FISHERIES *of* BRITISH COLUMBIA

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BUREAU OF PROVINCIAL INFORMATION.

THE FISHERIES OF BRITISH COLUMBIA.

BULLETIN No. 20.

(Second Edition.)

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

**PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.**

VICTORIA B. C.

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1910.

HONOURABLE W. J. BOWSER, K. C.,

Minister of Finance and Agriculture,

Victoria, B. C.

SIR,—I have the honour to submit, for your approval, Bulletin No. 20, The Fisheries of British Columbia, which takes the place of Bulletins Nos. 13 and 16, which are now out of print.

In the compilation of this bulletin I have endeavoured to furnish reliable information regarding the present conditions of the fishing industry, and to point out its future possibilities.

I have the honour to be,

Sir,

Your obedient servant,

FRANK I. CLARKE,

Secretary, Bureau of Provincial Information.

Victoria, B. C., December, 1909.

Whaling Gun, Showing Harpoon.

BRITISH COLUMBIA FISHERIES.

THE coast of British Columbia, embracing all the sea-front which lies between the 49th and 55th parallels of north latitude, presents an ideal field for the establishment and profitable operation of a great fishing industry in all its branches. The coast is so indented by numerous sounds, bays and inlets, many stretching inland for long distances, that the actual shore-line (including Vancouver Island and the Queen Charlotte Group) exceeds 15,000 miles. The Mainland coast is protected from ocean storms by thousands of islands, which serve to form a vast, land-locked maze of waters, teeming with sea life of many varieties,—from the mighty whale to the tiny sardine—while the beaches are alive with shell-fish. Beyond this great natural fish preserve, the North Pacific and Behring Sea afford deep-sea fishing grounds eclipsing the North Atlantic in their wealth of food fishes.

Although the British Columbia fisheries show remarkable development in some branches, producing an average annual value of over six million dollars in the past decade, it may be confidently stated that the industry is still in the initial stage, for 80 per cent. of the yearly output is credited to salmon, which (with the exception of halibut) is the only fish which has so far been taken in large quantities.

The activity in salmon fishing is accounted for by the habits of the fish itself. Swarming into the straits and the mouths of the rivers in countless myriads at certain seasons every year, the salmon invited capture, and capital, with an eye to substantial dividends, was attracted by the ease with which it could be turned to profitable account. The excellent quality of British Columbia canned salmon, and its cheapness, made it a universally popular article of food, so the industry grew apace while other fishes, equal in food value, were overlooked and escaped the net.

The strides made in salmon canning may be realised by the following figures, showing the progress in ten-year periods since 1876, the year in which the business was established in British Columbia:—

Cases.		Value.		Cases.	Value.
1876.....	9,800 ..	\$ 46,840	|	1896.....	601,500 .. \$2,875,170
1886.....	161,200 ..	770,536		1906.....	629,400 .. 3,008,532

These figures are the more remarkable from the fact that they do not include any of the so-called "big years," in which the run of salmon is unusually large. Thus, in 1901, a big year,

1,236,156 cases were put up, worth \$5,986,000, and containing 12,500,000 salmon, weighing 60,000,000 pounds; again, in 1905, the pack amounted to 1,168,000 cases, valued at \$5,583,000. During the period covered by the above table, the number of canneries in operation increased from 6, in 1876, to 62 in 1906.

The salmon canning industry had its inception on the Sacramento River, California, in 1864, with a total pack of 2,000 cases. In 1866, a pack of 4,000 cases was put up on the Columbia River, Oregon, and in 1876, as already stated, the business was established on the Fraser River, British Columbia, with a pack of 9,800 cases. Two years later, in 1878, 8,159 cases were packed in Alaska. Finally, in 1891, canneries were built on Puget Sound, Washington, the first year's pack being 11,500 cases.

The following table shows at a glance the enormous growth of the industry on the Pacific Coast:—

PACIFIC COAST SALMON PACK.
FROM THE INCEPTION OF THE INDUSTRY IN 1864.

Year	Columbia River.	Sacramento River.	Outside Rivers	British Columbia.	Alaska.	Puget Sound.	Total.
1864	.....	2,000	.....	.....	.....	.....	2,000
1865	.....	2,000	.....	.....	.....	.....	2,000
1866	4,000	.....	.....	.....	.....	.....	4,000
1867	18,000	.....	.....	.....	.....	.....	18,000
1868	28,000	.....	.....	.....	.....	.....	28,000
1869	100,000	.....	.....	.....	.....	.....	100,000
1870	150,000	.....	.....	.....	.....	.....	150,000
1871	200,000	.....	.....	.....	.....	.....	200,000
1872	250,000	.....	.....	.....	.....	.....	250,000
1873	250,000	.....	.....	.....	.....	.....	250,000
1874	350,000	2,500	.....	.....	.....	.....	352,500
1875	375,000	3,000	.....	.....	.....	.....	378,000
1876	450,000	8,300	25,600	9,847	.....	.....	493,747
1877	460,000	21,500	24,800	67,387	.....	.....	573,687
1878	460,000	36,500	30,000	113,601	8,159	.....	648,260
1879	480,000	31,000	30,000	57,394	12,530	.....	610,924
1880	630,000	51,000	37,200	61,300	6,539	.....	786,039
1881	551,000	181,200	48,500	175,675	8,977	.....	965,352
1882	541,300	200,300	49,000	255,061	10,244	.....	1,055,905
1883	629,400	160,000	38,000	243,000	36,000	.....	1,106,400
1884	656,179	81,450	41,350	138,945	54,000	.....	971,924
1885	524,530	48,500	51,750	106,865	74,850	.....	806,495
1886	454,943	39,300	131,100	163,004	120,700	.....	909,047
1887	373,800	36,500	195,400	201,990	190,200	.....	997,890
1888	367,750	58,000	154,000	135,600	427,372	.....	1,142,722
1889	325,500	66,666	199,068	414,400	709,347	.....	1,714,981
1890	433,500	35,006	67,117	409,464	688,332	.....	1,633,419
1891	390,183	4,142	66,805	314,813	789,294	11,500	1,576,737
1892	481,900	4,600	144,200	221,797	461,482	15,000	1,325,979
1893	425,200	23,336	119,660	590,229	645,545	66,500	1,870,470
1894	511,000	28,463	118,500	494,470	678,501	67,933	1,898,867
1895	617,460	24,000	264,300	512,877	619,379	52,000	2,090,016
1896	463,621	13,387	115,400	598,300	958,700	248,200	2,397,608
1897	552,721	42,500	68,683	1,015,477	969,850	423,500	3,072,731
1898	473,230	28,000	78,600	454,500	956,979	417,700	2,409,009
1899	340,125	33,550	82,432	711,600	1,098,833	871,500	3,138,040
1900	313,417	34,000	106,300	527,281	1,534,745	478,742	2,994,485
1901	248,494	17,500	123,326	1,236,156	2,034,895	1,380,590	5,040,961
1902	367,241	14,043	124,190	625,982	2,554,423	563,307	4,259,186
1903	332,980	8,200	77,536	473,547	2,231,594	406,851	3,530,708
1904	423,073	19,698	164,971	465,894	1,952,144	276,920	3,302,700
1905	410,041	1,314	141,850	1,167,460	1,885,316	1,061,883	4,667,816
1906	360,129	.....	159,953	629,460	2,227,064	440,710	3,817,316
1907	302,481	.....	127,591	547,459	2,170,272	721,666	3,869,461
1908	253,341	.....	103,392	542,689	2,619,019	314,151	3,832,592

This marvellous record of expansion, while proving the importance and magnitude of salmon canning, suggests the possibilities offered by other branches of the fishing industry. The yield of the Atlantic Coast fisheries, important as it is as an item in the economic fabric of Canada, might easily be duplicated, if not surpassed, on the Pacific Coast were our fisheries developed to one-half the extent of their potentialities. The Atlantic fisheries—i. e., those of Prince Edward Island, Nova Scotia, New Brunswick and Quebec—produced in an average year \$14,210,500, against \$4,364,500 produced by British Columbia, of which \$3,753,800 was derived from salmon, the value of all other fish being \$610,700; no account being taken of the fresh-water fishes, of which there is a great abundance in the rivers and lakes of the Province. The total value of the fisheries of the whole of Canada in the year quoted was \$21,959,500, so that British Columbia's contribution was about 20 per cent. of the total, and of that percentage 86 per cent. was credited to salmon. Such figures, taken in conjunction with the fact that the Atlantic fisheries have reached a stage of development which is already taxing their resources, while those of British Columbia have been seriously exploited in only one branch of the industry, it is only reasonable to anticipate very great results when British Columbia's fisheries are more fully developed. Practically inexhaustible, the only limit to their possible yield would be the lack of a market.

Another significant fact bearing upon the importance of British Columbia's fisheries, is found in the large revenue which they return to the Dominion Government. To encourage the fishing industry on the Atlantic Coast, the Government, in 1882, offered bounties to owners and crews of fishing vessels at the rate of \$2.00 per ton, and to owners and crews of fishing boats at the rate of \$5.00 per man. These bounties are distributed annually, the total amount paid from 1882 to 1907, inclusive, being \$4,105,815. This large amount (averaging \$157,915 yearly) was divided among the vessel owners and fishermen of Prince Edward Island, Nova Scotia, New Brunswick and Quebec—those of British Columbia receiving nothing. During the five years, from 1904 to 1908, inclusive, the Dominion expended \$397,500 on the fisheries of the Maritime Provinces, over and above the bounties, and only \$114,250 on the British Columbia fisheries. In the same period, the fisheries of Prince Edward Island, Nova Scotia, New Brunswick and Quebec, combined, furnished revenue to the Dominion totalling \$117,684, while those of British Columbia contributed \$234,512,

almost double that of the four Atlantic Provinces. The total fisheries expenditure during the five years, for the whole of Canada, was \$3,757,731 (exclusive of fishing bounties, \$789,846), while the revenue derived from the same totalled \$424,410. It will thus be seen that British Columbia's contribution, \$234,512, amounted to over 55¼ per cent. of the whole revenue.

FISHERIES COMMISSION.

It is therefore evident that the development of the British Columbia fisheries would insure a very considerable increase in the general revenue, and it would seem to devolve upon the Federal Government to encourage such expansion. The first step in this direction was taken in 1905, when, after many urgent requests made by parties interested in the fishing industry, the Governor-General in Council appointed a Commission to make an investigation into the state of the industry on the British Columbia Coast. This Commission was appointed in July, 1905, and consisted of Professor Edward E. Prince, F.R.S.C., Dominion Commissioner of Fisheries, and General Inspector of Fisheries for Canada; Campbell Sweeney, Esq., Vancouver; John Cunningham Brown, Esq., New Westminster; Richard Hall, Esq., Victoria; Rev. George W. Taylor, F.R.S.C., Nanaimo, and John Pease Babcock, Provincial Fisheries Commissioner, Victoria.

Amongst the matters specified for the Commission's investigation were:—

1. Salmon industry.—Close seasons; mesh, depth and length of nets; limitation of netting in Fraser River and estuary; conditions in granting of leases and licences, with special reference to Japanese and Chinese exclusion; limitation of amount of gear; areas for pound-nets or trap-nets and other nets; limitation of canneries, and suggested abolition of canners' fishing licences.

2. The offal and dog-fish question, including the use generally of fish for the manufacture of oil and fertilisers.

3. Trout and angling questions.—Close seasons for spawning fish; open seasons for angling, trolling, etc.; restrictions as to legal size of fish to be taken.

4. Sturgeon fishing.—Protection and restoration of the industry.

5. Hecate Straits and foreign fishing operations.

6. Sea fisheries of the north.—Halibut industry; herring fisheries; abuses re bait, fish offal, etc.; skill or black cod and true cod; sardine, anchovy and oolachan, oyster, abalone and crab fisheries; best methods of developing sea fisheries; restrictions, suggested leases and licences.

Spring Salmon.

After an investigation spread over two years, the Commissioners, in presenting their report, remarked upon the magnitude and exceptional complexity of the task assigned them. "The questions submitted," says the report, "concern not only the prosperity of vast commercial enterprises, and the conservation of almost unparalleled natural resources in marine and fresh-water areas, but they trench upon matters intimately associated with the intricate connections of capital and labour, and the momentous interests bound up with international relations and rights."

Some of the principal subjects dealt with were:—

United States' drain on the Fraser River salmon supply; dependence of Washington State salmon industry on Fraser River; difficulties confronting British Columbia salmon industry; growth of British Columbia fisheries; opening of foreign and other markets; Hecate Straits question; fishery police patrol service; Government brands for salmon and herring; fishery leases; fishing and canning licences; salmon trap-fishing; oyster and clam leases and licences; steam trawling; general review of fish and fisheries of British Columbia; Indian claims; fish hatcheries, etc.

