PROVINCE OF BRITISH COLUMBIA

Provincial Department of Fisheries

REPORT

WITH APPENDICES

For the Year ended December 31st

1946

VICTORIA, B.C.:
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1947.

To His Honour CHARLES ARTHUR BANKS,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

I beg to submit herewith the Report of the Provincial Department of Fisheries for the year ended December 31st, 1946, with Appendices.

LESLIE HARVEY EYRES,
Minister of Fisheries.

Department of Fisheries,
Minister of Fisheries' Office,
Victoria, B.C.

Honourable Leslie H. Eyres,
Minister of Fisheries, Victoria, B.C.

SIR,—I have the honour to submit herewith the Annual Report of the Provincial Department of Fisheries for the year ended December 31st, 1946, with Appendices.

I have the honour to be,
Sir,
Your obedient servant,

GEORGE J. ALEXANDER,
Deputy Minister.

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Report of the Provincial Department of Fisheries for 1946.

VALUE OF CANADIAN FISHERIES AND THE STANDING OF THE PROVINCES, 1945.

The value of the fisheries products of Canada for the year 1945 totalled $113,690,630. During that year British Columbia produced fisheries products to the value of $44,531,858, or 39.2 per cent. of Canada's total.

British Columbia in 1945 led all the Provinces in the Dominion in respect to the production of fisheries wealth. Her output exceeded that of Nova Scotia, the second in rank, by $13,824,958.

The market value of the fisheries products of British Columbia in 1945 was $9,630,868 more than in the year previous. There was an increase in the value of salmon amounting to $9,801,731.

The capital invested in the fisheries of British Columbia in 1945 was $37,128,455, or 49.6 per cent. of the total capital employed in fisheries in all of Canada. Of the total invested in the fisheries of British Columbia in 1945, $18,193,201 was employed in catching and handling the catches and $18,935,254 invested in canneries, fish-packing establishments, and fish-reduction plants.

The number of persons engaged in British Columbia fisheries in 1945 was 19,330, or 22.6 per cent. of Canada's total fishery-workers. Of those engaged in British Columbia, 13,292 were employed in catching and handling the catches and 6,038 in packing, curing, and in fish-reduction plants. The total number engaged in the fisheries in British Columbia in 1945 was 754 more than in the preceding year.

The following statement gives in the order of their rank the value of fishery products of the Provinces of Canada for the years 1941 to 1945, inclusive:—

Province.	1941.	1942.	1943.	1944.	1945.
British Columbia	$31,732,037	$38,059,559	$32,478,632	$34,900,990	$44,531,858
Nova Scotia	12,634,957	15,297,482	21,684,435	23,662,055	30,706,900
New Brunswick	6,484,831	7,132,420	11,128,864	11,968,692	13,270,376
Quebec	2,842,041	4,194,092	5,632,809	5,361,567	7,727,222
Ontario	3,518,402	4,135,205	5,292,268	4,938,193	7,261,661
Manitoba	3,233,115	3,577,616	4,564,551	3,581,795	4,263,670
Prince Edward Island	952,026	1,639,539	2,860,146	2,598,975	3,076,811
Alberta	440,444	492,182	795,000	929,887	1,450,502
Saskatchewan	414,492	585,782	1,154,544	1,482,223	1,286,361
Northwest Territories	.....	.....	.....	.....	112,131
Yukon	6,652	3,056	2,495	3,131	3,138
Totals	$62,258,997	$75,116,933	$85,594,544	$89,427,508	$113,690,630

SPECIES AND VALUE OF FISH CAUGHT IN BRITISH COLUMBIA.

The total marketed value of each of the principal species of fish taken in British Columbia for the years 1941 to 1945, inclusive, is given in the following table:—

Species.	1941.	1942.	1943.	1944.	1945.
Salmon	$20,879,104	$22,419,881	$14,740,298	$15,623,223	$25,424,954
Halibut	1,650,731	1,985,705	2,517,038	2,679,657	3,042,390
Halibut livers and viscera	470,958	243,113	244,062	257,288	275,825
Herring	4,665,260	8,223,754	7,809,630	6,758,626	8,423,136
Pilchard	1,781,876	2,016,607	2,756,416	2,222,181	1,439,145
Mackerel	.....	.....	.....	780	.....
Cod, ling	398,316	676,903	978,973	1,353,900	1,296,639
Clams	98,970	155,965	148,226	174,673	206,045
Black cod	189,527	193,840	399,923	414,753	368,408
Crabs	83,253	104,021	34,743	52,495	77,958
Soles	30,470	42,670	49,320	271,231	438,219
Shrimps	8,115	7,222	10,417	10,451	24,025
Oysters	116,111	57,862	82,318	149,754	105,596
Abalones	.....	.....	1,600	.....	6,370
Flounders	14,555	24,829	72,619	132,136	90,786
Red cod	15,832	51,375	150,551	284,828	284,759
Perch	3,095	8,042	9,792	13,741	16,174
Smelts	5,920	2,552	736	3,278	5,076
Sturgeon	3,675	1,965	3,526	3,915	6,521
Octopus	986	390	271	1,444	5,802
Skate	2,478	5,235	5,932	5,866	4,685
Oolachans	1,492	8,960	9,504	16,456	24,091
Whiting	25	7	21	540	50
Sardines	47,086	.....	.....	.....	.....
Trout	.....	.....	.....	.....	.....
Grayfish, etc.—					
Fresh	13,117	.....	.....	.....	.....
Livers	29,328	23,250	18,982	60,930	10,634
Liver-oil	531,355	1,178,242	2,028,875	3,661,131	2,337,267
Body-oil	29,569	31,135	16,756	8,263	.....
Meal	69,062	60,872	41,857	21,136	.....
Whales	298,349	178,667	92,890	.....	.....
Fur-seals	.....	.....	.....	730	.....
Hair-seals	.....	.....	.....	50	.....
Anchovies	162,159	80,295	11,483	261,160	82,545
Tuna	804	.....	5,760	93,373	319,404
Shark-livers	44,860	42,194	21,045	12,564	6,548
Shark-liver oil	23,913	165,966	158,184	323,068	187,866
Ratfish-livers	.....	.....	.....	.....	2,679
Miscellaneous	61,686	68,040	56,216	29,429	18,531
Totals	$31,732,037	$38,059,559	$32,477,964	$34,900,990	$44,531,858

VALUE OF BRITISH COLUMBIA FISHERIES IN 1946 SHOWS A SLIGHT DECREASE.*

The total marketed value of the fisheries of British Columbia in 1946 amounted to $43,817,147 or 1.6 per cent. below the 1945 value of $44,531,858. The decrease in value was owing to the failure of the run of pink and coho salmon—partially relieved by increases in sockeyes and chums—and by the failure of the run of pilchards. The total value of all salmon marketed was $24,346,483, as compared to $25,424,954 in 1945. The 1946 salmon marketings amounted to nearly 56 per cent. of the marketed value for all species.

Herring was the second species in order of value. Although the catch was only 2,123,651 cwt., as compared to 2,576,536 cwt. in 1945, higher prices for canned goods

* These figures are taken from the Advance Report on the Fisheries of British Columbia, 1946, Dominion Bureau of Statistics, Department of Trade and Commerce.

were an important factor in raising the total marketed value of herring to $9,574,643, an increase of $1,151,507 over 1945.

Halibut, in third place, was valued at $4,009,122, an increase of $690,907, due entirely to the greater quantities landed. Ling cod displaced grayfish products in fourth place, with a marketed value of $1,064,627, although both quantity and total value were lower than in the previous year.

The total quantity of fish and shell-fish landed was 4,293,881 cwt., a decrease of 1,146,410 cwt. or 21 per cent. from the 5,440,291 cwt. recorded for 1945. Of the decrease, salmon accounted for 19 per cent. and herring for 40 per cent. Despite the decrease in the quantities landed, the landed value was $21,372,034, an increase of $171,389 over that of 1945.

CAPITAL, EQUIPMENT, AND EMPLOYEES.

Capital.—The capital employed in the primary fishing industry—that is, the actual catching and landing of the fish—amounted to $21,773,297, an increase of nearly 20 per cent. over the 1945 figure of $18,193,201. Of these totals, vessels and boats accounted for $17,490,786 in 1946 and $14,799,684 in 1945, or 81 per cent. and 80 per cent. respectively.

Employment.—Employment showed no significant change as compared with 1945. The total number finding work in the industry as a whole was 19,744 in 1946 and 19,330 in 1945, an increase of 414. Personnel engaged in the primary operations of catching and landing the fish numbered 13,665 in 1946 and 13,292 in 1945, an increase of 373, while those employed in fish-processing establishments numbered 6,079 in 1946 and 6,038 in 1945.

THE CANNED-SALMON PACK FOR BRITISH COLUMBIA, 1946.

The total canned-salmon pack in British Columbia in 1946 amounted to 1,348,139 cases, according to annual returns submitted to the Provincial Department of Fisheries by the licensed canners. The 1946 pack was 391,174 cases less than were canned in the year previous and 102,819 cases less than the average annual pack for the previous five years. The 1946 pack was also the smallest pack, except for 1944, since the very low packs of the depression years in the early thirties. The canned-salmon pack for 1946 was composed of 543,027 cases of sockeye, 8,100 cases of springs, 4,115 cases of steelheads, 100,154 cases of cohoes, 116,607 cases of pinks, and 576,133 cases of chums. In each instance half-cases have been dropped.

A breakdown of the pack figures by species shows that the sockeye-pack in 1946 was the largest pack of this species canned in British Columbia since 1942 and was considerably above the average sockeye-pack for a number of years. The 1946 sockeye-pack was 214,026 cases greater than the pack of the year previous but was 123,543 cases less than were packed in 1942, the cycle-year for most sockeye runs to British Columbia streams. The returns to the spawning-beds of the Nass and Skeena Rivers and Rivers Inlet are reported to have been good. An increase was reported in the number of spawning sockeye over the whole of the Fraser River watershed.

With regard to the spring-salmon pack in 1946, there were 8,100 cases of this species canned, compared with 12,801 cases in 1945 and 19,362 cases in 1944. The canned-salmon pack of spring salmon, as reported in these pages, must not be taken as an indication of the size of the run, however, as most spring salmon which are canned in British Columbia are caught incidental to fishing for other species. The spring-salmon catch proper is disposed of principally on the fresh- and frozen-fish markets.

The cohoe-pack in 1946 amounted to 100,154 cases, which was 118,732 cases less than the pack in 1945 and 85,889 cases less than were packed in 1943, the cycle-year

for this species. An examination of the pack figures for the British Columbia canned-cohoe pack indicates that the 1946 season was most disappointing, the 1946 pack being less than 50 per cent. of the average annual pack for the previous ten years.

The pink-salmon pack in 1946, amounting to 116,607 cases, was also most disappointing. In 1945 the pink-salmon catch produced a pack of 825,513 cases, and in 1944 the pack was 389,692 cases. The pink-salmon pack in 1946 was probably one of the lowest packs of this species on record.

Chum salmon were canned in British Columbia in 1946 to the extent of 576,133 cases. In considering the canned-salmon pack of chum salmon as a measure of the catch, due allowance should be made for the fact that large numbers of chum salmon are frozen each year. The 1946 pack of canned chums was 225,945 cases greater than the pack for this species in 1945 but was 57,701 cases less than the chum-salmon pack of 1942, the cycle-year.

Steelheads are not salmon, but a few are caught each year incidental to the canned-salmon fishery and are canned also. In 1946 there were 4,115 cases of steelheads canned in British Columbia, compared with 2,922 cases of this species canned in the year previous and 3,926 cases canned in 1944.

The reader is referred to the next section of this report for a breakdown of the figures of each species by districts.

BRITISH COLUMBIA'S CANNED-SALMON PACK BY DISTRICTS.

Fraser River.

The total canned-salmon pack in British Columbia from Canadian-caught salmon in 1946 amounted to 413,542 cases. This was 192,191 cases greater than the total pack for this river system in 1945. The 1946 pack was composed of 341,957 cases of sockeye, 1,096 cases of springs, 178 cases of steelheads, 9,168 cases of cohoes, 429 cases of pinks, and 60,713 cases of chums. It will be noted that 1946 was an off year for pink salmon in the Fraser River. The 1946 season, however, was the cycle-year for the Adams River run, which, to a large extent, accounts for the increase in the Fraser River totals.

Sockeye Salmon.—In 1946 the total pack of canned sockeye salmon produced from Fraser River caught fish by both Canadian and American canners amounted to 610,518 cases. This was 476,486 cases more than were canned from this source in 1945. The increased pack in 1946 over the year previous reflects the increased run of sockeye, particularly to the Adams River, as 1946 was the cycle-year for the Adams River run. The 1946 run of sockeye to the Fraser River should be compared with the pack of 1942, in which year there were canned from American and Canadian gear a total of 709,892 cases. In 1946 Canadian fishermen caught 341,957 cases of sockeye, while the American catch amounted to 268,561 cases. The year 1946 was the first year that the International Pacific Salmon Fisheries Commission was authorized to regulate the catch, which, under the treaty, is supposed to be regulated as near as practicable on a fifty-fifty basis. In 1946 Canadian fishermen took 56.1 per cent. of the total Fraser River sockeye-salmon catch, while American vessels accounted for 43.9 per cent. For convenience the percentages for the Fraser River sockeye catch by American and Canadian fishermen are tabulated below:—

	American. Per Cent.	Canadian. Per Cent.
1931	68.00	32.00
1932	55.00	45.00
1933	71.00	29.00
1934	72.00	28.00
1935	47.00	53.00

	American. Per Cent.	Canadian. Per Cent.
1936	25.00	75.00
1937	38.00	62.00
1938	42.00	58.00
1939	44.50	55.50
1940	37.50	62.50
1941	39.30	60.70
1942	37.20	62.80
1943	37.42	62.58
1944	29.77	70.23
1945	39.90	60.10
1946	43.90	56.10

The 1946 sockeye-pack, while considerably in excess of the packs in the intervening years, was, in comparison with the immediately preceding cycle-year, somewhat disappointing, although much above any of the other preceding cycle-years.

In any consideration of the salmon-packs as an indication of the runs to the different river systems and for the different species, due consideration must be given to the numbers of fish reaching the spawning-beds. In 1946, reports from the sockeye spawning-beds of the Fraser River watershed indicated that, in nearly all cases, the beds were seeded in excess of previous seedings, which would indicate that a larger number of spawning salmon reached the Fraser River spawning-beds than for a very long time.

Spring Salmon.—The 1946 pack of spring salmon on the Fraser River was 1,096 cases. This was very much below the normal pack for this variety, but as spring salmon find an outlet principally in the fresh- and frozen-fish trade, the small canned pack probably reflects a brisk market in the fresh- and frozen-fish trade rather than any slackening off in the run of this species. The spring-salmon pack on the Fraser River in 1945 was 6,130 cases; in 1944, 12,577 cases; and in 1943, 3,505 cases.

Cohoe Salmon.—The cohoe-pack on the Fraser River in 1946 was 9,168 cases. While this was disappointing in comparison with the cohoe-packs of the immediately preceding cycle-years, it was slightly above the cohoe-pack in 1943, the cycle-year, when 8,809 cases were packed. It should be remembered, however, that, outside of the small pack in 1943, the 1946 pack of Fraser River caught cohoes was the smallest since 1931.

Pink Salmon.—1946 was an off year for pink salmon on the Fraser River. The runs of pink salmon to this river system appear only in the odd-numbered years; consequently, pink salmon were not anticipated in 1946. There were 429 cases of pink salmon canned on the Fraser River in 1946.

Chum Salmon.—The canned pack of chum salmon credited to the Fraser River varies widely from year to year. As large quantities of this species are frozen each year, the canned pack does not necessarily reflect the size of the runs. In 1946 there was a total of 60,713 cases of chum salmon packed from Fraser River caught fish. The pack of chum salmon on the Fraser River in 1942, the cycle-year, amounted to 82,573 cases. The average annual pack of this species for the previous ten-year period was 44,824 cases.

In using the canned-salmon pack figures for any species as an index of the run to any river system, other factors should be given equal consideration—namely, the escapement to the spawning areas and the quantities of the species under consideration finding a market in other outlets.

For a detailed statement of the escapement to the spawning-beds of the various species, the reader is referred to the Salmon-spawning Report for British Columbia, 1946, in the Appendix to this report.

Skeena River.

The total canned-salmon pack on the Skeena River in 1946 amounted to 105,912 cases, composed of 52,928 cases of sockeye, 2,439 cases of springs, 2,366 cases of steelheads, 26,281 cases of cohoes, 10,737 cases of pinks, and 11,161 cases of chums. The 1946 total pack of Skeena River salmon was the smallest pack for many years. The pack in 1945 amounted to 221,471 cases; in 1944, 149,948 cases; in 1943, 133,589 cases; and in 1942, 152,418 cases.

Sockeye Salmon.—The sockeye-salmon pack on the Skeena River in 1946, amounting to 52,928 cases, reflects the small pack of 1942, the cycle-year, when 34,544 cases were canned. The 1946 pack is also compared with the previous cycle-year of 1938 when 47,257 cases were canned. The Skeena River sockeye are largely four-year-old fish, although five-year-olds are prominent in the sampling. The 1946 pack was, therefore, the return from the spawning of 1942 and of 1941. In the latter year the pack amounted to 81,767 cases.

As has been previously pointed out in the pages of this report, the Skeena River sockeye production in recent past years has been very much below normal and the disappointing pack in 1946 is no exception. It is sincerely hoped that the Federal Government's scientific investigation on the Skeena River will produce information which will halt the downward trend of this important producing area.

Spring Salmon.—The spring-salmon pack on the Skeena River in 1946 amounted to 2,439 cases. This is compared with 2,382 cases in 1945, 1,500 cases in 1944, and 1,783 cases in 1943. Spring salmon find their principal outlet in the fresh- and frozen-fish trade, therefore the canned-salmon pack figures for this species are no indication of the size of the run.

Cohoe Salmon.—In 1946 the Skeena River produced a pack of cohoe amounting to 26,281 cases, compared with 34,201 cases in 1945, 20,191 cases in 1944, and 40,479 cases in 1943, the last mentioned being the cycle-year. The Skeena River cohoe-pack in 1946 was 7,115 cases below the average annual pack for this species for the past ten years.

Pink Salmon.—The 10,737 cases of pink salmon canned on the Skeena River in 1946 were most disappointing. A pack of at least 50,000 cases was anticipated. In 1944 the cycle-year produced a pack of 48,837 cases of this species, while two cycles previous the pack was 52,767 cases. Following the cycle-year further, 1940 produced a pack of 47,301 cases, while in 1938 the pink-salmon pack on the Skeena River was 69,610 cases. This cycle has produced very much larger packs. In 1934, 126,163 cases of pink salmon were packed. The pink-salmon runs, as measured by the canned-salmon packs of this species, would appear to be in need of attention by the biologists, with a view to ascertaining the cause of the decline, and sufficiently drastic conservation measures taken which would bring this river system back to its known potential production.

Chum Salmon.—The Skeena River is never a large producer of canned chum salmon. In 1946, 11,161 cases of this species were canned. This figure is compared with the packs for 1945 when 9,264 cases of chums were canned, 1944 when the pack amounted to 8,741 cases, and 1943 when 6,597 cases of chum salmon were canned. In 1942, the cycle-year, the pack of chum salmon was almost identical with 1946. In the former year 11,421 cases were packed.

