
<b>Northern border and Lake ports:</b>						
Champlain, N. Y.....	234	1,464	449	1,542	1,183	2,142
Detroit, Mich.....		742	24		1,393	4,445
Genesee, N. Y.....					26	
Huron, Mich.....	456	121	225	55		
Memphremagog, Vt.....			6	7	24	
Montana and Idaho.....	2	6				6
North and South Dakota.....	523	162	95	36	378	247
Superior, Mich.....						33
Vermont, Vt.....	301	115	20	40		22
<b>Total.....</b>	<b>535,276</b>	<b>426,738</b>	<b>694,435</b>	<b>869,352</b>	<b>1,163,489</b>	<b>1,832,655</b>
RECAPITULATION.						
Atlantic ports.....	346,924	330,890	503,439	767,397	1,103,034	1,757,832
Gulf ports.....		5	143	30	124	159
Mexican border ports.....	1,192	535	1,857	1,227	1,160	997
Pacific ports.....	185,644	92,698	188,177	99,018	56,167	66,772
Northern border and Lake ports.....	1,516	2,610	819	1,680	3,004	6,895

EXPORTS, BY CUSTOMS DISTRICTS, OF DOMESTIC PICKLED, FRESH, ETC., SALMON,  
1900 TO 1910—Continued.

Customs districts from which exported.	1906	1907	1908	1909	1910
<b>Atlantic ports:</b>					
Baltimore, Md.....	\$11			\$31	
Bangor, Me.....			\$7	58	
Belfast, Me.....	15	88		11	\$12
New York, N. Y.....	1,781,330	1,786,105	1,590,757	1,230,436	1,479,625
Philadelphia, Pa.....	105				
Portland and Falmouth, Me.....	15	11,298	14	6	19
<b>Gulf ports:</b>					
Mobile, Ala.....	14		128		
New Orleans, La.....		276	7,098	49	74
<b>Mexican border ports:</b>					
Arizona.....	700	134	13	25	
Brazos de Santiago, Tex.....					5
Paso del Norte, Tex.....	8	260	154		
Salina, Tex.....	80				197
<b>Pacific ports:</b>					
Alaska.....	44,436	451	893	1,091	212
Puget Sound, Wash.....	63,626	44,492	14,370	11,677	22,666
San Diego, Cal.....	44		28	4	12
San Francisco, Cal.....	31,500	28,984	29,112	37,305	27,628
Willamette, Oreg.....				743	3
Hawaii.....				14	
<b>Northern border and Lake ports:</b>					
Buffalo Creek, N. Y.....				3,069	
Cape Vincent, N. Y.....		92			
Champlain, N. Y.....	992	4,333	1,359	2,079	598
Detroit, Mich.....	3,954	1,972	1,667		
Duluth, Minn.....					68
Huron, Mich.....	428		284	891	
Memphremagog, Vt.....					20
Minnesota, Minn.....	10	52	798	59	
Montana and Idaho.....	69	92	45	154	82
North and South Dakota.....	36	3	20		
Vermont, Vt.....	61	161	1,387	858	1,419
<b>Total.....</b>	<b>1,927,464</b>	<b>1,878,743</b>	<b>1,648,044</b>	<b>1,288,560</b>	<b>1,532,640</b>
<b>RECAPITULATION.</b>					
Atlantic ports.....	1,781,476	1,797,411	1,590,778	1,230,542	1,479,656
Gulf ports.....	14	276	7,226	49	74
Mexican border ports.....	788	424	167	25	202
Pacific ports.....	139,606	73,927	44,313	50,834	50,521
Northern border and Lake ports.....	5,580	6,705	5,560	7,110	2,187

## IMPORTS OF FRESH SALMON.

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 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 reciprocity agreement with Canada now before Congress provides for the free entry of fresh fish and would permit the canneries of either country to import salmon as they wished. This agreement, if adopted, will undoubtedly be of considerable importance to the Puget Sound canneries in securing full packs in certain poor years.

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.

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	835	1907.....	113,224	4,131
1894.....	3,872	219	1901.....	27,072	2,030	1908.....	8,880	735
1895.....	14,000	1,403	1902.....	22,353	739	1909.....	41,073	2,346
1896.....	11,799	419	1903.....	6,860	313	1910.....	198,251	10,116

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 PICKLED PACIFIC SALMON, 1886 TO 1909.

Year.	British Columbia.		Japan.		Hongkong.		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
1892.....										
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	206	14,045	456
1899.....	15,875	1,554							a 16,032	a 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	369	18					161,909	11,774
1904.....	282,210	23,319	1,400	52					283,610	23,371
1905.....	282,027	25,384	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	1,671
1910.....	111,645	3,505								

a Includes 157 pounds, valued at \$6, from China.