SALMON INDUSTRY THREATENED.

The Commission paid special attention to the salmon fisheries, as there was found to be so serious a falling-off in the yearly catch as to threaten the depletion of the Fraser River. It was accepted without question that all the salmon caught in the waters of Puget Sound (United States territory), as well as those caught on the Canadian side, are spawned in the inland reaches of the Fraser River and its tributaries. All the evidence obtained went to prove that the run of a given year depends upon the quantity of spawn deposited in the Fraser River watershed in the fourth year previous, and that if the fish are prevented from reaching the spawning grounds in any given year, the fourth year following will be a "lean year." In illustration of this fact, the catch of 1903 was 62 per cent. less than in 1899; the catch of 1904 was 66 per cent. less than in 1900; the catch of 1905 was 22 per cent. less than 1901 (a big year); the catch of 1906 was 26 per cent. less than 1902, and the catch of 1907 was 38 per cent. less than that of 1903. Considering that the methods employed to catch the salmon have been improved in recent years, that the traps and nets are more numerous, the area fished more extensive, that there is a greater demand and higher prices for the fish, the only possible reason that can be assigned for the catches not increasing is a decrease in the supply.

A majority of the Commission recommended as a remedy a weekly close season of thirty-six hours at the mouth of the Fraser River in "big" years, and a sixty-hour close season in the intervening "off" or "poor" years; the thirty-six hour close time to prevail outside the mouth of the Fraser in all years. A minority, consisting of Messrs. Sweeny and Babcock, held that these measures were insufficient, and recommended the prohibition of all fishing in the Fraser River above New Westminster from July 1st to September 15th, restricting the length and depth of nets, the enforcement of the thirty-six hour weekly close season in all the waters of the Fraser, and the absolute closing of the river from August 25th to September 15th each year, or, as an alternative, the prohibition of all fishing on both sides of the International Boundary Line for four years, and the enforcement of the foregoing regulations thereafter.

As all these proposals would prove ineffective without the co-operation of the fishermen and cannerymen of Puget Sound, conferences were held with representatives of the State of Washington which resulted in the passing of an Act of the Washington Legislature prohibiting salmon fishing, excepting with hook and line, from 6 p.m. Friday to 6 a.m. Sunday in each week, the prohibition of all salmon fishing from August 25th to September 15th in each year, and the closing of all fish traps and pound nets during the weekly close season. The law also provided for a fine of not less than \$250 and not more than \$1,000, or imprisonment for 25 days minimum, or one year maximum, for violation of the regulations. Although this Act was classed as an emergency measure and declared operative immediately on its passing the Legislature in 1906, it was "more honoured in the breach than the observance," for many of the Puget Sound fishermen and fishing companies went on fishing as if no such law existed. A few were summoned and fined (the minimum) but preferred paying the penalty to closing their traps, finding the violation of the law the more profitable. Needless to say, the non-observance of the law was a disappointment to the Canadian fishermen, as they had hoped for the co-operation of their United States competitors in the effort to preserve the fishing grounds and had received solemn assurances of such co-operation, only to see the restrictions ignored and the old destructive methods continued.

An understanding of the situation may be gleaned from the following extracts from Mr. Babcock's Annual Report for 1903:—

I believe that the decrease in the run and the absence of fish upon the spawning grounds this year is attributable to excessive fishing. An investigation of the conditions existing on the fishing grounds for the past five years amply demon-

strates that to be the cause. And the small catch and the empty spawning beds of the Fraser, this year and last, prove it.

In my report of last year I had occasion to review in detail the conditions existing upon the fishing and spawning grounds of the Fraser, in which I sought to trace the movements of the sockeye from the sea to the river, and attempted to show that too great a proportion of the sockeye was being captured in the poor years, that an insufficient number reached the spawning grounds, and that there was urgent need of giving greater protection to the fish. In that review I sought to show, as others have done, that the greatest movement of the sockeye seeking entrance to the Fraser passed through the American channels of Puget Sound, and called attention to the fact that there were no limitations, either of time or method, placed upon the capture of sockeye in those waters, and that in consequence all, or most all, the fish which attempted to pass through those channels were captured by trap, purse or drag-nets. It was also shown that in our waters, though fishing was prohibited until July 1st and that a weekly 36-hour closed season was enforced, and that the fishing was confined to the use of gill nets, there was an excessive number of such nets being used.

My observations during the past season confirm these predictions. Since that time there has been no improvement in these conditions existing upon the fishing grounds. They remain in the same deplorable state. There is no occasion for surprise that no greater restrictions have been placed upon our fishermen in view of the fact that the whole burden of protection already falls upon them, while the Americans continue to take every fish possible during the entire time they are in their waters. If the decline in this fishery is due to excessive fishing, as I have already asserted, the censure for it rests principally, if not wholly, at the door of the State of Washington, as the unbridled fishing conducted in her waters is indefensible and unjustifiable, and, if continued, will wipe out the salmon fishery of the Fraser. We are told by some Washington officials that the decrease in the run of salmon is occasioned by the failure to provide adequate hatcheries; that only by their establishment can the run be maintained, and it is even proposed that the people interested in the fishing industry in the State of Washington will, if permitted, construct and operate extensive hatcheries on the Fraser. It may be that the great canning interests of Washington believe this, and are the authors of this movement, and would willingly contribute towards the building and maintenance of extensive hatcheries. They would certainly be justified in doing so, but until they secure the passage of suitable protective legislation governing their own fishing methods, there would seem to be a lack of sincerity in their suggestion that is apparent to any one familiar with the regrettable conditions existing there, and which so seriously threaten their own interests and ours. No hatchery system, however extensive, can be devised that will maintain the run of sockeye in the Fraser from eggs obtained from its waters, unless the fishing is so regulated as to permit the free passage of a sufficient number of fish to reach the spawning grounds each year. While it is true that the output of young fish for the season could have been greatly increased had there been an additional hatchery at the head of Lillooet Lake, it is equally true that under present conditions 75 per cent. of the spawning grounds of the Fraser were barren of fish this year. Two of the three hatcheries already established on the Fraser were unable to obtain over 10 per cent. of the eggs they have capacity to handle, and the eggs they did get were, with the exception of three hundred thousand, secured at Shuswap, taken from fish which entered the Fraser after most of the American traps had been removed from the Sound.

The Canadian canners, chafing under the restrictions imposed upon them, united in petitioning the Dominion authorities to permit the use of salmon traps in Juan de Fuca Strait, in order that they might be placed on a comparatively equal footing with their competitors of Puget Sound. Their request was endorsed by the Government of British Columbia by the granting of foreshore rights (fish-trap sites), a substantial mark of sympathy, and Mr. Babcock expressed his views on the subject as follows:—

Sockeye Salmon.
Coho Salmon.

In the discussion of this question it has been pointed out on the one hand that the use of traps is a destructive method of catching fish; that too great a portion of the run is taken; that their use will exterminate the fish, and will deprive the fishermen of employment, because the cost of traps is so great that only men of means could own and operate them. On the other hand it is said that the use of traps is more scientific, more economical, and the more easily regulated method of catching fish; that by no other method can they be taken in the clear waters; that in the clear waters of the Straits and Sound the fish are in better condition for use; that the fish taken are not killed until removed from the traps; that they can be held for a week or ten days without injury to their canning qualities; that when the packing capacity of the canneries has been reached the traps can be closed; that fish taken in gill-nets are killed or fatally injured in being removed from them; that their catch cannot be regulated, and at times is in excess of the capacity of the canneries; that there is an ever-increasing scarcity of labourers in the packing establishments; that the men who are now engaged in the hazardous and laborious business of fishing would find ready and equally remunerative employment in the canneries and in connection with the trap-fishing.

Clearly there is much to be said on both sides of this pressing question. Independent, however, of the many arguments pro and con, I believe that the use of traps, purse and drag nets for the capture of salmon on the south-west coast of Vancouver Island is justifiable, because the main portion of the Fraser River run of sockeye salmon which comes in from the sea strikes the coast of the Island east of Port San Juan, and advances close in shore through the Straits to Race Rocks, thence easterly into American waters, and the fish are there captured in vast numbers by means of traps, purse and drag nets. I also believe that by the use of traps and purse nets on the south-west coast of Vancouver Island a good portion of this run which now passes from our waters into American waters could be captured. I believe, from personal observation and investigation, in a season like the past, that the greater part, if not all, of the fish that strike the south-east end of San Juan Island and the waters to the south, and which direct their course for the Fraser River through Rosario Strait, are captured by the American traps and purse nets, and consequently never regain British Columbia waters. To me it is not a question as to whether the capture of these fish in provincial waters by means of traps will endanger the perpetuation of them. In my opinion the question as to whether trap-fishing is or is not a destructive method of catching fish is not one that confronts the Government at this time. It is not a theory, but a condition, that must be met. During the past season, as has been shown, the State of Washington issued 305 trap, 84 purse-net and 92 drag-net licences for the capture of these salmon, while under the Dominion regulations our fishermen were confined to the use of gill-nets, which are not suited to successful use in the clear waters through which the fish pass before entering the American waters. If the use of traps endangers the perpetuation of our Fraser River salmon fishery, then the Americans will soon have accomplished the extinction of these fish, and will have reaped the benefit. For the above reasons I believe that the use of traps in Juan de Fuca Strait and south of Discovery Island is justifiable.

If traps are permitted to be used in the waters south of Discovery Island, the use of purse-nets should also be sanctioned, as very few of our fishermen are financially able to place traps. Purse-nets, the use of which has become quite general and very successful on the American side, are not nearly so expensive as traps. It takes ten men to operate the kind of purse-net in general use, so that our fishermen could, by combining, enter the business and compete with the Americans who use the traps.

I am not, however, at this time prepared to advocate the use of traps in any of the waters of the Province that are unaffected by the use of American traps.

As a result of the agitation the Dominion Government gave permission to use trap-nets, purse-seines and drag-nets in Canadian water, but prohibited their use within three miles of the mouth of a navigable river, or within half a mile of the mouth of a salmon river.

The first fish-traps used in British Columbia were located on Boundary Bay, inside of Point Roberts, and on the southern shore of Vancouver Island, between Victoria and Otter Point, in 1905, and are being successfully operated, a large percentage of the catch being Spring salmon, which is mild salted for the German market. The Canadian fish-traps are subject to regulations which are strictly observed by the owners, in marked contrast with those on Puget Sound, which are worked in season and out of season without regard to consequences affecting the future of the salmon industry.

FISHERIES TREATY.

After negotiations spreading over many years between the Governments of Canada and the United States, a Treaty relating to the protection, preservation and propagation of the food fishes in the waters contiguous to Canada and the United States was signed at Washington on April 11th, 1908. Under this Treaty an International Fisheries Commission is created, consisting of one person named by each Government, with power to "fix and determine by uniform and common International regulations, restrictions and provisions," the times, seasons and methods of fishing in the waters contiguous to Canada and the United States and the nets, engines, gear, apparatus and appliances which may be used; the protection and preservation of food fishes; an arrangement for concurrent measures for the propagation of fish; to put into operation and enforce the regulations by legislative and executive action and provide for appropriate penalties for all breaches thereof, with power by either Government to exercise jurisdiction "as well over citizens or subjects of either party apprehended for violations of the regulations in any of its own waters to which said regulations apply, as over its own citizens or subjects found within its own jurisdiction who shall have violated said regulations within the waters of the other party."

The Treaty covers, among other waters specified, "the Strait of Juan de Fuca, those parts of Washington Sound, the Gulf of Georgia and Puget Sound, lying between the parallels of 48 deg. 10 min. and 49 deg. 20 min." The regulations are to remain in force for four years after their promulgation, and thereafter for one year from the date when either Government shall give notice to the other of a desire for their revision, and if such revision be made the revised regulations shall remain in force for another four years, and so on in case of further revisions and modifications.

The regulations under the Treaty have not been fixed by the respective Governments, but even after their ratification and promulgation by the United States Government, it is doubtful if it will bring about the reforms contemplated, as it is quite within the possibilities that in some instances the question of State sovereignty may be raised, and the provisions of the Treaty held to be an unwarrantable interference by Congress regarding a matter in which the State Legislature is supreme. It is evident that the only remedy for the conditions existing on Puget Sound—threatening the destruction of the salmon industry—is voluntary compliance with the existing law on the part of those engaged in the business, and a universal and earnest determination to protect and perpetuate a great industry for the benefit of their posterity by the people of the State of Washington.