In all cases in this report where catch figures for the various salmon streams in British Columbia are used as a means of indicating the possible size of the runs to the individual streams, the reader is cautioned to give due consideration to the escapement to the spawning-beds of the respective river systems. The annual report on the salmon-spawning beds of British Columbia, issued by the Chief Supervisor of Fisheries for the Federal Government, is reproduced in full in the Appendix to this report. The reader is referred to the report for information as to conditions on the different spawning-beds.

Nass River.

The total pack of canned salmon on the Nass River in 1946 amounted to only 38,313 cases of all varieties. The pack was made up of 12,511 cases of sockeye, 472 cases of springs, 134 cases of steelheads, 4,239 cases of cohoes, 7,147 cases of pinks, and 13,810 cases of chums. While the canned-salmon pack on the Nass River fluctuates widely from year to year, the particularly small pack in 1946 was unexpected and, when compared with the packs for recent past years, must be considered as a definite disappointment. In 1945 the Nass River produced a pack of 54,980 cases. In 1944 the total pack amounted to 61,096 cases, and in 1943, 52,333 cases were canned. In 1942, the cycle-year for most species running to the Nass River, the pack was 100,142 cases.

Sockeye Salmon.—The 12,511 cases of sockeye salmon canned on the Nass River in 1946 were 8,574 cases below the sockeye pack for this river system in 1942, the cycle-year, assuming Nass River fish to be four-year fish. While it is known that considerable numbers of sockeye salmon running to the Nass River are five-year-old fish, if the 1946 pack is compared with 1941, it is even more disappointing in that in the latter year the pack was 24,876 cases. Since 1942 the Nass River has not been producing sockeye salmon up to average expectations. In 1945 the pack was only 9,899 cases, while in 1944, 13,083 cases were packed. The 1943 pack amounted to 13,412 cases.

Spring Salmon.—Spring salmon are never a factor in the Nass River production, and the year 1946 was no exception, 472 cases of this species being canned. Spring salmon on the Nass River are caught only incidental to fishing for other species, hence the smallness of the pack.

Cohoe Salmon.—The year 1946 produced a pack of cohoe salmon on the Nass River that amounted to 4,239 cases. This was slightly more than in the year previous when 3,895 cases were packed, but less than the 1944 pack of 6,102 cases. The 1946 pack was less than half the number of cases of cohoe packed in 1943, the cycle-year. In that year the pack amounted to 9,768 cases.

Pink Salmon.—The pink-salmon pack on the Nass River in 1946, amounting to 7,147 cases, was particularly disappointing. The cycle-year, 1944, produced a pack of 31,854 cases, while the previous cycle-year, 1942, produced a pack of 49,003 cases. A pack of 35,000 cases for the Nass River in 1946 was not too much to expect, and the consequent low pack of this species was definitely unexpected.

Chum Salmon.—The Nass River is never a heavy producer of chum salmon, and the 13,810 cases of this variety packed in 1946 was somewhat higher than average. If chum salmon are considered to be four-year fish, the 1942 pack, which would be the cycle-year, produced 12,518 cases. In 1938, the previous cycle-year, 15,911 cases were packed. The 1946 pack was considerably above the average for chum salmon in this river system.

The reader is again reminded that conditions on the salmon-spawning beds should be taken into consideration when using the canned-salmon pack as a measure of the size of the runs.

Rivers Inlet.

The total canned-salmon pack of all varieties on Rivers Inlet for 1946 amounted to 123,304 cases, composed of 73,320 cases of sockeye, 1,108 cases of springs, 314 cases of steelheads, 9,524 cases of cohoes, 1,641 cases of pinks, and 37,395 cases of chums.

Sockeye Salmon.—The Rivers Inlet pack of sockeye salmon in 1946 amounted to 73,320 cases. Rivers Inlet sockeye are four- and five-year-old fish, the percentage of four-year-olds slightly exceeding the five-year-olds. Therefore the fish composing the 1946 pack are the progeny of the escapement in 1942 and 1941, in which years the packs

amounted to 79,199 cases and 93,378 cases respectively. While the 73,320 cases packed in 1946 were somewhat less than might have been expected, nevertheless the difference between the actual pack and expectation was not out of line, particularly when it is remembered that the 1945 pack of 89,735 cases was the four-year progeny of the 1941 run and the five-year progeny of the 1940 run, when the pack dropped to 63,469 cases.

Spring Salmon.—Spring salmon are caught and canned on Rivers Inlet incidental to fishing for other species, therefore the canned pack of this species is never large and fluctuates widely. In 1946 the canned pack of spring salmon on Rivers Inlet amounted to 1,108 cases. In 1945 the pack of this species amounted to 1,191 cases, while the packs in 1944 and 1943 were 805 and 765 cases respectively.

Cohoe Salmon.—The year 1946 produced a cohoe-pack on Rivers Inlet amounting to 9,524 cases. This is compared with 17,516 cases in 1945, 13,921 cases in 1944, and 11,448 cases in 1943, the cycle-year.

Pink Salmon.—Pink salmon are never a large factor in the Rivers Inlet canning picture. The 1946 pack, amounting to 1,641 cases, was considerably below the packs of pink salmon produced in Rivers Inlet in recent past years, but no significant importance is attached to this as pink salmon canned in Rivers Inlet are caught incidental to fishing for other species.

Chum Salmon.—Previous to 1935 chum salmon were not fished in Rivers Inlet except incidental to the sockeye-fishery. Since 1935, however, Rivers Inlet has continued to produce an increasing quantity of canned chum salmon. In the year 1935 the pack amounted to 7,136 cases, while in 1946 the pack amounted to 37,395 cases. The 1946 pack was the largest pack ever recorded for chum salmon in Rivers Inlet. If chum salmon are considered to be four-year-old fish, the 1946 pack should be compared with 1942, when Rivers Inlet produced a pack of 15,874 cases.

Smith Inlet.

Smith Inlet is primarily a sockeye-fishing area. The total pack of all varieties of salmon canned in Smith Inlet in 1946 amounted to 23,177 cases. This figure is compared with the total pack for this inlet in 1945 of 21,682 cases and 6,194 cases in 1944. In 1943 the total pack in Smith Inlet amounted to 21,942 cases, while 23,777 cases of all varieties were canned in 1942.

Sockeye Salmon.—The sockeye-salmon pack in Smith Inlet in 1946 amounted to 14,318 cases. This is compared with 15,939 cases packed in 1942, the cycle-year. The pack in 1945 was 15,014 cases, while in 1944, the cycle-year, the sockeye pack dropped to 3,165 cases. The pack in 1943 was 15,010 cases. The 1946 pack was 5,431 cases below the average for the previous ten years if the exceedingly low pack in 1944 is excluded.

Spring Salmon.—Smith Inlet, like Rivers Inlet, produces a small amount of canned spring salmon each year, caught incidental to fishing for other varieties. In 1946 the spring-salmon pack in Smith Inlet amounted to 45 cases.

Cohoe Salmon.—Smith Inlet is not a cohoe-producing area, but, like spring salmon, a few are caught incidental to fishing for sockeye. In 1946 the pack of canned cohoe for Smith Inlet amounted to 177 cases.

Pink Salmon.—Pink salmon are not fished in Smith Inlet, except those few which are caught in the sockeye-nets. There were 235 cases of pink salmon canned from Smith Inlet caught fish in 1946.

Chum Salmon.—In recent years there has been some fall seining for chum salmon in Smith Inlet, although Smith Inlet is primarily considered a sockeye-fishing area. In 1946 the canned-salmon pack of chum salmon caught in Smith Inlet was 8,369 cases. This was the largest pack of chums from Smith Inlet caught fish since 1937, when 9,494 cases were canned. In the immediately preceding years the packs were: 1945, 3,692 cases; 1944, 2,122 cases; and 1943, 5,693 cases.

The reader is again referred to the report on conditions on the spawning-beds in the Appendix to this report.

Queen Charlotte Islands.

Pink and chum salmon for canning purposes are the two principal species fished for and caught in the Queen Charlotte Islands district, except in certain years when a considerable number of troll-caught cohoes from this area find their way to the canneries. Pink salmon frequent the Queen Charlotte Islands in the even-numbered years. In the odd-numbered years there is no run of pink salmon to the Queen Charlotte Islands. In 1946 the total pack of all species credited to the Queen Charlotte Islands catch amounted to 41,635 cases. Of this, 1,192 cases were cohoes, 8,024 cases were pinks, and 32,414 cases were chums.

Cohoe Salmon.—The canned pack of cohoes caught in the Queen Charlotte Islands district varies considerably from year to year and does not necessarily represent the total production from this species. In 1946 the canned pack amounted to 1,192 cases. In 1945 the canned pack of this species was 1,108 cases. In 1944, however, there were 19,615 cases of cohoes packed from Queen Charlotte Islands caught fish, and in 1943 the pack was 14,488 cases. Cohoe salmon find a ready market as fresh and frozen, and the demand of the freezers and fresh-fish market, with the consequent higher prices, materially affects the quantity of this species canned in any one year.

Pink Salmon.—As pointed out above, pink salmon occur in the Queen Charlotte Islands area every second year, the runs coinciding with the even-numbered years. In 1946 the run of pink salmon to the Queen Charlotte Islands, as represented by the canned-salmon pack, was most disappointing, the catch producing a pack of 8,024 cases. When it is realized that the pink-salmon runs to the Queen Charlotte Islands have been producing packs in the neighbourhood of 50,000 to 100,000 cases, it will be realized how disappointing the run of pinks to this district was in 1946.

Commenting on the Queen Charlotte Islands run of pink salmon, the Acting Chief Supervisor of Fisheries for the Federal Government remarked that the run of pinks generally over the British Columbia coast in 1946 was disappointingly light, late in arrival, and the individual fish were small in size; also that the run to Masset Inlet, the chief producer of pink salmon in the Queen Charlotte Islands district, was no exception. Because of the obviously light run, the area was closed to seining on September 1st, which was a week or ten days earlier than normal.

The seeding by pink salmon in the spawning area was only medium. It would appear that the pink-salmon runs to the Queen Charlotte Islands district should receive special attention, with a view to bringing this district back to something like its former productivity.

Chum Salmon.—The chum-salmon pack in the Queen Charlotte Islands district in 1946 amounted to 32,414 cases. This is compared with 12,132 cases in 1945 and 81,916 cases in 1944. In 1943 the chum pack in the Queen Charlottes amounted to 35,370 cases, while in 1942 the pack was 43,801 cases. An examination of the pack figures for chum salmon for the Queen Charlotte Islands district over a period of years will indicate that 1946 was indeed a poor producing year for this species.

The pack figures should be read in conjunction with the Chief Supervisor of Fisheries' report on the spawning-beds for a true picture of the runs to the different districts.

Central Area.

For statistical purposes the Central Area comprises all of the salmon-fishing areas off the coast of British Columbia between Cape Calvert and the Skeena River, except Rivers Inlet. The total pack of all varieties of canned salmon caught in the Central Area in 1946 amounted to 337,333 cases. This figure is compared with 574,080 cases

in the year previous. In comparing these two figures, it should be pointed out that the pink-salmon pack in the Central Area in 1945 was exceptionally large, whereas in 1946 the pack of pinks was even lower than anticipated. The 1946 pack of canned salmon in the Central Area was composed of 12,611 cases of sockeye, 656 cases of springs, 934 cases of steelheads, 19,589 cases of cohoes, 81,584 cases of pinks, and 221,958 cases of chums.

Sockeye Salmon.—The principal sockeye-salmon fishing-grounds in the Central Area are Fitzhugh Sound and Burke and Dean Channels. While some sockeye are taken annually in the vicinity of Banks Island and Principe Channel and a small gill-net sockeye-fishery is conducted in Gardner Canal, these latter-mentioned areas are much less important. Because of the widely scattered area and separate races of salmon to the different parts of the area, no attempt is made in these pages to report separately on the different populations.

The total sockeye-pack in the Central Area in 1946 amounted to 12,611 cases, compared with 24,109 cases in the year previous, and, assuming sockeye to be four-year fish, the pack is compared with 17,470 cases in 1942. In the previous cycle-year, 1938, the sockeye-pack in the Central Area amounted to 36,178 cases. The 1946 pack was slightly less than half the average annual pack for this area for the past ten years, inclusive.

Spring Salmon.—Spring salmon are caught and canned in this area to some extent, but, as in other areas, the canned pack is from fish caught incidental to fishing for other varieties. Much of the spring salmon caught in this district finds a market in the fresh, frozen, and mild-cured trades, consequently the canned-salmon pack figures are not indicative of the extent of the run or the size of the catch. In 1946 the canned-salmon pack of spring salmon in the Central Area was 656 cases, compared with 542 cases in 1945 and 643 in 1944.

Cohoe Salmon.—There were 19,589 cases of cohoe salmon canned in the Central Area in 1946, compared with 45,462 cases canned in 1945. Cohoe are three-year-old fish, and in 1943, the cycle-year, the canned cohoe-pack from fish caught in the Central Area amounted to 26,645 cases. In 1940 the Central Area produced a pack of 49,886 cases. Large quantities of cohoe salmon are frozen each year, and it may be that a greater number of cohoe from the Central Area entered the freezers than in those years of comparison.

Pink Salmon.—The Central Area has always been considered a good producing area for pink salmon. The pink-salmon pack in 1946, amounting to 81,584 cases, was most disappointing, although the 1946 cycle has been probably the one of least importance. Nevertheless the run in the previous cycle-year produced a pack of 162,986 cases, and a pack of 100,000 cases in 1946 was not unduly optimistic. In 1942 the run produced a pack of 69,434 cases, while the low point for pink salmon in this cycle in the Central Area was 1940, when 54,478 cases were packed. The Central Area in 1930 produced a pack of 376,084 cases.

Chum Salmon.—The Central Area in 1946 produced a pack of 221,958 cases of chum salmon. This is compared with 138,992 cases in 1945, 80,793 cases in 1944, and 109,101 cases in 1943. Assuming chum salmon to be four-year fish, the cycle-year for the 1946 run was 1942, and in that year there were 79,152 cases of chum salmon canned from fish caught in the Central Area.

Vancouver Island.

The total canned-salmon pack from fish caught in the Vancouver Island district amounted to 264,922 cases. This pack was composed of 35,381 cases of sockeye, 2,283 cases of springs, 151 cases of steelheads, 29,983 cases of cohoes, 6,809 cases of pinks, and 190,313 cases of chums. Vancouver Island, like the Central Area, supports numer-

ous races of salmon running to the different watersheds. In this breakdown no attempt is made to deal with the races separately. It probably should be mentioned, however, that sockeye salmon caught in the Sooke traps are not credited to Vancouver Island but rather to the Fraser River, where they are known to migrate.

Sockeye Salmon.—The sockeye-salmon pack for Vancouver Island caught fish amounted to 35,381 cases. This figure is compared with 51,961 cases of sockeye canned from Vancouver Island caught fish in 1942, the cycle-year for most sockeye, and 27,965 cases in 1938. The sockeye-pack for Vancouver Island for 1945 was 5,988 cases; for 1944, 5,288 cases; and for 1943, 7,185 cases.

Spring Salmon.—Large quantities of spring salmon are caught in the waters off Vancouver Island each year. Most of these fish, however, are taken by troll and find a market in the fresh- or frozen-fish trade or as mild-cured salmon. The trap catch on the lower west coast of Vancouver Island also finds a market principally as fresh, frozen, or mild-cured. The amount of spring salmon canned from Vancouver Island caught fish consists principally of spring salmon taken in the seines while fishing for other varieties, consequently the pack figures are no indication of the size of the run or the quantity of this species taken. In 1946 there were 2,283 cases of spring salmon credited to Vancouver Island, while the spring-salmon pack in 1945 was 2,323 cases; in 1944, 3,068 cases; and in 1943, 2,937 cases.

Cohoe Salmon.—Vancouver Island produced a canned cohoe-pack of 29,983 cases in 1946, compared with 104,528 cases in 1945. The cohoe-pack in 1944 was 79,813 cases, and in 1943, the cycle-year for this species, the pack was 73,846 cases. The canned cohoe-pack for Vancouver Island in 1946 was the smallest canned cohoe-pack credited to this area for many years.

Pink Salmon.—The pink-salmon pack for Vancouver Island in 1946 amounted to only 6,809 cases. While the 1946 cycle has not been a heavy producer for many years, nevertheless the 1946 pack was most discouraging. In 1944 the pink-salmon pack for Vancouver Island amounted to 49,092 cases, while in 1942 it was 14,474 cases. In 1940 the Vancouver Island pink-salmon pack was 33,785 cases, while in the cycle-year previous to that 70,108 cases of pinks were canned. In the case of pink salmon the size of the canned-salmon pack is very largely a measure of the catch, as practically all of the pink-salmon catch is canned.

Chum Salmon.—Vancouver Island produced a pack of canned chum salmon in 1946 amounting to 190,313 cases. This is compared with 136,724 cases of chums packed in 1945, and, if chums are considered a four-year fish, the 1946 pack is compared with 1942, when 383,005 cases of chum salmon were canned. Compared with previous chum-salmon packs, the canned pack in 1946 again reflects a period of low production for Vancouver Island. It is interesting to note that from 1936 to 1942 the Vancouver Island chum-salmon pack ranged between a low of 203,900 cases and a high of 593,016 cases, the average for these years being 326,636 cases, while the average for the period from 1943 to 1946 was 128,977 cases. In the pages for this report for 1945 we presented a table showing the chum-salmon pack of Vancouver Island from 1934 to 1944. The table is again included, as it is felt that the recent downward trend in the Vancouver Island chum-salmon pack is of sufficient importance to warrant the close attention of everyone interested.

	Cases.		Cases.
1934	210,239	1940	279,064
1935	143,960	1941	593,016
1936	347,951	1942	383,005
1937	203,900	1943	132,843
1938	266,566	1944	56,029
1939	212,949	1945	136,724

In comparing Vancouver Island pack figures for recent past years with the pack figures of this area in pre-war years, two important factors must be considered. First, the heavy demand of the freezers for Vancouver Island caught chum salmon, particularly during the latter war years, and, second, previous to the war large quantities of Vancouver Island chum salmon were salted and shipped to the Orient. Notwithstanding these two factors, however, the trend indicated is definitely downward.

REVIEW OF BRITISH COLUMBIA'S SALMON-CANNING INDUSTRY, 1946.

The Provincial Department of Fisheries licensed thirty-three salmon-canneries for operation in 1946. Two of these did not operate, therefore there were two more canneries operated in 1946 than in 1945, in which year twenty-nine canneries operated. The operating canneries were located as follows:—

Queen Charlotte Islands	---
Skeena River	7
Central Area	4
Rivers Inlet	1
Johnstone Strait	3
Fraser River and Lower Mainland	13
West coast of Vancouver Island	3
Nass River	---

It will be noted from the above that, whereas on the Fraser River and Lower Mainland in 1946 there were thirteen operating canneries, in the year previous only ten canneries operated in this area. In 1946 there were no canneries operated on the Nass River, whereas in 1945 one cannery operated. For the past two years, 1945 and 1946, there have been no salmon-canning operations in the Queen Charlotte Islands.