## XI. SALMON CULTURE.

### 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 Pitt 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 Mr. 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 in 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 State, 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 Korbels station was established about one-half mile above Korbels, 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 State 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  $2\frac{1}{2}$  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. The work of this hatchery was to handle the eggs turned over to it by the United States Fish Commission.

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.

In the fall of 1897 a hatchery was established by the State 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.

Santa Cruz County has had a hatchery at Brookdale for a number of years.

#### OUTPUT.

The following tables show separately the quantity of eggs, fry, etc., distributed by the United States Fish Commission and the State since the inception of the work. The large quantity of eggs shown by the Commission 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 OWNED BY THE UNITED STATES BUREAU OF FISHERIES.

Year ending June 30 <sup>a</sup> —	Chinook.		Silver fry.	Steelhead trout.		Total.	
	Eggs.	Fry.		Eggs.	Fry.	Eggs.	Fry.
1872.....	30,000					30,000	
1873.....	1,491,000					1,491,000	
1874.....	4,155,000	859,000				4,155,000	859,000
1875.....	6,250,000	1,750,000				6,250,000	1,750,000
1876.....	5,065,000	1,500,000				5,065,000	1,500,000
1877.....	4,983,000	2,000,000				4,983,000	2,000,000
1878.....	7,810,000	2,500,000				7,810,000	2,500,000
1879.....	4,250,000	2,309,000				4,250,000	2,309,000
1880.....	3,800,000	2,000,000				3,800,000	2,000,000
1881.....	4,300,000	3,100,000				4,300,000	3,100,000
1882.....		3,991,750					3,991,750
1883.....		776,125					776,125
1889 <sup>b</sup> .....	3,450,000	1,500,000				3,450,000	1,500,000
1890.....	1,554,000	84,000				1,554,000	84,000
1891.....	2,988,000	777,000				2,988,000	777,000
1892.....	2,902,000	315,500				2,902,000	315,500
1893.....	3,530,000	1,190,100				3,530,000	1,190,100
1894.....	7,500,000	438,500	280,000	75,000	308,500	7,575,000	1,027,000
1895.....	3,676,000	500,000	c1,250,000		d1,184,500	3,676,000	2,934,500
1896.....	6,170,800	715,700		175,000	107,808	6,345,800	823,508
1897.....	18,232,590	3,056,701	298,137	50,600	257,000	18,282,590	3,611,838
1898.....	30,605,000	15,643,300		60,000	650,000	30,665,000	16,293,300
1899.....	27,665,000	3,275,110				27,665,000	3,275,110
1900.....	2,925,000	3,533,950				2,925,000	3,533,950
1901.....	3,934,036	889,570				3,934,036	889,570
1902.....	17,580,410	2,115,560				17,580,410	2,115,560
1903.....	11,275,777	1,618,066				11,275,777	1,618,066
1904.....	64,598,354	2,350,130				64,598,354	2,350,130
1905.....	96,025,765	7,561,380				96,025,765	7,561,380
1906.....	107,905,945	3,496,405				107,905,945	3,496,405
1907.....	73,376,315	2,512,250				73,376,315	2,512,250
1908.....	64,990,550	4,780,855				64,990,550	4,780,855
1909.....	32,278,265	3,590,078				32,278,265	3,590,078
1910.....	30,539,467	2,286,257				30,539,467	2,286,257
Total.....	655,736,274	82,998,287	1,828,137	300,000	2,507,808	656,106,274	87,334,232

<sup>a</sup> The calendar year was used up to 1889.<sup>b</sup> The hatchery was closed from 1884 to 1888.<sup>c</sup> Includes 500,000 fingerlings, yearlings, or adults.<sup>d</sup> Includes 332,000 fingerlings, yearlings, or adults.<sup>e</sup> Includes 138 fingerlings, yearlings, or adults.

## OUTPUT OF HATCHERIES OWNED BY THE STATE OF CALIFORNIA.

Year.	Chinook.		Steel- head fry.	Total.	
	Eggs.	Fry. <sup>e</sup>		Eggs.	Fry.
1873.....			520,000		520,000
1874.....			850,000		850,000
1875.....	b250,000		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

<sup>a</sup> The greater part of the output of chinook fry was from eggs supplied by the United States Bureau of Fisheries hatcheries in California.<sup>b</sup> All were lost.

## OUTPUT OF HATCHERIES OWNED BY THE STATE OF CALIFORNIA—Continued.

Year.	Chinook.		Steel-head fry.	Total	
	Eggs.	Fry.		Eggs.	Fry.
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	667,800		29,137,545
Total.....	250,000	621,174,563	2,568,800	250,000	623,743,363

## DISTRIBUTION.

The following table shows, by streams and species, the distribution in California of the eggs, fry, etc., from the hatcheries of the United States Fish Commission 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 EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA.