A QUESTION OF JURISDICTION.

When British Columbia entered the Canadian Confederation in 1871, the Terms of Union included the following item:—Canada will assume and defray the charges for the protection and encouragement of the fisheries.

Under this agreement it has been contended that the Dominion should bear all the expenses of administration of the fisheries, while the revenue derived should form part of the revenue of the Province. The Dominion assumed the position of being supreme in the premises, made rules and regulations, established a fisheries protective service, fixed the cost of fishing leases and licences, and retained the revenue collected, despite objections and protests on the part of the Province. As already shown, the amount contributed to the Dominion from this source is far in excess of the expenses incurred in the administration of the fisheries, and the Province has long sought a settlement of its claims. In 1898, in a case submitted to the Judicial Committee of the Imperial Privy Council, it was decided that inland and tidal fisheries were the property of the Provinces; that, in a general way, fish, as a property or asset, would seem to belong to the Provinces; but jurisdiction in respect to legislation and the right to license was not defined, and the rights in regard to fishing within the three-mile limit were not specifically determined. Many attempts have been made to arrive at an adjustment of these important questions, and the Dominion Government and the Government of British Columbia have agreed to submit a case to the Privy Council. One question will be, briefly: Who owns the fish in British Columbia?

Humpback Salmon.
Dog Salmon.

The Province contends that the fish, being the property of British Columbia, it has the right to prescribe where, when and how its licensees shall take its fish, subject to any regulations made by the Dominion authorities.

The second and more important question to be submitted will be for a definition of sub-section E of section 5 of the Terms of Union (quoted above).

PACIFIC FOOD FISHES.

The following brief descriptions of the food fishes of the North Pacific are taken from the latest authorities, and may be accepted as fairly reliable, although it must be admitted that the knowledge of the life habits of most of the species is so meagre as to call for systematic biological investigation. The pressing necessity for scientific study of the marine life in British Columbia waters is recognized by the Dominion Government, and a biological station has been established at Departure Bay, near Nanaimo. In mentioning the establishment of this station, the Deputy Minister of Marine and Fisheries says: "Nowhere else on the North American continent is there a field so prolific and so inviting as these unparalleled waters of the great Pacific Province of Canada."—Annual Report, 1909.

SALMON.

The Pacific salmon is thus described by Mr. John Pease Babcock, Provincial Commissioner of Fisheries:—

"We have in our waters the five known species of the genus *Oncorhynchus*, termed the Pacific salmon. They are distinct from the salmon of the Atlantic, which are the genus *Salmo*. Indeed, the word salmon does not by right belong to any fish found in the Pacific, it having first been applied to a genus found in Europe. The settlement of the Atlantic Coast of America was made by a people familiar with the European form, who at once recognized this fish as running in the rivers of their newly-acquired territory. They naturally and by right gave it the name salmon, for it is

identical with the European form. With the advent of people from the Atlantic States to the Pacific Coast, they found running in all the main rivers a fish similar in form and colour, and of apparently similar habits, and they naturally called them salmon. Structurally these fish are but slightly different, but their life history is totally dissimilar, and they are distinctly and positively placed. The greatest difference is presented in the fact that all the species found in Pacific waters die shortly after spawning once. This is true of both sexes. This remarkable characteristic, when first brought to the attention of some Atlantic and European authorities, was discredited, as they did not then generally know that the Pacific salmon was different from and not identical with the *salmo salar*, which does not die after spawning, and generally returns to salt water after depositing its ova. While our Pacific fish are not salmon in a scientific sense, they are now the salmon of the world, because of their abundance and their fine canning qualities, which permit them to be offered in the markets of the civilized world.

"Taken in the order of their commercial importance in the Province, they are known as:—(1) The Sockeye or Blueback (*Oncorhynchus nerka*); (2) the Spring or Quinnet (*O. tshawytscha*); (3) the Coho or Silver (*O. kisutch*); (4) the Dog (*O. keta*); (5) the Humpback or chum (*O. gorbuscha*).

The Sockeye.

"(1.) The Sockeye weighs from 3 to 10 pounds, though specimens of 17 pounds in weight are recorded. The anal fin is long, and has about 14 developed rays. There are 14 branchiostegals. The gill-rakers are more numerous than in any other salmon, 32 to 40. The young fry of this species can always be distinguished by the great number of the gill-rakers. The scales of the adult usually average 130 to 140 in the lateral line. The tail is narrow and widely forked. The adults in salt water are free from spots; the backs are a clear blue, and below the lateral line they are immaculate. They are in form and colour considered the most beautiful of their family.

"The bluish backs and silvery sides, which so distinguish them in salt water, give place in the headwaters, at spawning time, to a deep carmine, while the head and tails become a deep olive green, the male and female being equally highly coloured in the specimens found in the extreme headwaters of the Province. The head of the male undergoes less distortion in our waters than any of this genus. Specimens which enter the rivers towards the last of the

season's run, and which do not ascend to the headwaters of the main streams, but which spawn in the lower reaches nearer the sea, do not become nearly so highly coloured at the spawning period, many of the females not showing much, if any, red. The flesh of the sockeye is of a deep and unfailing red. They enter the Fraser River as early as April. They are not taken until July 1st. The main run in the Fraser is looked for toward the latter part of July. The run is at its height during the first ten days of August.

"The sockeye run in all our Mainland rivers, and in some of the rivers of the west coast of Vancouver Island, and in the Nimkish River, near the head of the east coast of that Island. In the rivers of the north-west Mainland coast they run a month earlier than in the Fraser.

"The abundance of sockeye in the Fraser varies greatly with given years; there are years known as 'the big years' and as 'the poor years.' Their movement appears to be greatest every fourth year, and the run is the poorest in the year immediately following. The causes which may have led up to this most remarkable feature have given rise to much speculation, and many theories have been advanced to account for them, but none are sufficiently satisfactory to be generally accepted. This periodicity in the run of sockeye, which is so pronounced in the Fraser, has no marked counterpart in any other river in the Province or on the Coast.

"The spawning period of the sockeye extends from August, in the headwaters, to as late as October and November in the waters nearest the sea. They usually spawn in lake-fed or in lake-feeding streams, the first of their run seeking the extreme headwaters. Very little is known of the life of the young or the length of time they live in fresh waters before seeking salt water. Nothing is known of their feeding grounds in salt water, as they are never found in the bays and inlets which distinguish our coast, and where the spring and coho are so common. It is thought that their feeding ground must be in the open sea. There is a smaller specimen of the sockeye found in many of our interior waters that appears to be a permanently small form, which is known to writers as 'The Little Red Fish,' 'Kennerly's Salmon,' or 'The Evermann form of the Sockeye,' and which in some lakes of the Province can be shown not to be anadromous. This form of the sockeye is often mistaken by observers as a trout. It has no commercial value, and does not 'take a fly' or any other device commonly used by anglers for taking trout. The Indians of Seton and Anderson Lakes cure great numbers of these small salmon by smoking them. They give them the name of 'Oneesh.'

Steelhead.
Kamloops Trout.

The Spring Salmon.

"(2.) The Spring or Quinнат Salmon (*O. tshawytscha*) ranks second in importance in the waters of the Province. This species is known in Alaska as the King or Tyee salmon; in British Columbia as the Chinook, the King or Quinнат; in California as the Sacramento or Quinнат salmon. It was the first and for many years the only salmon used for canning. The spring salmon attains, in our waters, an average weight of from 18 to 30 pounds. Specimens weighing from 60 to 100 pounds have been reported. It has 16 rays in the anal fin, from 15 to 19 branchiostegals, and 23 gill-rakers. The number of scales in the lateral line run from 135 to 155. The tail is forked, and, like the back and dorsal fin, is commonly covered with round black spots. The head is rather pointed and of a metallic lustre. The back is of a dark green or bluish colour; below the lateral line it is silvery. At spawning it becomes almost black, with little or no red. On the spawning grounds of the Province they are often spoken of as 'black salmon.' In this respect these fish in our waters are different to those in the waters to the south, where the spawning fish are of a dull red. The spring salmon are the most powerful swimmers which seek our rivers, usually going to the extreme head of the watershed which they enter. They seem to prefer the most rapid moving streams, and apparently avoid the lake-fed tributaries. The colour of their flesh in our waters is from deep red to a very light pink, at times almost white. Owing to the uncertainty of its colour, it is less generally used for canning, and all specimens are examined by the canners before accepting them from fishermen. It is stated that the 'early run' fish are the most reliable in colour. It has also been stated that these pale pink or white-meated salmon are not any less rich in flavour or oil than the red-meated ones; but as the English market demands a red-meated salmon and refuses to accept anything else, they are rejected by the packers.

"The spring fish enters the Fraser early in the spring, and the run continues more or less intermittent until July. There is no pronounced run in the fall.

In recent years considerable quantities of spring salmon have been mild cured for the German market. In 1908 this trade amounted to 795,000 pounds, valued at \$79,500.

The Coho.

"(3.) The Coho (*O. kisutch*), or Silver or Fall Salmon, is found in all of the waters of the Province, and of late years has become a considerable factor in the canned product. This species

on an average weighs from 3 to 8 pounds. Heavier specimens are not uncommon. It has 13 or 14 developed rays in the anal fin, 13 branchiostegals, 23 gill-rakers, and there are about 127 scales in the lateral line, the scales being larger than any other of the genera. In colour these fish are very silvery, greenish above, with a few black spots on the head and fins. These fish run in August and September in the rivers on the north-west coast, and in September and October in the Fraser. Like the sockeye, they travel in compact schools. They do not seek the extreme headwaters, and frequent both the streams and lakes to spawn.

Dog Salmon.

“(4.) The Dog Salmon (*O. keta*) run in most of the rivers and Coast streams late in the fall. They average from 10 to 12 pounds in weight; much larger specimens are not unusual in most of our waters. They have 14 anal rays, 14 branchiostegals, 24 gill-rakers and about 150 scales in lateral line. In Provincial waters they spawn close to the sea, ascending almost every one of even the minor Coast streams. In the sea they are dark silvery in colour, the fins being black. At the spawning period they become dusky, with lateral lines of black, with more or less grey and red colouring along the sides. The heads of the males undergo the most marked distortion, and the teeth in front become large and dog-like, hence the popular name. Until within the last four years, these fish have not been considered of any value. Now they are captured in great numbers by the Japanese, who dry-salt them for export to the Orient, many thousands of tons being exported annually. They are never canned in the Province.

The Humpback.

“(5.) The Humpback Salmon (*O. gorbuscha*) is the smallest of the species found in our waters, averaging from 3 to 6 pounds. It has 15 rays in the anal fin, 28 gill-rakers, and 12 branchiostegals. The scales are much smaller than in any other salmon, there being 180 to 240 in the lateral line. In colour it is bluish above and silvery below. The back and tail are covered with oblong black spots. In the fall the males of this species are so greatly distorted as to give them their popular name. These fish run in abundance only every other year, coming in with the last of the sockeye run. They are but little valued, though a considerable use has sprung up during the last few years. With the development of the markets for cheap fishery products, a demand has come for all of our salmon products, with

the result that the fishing season is being extended to cover the runs of all five of the salmon species found in our waters. This lengthening of the season is of marked benefit to our regular fishermen, and with the development of our other fisheries, it is confidently believed that these hardy men may find ready employment during the entire year."

Local Conditions.

Concerning the habits of the salmon in British Columbia waters, there is a wide field for investigation, and though a good deal has been accomplished there is still much to be learned.

The facts as to the conditions governing and affecting spawning; the time of their going to sea; the effects, injurious or otherwise, of dumping the offal of the canneries into the river; the economic results of the hatchery and the methods of incubation and disposal of the fry; the degree of protection necessary, and the proper limits of a close season are not to be determined wholly by experience elsewhere, but by local observation and systematic investigation extending over a series of years. This the Provincial Government, by the establishment of a Fisheries Department and the appointment of a Fisheries Commissioner, has undertaken to determine, and with every promise of success. The efforts of Mr. Babcock in the direction of acquiring useful data are demonstrated in his annual reports bearing on many matters of practical interest, and in the erection of a hatchery, most modern in its equipment and of great capacity, near Seton Lake, in the Lillooet District.

Salmon Canning.

The methods used in handling and packing salmon have been greatly improved—to such an extent, in fact, that after the fish is taken from the net it is practically untouched by hand during the process of cleaning, cutting up and canning. The canneries are now equipped with ingenious machines which perform the work with a rapidity and precision unattainable in the old days, when Indians and Chinese were employed. The salmon are taken from the boats by a conveyor which delivers them on a table convenient to a machine called the "Iron Chink," which does the work of many Chinamen, and from whom it derives its name. The Chink is fitted with an intricate arrangement of knives and cutters which slice off the heads, tails and fins, scales and splits the fish and removes the entrails. Another conveyor takes the fish to the cutter where it is divided into convenient pieces to fit the cans. During these processes the fish is sprayed continuously with water.