Attention has been drawn previously to the fact that, since the beginning of the war, the number of salmon-canneries licensed to operate by the Provincial Department of Fisheries has been considerably less than the number generally operated in pre-war years. The shortage of labour and technical help has forced a consolidation of operations in many cases. Companies owning several canneries have been forced to close down one or more operations and consolidate their operations in fewer plants. In other cases two or more companies have made working agreements to can each other's fish in different areas. These consolidations and joint operations have been forced on the different companies by circumstances largely brought about by the war, but where the arrangements have been satisfactory from an operating or economic standpoint, one may expect these arrangements to continue. Higher operating costs in the post-war years, together with higher prices for fish on the one hand and the competitive position in which canned salmon will find itself in the post-war years, will force the operators to use every measure at their disposal that will tend to lower production costs. Successful joint operations or consolidations, up to a point, are a step in this direction.

In 1946, as in the war years, a very large proportion of the British Columbia salmon-pack went to the British Ministry of Food. The demand for British Columbia canned salmon by Great Britain was still very great but somewhat larger quantities were made available for domestic consumption in 1946 than during the war years.

Again in 1946, as in the war years, the Provincial Government refused to permit the operation of salmon dry-salteries, and the Federal Government also placed an embargo on the export of fresh salmon in certain categories, except under export permit. These steps were taken to divert as much of the salmon-catch as possible to the canneries because of the heavy demand for this commodity.

OTHER CANNERIES (PILCHARD, HERRING, AND SHELL-FISH).

Pilchard.—Seven plants were licensed by the Provincial Department of Fisheries to can pilchards in 1946. This was one more than the number licensed in 1945. In 1946, however, due to the complete failure of pilchards to make an appearance, only one plant actually operated on pilchards. Two of the licensed plants, however, operated on anchovies. The three operating plants, one on pilchards and two on anchovies, produced a total pack of 34,305 cases of canned pilchards and anchovies combined. The pilchard-canning operation, for the reasons pointed out above, was a dismal failure in 1946. This was very unfortunate, as the European market was particularly anxious to secure as large an amount of this desirable canned product as possible.

Herring.—In 1946 twenty-three herring-canneries were licensed to operate by the Provincial Department of Fisheries, although only twenty operated. Herring have been canned in British Columbia for a number of years previous to the war, but in the pre-war years the canned herring-pack was comparatively small, averaging not over 25,000 cases annually. At the outbreak of hostilities the demand for canned herring increased enormously. This war-stimulated demand enlarged the herring-canning industry of the Province from a comparatively insignificant branch of our fisheries to one of the Province's most important. The first year of the war the industry in British Columbia produced 418,000 cases of canned herring, and each year since then the annual pack has been over 1,000,000 cases. In 1945 the twenty operating plants produced 1,307,514 cases. In 1946, the year under review, twenty operating plants produced 1,634,286 cases of canned herring.

Shell-fish Canneries.—In 1946 eleven shell-fish canneries were licensed to operate by the Provincial Department of Fisheries, but for reasons unknown to the Department only seven of these plants operated. The seven operating plants produced 750 cases of crabs, 39,492 cases of clams, and 48 cases of shrimps. Incidentally the 48 cases of shrimps were more or less in the nature of an experiment. It is expected, however, that the pack of this commodity will increase from now on.

MILD-CURED SALMON.

There were ten plants licensed to operate on mild-cured salmon in 1946, although only seven of these actually got into production. These seven plants produced 2,208 tierces of mild-cured salmon in 1946. In 1945 the production was 1,697 tierces from six operating plants.

DRY-SALT SALMON.

Previous to 1939 varying amounts of chum salmon were dry-salted for shipment to the Orient. In some years the production of this product reached fairly large proportions. During the war years the demand for dry-salt salmon from the Orient has not been great. Nevertheless there has been a small demand for dry-salt salmon to meet Canadian trade. Due to the increased demand occasioned by the war for inexpensive protein foods, such as canned salmon, the Provincial Government has repeatedly declined to issue salmon dry-saltery licences, and no change in this policy was made in 1946. The last production of dry-salt salmon in British Columbia was in 1938.

DRY-SALT HERRING.

Previous to the outbreak of the war dry-salt herring were produced in large quantities in British Columbia and shipped to China. Since the outbreak of the war the bulk of the herring caught in British Columbia has been canned, and, in order to divert as much as possible of the herring-catch to the canneries, no herring dry-salteries have been permitted to operate in British Columbia since 1940. Late in 1945, however,

U.N.R.R.A. asked the British Columbia producers to again dry-salt a quantity of herring for China. The necessary plant and equipment was not available for a large production. On this account and the fact that the request came late in the season, only one plant was able to get into production in 1945, and this for only a short time before the season closed. The production, therefore, was very small, amounting to some 302 tons. Early in 1946 U.N.R.R.A. again signified its desire for dry-salt herring for China. The Provincial Department of Fisheries licensed ten plants to operate, eight of which actually got into production. These eight plants in 1946 produced 5,807 cured tons of dry-salt herring. Not all of this amount, however, was for the account of U.N.R.R.A., but all was shipped to the Orient. It is expected that if trading conditions are acceptable, the dry-salt herring business will probably make its reappearance in 1947.

PICKLED HERRING.

The business of pickling herring in British Columbia had been on fairly large proportions during World War I, due largely to the fact that European supplies of pickled herring were unavailable. After the Armistice in 1918 the demand for British Columbia pickled herring dropped off rapidly, and for many years no pickled herring was produced in British Columbia. Again, during World War II, the demand for pickled herring was revived, due largely to the fact that the source of supply, which was Europe, was again cut off, and Canada and the United States have had to look elsewhere for this product. The British Columbia production of pickled herring since the war has not been large. The peak seems to have been reached in 1940, when 5,500 barrels were pickled. Since that time the production figures have varied. In 1946 there were 650 barrels of pickled herring produced by three licensed plants.

HALIBUT PRODUCTION.

The halibut-fishery on the Pacific Coast of North America is regulated by the International Fisheries Commission under treaty between Canada and the United States. The fishery is shared in by the nationals of the two countries. The Commission regulates the fishery on a quota basis, and on that account there is very little fluctuation in the total amount of halibut landed from year to year, except when the quotas are changed for any reason. For the purpose of regulation, the coast has been divided into four areas, the principal areas from the standpoint of production being Areas Nos. 2 and 3. Area No. 2 comprises the waters of the Washington and British Columbia coasts from the approximate vicinity of Willapa Harbor in the south to Cape Spencer in the north. Area No. 3 comprises the waters from the northern boundary of Area No. 2 to the Aleutian Islands. The other two areas, Nos. 1 and 4, from which production is small, comprise the waters south of Area No. 2 and the Bering Sea respectively.

In 1946 the catch-limit set by the Commission for Area No. 2 was 24,500,000 lb. and for Area No. 3, 28,000,000 lb. These were the same quotas as were in effect for these respective areas in 1945. These quotas are exclusive of the halibut which are caught incidentally while fishing for other species with set-lines in the areas closed to halibut-fishing in accordance with the Commission's regulations.

The total landings of halibut by all vessels in all ports in 1946 amounted to 60,391,000 lb., including halibut caught incidentally while fishing for other species. This was 5,726,000 lb. greater than the total landings in 1945. Of this total, Area No. 2 produced 28,482,000 lb. while Area No. 3 produced 31,187,000 lb.; 722,000 lb. were produced by Area No. 1.

The total halibut-landings by all vessels in Canadian ports in 1946 were 22,284,000 lb. Of this amount, 14,740,000 lb. were caught in Area No. 2 while Area No. 3 pro-

duced 7,544,000 lb. These figures are compared with 19,680,000 lb. landed by all vessels in Canadian ports in 1945.

Canadian vessels landed in Canadian ports, in 1946, 17,900,000 lb. of halibut; 14,286,000 lb. came from Area No. 2 and 3,614,000 lb. came from Area No. 3. Canadian vessels also landed 472,000 lb. of halibut in American ports in 1946; 448,000 lb. of this was caught in Area No. 3, while 24,000 lb. was reported to have been caught in Area No. 2. The total landings by American vessels in Canadian ports in 1946 were 4,384,000 lb. This latter figure is compared with 4,571,000 lb. of American-caught halibut landed in Canadian ports in 1945.

The average price paid for Canadian halibut in Prince Rupert in 1946 was 16.9 cents per pound, and for all Canadian landings in all British Columbia ports the average price for Canadian halibut was 17.5 cents per pound.

Halibut-livers have been a source of revenue to the halibut fishermen because of their high vitamin content. The calculated value of the halibut-livers to the United States and Canadian fishermen in 1946 was $1,801,130, compared with $1,220,000 in 1945. Of this amount, Canadian fishermen received $261,750, compared with $148,000 for the Canadian fishermen's share in 1945.

The statistical information in connection with the Pacific halibut-fishery quoted above has been supplied by the International Fisheries Commission and is hereby gratefully acknowledged.

FISH OIL AND MEAL.

Fish-oil and edible fish-meal have been an important branch of British Columbia's fishery production for a number of years. Previous to the war pilchards and herring were the principal species used for the production of oil and meal. Since the outbreak of the war and the consequent increase in the demand for natural sources of vitamins, other species have been found to yield oils of higher vitamin content, and the increased demand for these products has stimulated activity in this field. Dogfish-livers, shark-livers, codfish-livers, cannery waste, and viscera are all utilized for the production of fish-oil, much of which finds a market in the pharmaceutical trade. In addition to the high vitamin oils used in the medicinal field, British Columbia fish-oils of the lower vitamin potencies find an outlet in many of the manufacturing processes, such as the production of soaps, paints, linoleums, printers' ink, etc. Other vitamin-bearing fish-oils produced in British Columbia are sold in large quantities for the feeding of poultry and live stock.

Fish-liver Oil.—Fish-liver oil production in British Columbia since the outbreak of the war has reached quite important proportions in the Province's fisheries economy. It has been known for some time that the livers and viscera of certain Pacific fishes were a valuable natural source of vitamins, and the increasing demand for a natural source of Vitamin A has been the chief cause for the continued rise in the production of fish-liver oil.

Since 1942 the Provincial Department of Fisheries has required the operators of fish-liver reduction plants to obtain a licence and to make returns. In 1946 nine plants were licensed to operate fish-liver reduction. These nine plants processed 3,724,804 lb. of liver, producing 211,914 imperial gallons of oil valued at $1,602,625. In 1945 ten plants were licensed to operate, and, from returns made to this Department, these ten plants processed 6,281,195 lb. of livers, producing 445,858 imperial gallons of oil.

In the case of fish-liver oil it should be noted that this oil is of high vitamin content and, therefore, the value is not comparable with values for other types of fish-oil.

Pilchard Reduction.—The pilchard-fishery of British Columbia is conducted principally off the west coast of Vancouver Island. Pilchards, which are a migratory fish, make their appearance in British Columbia coastal waters during July, August, and

September. These pilchards range from Southern California, and it is during their northern migration that the British Columbia fishermen obtain their share of this pelagic fish.

In 1946 there were seven plants licensed to operate, only four of which actually got into production. The pilchard migration in 1946 was almost a complete failure so far as the British Columbia fishermen were concerned. Reports from Washington and Oregon indicated a similar condition. From a financial standpoint the pilchard-fishery and pilchard reduction were heavy financial losses. The four operating plants in 1946 produced 699 tons of edible fish-meal and 81,831 imperial gallons of oil. In 1945 six plants produced 5,812 tons of meal and 1,273,329 imperial gallons of oil, while in 1944 seven plants produced 8,435 tons of meal and 1,675,090 imperial gallons of oil.

Herring Reduction.—The reduction of herring to meal and oil in British Columbia has become an important branch of our winter fishery. Herring are caught from October through to March, and, while heretofore the reduction of herring was conducted largely on the west coast and south-east coast of Vancouver Island, latterly the industry has spread and now practically covers the entire British Columbia coast from the south-east shores of Vancouver Island to Prince Rupert.

In 1946 there were thirteen plants licensed by the Provincial Department of Fisheries to reduce herring. Twelve of these operated and produced 7,223 tons of meal and 484,937 imperial gallons of oil. In 1945 there were eleven plants operating, which produced 5,525 tons of meal and 521,649 imperial gallons of oil.

Whale Reduction.—There has been no licensed whale reduction in British Columbia since 1944.

Miscellaneous Reduction.—Dogfish and fish-offal reduction plants are licensed under miscellaneous reduction. These plants produced oil and meal from cannery waste and from the carcasses of dogfish. The oil from the carcasses of dogfish is not to be confused with dogfish-liver oil which is reported in another section of this report. In 1946, nineteen plants were licensed in this category, seventeen of which operated. These seventeen plants produced 4,248 tons of meal and 453,008 imperial gallons of oil.

NET-FISHING IN NON-TIDAL WATERS.

Under section 23 of the Special Fishery Regulations for British Columbia, fishing with nets in certain specified non-tidal waters within the Province is permissible under licence from the Provincial Minister of Fisheries. This fishery is confined almost exclusively to the residents living within reasonable distance of the lakes mentioned. In the Appendix to this report there again appears a table showing the name and number of lakes in which net-fishing has been permitted, together with the number and approximate weight of the various species of fish taken from each lake.

It will be noted that there are three different kinds of fishing licences issued for net-fishing in the non-tidal waters of the Province—namely, fur-farm, ordinary, and sturgeon. In 1946–47 there were thirty licences issued to fur-farmers, compared with twenty-five in the year previous. The coarse fish taken under these licences are used for feeding fur-bearing animals held in captivity.

There were ninety-nine ordinary fishing licences issued in 1946–47, compared with eighty-four in 1945–46. In 1946–47 there were issued three sturgeon fishing licences, compared with one in the year previous.

The total number of fish taken by licensed nets in the non-tidal waters of the Province in the 1946–47 season was 67,119 of all species permitted, with an approximate weight of 78,016 lb.

For a more detailed account of the fish taken by licensed nets in the different waters of the Province, the reader is referred to the table above mentioned appearing in the Appendix.

CONDITION OF BRITISH COLUMBIA'S SALMON-SPAWNING GROUNDS.

Owing to this Department having discontinued making inspections of the various salmon-spawning areas of the Province, we are indebted to the Chief Supervisor of Fisheries, and the officers of his Department who conducted the investigations, for furnishing us with a copy of his Department's report. His courtesy in supplying us with this report is gratefully acknowledged.

The Chief Supervisor's report on the condition of British Columbia's salmon-spawning grounds will be found in full in the Appendix to this report.

CONTRIBUTIONS TO THE LIFE-HISTORY OF THE SOCKEYE SALMON.

(Digest.) (No. 32.)

In the Appendix to this report will be found another paper, No. 32, in the series "Contributions to the Life-history of the Sockeye Salmon," again contributed by Dr. W. A. Clemens, Department of Zoology, University of British Columbia.

In commenting on the general characteristics of the sockeye-salmon runs to the various river systems, Dr. Clemens points out that the runs of sockeye salmon to Rivers Inlet and to the Skeena and Nass Rivers in 1946 were apparently rather small, in that they produced commercial packs of 73,320, 52,928, and 12,511 cases respectively. The escapements were reported as good, indicating that they were neither exceptionally large nor small so as to attract attention. While the pack of 73,320 cases at Rivers Inlet may appear to be large, it is only a medium-sized pack in relation to the history of the area, for packs of over 100,000 cases have not been uncommon. Following the adoption of constructive measures on the Skeena River as the result of the present thorough investigation by the Fisheries Research Board, similar action should be taken in regard to Rivers Inlet. There would appear to be every reason to believe that each of these areas should produce at least 100,000 cases annually.

With respect to the Skeena River, Dr. Clemens observes that the run of sockeye salmon to this river in 1946 was relatively small, producing a pack of 52,928 cases, with a fair escapement. The percentage of five- and six-year-old fish was high, indicating that the small run of 1942 contributed relatively little to that of 1946. As the return in 1947 will be the product of the spawnings of 1942 and 1943, and in both these years the packs were exceptionally small with corresponding escapements relatively small, the outlook for 1947 is, therefore, very poor.

As pointed out in the 1943 report, the conditions on the Skeena are undoubtedly the result of the accumulative effect of low productions in certain years without a lessening of the fishing intensity. Dr. Clemens suggests that it would have been a wise procedure to have limited the commercial catch on the Skeena River in 1947 to 20,000 cases in order to provide a reasonable escapement for these depressed cycle-years.

With regard to the Nass River, Dr. Clemens points out that the pack of sockeye salmon from the Nass was 12,511 cases in 1946, which was somewhat below the anticipated amount. However, the run may have been close to expectancy, as the report from the spawning-grounds stated that the escapement was good, that the fish came in early and were large in size. The return in 1947 will be derived from the brood-years of 1942 and 1943. In the former year the pack was 21,085 cases and in the latter year 13,412 cases. In both years the escapements were reported as good. While a large return cannot be expected in 1947, the size of the pack cannot be predicted in view of the variation in the sizes of the catches over a long period of years.

With respect to the run of sockeye salmon to Rivers Inlet, it is noted in Dr. Clemens' paper that the run of sockeye to this inlet in 1946 was possibly smaller than might have been expected from the information available. In the absence of quantitative data on spawning escapements, it is difficult to judge the extent of the escapements

and to compare conditions from year to year except in very broad terms. The return in 1946 was the product of the spawnings of 1941 and 1942. These years produced packs of 93,378 and 79,199 cases, and the escapements were reported as very good. However, climatic conditions are most variable and usually severe in the Rivers Inlet area, and undoubtedly production of fry varies widely from year to year. The only protective measure available at the present time is conservative fishing. The return in 1947 will be the product of the spawnings of 1942 and 1943. In the former year the pack was 79,199 cases and the escapement was reported as very good. In the latter year the pack was 47,602 cases and a satisfactory escapement was indicated. Unless the production of fry was exceptional in the brood-years, the return in 1947 should be on the small side, producing a pack in the neighbourhood of fifty to sixty thousand cases.

For a full account of Dr. Clemens' analyses of the samplings of these three river systems, the reader is referred to Paper No. 32 in the series "Contributions to the Life-history of the Sockeye Salmon," appearing in the Appendix to this report.

HERRING INVESTIGATION.

In the 1946–47* season the herring investigation was continued by Dr. A. L. Tester and Mr. J. C. Stevenson, of the Pacific Biological Station, and their assistants, under joint financial arrangement with the Fisheries Research Board of Canada and the Provincial Department of Fisheries.

A detailed investigation of the west coast of Vancouver Island population has been initiated. The results of the first year's work are given in the Appendix to this report. It is pointed out that, in order to formulate a management policy which will assure maximum utilization of the stock, the causes of natural fluctuations in survival between the egg and recruitment stages must be ascertained and the average minimum spawning population necessary to produce maximum yield must be determined. To this end, the main energies of the staff of the herring investigation have been concentrated on the west coast study, which is expected to yield results which can be applied to all herring-fisheries of British Columbia.