Year.	Klamath River and tributaries.				Redwood Creek and tributaries.			
	Chinook.		Silver.		Chinook.	Silver.		Steel-head.
	Fry.	Yearlings.	Fry.	Adults and yearlings.	Fry.	Fry.	Adults and yearlings.	Fry.
1890.....	50,000							
1891.....	30,000							
1892.....	147,600	25,000			142,500			
1893.....	487,200				179,000			
1895.....			300,000	160,000		140,000	400,000	
1896.....					65,700			107,808
1897.....					280,250	124,750		202,600
1898.....	16,000				1,260,000			650,000
1899.....	50,000							
Total.....	810,800	25,000	300,000	160,000	1,943,450	264,750	400,000	659,808

## DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA—Con.

Year.	Mad River and North Fork.			Eel River.		Rus- sian River.	Skaggs Springs.	Marin County creeks.
	Chinook.	Silver.	Steel- head.	Chinook.	Steel- head.	Chi- nook.	Chi- nook.	Chinook.
	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.
1881							15,000	
1894		280,000	508,500					
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	340,000			
Total	145,365	923,387	368,500	66,061,755	1,455,000	40,000	15,000	3,530,000

Year.	Sacramento River and tributaries.				San Fran- cisco Bay streams	San Grego- rio River.	Pesca- dero Creek.	Monterey Bay and tributaries.
	Chinook.			Steel- head.	Chi- nook.	Chi- nook.	Chi- nook.	Chinook.
	Eggs.	Fry.	Year- lings, finger- lings, and adults.	Fry.	Fry.	Fry.	Fry.	Fry.
1873	20,000	520,000						
1874		850,000						
1875	a 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		2,300,500			20,000	15,000	15,000	30,000
1882	80,300	3,991,750						
1884		600,000						
1886		150,000						
1887		200,000						
1888		1,290,000						
1889		3,665,000						
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		16,359,605						
1904		60,782,130						
1905		91,561,380		108,000				
1906		100,038,552						900,000
1907		66,209,250		125,000				1,200,000
1908		59,245,855		170,000				800,000
1909		26,090,000		168,000				
Total	435,500	585,771,472	250,000	626,000	20,000	15,000	15,000	2,930,000

a All were lost.

DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA—CON.

Year.	Monterey Bay and tributaries.		Truckee River.	Total.					
	Silver.	Steel-head.	Chinook.	Chinook.		Silver.		Steel-head.	
	Fry.	Fry.	Fry.	Eggs.	Fry.	Year-lings, finger-lings, and adults.	Fry.	Adults and year-lings.	Fry.
1873.....				20,000	520,000				
1874.....					850,000				
1875.....			250,000	250,000	2,250,000				
1876.....					2,064,060				
1877.....					2,460,000				
1878.....					2,560,000				
1879.....					2,300,000				
1880.....					2,225,000				
1881.....			10,000		2,420,500				
1882.....				80,200	3,591,750				
1883.....					600,000				
1884.....					150,000				
1885.....					290,000				
1886.....					1,290,000				
1887.....					3,668,000				
1888.....					1,194,000				
1889.....					3,575,000				
1890.....					2,966,000	25,000			
1891.....					5,151,950				
1892.....					8,214,900		280,000		573,500
1893.....					3,935,000		910,000	560,000	
1894.....					15,738,883	250,000			107,808
1895.....					20,324,701		298,137		262,000
1896.....					45,101,688				650,000
1897.....				85,200	25,409,110				
1898.....					6,072,950				
1899.....					1,128,570				
1900.....					18,967,600				301,000
1901.....					5,297,947				120,000
1902.....					65,982,130				90,000
1903.....					102,661,380				108,000
1904.....					110,204,472				243,000
1905.....					75,029,250		80,000		487,000
1906.....	80,000				66,199,855		80,000		170,000
1907.....	80,000				31,590,000		42,000		518,200
1908.....	42,000	1,200							
1909.....									
Total.....	202,000	1,200	260,000	435,500	645,201,236	275,000	1,690,137	560,000	3,410,568

OREGON.

HATCHERIES ON COASTAL STREAMS.

*Rogue River.*—In 1877 Mr. 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. The death of Mr. Hume in 1908 may lead to the abandonment of this hatchery, unless the State or Government takes it over.

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 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.

*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.

*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.

*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 made permanent the next year.

*Tillamook Bay.*—In 1902 the State established a station on Wilson River, a tributary of Tillamook Bay, and about 8 miles above tide water. In 1906 the station was removed to the Trask River, a tributary of Tillamook Bay.