White Sea Bass.

so that it is thoroughly cleaned. The fish is then packed in the cans, which are soldered as they pass along a belt to the test tanks. These are large tanks in which the cans are submerged so as to detect any defect in sealing. Should bubbles rise the defective cans are set aside. Next the cans are placed in a retort where they are subjected to a high degree of heat, which thoroughly cooks the fish. After the cooking the cans are conveyed to the labelling and packing rooms where they are made ready for shipping. In every stage from its capture to its final cooking, the fish is carefully kept from contamination, every possible precaution being taken to ensure cleanliness.

THE HALIBUT.

Next in economic importance to the salmon is the halibut (*Hippoglossus Vulgaris*), which belongs to the flounder family, and is found in great numbers in the North Pacific. Three varieties of the fish are found in British Columbia waters, viz.:—The Arrow-toothed, the Monterey or Bastard, and the Common halibut, which is the most numerous and the only one of the three caught in large quantities. The common halibut is found all along the Coast, from Behring Strait as far south as San Francisco, its centre of abundance being, according to some authorities, the Gulf of Alaska, in the vicinity of Kadiak and the Shumagin Islands, where extensive banks exist which furnish a favourite habitat for the big, flat fish. These banks, however, have not been fished over to any extent, as the fishermen find an abundant catch at much more convenient distances from markets and shipping points. A very large bank lies off Cape Flattery, at the mouth of Juan de Fuca Strait, which is a favourite fishing ground during the summer. In winter the fishing is done farther north, in the more sheltered channels, and in Dixon Entrance and Hecate Strait, where the fish is very plentiful and of superior quality. Samples are taken which weigh up to 300 pounds and measure 5 and 6 feet in length, but the average size, and that most esteemed, is about 60 pounds. The halibut fishery employs quite a large fleet of schooners and several steamers, which make their home ports at Vancouver, Seattle and Tacoma, the great bulk of the catch being marketed in the United States.

On The Banks.

The method of fishing for halibut from schooners is practically the same as on the Atlantic coast, for, with few exceptions, all the men in the business got their training on the Atlantic halibut banks. The schooners used on this Coast are smaller, as a rule,

than the Eastern ones, and carry fewer men, five or six constituting a crew. On arrival at the banks the schooner is hove-to, and all hands prepare for work. First the dories are launched and the buoy lines lowered. The buoy line is usually about 150 feet long, with an anchor attached to the end. The anchor is lowered to the bottom and then the trawl lines, usually three in number, are lowered over the side of the boat. The trawl lines are each about 1,800 feet long, and are joined together so as to make one continuous line. Side lines, about six feet long, are attached to the trawl lines and are placed about three or four feet apart. These lines have hooks and bait (usually herring) attached, and are so placed as to rest on the bottom. The trawl lines are lowered over the end of the dory, and great skill is needed in placing the trawl so as to cover as much ground as possible and yet not get the lines crossed or tangled. To lift the trawl the buoy line with the anchor attached is taken in first, and then the trawl. Some schooners are equipped with a windlass to do this work. The fish are thus hauled to the top of the water, hit on the head with a club, unhooked, and thrown into the dory. Many fish of other kinds are hooked on the side lines, but, with the exception of black cod, none of these are considered worth keeping. Large numbers of dog fish are caught in this way, and they are the bete noir of the fishermen, as they persist in usurping the places of more profitable quarry. When the dory's load is complete her cargo is transferred to the schooner's deck, where the fish are stacked up and the work of cleaning begins. This consists of removing the heads and entrails, a thorough sousing with sea water, and packing in the hold in alternate layers of ice and fish. Then the schooner makes all sail for her home port, where her cargo is packed in boxes and shipped in cold storage cars to the Eastern markets.

Fishing From Steamers.

There is little difference in the methods employed in fishing with steamers from that already described, except that the work is done on a much larger scale, and the catch is proportionately greater. A steamer generally makes a round trip in from six to eight days. Fishing from a dozen dories, over eighty miles of line is used. On arrival at the grounds, the dories are placed in position by the steamer, and the trawls set. Each dory carries from two to three trawls, each about three miles in length, from which short lines, with baited hooks, radiate. A full cargo is often caught in one day, and frequently consists of over 100,000 pounds of choice fish.

A Growing Industry.

The halibut industry on the Pacific Coast had its inception about twenty years ago, and for many years it languished, as there was but a limited local demand, and the existing means of transport did not permit shipment to the Eastern markets which, moreover, were then well supplied from the Atlantic fisheries. But conditions changed, the centres of population moved Westward, the Atlantic catch declined, the cold storage system and fast freight service came into use, and Pacific halibut became a leading feature in the fresh fish markets of the East. The Atlantic halibut banks, fished over for a century, seem to be threatened with depletion, judging from the rapid decline in production during the past five years. In 1899, the Atlantic catch amounted to 9,025,182 pounds; in 1902, it had decreased to 4,067,867 pounds, and in 1908 had fallen off to 1,690,478 pounds.

On the Pacific Coast, the history of the industry is reversed, for the production rose from 6,877,640 pounds in 1899, to 17,512,555 pounds in 1908, over ten times the total Atlantic catch. The bulk of the halibut fishing is done by vessels outfitted at Seattle and Tacoma, in the State of Washington, but a great deal of their fishing is done in Canadian waters—notably in Hecate Strait—and one big concern, the New England Fish Co., operating four large steamers from Vancouver, B. C., is credited annually with at least one-half of the whole catch. This company has a special arrangement with the Dominion Government, whereby it is permitted to fish in Canadian waters and ship its catch in a Canadian port. Recently, some of the Canadian firms engaged in halibut fishing entered a protest against the continuance of this special privilege to an alien corporation, and the authorities at Ottawa have also been asked to deal with a firmer hand with the United States poachers, who are alleged to have contravened the law for years by fishing in Canadian waters.

Flounders.

Many members of the halibut family, coming under the name of flounders, are found in these waters, all possessing more or less value as food fishes. Certain kinds of these fish are locally known as "turbot," while others are sold as "soles," though authorities on the subject maintain that there are no true turbot or soles in the North Pacific. The catch of these fishes is limited to the local demand. Among the varieties are the following: Large-eyed flounder, large-scaled flounder, hook-toothed flounder, long-finned

Preparing to Lift Salmon Trap-Net.

flounder, short-finned flounder, bastard turbot, spine-checked turbot, black-tailed sole, black-dotted plaice, and many others which are sold as sole in the local markets.

THE COD.

The Cod (*gadus morrhua*), the Cultus Cod (*ophiodon elongatus*), the skill, or black cod, the red rock-cod, and many other varieties of fish which pass under the name of cod, abound in the North Pacific and Behring Sea. Authorities differ as to the quality of the Pacific cod, some claiming that it is not so fine a food fish as its Atlantic brother, and that the air bladder or "sound" is much smaller, while others maintain that it is equal in every respect to anything caught in Eastern waters. The fact is, that the Pacific cod has been overshadowed by the more attractive and readily captured salmon, and consequently, the habits, migrations, and food qualities of the several varieties of the cod family have not been given careful study, and comparatively little is known about them. That they abound in great numbers, however, is admitted on all hands, and that their killing and curing may be made a very important industry is becoming every day more manifest. Several causes have served to retard the cod-fishing industry on the Pacific Coast, chief of which may be mentioned: (1) The want of a home market; (2) the keen competition of Eastern producers, and their more advantageous geographical position with regard to centres of population, and (3) the tendency of capital to seek investment in the more promising salmon fisheries. Another difficulty which has stood in the way of establishing cod-fishing on an extensive scale on this Coast, is the moist climate, which will not permit the curing of the fish in the open air. This was formerly held to be a fatal obstacle, but mechanical dryers have been invented, which are claimed to cure the fish faster, more thoroughly, and cheaper than the old sun and air process. Cod fishing on a commercial scale was established on the Pacific as early as 1863, the fishermen of that day seeking their catch on the coast of Siberia, and marketing it in San Francisco.

The discovery of the Pacific cod was made in 1857, by Capt. Mathew Turner, of the brig "Trinandra," 120 tons, who was detained by ice for three weeks in Castor Bay, at the head of the Gulf of Tartary, while en route from San Francisco to Nicolaevsk, on the Amoor River. During their enforced idleness, the crew of the "Trinandra" amused themselves by fishing, and to their surprise caught plenty of cod, averaging two feet in length; but it was not till 1863 that Capt. Turner turned the knowledge of

his discovery to account. In that year he outfitted a schooner for the business and made a successful trip, securing a full cargo off the Siberian coast. His success encouraged others to try cod fishing, and the result was the discovery of abundance of the fish in deep water all along the North Pacific coast, from California to Behring Strait. The industry has been carried on on a considerable scale in California during all the intervening years, but it was only in 1903 that it was regularly established in Washington and British Columbia.

The methods in vogue for catching cod are practically the same as those used on the Atlantic. In the deep-sea fishing, hand lines are the rule, the fish being caught from dories. Several small dories are carried by each steamer or schooner, and a single fisherman goes in each boat. Standing in the centre of the dory (which is about 13 feet long on the bottom, and a little over 16 feet on top), he throws out a line on each side, and the fish taken are put into the ends of the craft until she is loaded, when they are taken to the vessel and hoisted to the deck to be dressed. The splitters and salters then dress, clean, and salt the fish, which is deposited in the hold, the quantity being added to daily until a full cargo has been secured. The time for loading a dory varies, according to the abundance or scarcity of fish, from a few hours to a whole day, but when the fish are plentiful the average catch per dory will easily reach 500. Trawls have been tried in Behring Sea, but have not proved successful, because of the myriads of sea fleas (amphipod crustaceans) on the bottom. These active scavengers not only swarmed upon the bait, but they also injured or devoured the cod before the trawls could be hauled.

The estimated cost of outfitting a vessel for the Behring Sea cod fishery, on a catch of 157 tons, or 70,000 fish, average weight $4\frac{1}{2}$ pounds, length of voyage, three months, calculated by a well-known Vancouver company, is as follows:—

Captain, three months @	\$125.....	\$ 375
Cook " "	70.....	210
Salter " "	70.....	210
(assistant), three months @	50.....	150
Splitter, three months @	70.....	210
Two men @ \$40	80.....	240
Mate's share 7,000 fish @ 3c. per fish		210
Nine fishermen's shares 63,000 fish @ $2\frac{1}{2}$ c.....		1,575
		<hr/> \$3,180
Provisions, 17 men @ \$10 per month per man		510
Charter of vessel @ \$200 per month		600
Fifty tons of salt @ \$12 per ton		600
Towage, port charges, fuel, &c.		150
Five dories, complete, @ \$50=\$250 per trip (good for five trips)		50
Lines, hooks, anchors, buoys, &c., for same, \$20.85 boat per trip		20
Hand lines, spare lines, hooks, cable, &c., &c., per trip.....		123
		<hr/> \$5,233

This total would represent the value of 157 tons of green salted fish, landed at the dryer. The cost of drying, per ton, is estimated at \$5, or \$785 for the cargo, making the total cost \$6,018. But the green salted fish loses 40 per cent. by shrinkage in the process called "hard dried" (necessary where the fish is intended for a distant market); 25 per cent. in "medium dried," and 15 per cent. "local market" dried, so that the respective quantities and cost of the three grades ready for market, from 157 tons of green fish, in each case, would be as follows:—

Hard Dried, 94 1-5 tons, total cost per ton f.o.b., including packing, &c.....	\$71 88
Medium Dried, 118 tons	59 00
Local Market, 133 ½ tons	53 08

This, at an average of four cents per pound, would give profits as follows:—Hard dried, \$18.12 per ton; medium dried, \$21 per ton; local market dried, \$26.92.

COAST FISHING.