The detailed study of the west coast population was commenced by intensifying the established lines of research on the adult population and by initiating a study of the young herring. With a boat supplied by the industry, closer contact was maintained with the fishermen and operators, permitting on-the-spot observations to be made on the progress of the fishery and facilitating the collection of catch statistics and tag-recoveries. Tagging was resumed on the west coast in 1946 (28,148 fish tagged) and 1947 (30,401 fish tagged) after a lapse of several years. Two tag detectors, one at Kildonan and one at Steveston, and magnets in several reduction plants recovered tags from the catches. Tests were made to determine the efficiency of recovery of tags by reduction-plant magnets, plant machinery, etc., and to ascertain the time-lag involved in the passage of tags through the plants, information which is used in interpreting tag returns. Tag-detector returns showed (1) that immigration of fish from other sub-districts to the West Coast was somewhat greater than emigration of West Coast fish to other sub-districts, (2) that the tendency for fish to return to the particular area of tagging was relatively weak, and (3) that there was a tendency for fish to wander to the south-eastward along the west coast.

An intensive sampling program in the West Coast Sub-district resulted in the taking of eighty-three samples (8,192 fish) from the commercial catch and sixteen samples (1,580 fish) from the spawning runs, almost twice as many as were taken in the previous year. The age composition of the catches confirmed the tagging results in indicating a south-easterly movement of the fish.

* The herring season in British Columbia overlaps the calendar year, and, as a consequence of time-lag between the conclusion of the herring season and the compiling of the annual report, the work of the herring investigators done in the season of 1946–47 is reported in this report for 1946.

More accurate surveys of the spawning-grounds on the west coast were undertaken than have been attempted previously, and plans are under way for further improvements in assessing the extent of spawnings. Despite the record herring-catch in the winter of 1946–47 (59,000 tons), spawning was only slightly less than the average over an eleven-year period.

In the preliminary larval herring survey in April and May, 1947, a total of 267 ten-minute hauls resulted in the collection of 4,500 larvæ. Information was obtained on the distribution and growth between hatching and schooling of the young in order to form a basis for the study of the causes of variations in their numbers. A study of the extent of egg mortality on the spawning-grounds was also begun this spring. It is anticipated that next year the investigation of the early-life history will be extended so as to include the study of the young at later stages.

Although attention was focused on the West Coast population, certain work was continued on the populations of the other sub-districts, with relatively greater stress being laid on the Lower East Coast fishery. As in previous years, the collection of catch statistics was continued for all herring-fisheries. Apart from the west coast taggings, 23,383 fish were tagged in 1946 and 11,150 fish in 1947, chiefly in the Lower East Coast Sub-district. The continuation of tagging in this sub-district is for the purpose of determining the extent of mixture between it and the West Coast, and for the purpose of determining mortality rates for comparison with the West Coast.

In addition to the intensive sampling of the West Coast fishery, a total of 112 samples (11,128 fish) were taken from the other fisheries, of which 56 samples (5,602 fish) were from the Lower East Coast catch and the remainder were from catches in the Discovery Passage, Upper East Coast and Central Sub-districts.

Knowledge of the extent of herring spawning over the entire coast was obtained from the reports submitted by fisheries officers as in previous years.

Experiments on the mortality of tagged fish were again continued but without conclusive results. Further experiments will be conducted when the construction of suitable concrete tanks is completed.

Predictions of the expected abundance of herring on the various fishing-grounds were made for the 1946–47 season and proved to be moderately accurate. These predictions are based on the catch and age composition of the fish in previous years and on the size of the spawning population as determined by the extent of spawning in the preceding spring.

PILCHARD INVESTIGATION.

The Canadian pilchard catch in 1946 was 3,984 tons—the smallest since 1924. The production by unit effort was reduced to about half that of the previous year and to less than a tenth that for 1943. This failure is serious in itself. Considered as the culmination of a series of successively less productive seasons, it is disconcerting indeed.

	Tons.		Tons.
1943	88,739	1945	34,302
1944	53,383	1946	3,984

The data which have been accumulated in the course of an investigation of pilchards suggest an explanation for the declining abundance and, in so doing, indicate that prospects for the immediate future of the pilchard-fishery are not bright. The investigation has been carried out by Dr. J. L. Hart and his associates, of the Pacific Biological Station, under a joint agreement between the Provincial Department of Fisheries and the Fisheries Research Board of Canada.

Extensive tagging experiments, the results of which have been published in these reports, have shown the interchange of pilchards among California, Oregon, Washington, and British Columbia fishing-grounds. It accordingly is pertinent to consider

conditions along the whole coast in assessing the present position and in particular to regard the declining coastwise catch as a warning indication, namely:—

	Tons.		Tons.
1943–44	569,000	1945–46	433,000
1944–45	602,000	1946–47	241,000

The average size of all pilchards in 1946 was 247 millimetres standard length, as compared with 240 millimetres for 1945, 237 millimetres in 1944, and 235 millimetres in 1943, the increasing average size representing increasing average age of fish. Eighth-year fish (produced in 1939) were most abundant, constituting about 38 per cent. of those sampled, and seventh-year fish were next in importance.

Detailed studies of the lengths and ages of the pilchards show beyond reasonable question that since the first part of 1939 pilchards have been unsuccessful in producing a large brood of young. It is certain that the *relative* contributions made by broods produced since 1939 have been smaller. This indicates that declining catches are a consequence of actual deficiency in the numbers of pilchards in the sea. If this interpretation is correct, any major improvement in the situation must await the production of one or more abundant brood-years and their growth to size suitable for the British Columbia fishery.

SHELL-FISH INVESTIGATION.

In the Appendix to this report will be found a paper by Mr. Ferris Neave, of the Pacific Biological Station, Nanaimo, B.C., on the commercial production of clams in British Columbia. Mr. Neave is in charge of the shell-fish investigation which is conducted jointly by the Provincial Department of Fisheries and the Fisheries Research Board of Canada.

The paper presents statistics on the clam-fishery based on reports received by the Pacific Biological Station through the co-operation of officers of the Federal Department of Fisheries and the industry. The statistics indicate that the production of butter and little-neck clams has increased substantially over the previous year. Probably the most interesting features relating to the production of butter-clams are (*a*) the maintenance of the high production in the southern portion of the Strait of Georgia, which has been exploited for many years, and (*b*) the greatly increased production of Northern British Columbia. The statistical data give a measure of the availability of clams to the fishermen in the various areas. The statistics also contain records of the razor-clam production from the beaches of the northern shore of Graham Island, which have been supplied by the kind co-operation of the Masset Co-operative Association.

The paper discusses very briefly the commercial clam-digging on the experimental plot at Seal Island. From the figures presented, it will be seen that the yield per unit of effort was practically the same in 1946 as in the previous year, indicating that this area is supporting the present degree of exploitation in a satisfactory manner and maintaining a very high level of productivity.

INTERNATIONAL FISHERIES COMMISSION, 1946.

The International Fisheries Commission continued the regulation of the Pacific halibut-fishery and carried forward the statistical and biological investigations upon which the regulation of the fishery is based.

United States representation on the Commission was changed shortly before the end of the year, when Mr. Charles E. Jackson, of Washington, D.C., who had been a member since 1940, resigned, and Mr. Milton C. James, Assistant Director of the United States Fish and Wildlife Service, was appointed as his successor. Continuing members of the Commission were Mr. G. W. Nickerson and Mr. A. J. Whitmore for Canada, and Mr. Edward W. Allen for the United States. Mr. Allen served as chairman and Mr. Nickerson as secretary.

A meeting of the Commission with the Halibut Conference Board, composed of representatives of the Canadian and United States halibut fleets, was held at Seattle on November 26th. The results of the Commission's investigations were reviewed and the fleets' recommendations for the regulation of the fishery in 1947 were received.

The annual meeting of the Commission was held at Seattle on November 25th and 26th, before and after the meeting with the Halibut Conference Board. The condition of the fishery, as revealed by current investigations, was examined and necessary modifications in the regulations were adopted.

The regulations governing halibut-fishing in 1946 became effective on March 6th, upon approval by the Governor-General of Canada and the President of the United States. They were essentially the same as those of previous years, though modified in a few respects.

Changes were made in the regulations to improve the utilization of the limited stock of halibut off Northern California. Area 1, which extended south from Willapa Harbor in the State of Washington, was divided at Cape Blanco, Ore., into Area 1A and Area 1B. Provision was made for the closure of Area 1B, the northern section, at the same time as Area 2 and for the closure of Area 1A, the southern section, at the same time as whichever of Area 2 or Area 3 should close later. To prevent illegal post-season halibut-fishing in Areas 1B and 2 under pretense of fishing in Area 1A, vessels fishing in Area 1A were required to have their licences validated at a port in that area prior to each fishing-trip after the closure of Areas 1B and 2.

Minor changes were also made in the section of the regulations under which vessels fishing with set-lines for other species in closed areas may secure permits to retain and sell 1 lb. of halibut for each 7 lb. of saleable fish of other species. In 1946 vessels with such permits were allowed to possess more halibut than they could sell legally, provided that such additional halibut did not exceed 30 per cent. of the amount that could be sold legally and that such additional halibut was surrendered to an enforcement officer at the time of landing. To facilitate enforcement of this provision, dealers and captains were required to report the arrival of vessels fishing under permit to an enforcement officer and to obtain permission to unload them.

The fishing season opened on May 1st, with catch-limits of 24,500,000 lb. and 28,000,000 lb. for Areas 2 and 3 respectively, as in the previous year. Halibut-fishing ended in Areas 2 and 1B on June 11th, when the Area 2 catch-limit was reached. Fishing terminated in Areas 3, 4, and 1A on August 19th, when the Area 3 limit was attained. Permit-landings of halibut caught incidentally during fishing for other species continued until November 15th.

The halibut-catch of Canadian and United States vessels on the Pacific Coast in 1946 amounted to 60,391,000 lb. This was an increase of 5,726,000 lb. over 1945 and the greatest catch since 1915. It was 16,169,000 lb., worth $3,000,000 to the fishermen, greater than in 1931, the year before regulation began.

Halibut-landings from the different areas were: 549,000 lb. from Area 1A, south of Cape Blanco, Ore.; 173,000 lb. from Area 1B, between Cape Blanco and Willapa Harbor, Wash.; 27,250,000 lb. from Area 2, extending from Willapa Harbor to Cape Spencer, Alaska; and 31,187,000 lb. from Area 3, between Cape Spencer and the Aleutian Islands. An additional 1,228,000 lb. of incidentally caught halibut were landed under permit from Area 2 after closure to halibut fishing. No landings were made from Area 4, in the Bering Sea region.

Canadian vessels in 1946 caught 18,372,000 lb. of halibut, an increase of 3,071,000 lb. over their catch in 1945. They took 14,310,000 lb. from Area 2 and 4,062,000 lb. from Area 3, which constituted 51 per cent. and 13 per cent. respectively of the Area 2 and Area 3 catches. The increase in the Canadian catch resulted from an increase in the size of the Canadian fleet.

Scientific investigations were continued along the lines required for the fulfilment of the purposes of the halibut treaty. They included the collection and analysis of current statistical and biological data, which show the effect of past regulations upon the stocks and provide a sound basis for future regulation. The collection of biological data at sea made the operation of a vessel necessary.

The abundance of halibut, as revealed by the average catch per standard unit of gear fished, was 6 per cent. above the level of 1945 in Area 2, which includes the grounds off the coast of British Columbia. In Area 3, off the coast of Alaska, it was 5 per cent. lower than in the previous year. The abundance of halibut in 1946 was 145 per cent. and 95 per cent. above the low levels which prevailed in Area 2 and Area 3 respectively in 1930.

Study of the changes occurring in the size and age composition of the marketable stocks was continued, being necessary for a proper understanding of the over-all changes in abundance. More than 18,000 halibut were measured from sixteen trips landed from a representative part of Area 2. Abnormalities in the distribution of landings prevented similar work on the stock in Area 3. Analysis of the Area 2 data showed that the increase in the catch per unit of fishing effort was contributed to by an increase in the number of young entering the fishery during the year.

Vessel operations, using an otter-trawl vessel, were undertaken to study the effect that the recent expansion of the otter-trawl fishery to important halibut grounds in Area 2 might be expected to have upon the supply of halibut. The trawling-gear used in this fishery was known to be capable of catching and destroying young halibut long before they reach commercial size.

The Canadian otter-trawl vessel " Santa Maria I " was chartered and operated in Hecate Strait and Dixon Entrance during late summer and early autumn. Extensive information was collected concerning the distribution of small unmarketable halibut, the sizes and numbers of halibut caught by trawl on different grounds, and the mortality of halibut caught by trawl under various conditions.

Trawling operations afforded an opportunity to collect biological materials for age and growth studies and to undertake a comprehensive tagging program. Recoveries from the 1,886 halibut which were tagged will, over a period of years, provide valuable information concerning the utilization of the stock and regarding the natural and fishing mortality rates now operative upon the partially rehabilitated stocks of halibut in the Hecate Strait and Dixon Entrance region.

The investigations of the Commission continued to measure the changes taking place in the stocks of halibut. They proved that the condition of the stock in Area 2 was continuing to improve. They showed a cessation of improvement in the Area 3 stock and indicated the need for very close observation and control of the Area 3 fishery to ascertain the cause and to prevent any sustained deterioration in the generally sound condition of the stock.

APPENDICES.

CONTRIBUTIONS TO THE LIFE-HISTORY OF THE SOCKEYE SALMON. (No. 32.)

By W. A. Clemens, Ph.D., Department of Zoology, University of British Columbia, Vancouver, B.C.

INTRODUCTION.

The runs of sockeye salmon to Rivers Inlet and to the Skeena and Nass Rivers in 1946 were apparently rather small, in that they produced commercial packs of 73,320, 52,928, and 12,511 cases respectively. The escapements were reported as good, indicating that they were neither exceptionally large nor small so as to attract attention. While a pack of 73,320 cases at Rivers Inlet may appear to be large, it is only a medium-sized pack in relation to the history of the area, for packs of over 100,000 cases have not been uncommon. Following the adoption of constructive measures on the Skeena River as the result of the present thorough investigation by the Fisheries Research Board, similar action should be taken in regard to Rivers Inlet. There would appear to be every reason to believe that each of these areas should produce at least 100,000 cases annually.

DESIGNATION OF AGE-GROUPS.

Two outstanding features in the life-history of the fish have been selected in designating the age-groups—namely, the age at maturity and the year of its life in which the fish migrated from fresh water. These are expressed symbolically by two numbers, one in large type, which indicates the age of maturity, and the other in small type, placed to the right and below, which signifies the year of life in which the fish left the fresh water. The age-groups which are met most commonly are:—

3_1, 4_1—the "sea-types" or fish which migrate in their first year and mature at the ages of three and four respectively.

3_2—"the grilse," usually males, which migrate in their second year and mature at the age of three.

4_2, 5_2—fish which migrate in their second year and mature at the ages of four and five respectively.

5_3, 6_3—fish which migrate in their third year and mature at the ages of five and six respectively.

6_4, 7_4—fish which migrate in their fourth year and mature at the ages of six and seven respectively.

1. THE RIVERS INLET SOCKEYE RUN OF 1946.

(1) General Characteristics.

The run of sockeye salmon to Rivers Inlet in 1946 was possibly smaller than might have been expected from the information available. In the absence of quantitative data on spawning escapements, it is difficult to judge the extent of the escapements and to compare conditions from year to year except in very broad terms. The return in 1946 was the product of the spawnings in 1941 and 1942. These years produced packs of 93,378 and 79,199 cases and the escapements were reported as very good. However,

climatic conditions are most variable and usually severe in the Rivers Inlet area and undoubtedly production of fry varies widely from year to year. The only "protective" measure available at the present time is conservative fishing.

The return in 1947 will be the product of the spawnings of 1942 and 1943. In the former year the pack was 79,199 cases and the escapement was reported as very good. In the latter year the pack was 47,602 cases and a satisfactory escapement was indicated. Unless the production of fry was exceptional in the brood-years, the return in 1947 should be on the small side, producing a pack in the neighbourhood of 50,000 to 60,000 cases.

(2) Age-groups.

The data for this year's study are obtained from twenty-five samplings of the commercial catch from July 1st to August 2nd, inclusive, representing 1,537 fish. The 4_2 age-group is represented by 563 individuals or 37 per cent. The 5_2 age-group consists of 964 individuals or 63 per cent. It may be noted that in 1942 the four-year-old fish formed only 8 per cent. of the run, but in 1946 the same age-group constituted 37 per cent. of the run. It does not appear, therefore, that four-year-old fish produce four-year-old progeny and that five-year-old fish produce five-year-old progeny. A reasonable conclusion appears to be that, in the case of Rivers Inlet, whether the sockeye mature at four or five years of age depends upon their rate of development as influenced by several factors, the chief of which may be temperatures and food. In the thirty-five years of record the percentage of 4_2's has exceeded the percentage of 5_2's nineteen times, the percentage of 5_2's has exceeded that of the 4_2's fourteen times, and in two years the percentages of the two-year classes has been practically identical. The balance has thus been slightly in favour of the earlier maturity.

The 5_3 age-group is represented by seven individuals and the 6_3 age-group by three (Table I).

(3) Lengths and Weights.

The average lengths of the males and females of the 4_2 age-group are 20.6 and 21.1 inches respectively, and the average weights are 3.9 lb. in each case. These data indicate very small fish. In fact, the weights are the smallest on record. It may be of interest to point out again that only in the case of Rivers Inlet sockeye do the females of the 4_2 age-class frequently exceed the males in length and weight.

The average lengths and weights of the males and females of the 5_2 age-group are 25.1 and 24.1 inches and 7.2 and 6.2 lb. respectively, indicating large fish. The lengths are the longest on record (Tables II, III, IV, and V).

(4) Distribution of the Sexes.

The total number of males in the samplings is 807 and of females 730, percentages of 53 and 47 respectively. In the 4_2 age-group the males predominate with a percentage of 79, while in the 5_2 age-group the females predominate with a percentage of 63. As may be seen in Table VI, the proportion of males in the 4_2 age-class is high.

Table I.—Rivers Inlet Sockeyes, Percentages of Age-groups in Runs of Successive Years and Packs.

Year.	Percentage of Individuals.			
	4_2	5_2	5_3	6_3
1907 (87,874 cases)	....	....	....	....
1908 (64,652 cases)	....	....	....	....
1909 (89,027 cases)	....	....	....	....
1910 (126,921 cases)	....	....	....	....
1911 (88,763 cases)	....	....	....	....
1912 (112,884 cases)	21	79	....	....
1913 (61,745 cases)	80	20	....	....
1914 (89,890 cases)	35	65	....	....
1915 (130,350 cases)	13	87	....	....
1916 (44,936 cases)	26	74	....	....
1917 (61,195 cases)	39	61	....	....
1918 (53,401 cases)	57	43	....	....
1919 (56,258 cases)	46	54	....	....
1920 (121,254 cases)	5	95	....	....
1921 (46,300 cases)	49	51	....	....
1922 (60,700 cases)	81	18	1	....
1923 (107,174 cases)	74	24	2	....
1924 (94,891 cases)	43	54	2	1
1925 (159,554 cases)	23	77	....	....
1926 (65,581 cases)	59	38	2	1
1927 (64,461 cases)	81	16	3	....
1928 (60,044 cases)	55	40	4	1
1929 (70,260 cases)	77	18	3	2
1930 (119,170 cases)	49	48	2	1
1931 (76,428 cases)	53	44	2	1
1932 (69,732 cases)	67	27	5	1
1933 (83,507 cases)	44	55	1	....
1934 (76,923 cases)	77	20	2	1
1935 (135,038 cases)	57	41	1	1
1936 (46,351 cases)	53	46	1	....
1937 (84,832 cases)	60	37	3	....
1938 (87,942 cases)	27	70	1	2
1939 (54,143 cases)	67	32	1	....
1940 (63,469 cases)	69	28	3	....
1941 (93,378 cases)	59	40	1	....
1942 (79,199 cases)	8	91	....	1
1943 (47,602 cases)	8	91	....	1
1944 (36,852 cases)	76	23	1	....
1945 (89,735 cases)	57	41	2	....
1946 (73,320 cases)	37	63	....	....