DISTRIBUTION.

The following table shows the distribution of fry in the coastal streams of the State by the Government and the State.

DISTRIBUTION OF SALMON FRY IN THE COASTAL STREAMS OF OREGON.

Year ending June 30—	Tillamook Bay and tributaries.			Yaquina River.			Alsea River.	
	Chinook.	Silverside.	Steel-head.	Chinook.	Silverside.	Steel-head.	Chinook.	Silverside.
	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.	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.....		4,806,000	569,690	485,500	1,006,309			
1910.....	624,800	3,506,990	2,309,770	324,038	28,815			
Total.....	4,132,669	12,679,990	2,879,460	11,061,747	12,073,067	2,189,895	2,074,388	3,597,651

Year ending June 30—	Siuslaw River.			Umpqua River.	Coos Bay and tributaries.		
	Chinook.	Silverside.	Steel-head.	Chinook.	Chinook.	Silverside.	Steel-head.
	Fry.	Fry.	Fry.	Fry.	Fry.	Fry.	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		
Total.....	8,921,972	5,099,040	495,598	29,265,572	24,134,434	1,032,000	222,000

## DISTRIBUTION OF SALMON FRY IN THE COASTAL STREAMS OF OREGON—Continued.

Year ending June 30—	Coquille River.		Rogue River and tributaries.			
	Chinook.	Silverside.	Chinook.		Silverside.	Steelhead.
	Fry.	Fry.	Fry.	Yearlings, fingerlings, and adults.	Fry.	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		3,180,300		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
Total.....	14,798,277	1,412,400	43,824,011	245,051	4,659,762	2,649,475

## Total.

Year ending June 30—	Chinook.		Silverside.	Steelhead.
	Fry.	Yearlings, fingerlings, and adults.	Fry.	Fry.
1877.....	50,000			
1897.....	180,000			
1898.....	2,370,314			
1899.....	2,700,000			
1900.....	2,156,945			
1901.....	4,594,058		128,000	65,850
1902.....	8,415,113		639,330	20,250
1903.....	9,427,654		680,800	
1904.....	20,268,809		985,220	8,073
1905.....	16,343,382		5,571,407	1,311,500
1906.....	14,123,977	75,000	7,260,083	1,443,130
1907.....	20,261,747		7,009,279	481,545
1908.....	19,671,753	170,051	4,863,048	937,680
1909.....	7,626,825		9,855,649	1,768,780
1910.....	10,022,493		3,561,094	2,399,620
Total.....	138,213,070	245,051	40,553,910	8,436,428

The following tables show the total output of the hatcheries in Oregon owned by the United States Bureau of Fisheries and the State of Oregon:

## OUTPUT OF HATCHERIES OWNED BY THE UNITED STATES BUREAU OF FISHERIES.

Year ending June 30—	Chinook.			Silver.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1880.....		4,500,000				
1890.....	1,000,000	2,776,475				
1891.....	700,000	4,901,325				
1892.....		1,332,400				
1893.....		4,100,000				
1894.....		213,000				
1895.....	23,000					
1896.....		<i>a</i> 2,832,150	<i>b</i> 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			128,000	
1902.....	1,866,000	11,587,061	1,668		424,530	
1903.....	4,884,400	5,453,860		680,800		
1904.....	3,113,000	15,270,675	250			
1905.....	30,000	9,822,636			1,250,132	
1906.....	28,200	2,454,371	122,980			300
1907.....	1,661,390	8,542,104				
1908.....	2,045,000	7,844,827	627,856		158,000	57,932
1909.....	3,531,000	5,021,655	2,763		1,799,915	
1910.....	3,953,992	4,220,197	225			
Total.....	25,762,982	122,807,506	1,312,892	680,800	3,907,701	58,232

Year ending June 30—	Steelhead trout.			Total.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1880.....					4,500,000	
1890.....				1,000,000	2,776,475	
1891.....				700,000	4,901,325	
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	105,300		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
Total.....	2,126,193	6,818,091	138,506	28,569,975	133,533,298	1,509,630

*a* All but 17,000 of these were from eggs received from the California stations.

*b* All raised from eggs received from the California stations.