The cost of outfitting a vessel for the Coast fishery is estimated as follows:—Estimated catch, 125 tons halibut, hake, red cod, shore cod, etc.; estimated length of voyage, six weeks:—

Captain, @	\$125 per month.....	\$187 50
Mate, @	75 " "	112 00
Cook, @	70 " "	105 00
Salter, @	70 " "	105 00
" (assistant), @	50 " "	75 00
Splitter, @	60 " "	90 00
Nine fishermen, @	60 " "	810 00
Two deck hands, @	40 " "	120 00
Total wages		\$1,605 50
Provisions		255 00
Charter		265 00
Salt (40 tons)		480 00
Port charges, towage, fuel, &c.		140 00
Outfitting of 5 dories, line, hooks and gear generally, and wear and tear		145 00
Total cost of cargo, 125 tons, green salted		2,890 00
Cost of drying		625 00
Total		\$3,515 50

The 125 tons green fish will shrink (25 per cent.) to 94 tons, which, adding cost of labour, packing, drayage, wharfage, insurance, etc., would cost \$45.36 per ton, f.o.b., and should sell for 3½ cents per pound, \$70 per ton, or \$6,580 for the cargo—a profit of \$2,317.

The process of drying used in British Columbia, is the invention of Thos. S. Whitman, of Annapolis, N. S., who devoted many years to experimenting before perfecting his system. Experience has shown that the Pacific cod, on account of its fatness, requires a special drying to thoroughly harden the glutinous substance contained in large quantities under the skin which, if not carefully managed, will turn to oil and become rancid. Sun drying, it is claimed, will not produce the desired hardness, which can only be insured by artificial means, and it is confidently

Unloading Salmon at Cannery.

asserted that Whitman's dryer does the work thoroughly. The use of the mechanical dryer saves much time and labour, for, given favourable weather conditions, it requires about six weeks to cure and dry fish by the sun and wind process, during all which time the fish has to be constantly turned, calling for constant attention, while the artificial dryer does the work in forty-eight to sixty hours.

British Columbia's output of cod for 1908 was only 630,000 pound, valued at \$37,800, as compared with an annual average of 2,000,000 pounds valued at \$10,000,000 caught by California and Washington fishermen. These figures show the opportunities of this industry in British Columbia waters.

HERRING.

Although there is a great abundance of herring in British Columbia waters, the catching and curing of these fish is only beginning to secure the attention which its importance deserves. The Atlantic herring fishery has been a profitable branch of the fishing industry for many years, herring occupying the fourth place on the list of principal commercial fishes, from 1869 to 1908, and yielding in that period an average value of over \$2,000,000 annually. Canadian herring have always had as strong rivals in the foreign markets, the Scottish, Norwegian and Dutch products, although they were declared by experts to be quite equal to their competitors in size, quality and flavour, the drawback to their acceptance being defective methods of curing and packing, which resulted in deterioration if they were kept for a considerable time. To overcome this defect the Dominion Fisheries Department engaged the services of Mr. John J. Cowie, of Lossiemouth, Scotland, an expert herring curer, and a crew of Scotch fishermen and curers, to conduct a series of experiments on the coast of Nova Scotia, and prove once for all the truth or fallacy of Canada's claims. These experiments were carried out during the season of 1904, and proved that the quality of Canadian herring is all that can be desired, and that the conditions necessary to gain for our herring the highest repute and the most remunerative prices are:—(a.) Gutting and curing as soon as possible after capture; (b.) Separation and proper selection of fish according to grade; (c.) Use of the right kind and quality of salt; (d.) Proper packing for shipment to market. By strict adherence to these rules and certain minor details, Mr. Cowie established the fact that Canadian herring could take rank with and command as good prices as the best products of Scotland, Holland or Norway, the latter being established by experimental

shipments to New York and St. Petersburg, which were disposed of at prices much higher than could be obtained for fish cured and packed by the old methods. Mr. Cowie and his staff will continue the experiments this year at other points on the Atlantic, and will also visit this Coast.

At the close of the herring fishing season on the Atlantic coast, Mr. Cowie paid a visit to Nanaimo, with a view of finding out if the industry here is capable of development along the lines proposed on the Atlantic coast. The following extract from his report gives the results of his observations:—

“Nanaimo seems to be the chief seat of the herring fishery, so far, in British Columbia.

“From the middle of November on to the month of March, herring come into the harbour of Nanaimo in such apparently incredible quantities that, during some seasons, they are left stranded on the beach in huge masses, and become a nuisance as they lie rotting there.

“The herring of the Pacific coast appear to be, generally speaking, of a smaller class, and contain a far greater amount of oil than the herring of the Atlantic.

“While I found that these Pacific herring make very good kippers, they may not prove to be so well adapted as the Atlantic herring for curing purposes, owing to the great amount of oil they contain, even after the roe and milt has formed in them.

“When I say that these herring differ from the Atlantic herring for purposes of curing, I do not mean that they cannot be cured, but that they will not keep in good condition for such a length of time as the herring of the Atlantic.

“The more oil there is in herring, the more difficult they are to cure in pickle, and the sooner they go wrong and lose quality. An excess of oil seems to be a prominent feature of all kinds of fish on the Pacific coast, owing, possibly, to the equable temperature of the water and the richness of the food they live on.

“Notwithstanding this, however, attempts have been made within the last four years to cure these herring for export, with no little success. The method of curing which has been adopted is a good deal similar to the Scotch method, and, in my opinion, the trade may be developed along the lines on which they have started, with some slight improvements regarding details.

“The barrel in use there is an admirable one, and is far ahead of the herring barrel in use on the Atlantic coast. It is strongly made, hooped with galvanized iron hoops, and is capable of carrying cured herring to any part of the world in good condition.

"The use of a similar barrel on the Atlantic coast would go far towards improving the present condition of the herring trade of the East.

"The salt in use, however, is, I consider, quite against the proper curing of Pacific herring.

"Trial shipments, I was told, had been made to Australia and New York, and in spite of the poor quality of the salt, and some defects in the curing process, have met with a very favourable reception, especially in Australia.

"I found there is a demand springing up for Pacific herring in China, not cured in pickle, but dry salted in boxes, and I believe extensive shipments of herring put up in that way will be made this season to that country.

"While there may not be a great demand for those Pacific herring in eastern Canadian or American markets, as there they will come into competition with a better class of fish, I believe there is a large outlet for them in the western states of America, in Australia, the west coast of South America, China and the Straits Settlements, if properly attended to.

"To improve the already fairly effective methods of curing in vogue in British Columbia, and as the people there are keenly anxious for such improvement, I would suggest that, as the herring season on the Pacific only begins after the season on the Atlantic has closed, next year three gutting girls and a cooper be sent to the Pacific coast, after operations have ceased on the Atlantic coast, to give a month's instruction in herring curing."

In his report for 1903, Mr. C. B. Sword, Dominion Inspector of Fisheries for British Columbia, notes an item of 3,500 cases of canned herring as a new venture, and remarks that there is no good reason why the fish put up in that way should not be marketed successfully. In 1903, the run of herring was very large. At Nanaimo the fish invaded the harbour in such numbers that thousands were washed up on the beach, like seaweed, by the waves created by passing steamers.

The herring fishery is increasing rapidly in British Columbia, showing a gain of more than forty million pounds in five years, the figures being:—1903, 3,620,000 pounds; 1908, 45,146,800 pounds. Smoked herring, too, shows an increase of over 25 per cent. Japanese fishermen have embarked in the herring fishing at Nanaimo in recent years, catching and salting large quantities of fish, which are exported to Japan.

Interior of Salmon Cannery. "The Iron Chink."

STURGEON.

Another important fish, though not utilised to any large extent, is the sturgeon, the roe of which, when salted, forms caviare, and the bladders are manufactured into isinglass. The Pacific Coast sturgeon (*Acipenser transmontanus*) enters the Fraser about the end of April, following up the oolachans, and spawn, although little or nothing is known about the period. They are taken by spearing or by night-lines, baited with salmon, and very often they are caught in the nets of the salmon fishers. They grow to enormous sizes, some of them weighing from 700 to 900 pounds, and it is said that the largest caught weighed over 1,000 pounds, although it is not authenticated. There is a small local market for sturgeon. A company was formed several years ago at New Westminster for the purpose of catching and export, which was done in a limited way. Mr. C. B. Sword, Inspector of Fisheries for the Dominion in British Columbia, in his report for 1901, says, regarding them:—

“This fishery shows a very small return, 65,000 pounds against 105,000 in 1900, 278,650 pounds in 1899, 750,000 in 1898, and 1,137,696 pounds in 1897. It would not appear that we are ever likely again to see this fishery of any commercial importance. The cold storage companies take all they can get, but the supply, especially of the larger fish, is very limited. Several illegal lines have been seized and destroyed, but the scarcity of the fish makes the employment of this method no longer so profitable as it once was, and comparatively few of these are now used.

“There is no lack of small sturgeon in the river, so that the only reason for the failure of this fishery would seem to be the number of years that this fish takes to obtain its full growth. Until a market was found abroad for them, the local consumption was too small to affect their numbers, and many were taken of a size now rarely met with.”

Sturgeon have also been taken in the interior lakes.

The above figures show that the catch of sturgeon has decreased very rapidly. In 1903, the total catch was only 30,000 pounds, and Mr. Sword says in his report for that year:—

“This fishing is practically extinct. There are still fish of some size taken occasionally, but not enough for the local demand. There is no lack of young sturgeon in the river (Fraser), so that it would appear that the large fish, formerly so common, had taken years to reach their growth, and, with the increased demand, the fishing has been too energetically prosecuted to allow the time needed for their development.”

Professor Edward E. Prince, Dominion Commissioner of Fisheries, ranks the sturgeon as one of the most valuable of Canadian fishes. In his special report on the "Canadian Sturgeon and Caviare Industries," (37th Annual Report, Fisheries Branch, Department of Marine and Fisheries, 1904), he points out that Canada supplies 75 per cent. of the world's consumption of caviare, and gives a mass of interesting information regarding the fish, its distribution, habits, methods for its capture, and the preparation of caviare, isinglass, and other products. The quantity and value of sturgeon and caviare for the Dominion, in 1903, were: Sturgeon, 1,660,920 pounds, value \$146,860; caviare 64,835 pounds, value \$52,426; total value, \$199,286. The use of caviare has become more general of late years, and in consequence it now sells as high as \$1 per pound, on the fishing ground, so that taking the yield of an average fish at 50 to 60 pounds of roe, the value would be \$50 to \$60 per fish, not reckoning the flesh, the bladder, the oil, and the skin, each having a distinct economic value. There is no other fish which yields so much, as every part of the sturgeon can be turned to profit. Named in the order of their commercial importance, the products of the sturgeon are:—(1) Caviare; (2) isinglass, made from the swim bladder; (3) the flesh, fresh, salted, smoked or otherwise prepared; (4) oil, which is of great value in the leather industry; (5) fertilizer, made from entrails and scrap; (6) the soft, gristly backbone, with its sheath, which, prepared, is called wesiga, and in Russia is an esteemed article of diet; (7) the brain and nerve cord removed from the gristle, when smoked and dried, is considered a great delicacy in China; (8) the back portion of the sturgeon, or dorsal region, is made into balyki; (9) the ventral part, or belly, of the fish is made into a food called pupki; (10) a valuable glue, differing from the isinglass of the swim bladder, is made from the nose, fins, tail, etc., and, lastly (11) leather is made from the tough and dense skin. Mill belts and boot laces are made from sturgeon leather, and experiments have shown that a set of sturgeon leather laces will last as long as the belt itself.

The catch of sturgeon, in 1908, was 180,000 pounds.

DOGFISH.

The waters of the North Pacific are infested with many varieties of small sharks (all known to the fisherman as dogfish), which are an endless source of vexation and loss to the deep-sea fishers. These coyotes of the sea, like their land brethren, skirmish on the flanks of the big schools of halibut, herring, cod and salmon, snatching their prey at unguarded moments, and when the fishermen lower their lines, pounce upon and devour the bait, while in

the case of nets, they tangle themselves up in the meshes, seemingly for very wantonness, a single dogfish often succeeding in wrapping himself up tightly in a 150 fathom net. The spike dogfish (*squalis sucklii*) and the tope shark (*geleorhinus galeus*) are the most common, and are found everywhere, and at all seasons, along the Coast. They are from two to five feet in length, and weigh from five to fifteen pounds. These creatures are exceedingly voracious and so destructive that on the Atlantic coast, where the spike dogfish is very common, the Dominion Government has established stations for their capture on a large scale, with a view to their extermination. At these stations the dogfish are converted into oil and fertilizers. On this Coast factories have been operated for years in utilising the dogfish, and the business is rapidly assuming importance, the output for 1908 being fifty-nine thousand dollars. The dogfish are very rich in oil, a very superior grade of lubricating and machine oil being extracted from the livers, while the bodies supply a large quantity of an inferior quality. The residue, after extraction of the oil, makes a good fertilizer. In addition to its value as an oil fish, the dogfish of the Pacific may yet become important as a food, for their good qualities in that respect have long been recognised in Norway, the Channel Islands, the Hebrides, and in Scotland, while recently several of the canneries in Nova Scotia and Prince Edward Island have been successful in putting canned dogfish on the market, which is said to be "superior to canned salmon." One brand of canned dogfish masquerades as "Japanese mackerel," and finds a ready sale.