Table II.—Rivers Inlet Sockeyes, 1946, grouped by Age, Sex, and Length, and by their Early History.

Length in Inches.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
17½	1	.....	.....	.....	.....	.....	.....	.....	1
18	4	.....	.....	.....	.....	.....	.....	.....	4
18½	14	1	.....	.....	.....	.....	.....	.....	15
19	29	3	.....	.....	.....	.....	.....	.....	32
19½	61	5	.....	.....	1	.....	.....	.....	67
20	71	13	.....	.....	.....	.....	.....	.....	84
20½	70	22	.....	.....	1	.....	.....	.....	93
21	69	29	.....	1	.....	.....	.....	.....	99
21½	39	21	2	1	.....	.....	.....	.....	63
22	42	10	7	26	1	1	.....	.....	87
22½	18	7	14	34	.....	.....	.....	.....	73
23	15	6	22	76	.....	.....	.....	.....	119
23½	6	2	33	91	.....	.....	.....	.....	132
24	4	1	35	97	1	.....	.....	1	139
24½	.....	.....	29	97	1	.....	1	.....	128
25	.....	.....	48	103	.....	.....	.....	1	152
25½	.....	.....	43	50	.....	.....	.....	.....	93
26	.....	.....	43	23	1	.....	.....	.....	67
26½	.....	.....	36	6	.....	.....	.....	.....	42
27	.....	.....	24	2	.....	.....	.....	.....	26
27½	.....	.....	10	.....	.....	.....	.....	.....	10
28	.....	.....	9	.....	.....	.....	.....	.....	9
28½	.....	.....	2	.....	.....	.....	.....	.....	2
Totals	443	120	357	607	6	1	1	2	1,537
Average lengths	20.6	21.1	25.1	24.1	22.8	22.0	24.5	24.5	.....

Table III.—Rivers Inlet Sockeyes, 1946, Grouped by Age, Sex, and Weight, and by their Early History.

Weight in Pounds.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
2	1	.....	.....	.....	.....	.....	.....	.....	1
2½	8	1	.....	.....	.....	.....	.....	.....	9
3	68	5	.....	.....	1	.....	.....	.....	74
3½	144	42	1	1	.....	.....	.....	.....	188
4	104	49	3	11	1	.....	.....	.....	168
4½	61	19	9	42	1	1	.....	.....	133
5	33	2	26	69	.....	.....	.....	1	131
5½	18	1	34	86	1	.....	.....	.....	140
6	6	1	44	113	1	.....	.....	.....	165
6½	.....	.....	31	81	1	.....	1	1	115
7	.....	.....	36	96	.....	.....	.....	.....	132
7½	.....	.....	53	64	.....	.....	.....	.....	117
8	.....	.....	33	29	.....	.....	.....	.....	62
8½	.....	.....	31	11	.....	.....	.....	.....	42
9	.....	.....	19	3	.....	.....	.....	.....	22
9½	.....	.....	16	1	.....	.....	.....	.....	17
10	.....	.....	14	.....	.....	.....	.....	.....	14
10½	.....	.....	4	.....	.....	.....	.....	.....	4
11	.....	.....	3	.....	.....	.....	.....	.....	3
Totals	443	120	357	607	6	1	1	2	1,537
Average weights	3.9	3.9	7.2	6.2	4.9	4.5	6.5	5.8	.....

Table IV.—Rivers Inlet Sockeyes, Average Lengths in Inches of the 4_2 and 5_2 Groups, 1912 to 1946.

Year.	4_2		5_2	
	M.	F.	M.	F.
1912–41	22.4	22.4	25.4	24.7
1912–41 (conversion)	21.6	21.6	24.6	23.9
1942	21.9	21.3	25.0	23.8
1943	20.5	21.1	24.3	23.7
1944	21.1	21.0	23.5	23.3
1945	20.9	21.2	24.2	23.9
1946	20.6	21.1	25.1	24.1

Table V.—Rivers Inlet Sockeyes, Average Weights in Pounds of the 4_2 and 5_2 Groups, 1914 to 1946.

Year.	4_2		5_2	
	M.	F.	M.	F.
1914–41	4.9	4.8	7.0	6.5
1942	5.1	4.6	7.2	6.4
1943	4.1	4.4	6.8	6.3
1944	4.6	4.4	6.2	6.0
1945	4.3	4.4	6.6	6.4
1946	3.9	3.9	7.2	6.2

Table VI.—Rivers Inlet Sockeyes, Percentages of Males and Females, 1915 to 1946.

Year.	4_2		5_2		Per Cent. Total Males.	Per Cent. Total Females.
	M.	F.	M.	F.		
1915–41 (average)	63	37	34	66	50	50
1942	61	39	35	65	38	62
1943	62	38	34	66	36	64
1944	67	33	33	67	59	41
1945	70	30	39	61	57	43
1946	79	21	37	63	53	47

2. THE SKEENA RIVER SOCKEYE RUN OF 1946.

(1) General Characteristics.

The run of sockeye salmon to the Skeena River in 1946 was relatively small, producing a pack of 52,928 cases and a fair escapement. The percentage of five- and six-year-old fish was high, indicating that the small run of 1942 contributed relatively little to that of 1946.

The return in 1947 will be the product of the spawnings of 1942 and 1943. In both these years the packs were exceptionally small, that of 1943 being the smallest on record. Correspondingly the escapements were relatively small. As pointed out in the 1943 report, the above condition has been undoubtedly the result of the accumulative effect of low productions in certain years without a lessening of the fishing

intensity. The outlook for 1947 is, therefore, very poor. It would have been a wise procedure to have limited the commercial catch in 1947 to 20,000 cases, and so provided a reasonable escapement for these depressed cycle-years.

(2) Age-groups.

The material for this year's analysis consists of thirty-six samplings taken from July 2nd to August 17th, inclusive, involving 1,804 fish taken at random from the commercial catch.

The 4_2 age-group is represented by 238 individuals or 13 per cent., the 5_2 by 1,256 or 70 per cent., the 5_3 by 142 or 8 per cent., and the 6_3 by 168 or 9 per cent. The outstanding feature in this record is that the percentage of four-year-old fish is the lowest on record. A very similar condition occurred in 1920, when this age-group comprised 15 per cent. of the run. The relatively high percentage of six-year-old fish is also of interest (Table VII).

In addition to the usual age-groups, representatives of three others occur as follows:—

6_2—male, 22½ inches, 4 lb.
female, 25½ inches, 5 lb.
female, 25½ inches, 6½ lb.
7_3—female, 25 inches, 6½ lb.
7_4—male, 24 inches, 6 lb.

These five fish have not been included in the calculations.

(3) Lengths and Weights.

The average lengths of the males and females in the various year-classes are shown in Table X and present no unusual features.

The weight data have presented some difficulty. Mr. D. J. Milne, of the Pacific Biological Station, checked at the end of the season the scales used by the collector and found that they were underweighing to a considerable extent. On the basis of the information supplied by Mr. Milne, a half-pound has been added to the average weights of all the year-classes. This procedure brings the weights into reasonable agreement with those of previous years, whereas the original weights are definitely below. The fact that the average lengths are not less than those of previous years appears to justify the correction of the weights (Tables VIII, IX, X, and XI).

(4) Distribution of the Sexes.

The total number of males in the samplings is 679 and of females 1,125, percentages of 38 and 62 respectively. In the 4_2 age-group the percentages of the sexes are equal, but in the 5_2 age-group the percentage of females is 68 (Table XII).

Table VII.—Skeena River Sockeyes, Percentages of Age-groups in Runs of Successive Years and Packs.

Year.	Percentage of Individuals.			
	4_2	5_2	5_3	6_3
1907 (108,413 cases)	....	....	....	....
1908 (139,846 cases)	....	....	....	....
1909 (87,901 cases)	....	....	....	....
1910 (187,246 cases)	....	....	....	....
1911 (131,066 cases)	....	....	....	....
1912 (92,498 cases)	57	43	....	....
1913 (52,927 cases)	50	50	....	....
1914 (130,166 cases)	25	75	....	....
1915 (116,553 cases)	36	64	....	....
1916 (60,923 cases)	34	38	13	18
1917 (65,760 cases)	57	29	9	5
1918 (123,322 cases)	51	34	9	6
1919 (184,945 cases)	27	60	9	4
1920 (90,869 cases)	15	71	6	8
1921 (41,018 cases)	69	22	6	3
1922 (96,277 cases)	70	16	12	2
1923 (131,731 cases)	56	29	8	7
1924 (144,747 cases)	23	69	7	1
1925 (77,784 cases)	51	45	3	1
1926 (82,360 cases)	62	26	9	3
1927 (83,996 cases)	62	28	9	1
1928 (34,559 cases)	51	39	7	3
1929 (78,017 cases)	62	30	6	2
1930 (132,372 cases)	39	52	8	1
1931 (93,023 cases)	40	30	28	2
1932 (59,916 cases)	44	37	7	12
1933 (30,506 cases)	57	36	5	2
1934 (54,558 cases)	58	34	7	1
1935 (52,879 cases)	49	31	18	2
1936 (81,973 cases)	67	20	11	2
1937 (42,491 cases)	45	40	11	4
1938 (47,257 cases)	64	15	16	5
1939 (68,485 cases)	50	35	11	4
1940 (116,507 cases)	80	15	4	1
1941 (81,767 cases)	39	52	8	1
1942 (34,544 cases)	86	54	7	3
1943 (28,268 cases)	39	39	16	6
1944 (68,197 cases)	37	52	7	4
1945 (104,279 cases)	20	63	12	5
1946 (52,928 cases)	13	70	8	9

Table VIII.—Skeena River Sockeyes, 1946, grouped by Age, Sex, and Length, and by their Early History.

Length in Inches.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
19	1	1	.....	.....	.....	.....	.....	.....	2
19½	1	.....	.....	.....	.....	.....	.....	.....	1
20	2	1	.....	.....	.....	.....	.....	.....	3
20½	1	3	.....	.....	.....	1	.....	.....	5
21	7	20	.....	.....	2	1	.....	.....	30
21½	15	17	.....	.....	.....	2	.....	.....	34
22	16	38	3	12	9	6	.....	.....	84
22½	18	17	.....	22	6	13	.....	.....	76
23	21	16	9	58	9	17	.....	7	137
23½	15	3	9	131	7	4	1	11	181
24	11	.....	25	206	15	7	1	17	282
24½	4	2	46	160	5	7	8	22	254
25	3	1	79	154	11	4	16	20	288
25½	2	.....	81	64	8	3	24	5	187
26	1	1	80	34	.....	.....	20	2	138
26½	.....	.....	38	8	3	.....	8	2	59
27	.....	.....	17	4	2	.....	2	.....	25
27½	.....	.....	11	.....	.....	.....	1	1	13
28	.....	.....	1	.....	.....	.....	.....	.....	1
28½	.....	.....	4	.....	.....	.....	.....	.....	4
Totals	118	120	403	853	77	65	81	87	1,804
Average lengths	22.7	22.0	25.4	24.3	23.9	23.2	25.5	24.4	.....

Table IX.—Skeena River Sockeyes, 1946, grouped by Age, Sex, and Weight, and by their Early History.

Weight in Pounds.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
1½	1	1	.....	.....	.....	.....	.....	.....	2
2	2	.....	.....	.....	.....	.....	.....	.....	2
2½	4	8	.....	.....	.....	.....	.....	.....	12
3	17	23	2	3	2	4	.....	.....	51
3½	19	36	2	23	3	5	.....	.....	88
4	20	27	7	63	5	8	.....	2	132
4½	18	16	8	140	18	21	1	15	237
5	18	4	31	187	10	14	5	12	281
5½	7	2	60	186	13	5	6	25	304
6	7	3	70	123	16	7	18	19	263
6½	4	.....	76	80	4	1	21	8	194
7	1	.....	54	32	2	.....	18	2	109
7½	.....	.....	50	11	2	.....	10	2	75
8	.....	.....	19	3	2	.....	1	2	27
8½	.....	.....	12	2	.....	.....	1	.....	15
9	.....	.....	10	.....	.....	.....	.....	.....	10
10	.....	.....	2	.....	.....	.....	.....	.....	2
Totals	118	120	403	853	77	65	81	87	1,804
Average weights	4.2	3.7	6.4	5.3	5.3	4.6	6.5	5.6	.....
Corrected	4.7	4.2	6.9	5.8	5.8	5.1	7.0	6.1	.....

Table X.—Skeena River Sockeyes, Average Lengths in Inches of Principal Age-groups, 1912 to 1946.

Year.	4_2		5_2		5_3		6_3	
	M.	F.	M.	F.	M.	F.	M.	F.
1912–41	23.7	23.1	25.8	24.9	24.2	23.4	25.8	24.8
1912–41 (conversion)	23.0	22.4	25.1	24.2	23.5	22.7	25.1	24.1
1942	22.6	22.3	25.2	24.3	24.1	23.7	26.3	24.9
1943	21.9	21.9	25.1	23.9	23.3	22.6	25.8	24.7
1944	22.4	21.7	24.8	23.9	22.5	21.7	25.0	23.7
1945	22.6	22.3	24.9	24.1	23.3	22.6	25.0	24.3
1946	22.7	22.0	25.4	24.3	23.9	23.2	25.5	24.4

Table XI.—Skeena River Sockeyes, Average Weights in Pounds of Principal Age-groups, 1914 to 1946.

Year.	4_2		5_2		5_3		6_3	
	M.	F.	M.	F.	M.	F.	M.	F.
1914–41	5.4	5.0	6.8	6.1	5.7	5.1	6.8	6.0
1942	4.9	4.7	6.7	6.0	5.8	5.4	7.2	6.6
1943	4.7	4.6	6.8	5.9	5.5	4.9	7.3	6.1
1944	5.1	4.6	7.0	6.1	5.3	4.6	7.1	5.8
1945	5.2	4.9	6.7	6.1	5.6	5.0	6.7	6.2
1946	4.7	4.2	6.9	5.8	5.8	5.1	7.0	6.1

Table XII.—Skeena River Sockeyes, Percentages of Males and Females, 1915 to 1946.

Year.	4_2		5_2		Per Cent. Total Males.	Per Cent. Total Females.
	M.	F.	M.	F.		
1915–41 (average)	48	52	43	57	46	54
1942	42	58	25	75	33	67
1943	50	50	31	69	43	57
1944	54	46	34	66	43	57
1945	41	59	35	65	38	62
1946	50	50	32	68	38	62

3. THE NASS RIVER SOCKEYE RUN OF 1946.

(1) General Characteristics.

The pack of sockeye salmon from the Nass River was 12,511 cases and somewhat below the anticipated amount. However, the run may have been close to expectancy, as the report from the spawning-grounds stated that the escapement was good, that the fish came in early and were large in size.

The return in 1947 will be derived from the brood-years of 1942 and 1943. In the former year the pack was 21,085 cases and in the latter 13,412 cases, and in both years the escapements were reported as good. While a large return cannot be expected, the size of the pack cannot be predicted in view of the variation in the sizes of the catches over a long period of years.

(2) Age-groups.

The material for 1946 consists of data and scales from 1,376 fish obtained in thirty-four samplings from July 3rd to August 17th, inclusive. The 4_2 age-group is represented by 178 individuals or 13 per cent., the 5_2 by 169 or 12 per cent., the 5_3 by 993 or 72 per cent., and the 6_3 by 36 or 3 per cent. The percentage of 5_3 fish is thus high, being slightly above the thirty-four-year average of 65 per cent. (Table XIII).

(3) Lengths and Weights.

The average lengths of both the males and females of the 4_2 age-group at 23.4 and 22.4 inches are somewhat low, but on the other hand those of the 5_2 age-group at 26.3 and 24.9 inches are high. The average lengths of the 5_3 age-group at 24.9 and 23.9 inches are not unusual. The average length of the males of the 6_3 age-group is exceptionally high at 28.1 inches, but only twenty-seven fish are involved.

Since the data on the Nass River fish were collected at the cannery on the Skeena River, the weights are apparently in error, as in the case of those of the Skeena River fish. A half-pound has been added, therefore, to all the average weights. As a result, the average weights of both the males and the females of the 5_2 age-group are exceptionally high, as well as of the males of the 6_3 age-group. However, the average lengths of these groups is exceptionally high and probably the corrected weights are not seriously astray. On the other hand the original weights are exceptionally low and not in keeping with the average lengths (Tables XIV, XV, XVI, and XVII).

(4) Distribution of the Sexes.

The total number of males in the samplings is 682 and of females 694, percentages of 50 and 50. The males are exceptionally abundant in the 4_2 age-group with a percentage of 62 and in the 5_2 age-group with a percentage of 59 (Table XVIII).

Table XIII.—Nass River Sockeyes, Percentages of Principal Age-groups in Runs of Successive Years and Packs.

Year.	Percentage of Individuals.			
	4_2	5_2	5_3	6_3
1912 (36,037 cases)	8	27	63	2
1913 (23,574 cases)	15	12	71	2
1914 (31,327 cases)	4	41	45	10
1915 (39,349 cases)	19	14	59	8
1916 (31,411 cases)	9	17	66	8
1917 (22,188 cases)	10	15	71	4
1918 (21,816 cases)	30	16	45	9
1919 (28,259 cases)	7	22	65	6
1920 (16,740 cases)	8	14	72	6
1921 (9,364 cases)	10	7	75	8
1922 (31,277 cases)	6	2	91	1
1923 (17,821 cases)	11	6	77	6
1924 (33,590 cases)	4	3	91	2
1925 (18,945 cases)	23	8	67	2
1926 (15,929 cases)	12	12	63	13
1927 (12,026 cases)	8	7	81	4
1928 (5,540 cases)	30	6	61	3
1929 (16,077 cases)	25	9	60	6
1930 (26,405 cases)	28	15	54	3
1931 (16,929 cases)	10	17	67	6
1932 (14,154 cases)	28	4	61	7
1933 (9,757 cases)	35	7	55	3
1934 (36,242 cases)	13	9	74	4
1935 (12,712 cases)	11	10	73	6
1936 (28,562 cases)	16	7	67	10
1937 (17,567 cases)	22	4	68	6
1938 (21,462 cases)	21	4	70	5
1939 (24,357 cases)	14	13	66	7
1940 (13,809 cases)	23	8	59	10
1941 (24,876 cases)	37	7	52	4
1942 (21,085 cases)	22	7	66	5
1943 (13,412 cases)	5	13	67	15
1944 (13,083 cases)	15	15	32	38
1945 (9,899 cases)	46	11	37	6
1946 (12,511 cases)	13	12	72	3

Table XIV.—Nass River Sockeyes, 1946, grouped by Age, Sex, and Length, and by their Early History.