## OUTPUT OF HATCHERIES OWNED BY THE STATE OF OREGON.

Year.	Chinook fry.	Silverside fry.	Steelhead trout 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
1882	1,300,000			1,300,000
1883	4,500,000			4,500,000
1884	990,000			990,000
1885	a 792,000			792,000
1886	2,500,000			2,500,000
1887	2,500,000			2,500,000
1888	2,700,000			2,700,000
1889	2,500,000			2,500,000
1890	7,562,000		200,000	7,807,000
1901	11,220,550	7,957,000	245,000	19,422,550
1902	18,502,072	3,288,600	300,850	22,091,522
1903	b 48,730,791	3,974,185	143,849	52,848,825
1904	16,393,249	5,509,085	1,495,735	23,398,069
1905	c 27,404,596	7,503,655	1,859,696	36,767,947
1906	d 25,156,732	6,446,628	376,245	31,979,605
1907	e 21,209,394	5,359,709		26,569,103
1908	f 20,108,990	9,212,649	1,403,129	30,724,768
1909	g 24,169,365	3,631,827	2,364,120	30,165,312
1910				
Total	244,634,430	52,883,338	8,644,951	306,162,728

a Eggs from which hatched obtained from United States Bureau of Fisheries.

b 6,826,540 eggs were obtained from United States Bureau of Fisheries.

c 7,714,000 eggs were obtained from United States Bureau of Fisheries.

d 3,550,000 eggs were obtained from United States Bureau of Fisheries.

e 3,020,000 eggs were obtained from United States Bureau of Fisheries.

f 6,581,000 eggs were obtained from United States Bureau of Fisheries.

g 6,465,300 eggs were obtained from United States Bureau of Fisheries.

## 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 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 is now operated by the United States Bureau of Fisheries.

In 1889 the State established a hatchery in the cannery of Mr. 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.

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  $1\frac{1}{2}$  miles below the Wallowa bridge on the Wallowa River, a tributary of the Grande Ronde River, in 1903.

In 1902 the State of Oregon erected a permanent plant on Salmon River at its junction with Boulder Creek.

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.

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.

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. 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  $1\frac{1}{2}$  miles from Chiwaukum station on the Great Northern Railway, and on Wind River, a tributary of the Columbia, about 1 mile from the junction.

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  $2\frac{1}{2}$  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  $1\frac{1}{2}$  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 established by the State of Washington on the Lewis River, some distance above the town of Woodland.

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:

TABLE SHOWING THE PLANTS OF SALMON FRY IN THE COLUMBIA RIVER BASIN SINCE 1877.

Year ending June 30—	Columbia River and tributaries.			Total.
	Chinook fry.	Silverside fry.	Steelhead trout fry.	
1877.....	300,000			300,000
1878.....	79,620			79,620
1879.....	3,076,500			3,076,500
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.....	3,756,475			3,756,475
1891.....	5,694,000			5,694,000
1892.....	1,332,400			1,332,400
1893.....	4,100,000			4,100,000
1894.....	213,000			213,000
1895.....	a 2,523,000			2,523,000
1896.....	b 10,389,300			10,389,300
1897.....	10,641,394			10,641,394
1898.....	26,212,074			26,212,074
1899.....	19,979,241		8,625	19,987,866
1900.....	22,510,869	7,175,824	299,000	29,985,693
1901.....	c 24,978,978	5,559,750	245,000	30,783,728
1902.....	44,328,085	17,545,724	256,327	62,130,136
1903.....	40,174,313	8,721,720	d 600,583	49,496,616
1904.....	71,694,587	8,422,085	158,981	80,275,653
1905.....	17,107,217	1,354,610	e 708,235	19,230,062
1906.....	f 36,372,785	g 828,872	h 1,709,494	38,971,151
1907.....	23,171,235	2,657,349	26,640	25,855,224
1908.....	i 34,852,008	1,705,543	15,000	36,572,551
1909.....	j 33,098,943	2,439,415	k 1,058,657	36,597,015
1910.....	l 37,744,002	3,374,733	m 2,063,688	43,182,423
Total.....	484,518,606	59,785,625	7,270,230	551,574,461

a Includes 23,000 eggs.

b Includes 557,150 yearlings, fingerlings, or adults.

c Includes 1,668 yearlings, fingerlings, or adults.

d Includes 37,033 yearlings, fingerlings, or adults.

e Includes 50,000 eggs.

f Includes 48,200 eggs and 47,980 yearlings, fingerlings, or adults.

g Includes 300 yearlings, fingerlings, or adults.

h Includes 24,383 yearlings, fingerlings, or adults, and 58,000 eggs.

i Includes 1,995,746 yearlings, fingerlings, or adults.

j Includes 16,949 yearlings, fingerlings, or adults.

k Includes 50,000 eggs.

l Includes 225 yearlings, fingerlings, or adults.

m Includes 25,000 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.

*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.

*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 Birdsvew, and some 30 miles from Baker Lake. In 1901 an auxiliary station was opened at Birdsvew, on Skagit River, and steelhead trout eggs were collected on Phinney and Grandy Creeks and brought to Baker Lake to be hatched.