OTHER OIL FISH.

In addition to the dog fish, there are several other oil-bearing fishes, the principal of which is the ratfish (*Hydralagus colioei*). It is found in great abundance in places, and the oil procured from its liver is used for the very finest work in watches, gun-locks, sewing machines, etc. It is a very prolific oil-bearer, and should prove to be valuable as the basis of an industry.

The basking shark (*Cetorhinus maximus*), is also plentiful in Queen Charlotte Sound during the summer months. It attains to a great size, is perfectly harmless, and so tame that while basking it may be touched by the hand. In England, 150 gallons of oil is the average yield of the liver, which alone is treated, but on the New England Coast the whole carcasses are utilised for the manufacture of fertilizer. The production of fish oil and guano is inconsiderable, when the opportunities afforded for their manufacture are taken into account, the production for 1908 being: Fish oil

Interior of Salmon Cannery. Soldering Tins and Conveying to Retort.

and glue, 142,480 pounds, value \$56,600; guano, 84 tons, value \$2,350; total value, \$58,950. These figures cover only the oils and fertilizers made from dogfish and fish offal, and do not include the whole products, which were valued at \$357,500, in 1908.

THE OOLACHAN AND THE SMELT.

The candle fish (*Thaleichthys Pacificus*), known locally as the oolachan, or eulachon, should be of considerable commercial value. It runs in enormous quantities up the rivers and inlets of the Coast, coming into the Naas about the middle or latter part of March, and reaching the Fraser about the middle of April, deteriorating somewhat in quality as it comes southward. This is a delicious pan fish and is greatly in favour in its season. It, however, like the skil, is too tender for carriage, and has, therefore, only a local market. It is about nine inches in length, and so plentiful at times when running as to be scooped up in bucketfuls. A good many are put up in pickle in small kits and cured like bloaters, but not much progress has been made in these directions, remarks applying similarly to those in regard to the skil.

The Indians catch them in immense quantities and extract the "oolachan grease," which they use much as we do butter. Oolachan oil, properly refined, might become of commercial value, there being practically no limit to their numbers. Experiments have been made with oolachan by bottling and canning, it is said, with success. The oolachans have many enemies besides the Indians. The seal, sturgeon, salmon and porpoise follow them in their run, and even bears and pigs gorge themselves on them when the opportunity offers. If they could be preserved, as indicated, for export, so as to retain their flavour and body, they would undoubtedly demand a sale co-extensive with sardines.

There are two varieties of smelts common in the local markets (*Osmerus thaleichthys* and *Hypomesus pretiosus*), which are in brisk demand.

Mr. Sword notes a substantial increase in the oolachan and smelt fisheries, and he remarks that as there has been no determined effort made to find a market abroad for these fishes, the figures given represent the local consumption, the Indians being the main consumers in the case of the oolachan. As both of these fish are unrivalled delicacies, it can only be a question of a short time before some method will be discovered for their preservation, whereby the flavour will be retained, and a large and profitable export business in them established. The quantity and value of oolachans and

smelts for 1902 were:—Oolachans, fresh, 1,024,320 pounds, \$51,216; salted, 4,070 barrels, \$40,700; smoked, 45,200 pounds, \$4,520; total value, \$96,436. Smelts, 450,000 pounds, \$22,500. These fisheries show no indication of increase as the figures for 1908 are, oolachans, \$31,855, smelts, \$19,195.

WHALING.

One cannot sail very far in any direction along the coast of British Columbia without seeing in the offing an occasional fountain of spray, followed by the flash of a mighty fluke, betraying the presence of a whale. Often in the Gulf of Georgia, or off the west coast of Vancouver Island, the traveller is treated to the sight of a school of whales, apparently enjoying a titanic game of tag, or he may share in the excitement of a whale hunt, if fortunate enough to secure a berth on one of the steamers of the Pacific Whaling Company. This company has been operating for about four years with great success, the average catch being over 600 whales per season. The company has adopted modern methods, and instead of the old style of sailing ship and whale boats, employs fast steamers, which dash boldly alongside the whale and dispatch it with a well-directed shot from a machine gun. The carcass is then towed to the whaling station, where it is hauled on to a suitable stage by machinery and cut up so that every portion of the huge mammal is utilised. This method of whaling was established in Norway several years ago, and later in Newfoundland and Quebec. The profits of whaling by this system are large, averaging from 15 per cent. to 40 per cent.

Several species of whale are found in the North Pacific and Behring Sea, of which may be mentioned the sulphur-bottom (*Sibbaldius sulfureus*), the bow-head (*Baloeua mysticetus*), the sharp-head finner (*Baloeuoptera davidsoni*), the right whale (*Baloeua japonica*), and the humpback (*Megapera versabilis*). The sulphur-bottom, which is the most common in British Columbia waters, grows to an enormous size, an average specimen weighing about 60 tons, and worth to its captors over \$500. A whale of this size should yield, 6 tons of oil, worth \$450; 3½ tons of body bone, \$175; 3½ tons of guano, \$105, and three hundredweight of whale-bone, worth \$48, or a total of \$778, which, after deducting expenses, estimated at \$206, would give a net profit of \$572. A humpback, which is a smaller whale, averaging about 27 tons, should give a profit of \$140, while a finback, weighing 50 tons, is credited with a gain of \$338. The right whale is much more rare than any of the others named, but offers a grand prize to the hunters, for he is worth \$10,000.

The Pacific Whaling Company has three stations on the coast of Vancouver Island, equipped with modern plant. On arrival at the station, the whale is raised from the water on an adjustable platform, for cutting up. Incisions are made in the carcase, running from head to tail, and about a foot apart. This divides the blubber into long, narrow strips, which are then torn or stripped off by means of large hooks attached to wire ropes which are operated by a steam winch. The blubber is then cut into small squares and put through a mincing machine, from which it goes to the steam-heated "trying-out" tanks, where the oil is extracted. The residue of the blubber and the lean meat are converted into guano and glue. The body bones are crushed, ground, and sold as fertiliser, while the whale bone is carefully cut from the jaws, trimmed and shipped to Dundee, Scotland, the home of the whaling industry.

Whalers, operating in the Sea of Japan and Behring Sea, do a considerable trade in whale meat, which is extensively used for food in Japan. Instead of converting the "beef" into fertiliser it is salted and in this form commands a better price. The importation of whale meat into Japan amounts to over two million pounds annually, representing a value of over \$50,000. Pickled whales' tails are esteemed a delicacy in Japan, and large quantities are shipped from this coast.

About two-thirds of the whales captured are cow-whales, either with suckling calves, or with young unborn, the females being broader across the body and slower in movement, as well as yielding more oil, are more easily captured than the males. This, and the fact that whales are hunted at all seasons, should induce the authorities to adopt reasonable restrictive measures for the preservation of these valuable creatures. The indiscriminate slaughter of whales in the North Sea, the Atlantic, and Gulf of St. Lawrence, has practically destroyed the industry in those waters, and without protection the same thing is likely to occur on this coast.

SARDINES AND ANCHOVIES.

Both the sardine (*Clupanodon coeruleus*) and the anchovy (*Engraulis mordax*) are quite plentiful in British Columbia waters. The sardine appears for a short period during the summer months, but the anchovy remains from May to November, and enters the bays and harbors in immense schools. These fish are said to be of excellent quality and to offer exceptional opportunity for their pre-

Interior of Salmon Cannery. Tins Ready for Labelling.

paration as anchovys or "sardines." Some experiments have been made in canning these fish, but as yet no one has undertaken the business on an extensive scale.

ROCKFISH.

The bass and perch families are well represented in the coast waters of British Columbia, and are taken in considerable quantities to supply the local markets. The red and black bass are plentiful, and much esteemed. The perches and other viviparous surf fishes are very common about the shores, and are extensively used as food.

The tom-cod (*Microgadus proximus*) is caught in large numbers, and finds ready sale in the markets of the Coast cities.

SHAD.

The Atlantic shad, which has been well established in the Pacific through plants of fry made in the Columbia and Sacramento Rivers, has worked its way north to Puget Sound and the Gulf of Georgia. It was first noticed in the Fraser River in 1888, and by 1896 it had increased to such an extent that the fisheries authorities deemed it expedient to make regulations governing its capture. The fish does not run in sufficient quantities to warrant its being fished for specially, but is taken incidentally with other fish. The catch is, however, increasing steadily, year by year, and in time the Pacific shad may become as important as its Atlantic progenitor.

The mackerel, which is the basis of an important industry on the Atlantic coast, is practically unknown in the North Pacific. Further south the bull's-eye, or chub mackerel (*Scomber colias*) is found in moderate abundance and is caught for local use. The northern limit of this fish is said to be Monterey Bay, California, but during the winter of 1904, a specimen was caught near Nanaimo, B. C., and it is possible that it may appear in large numbers on this coast in the future.

OYSTERS.

The small native oyster (*Ostrea lurida*) is found in considerable quantities at many places along the coasts of British Columbia and Washington. On Puget Sound, the cultivation of the native oyster has received attention, and several companies are in successful operation. Olympia, Wash., has become the centre of the oyster industry, and the Olympia oyster is esteemed everywhere on the Coast. Several firms have imported Atlantic seed oysters, and in many instances these plantations have produced good results. Although natural oyster beds exist at many points along the Straits

and on the west coast of Vancouver Island, very little has been done in oyster culture in British Columbia, the supply for local consumption being drawn from the East and from Puget Sound. There is a good opening for a profitable business in oysters, as the demand increases with the growth of population. Experience has taught the oyster growers of Washington that an inexpensive dyke, which holds a small amount of water over the oysters at low tide, greatly enhances the value and productiveness of an oyster bed. Many of the dyked beds yield from 100 to 350 sacks of oysters per acre each season, some producing as high as 500 sacks. The grower receives from \$4.50 to \$5 per sack, and as the cost of raising and marketing is about \$1.25 per sack, a handsome margin of profit is left. British Columbia's production of oysters for 1908 was valued at \$12,750.

CLAMS AND OTHER MOLLUSKS.

Clams, of various species, are found nearly everywhere on the Coast, and their value as food is being recognized by the establishment of clam canneries at various points. These canneries are not as yet on a very extensive scale, but their output is of good quality and the business promises to become important and profitable. The output of canned clams for 1908 was 1,700 cases (48 barrels), valued at \$8,160.

The abalone, a large mollusk, sometimes growing to the size of a soup plate, is quite common, and is by many esteemed a delicacy. Cockles, mussels, and other edible shell fish are very abundant, and are more or less sought for as food, and although such "small deer" of the sea are barely reckoned in estimating the commercial importance of our fisheries, they, in the aggregate, contribute a very considerable amount to the annual value of the industry, the figures for 1908 for these miscellaneous products—including clams, crabs, shrimps, etc.—summing up over \$23,000.

CRABS, SHRIMPS, ETC.

Large crabs, belonging to the genus *Cancer*, are very common, and at certain seasons come up on the shores, in some localities, in large numbers. They are in great demand for food, taking the place of the lobster, which is not found in the Pacific. The catch of crabs is little more than enough to supply the local demand, for no special effort is made to capture them. The business of canning crabs has been essayed recently by a couple of firms, and this will doubtless stimulate crab fishing.

Shrimps and prawns of good quality are plentiful, but they are not much fished for, and little information regarding them can be obtained. The habits of these creatures are such as to place them generally outside the ordinary range of observation, so that fishermen may be scarcely aware of their presence, when an active search might disclose them in abundance. At least two species of prawns, one of large size, the other smaller, are seen on the local markets. The principal fishing ground, so far, has been in the neighbourhood of Victoria, and in the southern part of Puget Sound. Shrimps and prawns to a value of \$6,000 to \$7,000 are taken annually.

Beche-de-mer, or trepang, is quite plentiful in the North Pacific, but it is not sought as a commercial commodity. Chinese and Japanese fishermen collect it in small quantities for their own use, but incidentally in their regular business. Beche-de-mer (*Holothuria edulis*) is also known as sea slug, sea cucumber, sea pudding. It is highly esteemed for food in China, where it is imported in large quantities. The animal is repulsive, resembling a big, flat worm, from 6 to 24 inches in length, and is prepared for use by boiling and drying over a wood fire, or in the sun. China imports beche-de-mer to the value of about \$650,000 annually.