Length in Inches.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
21	.....	3	.....	.....	.....	.....	.....	.....	3
21½	6	12	.....	.....	.....	.....	.....	.....	18
22	5	19	.....	.....	1	14	.....	.....	39
22½	14	13	.....	.....	2	40	.....	.....	69
23	22	9	.....	3	19	85	.....	.....	138
23½	30	8	1	1	35	102	.....	.....	177
24	17	1	3	12	58	143	.....	1	235
24½	8	2	6	18	74	71	.....	.....	179
25	9	.....	8	12	100	61	.....	1	191
25½	.....	.....	12	10	72	22	1	2	119
26	.....	.....	16	8	48	10	1	2	85
26½	.....	.....	20	4	26	1	1	.....	52
27	.....	.....	10	.....	7	.....	1	2	20
27½	.....	.....	13	1	2	.....	4	1	21
28	.....	.....	5	.....	.....	.....	4	.....	9
28½	.....	.....	5	.....	.....	.....	9	.....	14
29	.....	.....	1	.....	.....	.....	4	.....	5
29½	.....	.....	.....	.....	.....	.....	1	.....	1
30½	.....	.....	.....	.....	.....	.....	1	.....	1
Totals	111	67	100	69	444	549	27	9	1,376
Average lengths	23.4	22.4	26.3	24.9	24.9	23.9	28.1	26.0	.....

Table XV.—Nass River Sockeyes, 1946, grouped by Age, Sex, and Weight, and by their Early History.

Weight in Pounds.	Number of Individuals.								Total.
	4_2		5_2		5_3		6_3		
	M.	F.	M.	F.	M.	F.	M.	F.	
3	1	1	.....	.....	1	1	.....	.....	4
3½	3	5	.....	.....	4	21	.....	.....	33
4	12	23	1	.....	10	60	.....	.....	106
4½	19	21	.....	.....	29	138	.....	.....	207
5	25	11	2	7	43	141	.....	.....	229
5½	26	4	3	13	65	120	.....	1	232
6	17	1	5	18	117	52	.....	2	212
6½	5	1	13	14	81	13	1	3	131
7	3	.....	15	9	61	2	4	2	96
7½	.....	.....	14	7	19	1	2	1	44
8	.....	.....	21	1	7	.....	4	.....	33
8½	.....	.....	11	.....	7	.....	4	.....	22
9	.....	.....	10	.....	.....	.....	7	.....	17
9½	.....	.....	4	.....	.....	.....	3	.....	7
10	.....	.....	.....	.....	.....	.....	1	.....	1
10½	.....	.....	.....	.....	.....	.....	1	.....	1
11	.....	.....	1	.....	.....	.....	.....	.....	1
Totals	111	67	100	69	444	549	27	9	1,376
Average weights	5.1	4.4	7.6	6.2	6.0	4.9	8.4	6.5	.....
Corrected	5.6	4.9	8.1	6.7	6.5	5.4	8.9	7.0	.....

Table XVI.—Nass River Sockeyes, Average Lengths in Inches of Principal Age-groups, 1912 to 1946.

Year.	4_2		5_2		5_3		6_3	
	M.	F.	M.	F.	M.	F.	M.	F.
1912–41	24.5	23.7	26.3	25.2	26.1	25.3	27.7	26.4
1912–41 (conversion)	23.8	23.0	25.6	24.5	25.4	24.6	27.0	25.7
1942	23.9	23.2	26.1	24.9	24.9	24.3	26.9	26.0
1943	22.8	22.2	26.1	24.8	24.1	23.5	27.1	25.8
1944	23.5	22.7	25.7	24.6	24.8	23.8	26.8	25.8
1945	23.4	22.8	25.0	24.4	24.7	24.0	25.1	25.5
1946	23.4	22.4	26.3	24.9	24.9	23.9	28.1	26.0

Table XVII.—Nass River Sockeyes, Average Weights in Pounds of Principal Age-groups, 1914 to 1946.

Year.	4_2		5_2		5_3		6_3	
	M.	F.	M.	F.	M.	F.	M.	F.
1914–41	6.0	5.4	7.3	6.4	6.9	6.2	8.0	7.0
1942	5.8	5.1	7.1	6.3	6.2	5.6	7.5	6.7
1943	5.2	4.7	7.6	6.4	5.9	5.3	7.9	6.9
1944	5.7	5.0	7.7	6.5	6.7	5.7	8.2	7.1
1945	5.7	5.3	7.0	6.4	6.5	5.9	7.2	7.1
1946	5.6	4.9	8.1	6.7	6.5	5.4	8.9	7.0

Table XVIII.—Nass River Sockeyes, Percentages of Males and Females, 1915 to 1946.

Year.	4_2		5_2		5_3		6_3		Per Cent. Total Males.	Per Cent. Total Females.
	M.	F.	M.	F.	M.	F.	M.	F.		
1915–41 (average)	49	51	47	53	45	55	63	37	47	53
1942	42	58	48	52	44	56	70	30	45	55
1943	51	49	67	33	47	53	74	26	54	46
1944	53	47	45	55	39	61	60	40	50	50
1945	37	63	37	63	38	62	53	47	38	62
1946	62	38	59	41	45	55	75	25	50	50

RESULTS OF THE WEST COAST OF VANCOUVER ISLAND HERRING INVESTIGATION, 1946–47.

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INTRODUCTION.

A study of the herring (*Clupea pallasii*) and herring-fishery of British Columbia has been under way for several years. A recent survey of the results for the west coast of Vancouver Island (Tester, MS.) has produced no conclusive evidence that this population, actually a series of intergrading units, has suffered a progressive decline in abundance as a result of past fishing effort. Likewise the survey has produced no conclusive evidence that the population has materially benefited by catch restrictions which have been in force under the quota system of regulation (Tester, 1945). Apart from annual fluctuations, the catch has been sustained under a relatively high fishing effort, but not necessarily at or approaching the maximum yield of the population.

In this species, in contrast to the Pacific halibut (Thompson and Bell, 1934), the rate of increase of the fishable population from growth in weight is much less than the rate of decrease from natural mortality; thus maximum sustained yield will be obtained with an intensive fishery, the intensity being as great as is consistent with maintenance of the supply of young. In other words, the goal of maximum sustained catch will be reached when fishing effort is such that the spawning stock is kept at the minimum number necessary to produce an approximately constant supply of new recruits to the fishery. However, at this level of abundance, the catch will undergo more violent fluctuations than at a higher level.

In the west coast of Vancouver Island population there has been no close relationship between the size of the spawning stock and the size of the resultant year-class during the recent years of intensive fishing. Because of large natural variation in survival rate between egg and recruitment stages, big spawning stocks have sometimes

produced small year-classes and small spawning stocks have sometimes produced big year-classes. Determination of the causes of variation in the survival of young is one of the most difficult yet one of the most important problems facing fisheries investigators. If the causes could be determined, it is probable that accurate predictions of abundance could be made.

Aside from natural fluctuations, as fishing effort increases and the spawning stock decreases, eventually there must be a direct relationship between the size of the spawning stock and that of the resultant year class or, in other words, between the number of eggs deposited and the number of recruits to the fishable population. Theoretically there is a point below which population resilience—the ability to produce relatively more recruits from a smaller egg deposition—is exhausted, and below which a further decrease in egg deposition will cause a decrease in recruitment. The level of fishing effort which will allow the spawning stock to approach but not to exceed this critical minimum is the optimum for yielding maximum sustained catch. The determination of this optimum is a second difficult, yet important, problem facing the fishery investigator. Until it is known, there is the possibility on the one hand of wasting thousands of tons of fish and millions of dollars by over-restriction of the fishery and on the other hand of allowing a progressive dwindling of the stock by under-restriction.

It was recommended that an intensive investigation of the west coast of Vancouver Island herring population be undertaken with the primary objects of determining the causes of natural fluctuations in abundance and the average minimum spawning stock necessary to produce maximum sustained catch. As there was no conclusive evidence that the minimum spawning stock had been exceeded, or even approached, by the intensive fishing of recent years, it was recommended that restrictions be relaxed to allow a further increase in fishing effort and that the effect of the decreased spawning on recruitment be carefully studied. It was pointed out that a certain risk of "overfishing" was involved, but that this risk had to be taken if the problems were to be solved within a reasonable period of time. The ultimate object of the investigation was to formulate a management policy for all herring-fisheries of British Columbia which would assure the maximum utilization of the resource without endangering its perpetuity.

The above recommendations were accepted and an intensive study of the west coast of Vancouver Island herring population was started during the 1946–47 fishing season. In this, the first in a series of annual reports, the results of the first year of investigation as at present available are presented and discussed.

STATISTICAL AREAS.

The coast of British Columbia has been divided into districts, sub-districts, and areas (Fig. 1). The latter, numbered from 1 to 27, will, for brevity, be referred to in this and subsequent reports by number. Statistical areas for the west coast of Vancouver Island, frequently called the "West Coast Sub-district" or the "West Coast," are as follows:—

Area 23: Pachena Point to Quisitis Point, including Barkley Sound and contiguous waters.

Area 24: Quisitis Point to Estevan Point, including Clayoquot Sound, Sydney Inlet, Hesquiat Harbour, etc.

Area 25: Estevan Point to Tatchu Point, including Nootka Sound, Tahsis Inlet, Esperanza Inlet, Nuchatlitz Inlet, etc.

Area 26: Tatchu Point to Cape Cook, including Kyuquot Sound, Malksope, Ououkinsh, and Nasparte Inlets, etc.

Area 27: Cape Cook to Cape Scott, including Quatsino Sound, Klaskish and Klaskino Inlets, etc.

The locations of places referred to in the text are shown in Fig. 2.

THE 1946–47 FISHERY.

During the first part of November a few seine-boats scouted west coast of Vancouver Island areas without locating any fish. On November 20th the first catch of the season was made off Refuge Cove, in Area 24, and fishing continued in that area on a small scale until the first part of December.

Toward the end of November herring were located in abundance in the "outer" waters of Area 23—Peacock Channel, Sechart Channel, and Mayne Bay. In fishing these grounds, which are relatively shallow and have a very uneven bottom, the fishermen were greatly aided by the use of echo sounders in both finding the fish and in discovering places where sets could be made without danger of snagging the seines. Following closure of the Lower East Coast Sub-district on December 9th, fishing effort was greatly increased and a fleet of more than forty seine-boats crowded the grounds. The area continued to yield good catches, and by the time of holiday closure, December 19th, the West Coast Sub-district quota of 25,000 tons was largely used up.

During the holiday period negotiations between operators and the Dominion Department of Fisheries resulted in an extension of 15,000 tons to the quota. This enabled fishing to proceed while recommendations of herring investigators regarding the relaxation of catch restrictions were under study by the authorities. On January 9th quota restrictions for the West Coast Sub-district were abolished for the 1946–47 season.

The second part of the season opened on January 5th. Fair catches continued to be made in Area 23, but seiners scouting grounds to the north-westward discovered an exceptionally large body of fish in Esperanza Inlet and adjoining waters of Area 25. Spectacular fishing took place here, with total catches averaging two to three thousand tons per day for a short period. At Espinoza Inlet, on January 8th, a single set by the "Eastisle," skippered by John Bordewick, yielded a record catch of 1,200 tons. After a few days the large body of fish seemed to disappear—it either went into deep water, moved from the area, or was caught off. The seiners scattered to other grounds, including Tahsis Inlet (Area 25), Sydney Inlet (Area 24), and Barkley Sound (Area 23), where fair catches were made, although fishing was sporadic.

On January 25th, after four or five days of very poor fishing, the West Coast Sub-district was closed by the Dominion Department of Fisheries. Thus the season was terminated about ten days earlier than the prescribed closing date of February 5th.

Table I includes data on catch, fishing effort, and availability for each area and for the sub-district as a whole. The catch by area is estimated from various sources, including plant records of landings. The total number of active fishing-days expended by all seiners, a measure of effort, is compiled from daily records of fishing as submitted by seine-boat captains; it has been adjusted to compensate for the fact that the daily records were incomplete, comprising but 65 per cent. of the total catch. The availability or catch per unit effort, which is a measure of the success of fishing, was also compiled from daily catch records.

The total catch of herring, officially given as 58,797 tons, is the largest on record for the West Coast Sub-district and is about 31,000 tons greater than that of the previous year, when fishing was restricted to the 25,000-ton quota (official catch, 27,556 tons). Of the total catch, about 28,000 tons (48 per cent.) were taken from Area 23, about 9,000 tons (15 per cent.) from Area 24, and the remainder, about 22,000 tons (37 per cent.), from Area 25.

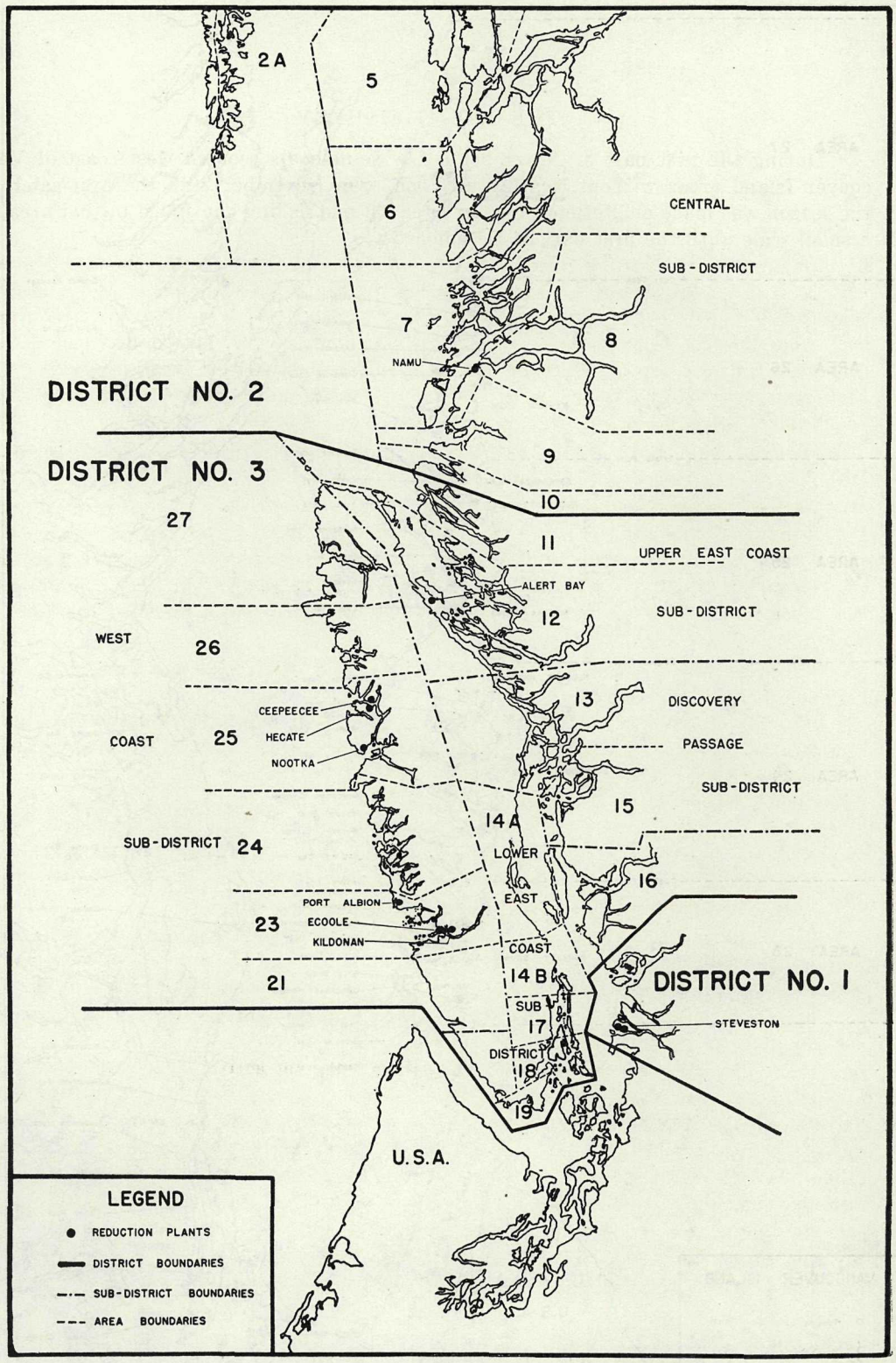

Fig. 1. Map showing districts, sub-districts, and areas.

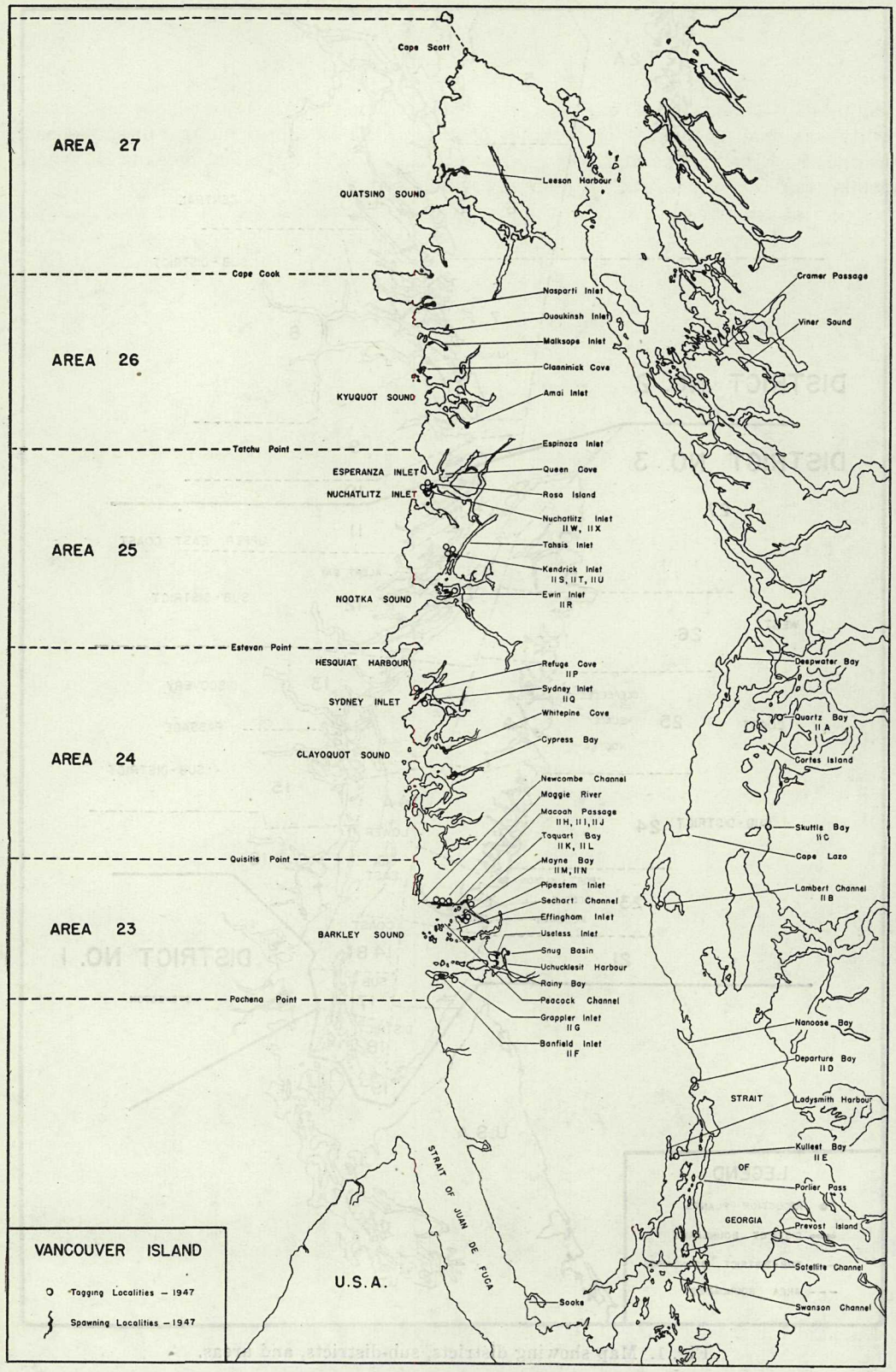

Fig. 2. Map of the West Coast Sub-district showing the location of places mentioned in the text.