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 1899 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 the 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 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 is devoted to salmon and oysters.

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. The station built on Sauk River, a tributary of the Skagit, has been operated only occasionally since the Skagit hatchery was built.

The United States Bureau of Fisheries has now (1911) under construction hatcheries on the Duckabush and Quileene Rivers in Hoods Canal.

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.	
	Eggs.	Fry.	Finger- lings, yearlings, and adults.	Eggs.	Fry.	Finger- lings, yearlings, and adults.	Eggs.	Fry.
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.....	3,050,000	11,565,553	14,186	100,000	5,430,626		272,000	7,661,110
1910.....	3,818,250	9,175,610			4,554,825		275,000	10,888,025
Total..	41,311,250	131,593,814	1,552,127	1,055,000	59,303,664	19,500	1,949,180	54,205,954

## OUTPUT OF THE SALMON HATCHERIES IN WASHINGTON OWNED BY THE UNITED STATES BUREAU OF FISHERIES—Continued.

Year ending June 30—	Humpback.		Steelhead trout.			Total.		
	Eggs.	Fry.	Eggs.	Fry.	Finger- lings, yearlings, and adults.	Eggs.	Fry.	Finger- lings, yearlings, and adults.
1897							1,848,760	
1898							7,391,886	
1899						4,926,000	1,791,056	
1900				26,000		2,686,000	17,335,947	
1901						6,581,000	9,436,174	
1902				110,000			19,118,687	
1903			80,000	440,000	223,815	80,000	21,027,631	223,815
1904		176,597	255,000	70,000		7,761,000	25,472,425	
1905			414,400	3,205		521,400	20,129,843	10,000
1906	2,000	969,990	348,000	540,000		9,183,180	26,087,599	9,500
1907			200,000	941,505		4,510,000	15,315,450	
1908	502,000	6,764,762	224,000	136,916		2,582,000	41,051,200	1,537,941
1909			220,000	717,691		3,642,000	25,374,980	14,186
1910		1,368,000	300,000	1,437,038		4,388,250	27,423,498	
Total....	504,000	9,279,349	2,041,400	4,422,355	223,815	46,860,830	258,805,136	1,795,442

## OUTPUT OF THE SALMON HATCHERIES OWNED BY THE STATE OF WASHINGTON.

Year ending June 30—	Chinook fry.	Dog fry.	Hump- back fry.	Silverside, or coho, fry.	Sockeye, or blue- back, 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
Total.....	172,457,805	77,211,470	3,470,700	265,575,818	10,900,000	34,912,236	564,528,029

NOTE.—As the printed reports of the State 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.

The following table 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 FRY IN THE WATERS OF WASHINGTON OTHER THAN THE COLUMBIA RIVER.

Year ending June 30—	Puget Sound and tributaries.					
	Chinook.	Sookeye.	Silver, or coho.	Hump-back.	Dog.	Steelhead.
1897.....		5,500,000				
1898.....		5,400,000				
1899.....	7,470,000		189,000			
1900.....		10,683,000	6,749,280		10,301,760	1,572,560
1901.....	300,000	3,834,453	14,360,185		16,478,280	1,398,476
1902.....	2,141,322	3,371,000	23,161,009		9,937,390	2,591,371
1903.....	2,113,850	3,731,789	21,507,771		9,937,390	a 3,326,091
1904.....	1,865,933	3,855,000	14,071,845	471,797		b 3,518,476
1905.....	2,590,738		16,441,375			c 1,320,940
1906.....	4,819,290	e 3,582,630	d 29,770,414	969,990	1,800,000	e 3,177,174
1907.....	3,907,598		26,960,552	4,224,255	5,220,000	3,964,308
1908.....	8,356,709	8,514,305	37,613,466	9,420,662	2,278,350	4,566,491
1909.....	9,647,288	5,430,626	28,622,310		6,048,000	f 4,499,141
1910.....	11,681,060	4,554,825	36,837,125	1,887,600	7,748,500	6,292,338
Total.....	54,893,788	58,457,628	256,284,392	16,974,304	69,749,670	36,236,366

Year ending June 30—	Chehalis River.			Willapa River.		
	Chinook.	Silver, or coho.	Dog.	Chinook.	Silver, or coho.	Steelhead.
1890.....	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	
Total.....	7,094,100	11,465,380	7,048,800	7,526,233	9,437,376	2,643,940

Year ending June 30—	Total by species.						Grand total.
	Chinook.	Sookeye.	Silver, or coho.	Hump-back.	Dog.	Steelhead.	
1878.....	g 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	23,161,009		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		3,938,806	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	51,012,578
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
Total.....	69,517,121	58,457,628	277,187,148	16,974,304	76,798,470	38,880,306	537,814,977

a Of these, 218,200 were yearlings, fingerlings, or adults.

b Of these, 14,400 were eggs.

c Of these, 9,500 were yearlings, fingerlings, or adults.

d Of these, 14,840 were yearlings, fingerlings, or adults.

e Of these, 15,000 were yearlings, fingerlings, or adults.

f Includes 100,000 eggs.

g These were brought from the Clackamas (Oregon) 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.