As already stated, there are no lobsters known to be native to the Pacific. Several years ago, the Dominion Department of Fisheries liberated a car-load of young lobsters in the Gulf of Georgia, but they either died from the effects of the journey across the continent, or were destroyed by some natural enemy, as nothing was ever seen of them. The Department repeated the experiment in 1906, but so far the results have not been ascertained, although lobsters are reported to have been seen near where they were liberated.

GAME FISH.

So far the fishes of British Columbia have been treated from an economic point of view, but from a sportsman's standpoint the field is not a less interesting one. The whole interior of the Province, Island and Mainland, possesses a wonderful system of water communication, lakes and rivers. These, as well as the lesser streams, are abundantly stocked with fish, principally salmon or trout, the several varieties of which have already been enumerated. There are also whitefish in the northern waters. While the best known and favourite resorts are on Vancouver Island, there is no locality where a fisherman may not prosecute with zest this time-honoured sport; and even on the sea-coast, during the salmon

Spring Salmon, 53 and 55 lbs. Campbell River, Vancouver Island.

run, with trolling line he will meet with gratifying success. The waters of Kootenay and Southern Yale are already becoming noted as fishing resorts, and when lines of communication are opened up, the rivers and lakes of the whole interior will attract numerous fishermen, affording, as they do, fish of uncommon size and number. The scenery, too, everywhere is on a grand and picturesque scale, and all natural conditions are healthful and invigorating.

BRITISH COLUMBIA TROUT.

The waters of the Province are rich in trout. No other section of the Dominion offers better fishing than can be found here. Of the varieties of trout found in the rivers, streams and lakes of the Province, the steelhead trout (*Salmo gairdneri*) is the best known and most highly considered, because of its abundance, great size, and "game" and commercial qualities. From its being more or less anadromous in its habits, it is locally and in many Coast sections classified with the Pacific salmon. The steelhead more closely resembles in form, colour of flesh, and habit, the Atlantic salmon than any other form found on the Pacific coast. It, like our salmon, spawns in fresh water only, but, unlike our salmon, it survives after spawning, and returns to the sea. It feeds at all times freely in fresh and salt waters. Commercially the steelhead is of importance. It is commonly found in our markets from early fall until late spring. A considerable quantity is shipped East in cold storage. It finds ready sale in all local and Eastern markets; and because of the demand for it in a fresh state, the entire catch is marketed in that way. In our waters it averages about 12 pounds in weight, though specimens weighing from 20 to 24 pounds are not uncommon. As a "game fish" the steelhead is considered by many fishermen to have no equal in fresh water. It readily takes a fly or spoon-bait, and "puts up a stiff fight, taxing the skill of the angler and the strength of his tackle to bring it to net or gaff."

There are numerous forms of trout to be found in the Upper Fraser and Thompson Rivers, and in many of their tributary lakes, that cannot be distinguished by any technical character from the steelhead, but which, because of the many differences in habit, form and colour, have been given many different names. Of these, perhaps the best known to anglers is the very game fish which abounds in the Kamloops, Shuswap, Okanagan and Kootenay Lake regions, to which Dr. Jordan gave the name of Kamloops trout (*Salmo Kamloops*). The smaller specimens of this trout readily take a fly, but the largest specimens are seldom secured except by means of trolling.

In addition to the salmon and trout which abound in our waters, we have the Great Lake trout (*Chriticomer namaycush*) and the Dolly Varden trout (*salvelunis parkei*), which are easily distinguished from the true trout by their red or orange spots. These last two—which should be called charr—while abundant in most of our interior waters, are not considered of great importance to the angler, because only the young ones are taken by means of a fly. Both these fish attain a large size, the Great Lake trout not uncommonly weighing as high as 30 pounds, while the Dolly Varden often weighs from 15 to 20 pounds.

SEALING.

Fur seal hunting was for many years one of British Columbia's most profitable industries, but owing to the restrictions imposed upon Canadian sealers as a result of the Behring Sea award, the business has fallen away very considerably. The annual catch decreased from an average of 62,600 skins for five years ending 1894, to 16,500 for the five years ending 1903. In 1905, the sealing fleet consisted of 37 schooners, employing 518 hunters (188 whites and 330 Indians), and the catch was 13,798 skins. In 1906, the catch was 10,370 skins, in 1907, 5,397 skins; and in 1908, 4,954 skins, the smallest on record. Of this total, 893 skins were taken in the South Pacific and 1784 on the British Columbia coast, so that only 2,277 were taken in the Behring Sea.

In addition to the fur seal, large numbers of hair, or Labrador seals, are killed annually, the catch in 1908 being 5,220 skins, valued at \$3,015. A few pelts of the valuable sea otter are also taken every year by the sealers and other hunters.

MARKETS FOR BRITISH COLUMBIA FISH.

The market for British Columbia canned salmon is world-wide, its reputation being firmly established wherever British trade has penetrated. Other fish and fish products are in demand in Canada and the United States, but as the industry grows the overseas markets must be cultivated. Principal among these are Japan, Australia, New Zealand, China, Central and South America, Great Britain, Germany, France, Italy and other European countries. The perfection to which cold storage has been brought, both on land and sea, should permit the profitable export of fresh fish to

the countries named. Some of the fishing companies are successfully shipping frozen salmon to the English and French markets in competition with Siberia, and by supplying London and Paris at the season (November till February) when high prices for salmon rule large profits may be secured. As the fisheries develop the exportation of many kinds of fish in a frozen state will no doubt become an important item of trade.

The following tables show the average yearly importations of fish and fish products into countries which should furnish markets for the output of British Columbia fisheries:—

JAPAN.

Salt Fish:	Yen.*
Total importation	1,557,436
From Canada	94,996
Russian Asia supplied the bulk of the importation	1,419,277

*Yen=50 cents Canadian.

CHINA.

Fish of all kinds:	Lbs.
Average imports for three years	46,983,338.
Value	4,742,677 taels=\$474,273

This does not include beche de mer, or trepang, of which 6,192,960 lbs. were imported.

INDIA.			Total. \$
<i>Singapore:</i>	Pikuls.		
Fish—Dried and salted	695,964	6,960,152	
Maws	2,915	280,513	
<i>Penang:</i>			7,240,665
Fish—Dried and salted	48,395	625,106	
Maws	1,080	148,513	
<i>Malacca:</i>			773,619
Fish—Dried and salted	43,964		127,054
<i>Ceylon:</i>	Cwt.		Rupees.
Fish—Cured and salted	287,879		1,766,524
<i>Mauritius:</i>	Kilos.		
Fish—Dried and salted	743,497	213,685	
Pickled	252,075	70,535	
(Of this total Canada supplied about \$8,500 worth.)			284,220
AUSTRALASIA.			£
<i>New South Wales:</i>	Lbs.		
Fish—Dried and preserved	6,220,504		125,036
<i>Victoria:</i>			118,193
Fish—Preserved and salted			25,658
<i>South Australia:</i>			
Fish—Preserved, pickled, dried, &c.	1,258,929		
(Canada's share of this was \$9,750.)			
<i>West Australia:</i>			39,640
Fish—Dried, salted, pickled and preserved ..	1,791,365		
<i>Tasmania:</i>			
(Trade reports include fish under the general heading, "Meats and Fish.")			
<i>Queensland:</i>			53,767
Fish—Preserved			
(Canada, \$15,000.)			
<i>New Zealand:</i>			42,234
Fish—Potted and preserved	1,933,188		
(Canada, \$24,614.)			
Total exports of fish from Canada to Australasia ..			71,384
MALAY: PROTECTED STATES.			\$
<i>Perak:</i>			171,012
Fish—Salted			
<i>Selangor:</i>	Pikuls.		235,897
Fish—Salted	26,913		
<i>Negri Sembilan:</i>			640,110
Fish—Salted			

The pikul=133 1-3 lbs. avoirdupois. The dollar is the standard Straits Settlements silver dollar.

Herring Salteries, Nanaimo, B. C.

West Indies.

The completion of the Mexican Trans-Isthmian Railway from Salina Cruz to Puerto Mexico gives British Columbia direct and rapid communication with the countries bordering the Gulf of Mexico, Caribbean Sea and the Atlantic.

<i>Bermuda:</i>			£
Fish—Preserved			5,953
<i>Jamaica:</i>			
Fish—Dried or salted	13,780,498	£ 116,560	
Pickled	Bbls.		
Herrings	14,457	11,566	
Other kinds	28,759	26,000	
(Total value of fish imported from Canada £120,865.)		17,519	171,645
<i>Turks and Caicos Islands:</i>			
Fish—All kinds			496
<i>St. Lucia:</i>			
Fish—Salted and dried	Cwt.		
(Canada, £2,638.)	10,448	9,041	
<i>St. Vincent:</i>			
Fish—Pickled	Bbls.		
Smoked, dried and salted	306	304	
(Canada, £80.)	726,922	4,701	5,005
<i>Barbados:</i>			
Fish—Dried, salted, or smoked	Quintals.		
Pickled	52,373	49,755	
Cured, tinned, or canned	Bbls.		
(Canada, £38,705.)	2,656	2,446	
		2,726	54,927
<i>Grenada:</i>			
Fish—Dried or preserved.	Lbs.		
(Canada, £1,286.)	1,549,155	12,574	
<i>Leeward Islands:</i>			
Fish—Dried	Cwt.		
Pickled herrings	20,727	18,124	
(Canada, £17,753.)	Bbls.		
	3,623	3,493	21,617
<i>Brazil:</i>			
Fish—All kinds, imported from Canada			\$ 617,408
<i>Porto Rico:</i>			
Fish—Fish, all kinds, imported from Canada			399,764
<i>Trinidad and Tobago:</i>			
Fish—All kinds	Lbs.		
(Canada, £67,385.)	9,611,204	85,637	
Total exports of fish from Canada to British West Indies			938,721
<i>British Guiana:</i>			
Fish—Dried	Cwt.		
Pickled	62,531	\$ 239,925	
Preserved and Smoked	Bbls.		
(Canada, \$226,187.)	3,354	15,911	
	Lbs.		
	426,220	38,874	397,747
<i>British Honduras:</i>			
Fish—Salted			6,120
(Canada, \$5,308.)			
<i>British India:</i>			
Fish—Cured or salted			£ 16,198
<i>Straits Settlements:</i>			
Fish—Cured or salted			5,149
<i>Mexico:</i>			
Fish—All kinds			\$ 75,881
<i>Cuba:</i>			
Fish—All kinds, imported from Canada			297,462
<i>Hayti:</i>			
Fish—All kinds, imported from Canada			129,333
CENTRAL AMERICA.			
<i>Guatemala:</i>			
Fish—All kinds, from United States of America			10,262
<i>Costa Rica:</i>			
Fish—All kinds, from United States of America			18,366
<i>Honduras:</i>			
Fish—All kinds, from United States of America			5,048
<i>Nicaragua:</i>			
Fish—All kinds, from British and foreign countries			£ 202
<i>San Salvador:</i>			
Fish—All kinds, from United States of America			

SOUTH AMERICA.		
<i>Columbia:</i>	From British and foreign countries	£ 1,097
	From United States of America	\$ 19,861
<i>Ecuador:</i>	From United States of America	8,917
<i>Chile:</i>	All kinds, from Great Britain and foreign countries	11,750
	All kinds, from United States of America	40,000
	All kinds, from Canada, 1908	4,865
<i>Peru:</i>	All kinds, from Great Britain and foreign countries	2,500
	All kinds, from United States of America	49,900

FISH EXPORTS.

Total exports of fish of all kinds from Canada (including furs and skins of marine animals and fish oils) for 1908-9. \$12,792,243. This total is made up in part as follows:—

United Kingdom	\$3,111,826
United States	4,254,463
British West Indies	1,164,218
France	1,019,099
Brazil	528,914
Porto Rico	418,030
Japan	359,491
Cuba	344,103
British Guiana	211,595
Italy	203,522
China	179,500
Germany	177,124
Australia	160,905
New Zealand	102,696
Hong Kong	95,027
Panama	57,737
Norway and Sweden	34,251
Portugal	25,286
Columbia	34,630

FISH BREEDING.