The average catch of a seiner for each day of fishing amounted to 76 tons, as compared with 78 tons in 1945–46, showing a similar abundance of herring on the fishing-grounds during the fishing season in the two years. However, the greater catch in 1946–47 was produced by greater effort, the calculated number of active fishing-days being 777 as compared with 353 in 1945–46. During 1946–47 the availability was smallest in Area 23, probably because of the very large number of seine-boats fishing there during the first half of the season, and it was greatest in Area 25, where fishing was very successful for a short period of time.

At the time of closure fear was expressed that practically all of the west coast of Vancouver Island herring population had been caught off, and that spawning would be very poor. This fear was heightened by the experience of one seiner who continued to fish in the sub-district for a limited supply of bait after the date of closure and made only one set in about two weeks of scouting. The results of observations on spawning will be given in a later section of this report.

TAGGING AND TAG-RECOVERY.

Tagging and tag-recovery form one important phase of the west coast of Vancouver Island investigation. It is hoped that it will yield information not only on the extent of mixture of the runs, but also on the rate of exploitation of the population and the abundance of the new recruits entering the fishery.

Methods and previous results have been described in detail in a series of articles which have been published annually since 1936 in the Reports of the British Columbia Provincial Fisheries Department. The methods, in brief, involve the use of internal metal tags (Fig. 3) and the recovery of these by means of electromagnets in the meal lines of reduction plants and tag detectors in the conveyer systems of reduction plants and canneries.

In preparation for the present investigation, intensive tagging along the west coast of Vancouver Island was resumed during the 1946 spawning period after a lapse of several years: 28,148 fish were tagged in the West Coast Sub-district and, in addition, 23,383 fish in other sub-districts (Tester, 1946). These tags, along with those used in previous years, were liable for recovery from West Coast catches during the 1946–47 fishing season.

An attempt was made to increase the efficiency of tag-recovery by installing two tag detectors in plants within the sub-district and by stimulating interest among plant crews in recovering tags from magnets and submitting them, with the required information, to the Pacific Biological Station.

One new-type tag detector (Tester, 1946) was installed at the Kildonan plant of B.C. Packers, Limited, and a second was installed at the Nootka plant of the Canadian Fishing Company, Limited. As has often been the case with new installations, considerable difficulty was experienced in adjusting the intricate apparatus to local conditions. The Kildonan detector recovered tags throughout most of the season, but its efficiency was relatively low. The Nootka detector was not properly adjusted until the close of the season. The old-type tag detector which has been operated at the Imperial Cannery, Steveston, for several years was again in use and recovered tags from catches made in several sub-districts, including the West Coast.

During the season all six west coast reduction plants were visited at least once, and some several times, to inspect magnets, collect tags, and conduct recovery efficiency tests. The tests consisted of inserting about fifty tags in dead herring and distributing these at random in the storage-bins containing fish which were to be processed. Most of these were later recovered by the plant crew from the magnet placed in the meal line for that purpose or were found in conveyers, grinders, or driers. A reward of 25 cents was paid for the recovery of test tags and 50 cents for the recovery of *bona fide* tags.

The tests served a dual purpose: they yielded information on the efficiency of recovery of tags in the plants and on the time-lag involved in their passage through the plants, and they stimulated and maintained interest among the plant crews in searching for tags.

Magnet Efficiency Tests.

The results of so-called magnet efficiency tests are given in Table II. Actually the tests as indicated above give the general efficiency of recovery of tags from reduction plants based on returns from all sources as submitted by plant crews. This involves not only the actual efficiency of the magnet in retaining tags from the flow of meal, but also the diligence of the crew in clearing the magnet of trash metal, in looking for tags among this trash, in searching driers and conveyers during shut-down periods and at the close of the season for tags that have failed to reach the magnet, and in searching the base of the grinders for tags that have passed over the magnets and are frequently battered beyond clear recognition. It also involves the efficiency of plant crews in submitting tags which have been recovered, and the accuracy with which they note and record the date of recovery.

Knowledge of the percentage efficiency of recovery is of importance in calculating the probable total number of tags in the catches. Table II shows that where several tests have been made on one plant the percentage efficiency is fairly uniform between tests. However, there is considerable variation between plants, as is shown by the following summary:—

	Number of Tests.	Average Percentage Recovery.
Area 23.		
Kildonan	3	73.8
Ecoole	3	32.9
Port Albion	3	90.0
Area 25.		
Nootka	1	77.1
Ceepeecee	2	50.5
Hecate	1	56.0
Grand average	----	63.6

Some of the tests were made toward the end of the season. It is possible that additional test tags, held up in plant machinery, will be recovered during the 1947 summer pilchard season or during the 1947–48 winter herring season.

Knowledge of the interval that elapses between the time the tag enters the plant and the time its recovery is recorded is of considerable importance in interpreting the place at which the load of fish containing the tag was caught. This is particularly the case when fish caught in different areas are being processed in close sequence. It will be seen from Table II that in some plants, Port Albion and Hecate for example, the time-lag is small, most of the tags being reported within three days. In other plants it is larger. The large time-lag at the Kildonan plant is due to the low efficiency of the magnets; at least 45 per cent. of the tags were recovered from the base of grinders toward and after the close of the season.

Tag-detector Recoveries.

Recoveries made by the Steveston and Kildonan detectors are listed in Table III according to area of tagging and area of recapture. Recoveries were made from catches taken on the following fishing-grounds: Area 13, Deepwater Bay; Area 14A, off Cape Lazo; Area 14B, Nanoose Bay; Area 17, Porlier Pass; Area 18, Swanson and Satellite Channels; Area 23, Barkley Sound; Area 24, Sydney Inlet; and Area 25, Esperanza Inlet.

The results are summarized in the following table:—

Area of Tagging.	Area of Recapture.				Total.
	23.	24.	25.	Outside.	
23	20	.....	2	1	23
24	33	5	7	2	47
25	4	3	20	1	28
26	4	.....	24	.....	28
Outside	8	1	5	216	230
Totals	69	9	58	220	356
Tonnage examined	5,985	998	2,956	11,597	21,536

A total of 356 tags were recovered, 220 from catches made in outside areas (lower east coast of Vancouver Island and Discovery Passage) and 136 from catches made in west coast of Vancouver Island areas. Of the former, four (1.8 per cent.) were fish which had been originally tagged on the west coast but which had wandered to outside areas as follows:—

To Swanson Channel (Area 18) from Pipestem Inlet (Area 23), 1; from Refuge Cove (Area 24), 1; from Ewin Inlet (Area 25), 1.

To Deepwater Bay (Area 13) from Refuge Cove (Area 24), 1.

Of the latter, fourteen (10.3 per cent.) were fish which had been originally tagged in outside areas but which had wandered to the west coast, as follows:—

To Barkley Sound (Area 23) from Cramer Passage (Area 13), 1; from Qualicum Bay (Area 14A), 1; from Ladysmith Harbour (Area 17), 2; from Prevost Island (Area 18), 3; from Sooke (Area 19), 1.

To Sydney Inlet (Area 24) from Prevost Island (Area 18), 1.

To Esperanza Inlet (Area 25) from Gunboat Passage (Area 7), 1; from Viner Sound (Area 12), 1; from Deepwater Bay (Area 13), 1; from Pender Harbour (Area 16), 1; from Departure Bay (Area 14B), 1.

Thus there was mixing of west coast of Vancouver Island fish with those of other sub-districts. Emigration of west coast fish to outside areas was relatively small and unimportant. Immigration of outside fish to the west coast was larger, the results suggesting that it involved roughly 10 per cent. of the catch (say, 6,000 tons of fish). This is somewhat greater than has been indicated in previous years. It emphasizes the need for continued tagging and recovery in outside areas.

Tags used in and recovered from west coast areas totalled 122. The tendency for tagged fish to return to the area of tagging was relatively weak, about 37 per cent. returning and the remainder, 63 per cent., wandering to other west coast areas.

The large run to Area 23 apparently received substantial additions from fish spawning the previous spring in Area 24 (Whitepine Cove and Refuge Cove) and smaller additions from fish spawning in Areas 25 and 26. However, it should be pointed out that tagging in Area 23 during the 1946 spawning period was not conducted on the main spawning-grounds along the westerly shore, but rather on a catch of fish not yet in spawning condition at Pipestem Inlet and on fish which were spawning on the relatively small spawning-grounds of Banfield Inlet. This may explain why the number of returns of fish tagged in Area 23 is smaller than was expected.

Tags recovered from fish caught in Area 24 were originally used within the area (Whitepine Cove and Refuge Cove) and in Area 25 (Ewin Inlet and Queen Cove).

The large run to Area 25 contained fish which had been tagged the previous spring on near-by spawning-grounds of Queen Cove and Ewin Inlet, both within the area. However, it also contained a large number of tags used in Area 26 (Clanninick Cove) and smaller numbers used in Areas 24 and 23.

The results for 1946–47 thus show a general south-easterly movement of west coast fish, which, as indicated by tagging results, involves on the average about 50 per cent. of the local runs. Some of the fish which spawned in previous years in Areas 26, 25, and particularly 24 moved to Area 23 in 1946–47; some which spawned in Area 25 moved to Area 24; and some which spawned in Area 26 moved to Area 25. In comparison, movement in the opposite direction, north-westerly, appeared to be very small, although there was no opportunity of determining its extent in Areas 26 and 27 as no fish were caught there during the fishing season. This latter fact, together with poor spawning runs to these two areas after the close of the fishing season (as will be shown later), would indicate that the runs were small, thus precluding the possibility of any extensive movement to the north-westward.

In Table IV is included the probable number of west coast tags in the catches, as indicated by tags recovered by detectors and the probable percentage recovery for west coast taggings of 1946 (only). The calculations were made from a consideration of tags recovered, tonnages examined for tags, and catch. The probable percentage recoveries are fairly uniform, ranging from 0.77 to 4.68 and averaging 2.49. The lowest value was obtained with the fish tagged in Pipestem Inlet (Area 23), and may be related to the fact mentioned previously that the fish were not on the spawning-grounds at the time of tagging. The highest value was obtained with fish tagged in the second of two taggings at Clanninick Cove (Area 26) and may be related to the fact that these tagged fish did not disperse to the same extent as those of other taggings—all recoveries came from Esperanza Inlet (Area 25) catches.

Tags recovered by Plant Crews.

Decipherable *bona fide* tags were recovered by plant crews from magnets, grinders, etc., at eleven reduction plants, as follows:—

Port Edward	16
Butedale	26
Alert Bay	36
Imperial	13
Gulf of Georgia	20
Kildonan	28
Ecoole	24
Port Albion	133
Nootka	29
Hecate	12
Ceepeecee	43
Total	380

The most probable locality of recapture of these has not yet been investigated. It involves an unbiased consideration of the reported place and date of recapture, the origin of the fish being processed at and prior to the time of recovery, and the time required for tags to pass from storage-bins to grinders in the various plants. The results will be reported in a later publication.

Tagging during the 1947 Spawning Season.

Three vessels, loaned by fishing companies, were used to facilitate the catching and tagging of herring on or near spawning-grounds in the Discovery Passage, Lower East Coast, and West Coast Sub-districts (Fig. 4). The fish, caught by means of small purse-seines, were handled with utmost care throughout the operation. This usually

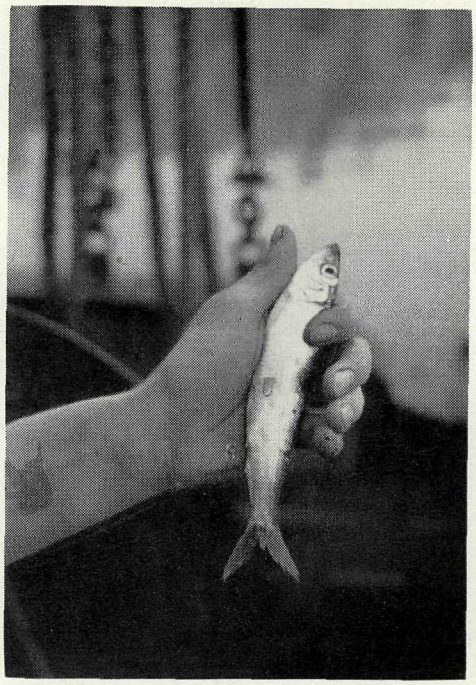

Fig. 3. Internal metal tag being inserted into the body-cavity of a herring through an incision which is made by a tagging-knife.

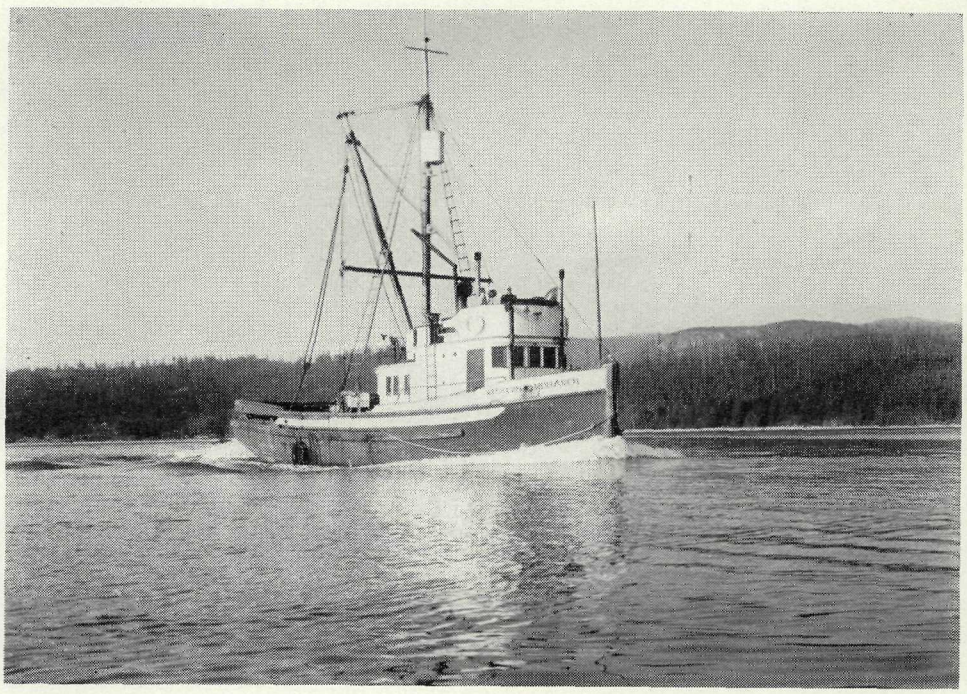

Fig. 4. The " Western Monarch," one of three vessels loaned by fishing companies for tagging and spawning-ground survey work.

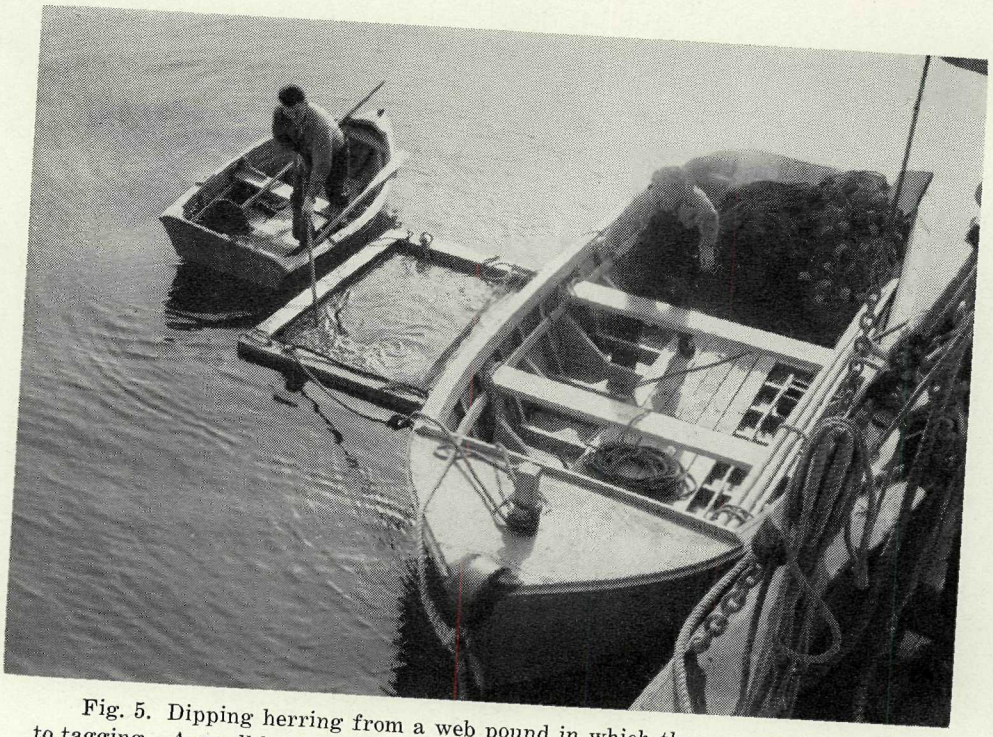

Fig. 5. Dipping herring from a web pound in which they are confined prior to tagging. A small bait purse-seine is piled in the stern of a large flat-bottomed seine skiff. Herring are caught on the spawning-grounds by setting the seine while the skiff is being towed by a small power-boat.