The Province of British Columbia owns Seton Lake Hatchery, which was established in 1903 on Lake Creek, on the north side, about half a mile from the outlet of Seton Lake, and it has been operated continuously ever since. Seton Lake is a part of the Fraser River chain and is some 300 miles above the mouth of the river. Lake Creek, the outlet of Seton Lake, empties into the Cayoosh Creek, a tributary of the Fraser, 45 miles north of the latter's junction with the Thompson, and 1 mile south of the town of Lillooet.

*Nimpkish River.*—In 1902 Mr. 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 this 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 it has been operated by the Dominion.

*Rivers Inlet.*—A hatchery was established by the Dominion on McTavish Creek, one of the tributaries of Oweekayno 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 1907 another was constructed on Babine Lake, the source of the Skeena River.

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.

## Fraser River.

Year.	Fraser River.						
	Dog.	Coho.	Spring, or king.	Hump-back.	Sockeye.	Steel-head 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 <sup>a</sup>		5,674,000 <sup>a</sup>
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
1901.....					[No fish.]		
1902.....		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
Total.....	75,000	29,334,700	22,897,200	22,550,000	474,610,400	91,000	549,558,300

Year.	Skeena River.		Rivers Inlet.		Nimpkish River.
	Sockeye.	Sockeye.	Spring, or king.	Total.	Sockeye.
1903.....	3,450,000				1,030,000
1904.....	4,000,000				2,496,000
1905.....	3,767,900				2,850,000
1906.....	3,784,450	8,000,000		8,000,000	4,873,400
1907.....	4,125,750	8,440,000		8,440,000	4,870,000
1908.....	8,946,950	8,594,000	4,706,000	13,300,000	4,800,000
1909.....	11,882,400	13,300,000		13,300,000	4,500,000
1910.....	<sup>a</sup> 11,521,700	12,750,000		12,750,000	5,055,000
Total.....	51,479,150	51,084,000	4,706,000	55,790,000	31,080,400

<sup>a</sup> Includes 80,000 coho fry.

## PLANTS OF SALMON FRY MADE IN THE WATERS OF BRITISH COLUMBIA—Con.

Year.	Total by species.						Grand total.
	Dog.	Coho.	Spring, or king.	Hump-back.	Sockeye.	Steel-head 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		450,000	6,300,000		134,639,200		141,389,200
Total	75,000	29,334,700	27,603,200	22,550,000	608,253,950	91,000	687,907,850

## 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 has operated this plant ever since.

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.

Capt. 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 Capt. 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 Capt. Callbreath's failing eyesight compelled the cessation of the actual hatching. Since then a man has been 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. The owner's expectation of a big run as a result of hatching operations was never realized.

In 1896 the Baranof Packing Company, 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 Company, 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 has been operated continuously ever since. In 1909 the North Alaska Salmon Co. acquired a half interest in it.

The Pacific Steam Whaling Company 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 Company, successor to the original owner, went into the hands of a receiver. In 1907 it was reopened by the Northwestern Fisheries Company, which had acquired the interests of the old company, and has been operated each season since.

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 Company 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 Company, 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, Revilla-gigedo Island, and about 8 miles from Loring, where the association has a cannery. This is without question the largest and costliest salmon hatchery in the world, having a capacity of 110,000,000 eggs, and the association is entitled to great credit for the public spirit it has shown and the work it has done, entirely without remuneration until 1906, in building and operating not only this hatchery but also the one at Karluk.

The Union Packing Company, at Kell Bay, on Kuiu Island, and Mr. 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 following tables show the eggs gathered and the fry planted from 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 1910.