As the future of the salmon industry depends upon the number of adult fish which reach the spawning grounds each year the importance of securing this desideratum is manifest. Nature has provided for the work of procreation, and under natural conditions there would be no danger of the fish becoming extinct, but with the innumerable devices for their capture in Puget Sound and other waters leading to the Fraser River such a possibility is menacing. Clearly the most effectual means of prevention would be the enforcement of restrictive measures which would insure the taking "of only that proportion of the run which is in excess of the number necessary to the perpetuation of the species."* As already shown, all attempts to regulate the indiscriminate taking of salmon on Puget Sound have been unsuccessful, and as an offset to the destructive methods of the Washington fishermen the Canadian authorities have established several fish hatcheries for

* Babcock's Report.

the purpose of perpetuating the fish by artificial means. The first of these was built at Bon Accord, on the Fraser River, in 1884, and since that year nine more have been installed at points favourable to the collection and distribution of the ova and fry of salmon and other fish. The Dominion Government hatcheries are:—

Fraser River	Hatchery,	Bon Accord.
Skeena River	„	Lakelse Lake.
Granite Creek	„	Kault.
Harrison Lake	„	Harrison Hot Springs.
Pemberton	„	Lillooet.
Rivers Inlet	„	Rivers Inlet.
Babine Lake	„	Babine Lake.
Stuart Lake	„	Stuart Lake.

Seton Lake Hatchery, Lillooet, established by the Provincial Government in 1903.

Nimpkish Hatchery, Nimpkish, Vancouver Island, operated by the British Columbia Packers' Association.

The Dominion Fisheries Commission recommends the establishment of hatcheries on the Cowichan River, on Quesnel Lake the Nechaco River, the Naas River, at or near Alberni, and one on Okanagan, Arrow or Kootenay Lake. The Commission also recommends a hatchery for game fish on the Columbia River or in Banff National Park. Barkley Sound, Great Central or Sproat Lake, and Kennedy Lake are also suggested as favourable locations for hatcheries.

The following tables give the output of the hatcheries for 1908:

	BON ACCORD.	Fry.	
Sockeye		3,630,000	
Coho		4,950,000	
Spring		2,095,000	
Atlantic salmon		90,000	} From imported eggs.
Speckled trout		30,000	

The Atlantic salmon fry was distributed as follows:—Coquitlam River, 2,500; Home Lake, 10,000; Nanaimo Lake, 5,000; Sutton Creek, 10,000; Koksilah River, 5,000; Comox Lake, 15,000; Harrison Lake, 5,000; Cowichan Lake, 15,000; Lillooet River, 5,000.

Speckled trout fry was distributed as follows:—Coquitlam River, 2,500; Brunette River, 2,500; Wallace Creek, 3,000; Home Lake, 6,000; Shawnigan Lake, 6,000; Koksilah River, 3,000; Sutton Creek, 7,000.

The ova collected were:—Coho, 7,420,000; sockeye, 3,618,000.

LAKELSE LAKE.

Total distribution of sockeye fry was 4,293,200; liberated in April and all in good condition.

KAULT.

Total distribution of sockeye fry, 6,700,000. About 5,000 young Kamloops trout were also released.

HARRISON LAKE.

Ova collected:—Sockeye, 6,800,000; spring, 9,200,000; coho, 500,000; total, 16,500,000, of which 12,100,000 were hatched and liberated.

PEMBERTON.

Total distribution:—Sockeye, 18,300,000; coho, 1,300,000.

Interior of Herring Saltery.

RIVERS INLET.

Total distribution : Sockeye, 8,594,000.

BABINE LAKE.

Total distribution :—Sockeye, 4,662,950 ; coho, 500,000.

STUART LAKE.

Total distribution :—Sockeye, 2,442,000.

NIMPKISH.

Total distribution :—Sockeye, 4,800,000.

SETON LAKE.

Eggs collected :—Sockeye, 825,000 ; spring, 636,000 ; coho, 2,686,000. The capacity of this hatchery is forty million eggs.

During the season the hatcheries provided over eighty million salmon fry, viz.:—Sockeye, 61,367,000 ; Spring, 11,931,000 ; Coho, 6,936,000. Each female salmon in this immense number of fish deposits about 3,500 eggs, so that if all were hatched and came to maturity the rivers would be jammed with fish during the annual runs, but it is estimated that only four per cent. of the eggs are hatched, and of these many are destroyed by accident or by the numerous enemies, finny and feathered, which prey upon the tender fry.

The Canadian Government is taking steps to perpetuate the salmon in the northern rivers—the Skeena, Naas and other large streams, with their tributaries—as well as in the Fraser—and as the salmon native to those waters are caught in Canadian territory there will be no difficulty in the way of preserving them. The excessive fishing in Alaskan waters, United States territory, where there are practically no restrictions, is steadily decreasing the supply. As an instance, in one small Alaska river that used to be good for a catch of 750,000 salmon yearly, three fishing crews, working all season at the mouth of the stream, caught only seventy-five fish.

COST OF BOATS, &c.

Fishing boats, 28 feet long, fitted with sails, &c., cost from \$75 to \$100, to which must be added the cost of nets, lines, hooks, anchor, buoys, &c., which would amount to from \$50 to \$75, according to quantity of gear carried. These boats are the kind used in salmon and general coast fishing.

FISHERIES PROTECTION.

The Dominion Government maintains a Fisheries Protection Service, consisting, in 1908, of thirteen cruisers, carrying an aggregate of 250 men. Of these vessels the following are employed in the protection of the fisheries on the Pacific Coast:—Kestrel, Falcon, Georgia, Alcedo and Restless.

FISHERIES REGULATIONS.

The fisheries regulations in force at present are fixed by the Dominion Department of Marine and Fisheries, and are subject to revision and change. Copies of these regulations may be had by applying to the Secretary, Fisheries Branch, Department of Marine and Fisheries, Ottawa, Canada.

Yield and Value of British Columbia Fisheries for the Year 1908.

Kinds of Fish.	Quantity.	Value.	Total. Value.
		\$.	\$.
Salmon, canned 48 lb. cases	566,303	3,484,369	
" fresh and frozen lb.	3,624,631	218,631	
" smoked lb.	428,500	42,850	
" (pickled) bbls.	8,994,000	449,700	
" salted, dry lb.	1,254	12,540	
" mild cured lb.	795,000	79,500	
			4,287,590
Halibut	17,512,555		875,652
Herring, fresh and salted	44,965,200	449,652	
" smoked	181,600	18,160	
			467,812
Oolachans, frsh and salted	613,300	30,665	
" smoked	11,900	1,190	
			31,855
Smelts	383,900		19,195
Trout	164,300		16,430
Cod	630,000		37,800
Shad	8,000		400
Sturgeon	180,000		9,000
Mixed fish	556,100		27,805
Oysters 128 lb. sacks	3,789		12,758
Clams	8,650		8,650
" canned Cases	1,700		8,160
Crabs, mussels, etc. (shrimps)			7,035
Fish, not mentioned above			115,500
Whale, product			357,500
Fish oil and glue Gal.	142,480		56,646
Fur seal-skins No.	4,954		108,988
Hair seal-skins	5,220		3,015
Sea, other skins	33		10,895
Fish, guano Tons	84		2,352
Total for 1908			6,465,038
" 1907			6,122,922
Increase			342,116

**Number and Value of Crafts and Fishing Materials in British Columbia for
the Year 1908.**

Description.	Number.	Value.	Total value.
		\$.	\$.
Fishing vessels and steamers	139	1,042,650	
" boats	5,012	336,282	
" dories and gear		30,000	
Fathoms of gill-nets and seines	758,370	491,484	1,408,832
Lines (long and hand)		16,700	
Trap-nets	15	15,000	
Salmon canneries, wharves, etc.	79	1,630,400	523,184
Fish houses (salting)	33	86,500	
Oil factories (and guano)	7	106,000	
Cold storage	3	135,000	
Fishing scows	172	44,900	
Whaling stations	3	247,930	
<i>Fur Seal Fleet.</i>			2,250,730
Vessels	36	348,358	
Boats and canoes		2,946	
Equipment		16,346	
			367,650
Total			4,550,396

**Statement of Persons Employed in the Fisheries of British Columbia During
1908.**

Men.	Number.	Total.
In fishing vessels	698	
" boats, canneries, etc.	10,855	11,553
Seal hunters—		
White men	116	
Indians	99	215
Total		11,768

British Columbia Sealing Report, 1908-09.

No.	Vessels.	Licence No.	Masters.	Tons.	CREWS.		Boats.	Cano's.	B. C. COAST CATCH.		CATCH OUTSIDE AREA OF AWARD.		EASTERN BEHR-ING SEA CATCH.		Totals.	Branded skins.	Other skins.
					Whites	Ind'ns.			Males.	Females.	Males.	Females.	Males.	Females.			
1	Allie J. Alger.....	4	A. B. Whidden.....	75	21	..	7	..	104	95	84	64	40	58	445	..	..
2	Dora Steward.....	8	Wm. Heater.....	94	6	..	2	14	..	..	..	..	342	232	574	..	..
3	Ella G.....	1	T. Lump.....	16	W'k'd.	..	..	..	..	..	..	..	..	..	..	..	..
4	Jessie.....	2	John C. Vass.....	48	21	..	7	..	38	174	51	149	8	51	471	2	5
5	Libbie.....	3	B. M. Balcolm.....	93	21	..	7	..	168	131	168	123	35	23	648	..	..
6	Markland.....	6	George Healer.....	99	8	..	2	11	184	181	..	..	200	339	904	6	..
7	Piscawha.....	9	A. C. Folger.....	98	24	..	7	..	..	..	..	..	74	73	147	..	..
8	Thomas T. Bayard.....	5	H. Blacksted.....	67	7	..	2	12	121	86	171	83	225	127	813	..	28
9	Umbrina.....	7	Wm. Delouchery.....	99	8	..	2	11	..	..	..	..	243	207	450	..	..
									615	667	474	419	1,167	1,110	4,452	8	33
									Indians catch (by individual Indians in canoes along the coast).....							502	
									Total catch of Canadian vessels							4,954	

SUMMARY.

British Columbia coast catch	1,282
Indians	502
Outside area of award.....	893
Behring Sea.....	2,277
Total	4,954
Sea otter	33

NOTE.—Although the returns show 36 vessels as belonging to the Fur Sealing Fleet, the Victoria Sealing Company (the owners) send out only part of the fleet in any one year, hence the reason why only 16 vessels were shown in the sealing report for 1907, and 9 vessels in 1908. The balance of the fleet remained laid up in Victoria Harbour.

Pack of British Columbia Salmon, Season 1909.

DISTRICTS AND CANNERIES.

Fraser River District—	Totals.
B. C. Packers' Association	193,608
A. B. C. Packing Co., Ltd.	75,987
J. H. Todd & Sons	24,100
Canadian Canning Co., Ltd.	46,726
B. C. Canning Co., Ltd.	29,166
Malcolm, Cannon & Co.	23,441
St. Mungo Canning Co., Ltd.	27,404
Northern Canning Co., Ltd.	13,083
Kildala Packing Co., Ltd.	22,717
Knight Inlet Canning Co., Ltd.	16,063
Unique Canning Co., Ltd.	16,343
The Glen Rose Canning Co., Ltd.	9,807
Great West Packing Co., Ltd.	15,599
Burrard Canning Co., Ltd.	9,334
Eagle Harbour Canning Co., Ltd.	11,506
M. DesBrisay & Co.	32,319
	<hr/> 567,203
Skeena River District—	
B. C. Packers' Association	33,970
A. B. C. Packing Co., Ltd.	20,552
J. H. Todd & Sons	14,465
B. C. Canning Co., Ltd.	14,175
Kildala Packing Co., Ltd.	12,395
Wallace Bros., Ltd.	21,660
Skeena River Com. Co., Ltd.	6,142
Cassiar Packing Co., Ltd.	17,380
	<hr/> 140,739
Rivers Inlet District—	
B. C. Packers' Association	36,365
A. B. C. Packing Co., Ltd.	10,171
J. H. Todd & Sons	12,657
B. C. Canning Co., Ltd.	11,172
Kildala Packing Co., Ltd.	10,190
Strathcona Packing Co., Ltd.	10,459
	<hr/> 91,014
Naas River District—	
John Wallace	13,217
Pt. Nelson C. & S. Co., Ltd.	14,829
Kincolth Packing Co., Ltd.	12,944
	<hr/> 40,990
Outlying Districts—	
B. C. Packers' Association	28,635
Kildala Packing Co., Ltd.	6,695
Robert Draney	13,971
Wm. Hickey Pkg. Co., Ltd.	14,300
Clayoquot S. Packing Co.	7,607
Quathiaski Packing Co.	500
J. H. Todd & Sons (Esquimalt)	40,540
B. C. Canning Co. (Cap. City)	15,726
	<hr/> 127,974
Grand total	967,920

Pack of Previous Years.—1908, 542,689; 1907, 547,459; 1906, 629,460; 1905, 1,167,460; 1904, 465,894; 1903, 473,674; 1902, 625,982; 1901, 1,236,156; 1900, 585,413; 1899, 732,437; 1898, 484,161; 1897, 1,015,477; 1896, 601,570.

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