Year ending June 30—	Yes Lake hatchery.						Afognak hatchery.			
	Red, or sockeye.		Coho, or silver.		Steelhead trout.		Red, or sockeye.		Humpback.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1906...	7,631,480	6,638,550	.....	.....	.....	.....	.....	.....	.....	.....
1907....	58,210,000	54,610,800	.....	.....	182,000	143,500	.....	.....	.....	.....
1908....	57,500,000	61,300,000	.....	.....	.....	.....	.....	.....	.....	.....
1909....	50,000,000	48,653,000	17,000	9,900	.....	.....	36,380,000	39,325,870	12,000	10,000
1910....	72,000,000	69,879,600	.....	.....	.....	.....	76,020,000	71,647,170	499,400	363,740
Total.	252,791,480	241,150,950	17,000	9,900	182,000	143,500	122,400,600	110,973,040	511,400	373,740

## OUTPUT OF THE SALMON HATCHERIES IN ALASKA OWNED BY THE UNITED STATES BUREAU OF FISHERIES, 1906 TO 1910—Continued.

Year ending June 30	Total by species.								Grand total.	
	Red, or sockeye.		Coho, or silver.		Humpback.		Steelhead trout.			
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1906.....	7,031,480	6,638,550							7,031,480	6,638,550
1907.....	58,210,000	54,610,800					182,000	143,500	58,392,000	54,754,300
1908.....	65,550,000	61,369,000							65,550,000	61,369,000
1909.....	96,380,000	87,978,870	17,000	9,900	12,000	10,000			96,409,000	87,998,770
1910.....	148,020,000	141,526,770			499,400	363,740			148,519,400	141,890,510
Total.....	375,191,480	352,123,990	17,000	9,900	511,400	373,740	182,000	143,500	375,901,880	352,651,130

## OUTPUT OF PRIVATE SALMON HATCHERIES OF ALASKA, 1893 TO 1910.

NOTE.—Unless otherwise stated in footnotes, all of the fry liberated were red salmon.

Year ended June 30—	Callbreath's hatchery.		Karluk hatchery.		Klawak hatchery.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1893.....	900,000	600,000				
1894.....	3,000,000	2,201,000				
1895.....	6,300,000	5,291,000				
1896.....	6,200,000	5,175,000				
1897.....	4,400,000	4,390,000	3,236,000	2,666,440		
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	a 1,000,000
1901.....	(b)		19,334,000	15,566,800	(c)	
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.....	(d)	(d)	38,679,200	36,846,000	3,600,000	1,187,000
1908.....	(e)	(e)	47,808,200	43,655,000	3,500,000	2,776,000
1909.....	(e)	(e)	40,320,600	37,105,000	3,500,000	3,200,000
1910.....	(e)	(e)	45,228,000	40,620,000	5,800,000	5,300,000
Total.....	763,350,000	52,121,000	384,793,300	324,091,632	41,223,000	27,563,000

Year ended June 30—	Hetta hatchery.		Quadra Bay hatchery.		Freshwater Bay hatchery.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
1893.....						
1894.....						
1895.....						
1896.....						
1897.....						
1898.....						
1899.....	2,800,000	2,600,000				
1900.....	2,000,000	1,500,000				
1901.....	1,800,000	a 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	(b)	(b)
1904.....	5,127,500	3,750,000	600,000	c 400,000	(d)	(d)
1905.....	(g)	(g)	(g)	(g)	(g)	(g)
1906.....	(g)	(g)	(g)	(g)	(g)	(g)
1907.....	(g)	(g)	(g)	(g)	(g)	(g)
1908.....	8,000,000	6,125,000	(g)	(g)	(g)	(g)
1909.....	8,400,000	8,131,000	3,325,000	3,025,750	(g)	(g)
1910.....	10,313,000	9,000,000	10,863,000	9,850,000	(g)	(g)
Total.....	45,710,500	37,309,000	24,788,000	20,775,750	1,500,000	1,000,000

a Many eggs frozen.

b No run of fish.

c Hatchery was not used, the eggs being hatched out in the lake.

d No report.

e Fish coming in to spawn were lifted over the dam.

f A considerable proportion of these are coho eggs.

g Not operated.

## OUTPUT OF PRIVATE SALMON HATCHERIES OF ALASKA, 1893 TO 1910—Continued.

Year ended June 30—	Fortmann hatchery.		Kell Bay hatchery.		Total.	
	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.	Eggs taken.	Fry liberated.
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.....					8,636,000	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	(a)	(a)	65,043,500	46,630,000
1905.....	65,010,000	63,181,000	(a)	(a)	119,360,000	104,101,000
1906.....	68,715,000	67,643,000	(a)	(a)	116,148,000	104,679,412
1907.....	105,450,000	80,973,000	(a)	(a)	147,729,200	119,006,000
1908.....	<sup>b</sup> 41,280,000	33,920,000	(a)	(a)	100,588,200	86,476,000
1909.....	24,465,000	22,785,000	(a)	(a)	80,010,000	74,249,750
1910.....	53,340,000	50,725,000	(a)	(a)	125,544,000	115,495,000
Total.....	431,973,000	372,312,000	2,500,000	2,000,000	995,867,800	837,172,462

a Not operated.

b Includes 30,000 coho eggs taken and 27,000 fry liberated.



















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