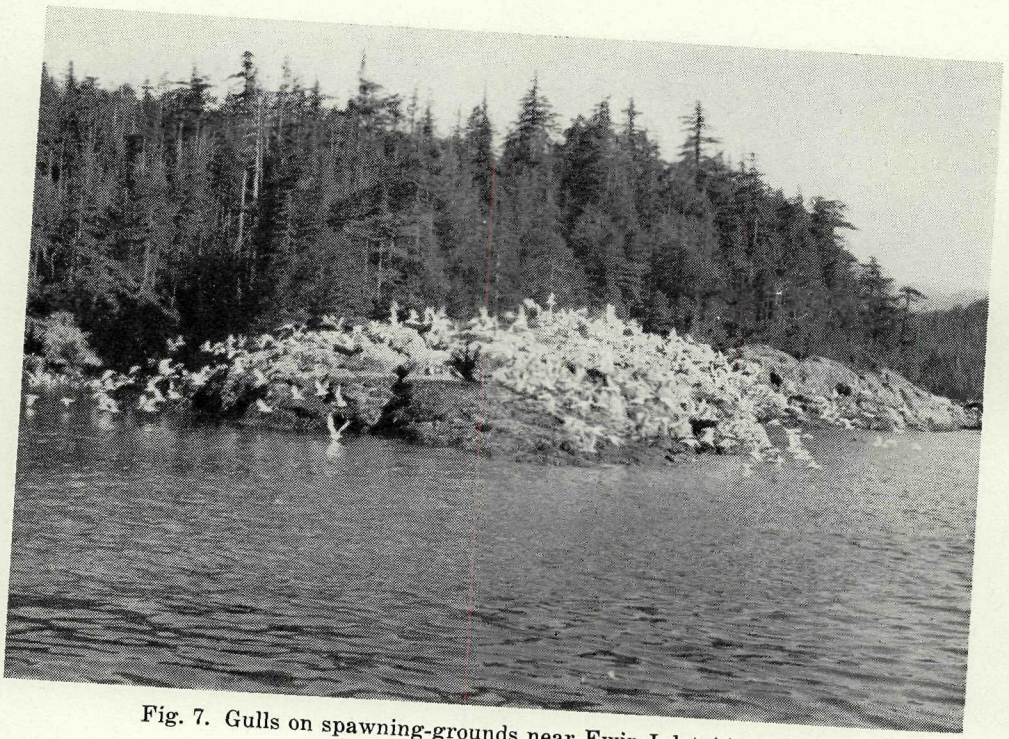

Fig. 7. Gulls on spawning-grounds near Ewin Inlet (Area 25).

consisted of setting and pursing the seine in shallow water on or near the spawning-grounds, "rolling" the fish from the "dried up" seine to a web live pound, towing them slowly in the pound to deeper water where the seine-boat was anchored (Fig. 5), dipping them into a fold of web forming a small shallow pound within the larger one, tagging them one by one from this and releasing them immediately.

Data on the various taggings are given in Table V. The identifying code letters for each lot of tags and the date and place in which each was used is given in Table XIII, which is placed at the end of this report for easy reference.

A total of 41,551 fish were tagged during the spawning season, 11,150 in the Discovery Passage and Lower East Coast Sub-districts, and 30,401 in the West Coast Sub-district. In the latter, 15,180 fish were tagged in nine taggings in Area 23, 6,583 fish in two taggings in Area 24, and 8,638 fish in six taggings in Area 25. The numbers of tags used in these areas were roughly in proportion to the relative magnitudes of the spawning runs. In Areas 26 and 27, where the spawnings were small, scattered, and of short duration, no taggings were made, although the areas were visited several times in search of fish by one of the tagging-vessels.

The tags used during the 1947 spawning season, along with those of previous years, will be recovered during the 1947–48 fishing season.

SAMPLING OF THE CATCHES.

One of the main purposes underlying this phase of the herring investigation is to study fluctuations in the abundance of successive year-classes of fish and their influence on the catch. In keeping with the present intensive investigation of the west coast population, almost twice as many samples were taken from the 1946–47 catch as from that of 1945–46. A total of eighty-three samples (8,192 fish) were obtained from the various areas, as follows: Area 23, fifty; Area 24, eight; and Area 25, twenty-five. In addition, sixteen samples (1,580 fish) were taken from the spawning runs, as compared with nine in the previous year. A complete list of the samples, with pertinent data, is given in Table VI.

The sampling procedure involves taking random samples, each of 100 fish, from the catches. For each fish in a sample, the standard length or distance from the closed lower jaw to the end of the silver area on the caudal peduncle is determined to the nearest millimetre by means of a specially constructed measuring board, the weight is determined to the nearest gram on a spring scales (Chatillon), and the sex and degree of maturity are noted. One scale is selected either from under the left pectoral fin or just posterior to it, and care is taken that its annuli or year marks are as clear as possible for age determination. The scales are mounted on glass slides and are later examined by means of a projection apparatus (Promar) at a magnification of twenty times and the ages are recorded. A fish in its third year of age is recorded as III.

Age Composition.

The following tabulation gives the average percentage age composition of west coast catches for the last three fishing seasons, the age composition for each area being weighted to the catch in that area:—

Year.	In Year of Age.						
	I.	II.	III.	IV.	V.	VI.	VII–X.
1944–45	0.8	27.0	35.3	17.9	8.0	8.1	3.0
1945–46	—	10.8	73.3	10.1	3.2	1.3	1.2
1946–47	+	4.9	52.6	32.3	6.1	2.6	1.5

In all three years, herring of Age III have dominated the catches, but the extent of their dominance has varied greatly. The marked variation in the relative abundance of III's has been due chiefly to the entry into the fishery of the highly successful 1943 year-class, which constituted about one-quarter of the 1944–45 catch as II's, about three-quarters of the 1945–46 catch as III's, and about one-third of the 1946–47 catch as IV's. In comparison, the 1942 year-class was very poor, but the 1944 year-class, which as III's in the past season of large catches overshadowed the dominance of the 1943 year-class (Fig. 6A), promises to be above average. This is also indicated by the fact that the 1944 year-class contributed 284.1 million fish (Table VIII) to the catch at Age III (in 1946–47), as compared with 210.2 million fish contributed by the 1943 year-class at the same age (in 1945–46) and 72.5 million fish contributed by the 1942 year-class also at the same age (in 1944–45), although it must be remembered that fishing effort was greater in 1946–47 than in preceding years.

The average percentage age composition of samples from the catches made in individual areas is included in Table VII and Fig. 6B. It will be noted that fish ranging from Age I to Age X were encountered, but that the majority were of Ages III and IV. Fish of the 1944 year-class (III's) dominated the catches in all areas, although they were relatively more abundant in Areas 24 and 25 than in Area 23. In the latter, fish of the 1943 year-class (IV's) dominated in about one-third of the samples. In the previous year the 1943 year-class exhibited much stronger dominance in both Areas 23 and 24 than in Area 25. The result for the present year may be explained by the movement of fish from Area 25 to 24 and from Area 24 to 23, as shown by tag returns.

It may be noted from Table VII and Fig. 6B that Area 25 samples contained a relatively larger percentage of older fish (Ages VI to X) than those of Areas 23 and 24. The tendency for older fish to appear in relatively greater abundance in areas to the north-westward has also been noted in previous years, but no plausible explanation can be offered at the present time.

The average percentage age composition of samples from the spawning runs is included in Table VII. In Areas 24 and 25 they were similar to those of the commercial catches. In Area 23 the age composition of the first four samples, taken from an early spawning run (February 19th to March 1st) resembled that of the fishery in the area, but the last four samples, taken from a late spawning run (March 15th to 21st) differed greatly in that the 1944 year-class (III's) was strongly dominant. Evidently the second spawning run was comprised mostly of new recruits to the mature population.

Sex Ratio and Stage of Development.

Sex ratios (number of females divided by number of males) and stages of development (immature, mature, and spent) are summarized in Table IX. The average sex ratio of samples from the commercial catches (1.02) showed approximately equal numbers of males and females in all areas. However, the sex ratio varied considerably from sample to sample; for example, in samples from Area 23 the variation was from 0.39 to 2.42. The average sex ratio of samples from the spawning grounds (0.92) showed males to be slightly more numerous than females, with considerable variation from area to area. Differences in sex ratio may often be related to age composition, the proportion of males to females being greater among younger fish. This accounts for the difference between the sex ratios of the early and late spawning runs to Area 23.

In samples from the commercial catch, immature fish averaged 5 per cent., as compared with 0.7 per cent. in samples from the spawning runs. In both series of samples the percentage of immature fish was highest in Area 23.

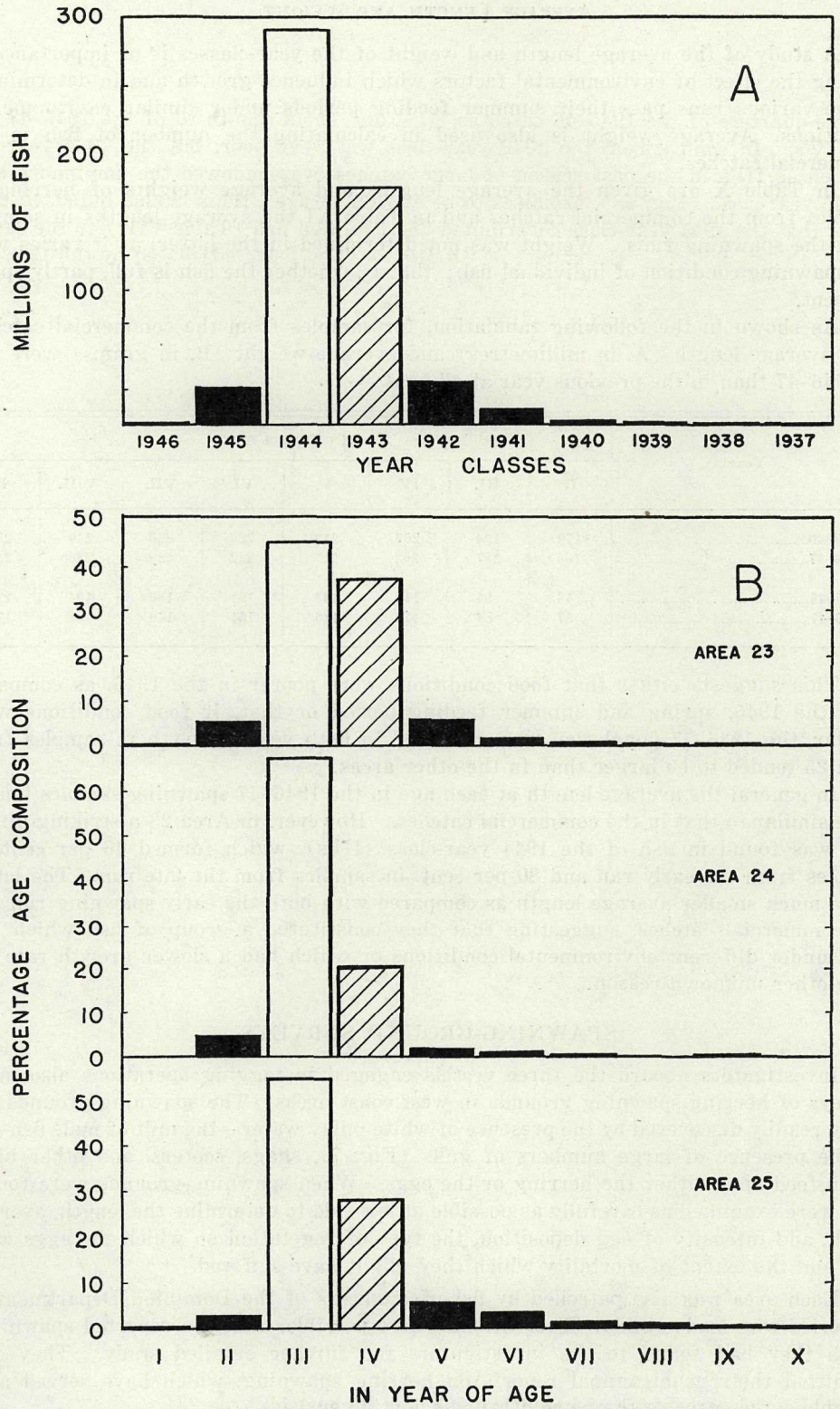

Fig. 6. Diagrams showing the total number of fish in each year-class caught by the commercial fishery in 1946–47 (A), and the average percentage age composition of samples from the commercial catches in Areas 23, 24, and 25 (B).

Average Length and Weight.

A study of the average length and weight of the year-classes is of importance in tracing the effect of environmental factors which influence growth and in determining if the various runs pass their summer feeding periods under similar environmental conditions. Average weight is also used in calculating the number of fish in the commercial catches.

In Table X are given the average lengths and average weights of herring in samples from the commercial catches and in Table XI the average lengths in samples from the spawning runs. Weight was not determined in the latter, as it varies with the spawning condition of individual fish; that is, whether the fish is full, partly spent, or spent.

As shown in the following tabulation, for samples from the commercial catches, both average length (A, in millimetres) and average weight (B, in grams) were less in 1946–47 than in the previous year at all ages:—

Year.		In Year of Age.							
		II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
A	1945–46	170	194	207	219	226	236	240	254
	1946–47	166	187	203	213	222	228	233	235
B	1945–46	58	95	119	143	161	180	194	221
	1946–47	57	86	113	133	151	170	183	177

This suggests either that food conditions were poorer in the 1946, as compared with the 1945, spring and summer feeding period or that, if food conditions were similar, the 1946–47 population was greater. In both years, growth in samples from Area 25 tended to be larger than in the other areas.

In general the average length at each age in the 1946–47 spawning samples tended to be similar to that in the commercial catches. However, in Area 23 a striking difference was found in fish of the 1944 year-class (III's), which formed 46 per cent. in samples from the early run and 80 per cent. in samples from the late run. The latter had a much smaller average length as compared with both the early spawning run and the commercial catches, suggesting that they constituted a group of fish which had lived under different environmental conditions or which had a slower growth rate for some other unknown reason.

SPAWNING-GROUND SURVEYS.

Investigators aboard the three vessels engaged in tagging operations also made surveys of herring-spawning grounds in west coast areas. The spawning-grounds are fairly readily discovered by the presence of white milky water—the milt of male fish—or by the presence of large numbers of gulls (Fig. 7), shags, scoters, and other birds which feed upon either the herring or the eggs. When spawning-grounds were found, they were examined as carefully as possible at low tide to determine the length, average width, and intensity of egg deposition, the type of vegetation on which the eggs were laid, and the extent of mortality which they might have suffered.

Each area was also patrolled by fisheries officers of the Dominion Department of Fisheries who made similar observations where possible, and who reported spawnings which they had found to the investigators for further detailed study. They also submitted their usual annual reports on herring spawning, which have served as a valuable supplement to the more detailed scientific surveys.

A list of the spawnings according to area, date, place, intensity, and extent of the grounds is given in Table XII. The average intensity of egg deposition is estimated in five categories, as follows: VL—very light; L—light; M—medium; H—heavy; and VH—very heavy. For present quantitative calculations, use is made only of the length of shore-line occupied by the spawning-grounds. This is estimated from a chart, and, of all the observations, it is least subject to personal bias. In a few cases, where the spawning has covered an area of considerable width (such as the head of an inlet), the area estimate has been converted to distance on the basis of the average width of the spawning-grounds within the (statistical) area.

Particularly extensive spawnings took place in Areas 23 and 25, the two main contributors to the exceptionally large 1946–47 catch, thus relieving fears that almost the entire runs had been taken by the fishery. Apparently additional schools entered inshore waters to spawn after the close of the fishing season.

In Area 23, important spawning-grounds along the western shore, extending from Macoah Passage both east and west of Maggie River to Toquart and Mayne Bays, were very well seeded during two pulses of spawning, one taking place from about February 19th to March 1st and the other from about March 15th to 21st. Large eel-grass beds in this area were heavily coated with eggs (Fig. 8), and although some were detached and washed ashore, in general they were not disturbed by pounding surf, which in some years can cause a heavy loss in exposed localities such as these. Heavy spawnings at Useless Inlet and Mud Bay took place earlier in the season, February 4th to 8th and February 10th to 13th. Lighter depositions occurred in February and early March on other grounds scattered throughout Barkley Sound.

In Area 25, spawnings at Esperanza Inlet and Nootka Sound took place at intervals from February 21st to March 29th. Particularly heavy depositions were noted on the extensive tide-flats off Nuchatlitz Village and on the shores of adjacent islands. The mileage estimate for this vicinity is approximate and probably low: it is a most difficult problem to thoroughly cover a broken, irregular shore-line such as this in the limited time which is available. Other important spawnings took place in March at Kendrick and Ewin Inlets, in Nootka Sound.

In other west coast areas the spawnings were less extensive. In Area 24, fair-sized spawnings took place at Cypress Bay and Whitepine Cove, but there was only a relatively small spawning at Refuge Cove, which is usually an important spawning-ground. In Area 26 there were the usual number of spawnings, but most of them were small and of short duration. In Area 27, apart from a fair spawning at Leeson Harbour on March 27th, the spawnings were all early and relatively small.

It may be noted that the amount of spawning was roughly proportional to the catches in the various areas. Of the three areas fished, catch and spawning were both largest in Area 23, intermediate in Area 25, and smallest in Area 24. No catches were made and spawning was very slight in Areas 26 and 27.

Most of the spawning took place on eel-grass or rock-weed beds which occur within or just below the intertidal zone. In a few cases, however, for example at Whitepine Cove and Ewin Inlet, spawning also took place on the large, broad-leaved brown kelp which may be rooted at a considerable depth. Kelp leaves, thickly coated with eggs, were brought up from a depth of 6 fathoms below the zero tide-level by a special drag-rake which was used.

As this is the first year in which detailed studies of the spawning-grounds have been made, there is no accurate basis of comparison of the 1947 spawnings with those

of previous years. However, the reports of fisheries officers may be used as a rough indication of conditions in 1947 as compared with 1946:—

Area.	Miles of Spawn.		
	Probable Total, 1947.	Recorded by Officers.	
		1947.	1946.
23	13.15	7.2	4.4
24	6.05	6.3	13.0
25	9.32	1.7	3.1
26	2.50	1.5	0.4
27	1.45	1.5	3.7
Totals	32.47	18.2	24.6

The total 1947 mileage reported by the officers is less than the probable total as compiled by the investigators. In comparing the officers' mileages for 1947 and 1946, it must be assumed that the tendency to underestimate has remained constant.

Their figures indicate that in Areas 23 and 26 spawning was more extensive, but in Areas 24, 25, and 27 it was less extensive in the present as compared with the previous year. Their totals indicate that, on the whole, spawning was less in 1947 than in 1946. However, their 1947 total (18.2) was not much less than the average over an eleven-year period (1937 to 1947), which amounts to 21.0.

It will be realized that spawning surveys will form a very important phase of the herring investigation in that they provide a relative measure of the quantity of fish left to propagate the species after the fishery has taken its toll. Plans are being made to improve the accuracy, uniformity, and coverage of the surveys in future years. Accurate large-scale charts of the areas are being prepared, and copies of these will be used by both investigators and fisheries officers for recording and estimating the extent of the grounds. The officers will also be supplied with special drag-rakes of the type designed and used in 1947 (Fig. 9) for locating egg depositions in water too deep for visual observation.

YOUNG-HERRING INVESTIGATION.

As pointed out in the introduction to this report, determination of the causes of natural variation in the mortality rate of larval and young herring would be of great value in predicting the abundance of year-classes in the fishable population. If a year-class could be followed closely from the time it was deposited as eggs on the spawning-grounds until the time it entered the fishery as maturing fish, it seems probable that the reasons behind its success or failure could be adduced. Certain stages in the early-life history might be found to be especially vulnerable, explaining why large spawning stocks have sometimes produced small year-classes and vice versa.

To initiate this study, a survey of larval herring was conducted from April 18th to May 22nd, 1947. It was essentially of a preliminary nature, as time was not sufficient to obtain much of the desired equipment. Nevertheless, most of the immediate objects were realized, thus enabling plans to be made for a more intensive survey next spring. Stress was placed on the normal cycle of events in the early-life history, such as distribution and growth, and the factors affecting them. In the relatively short period of the survey it was not possible to devote much time to studying sources of mortality, but some were noted, which will form a basis for future work.

A total of 267 hauls, mostly of ten-minutes' duration, was taken, using a conical cotton net 6 feet long and 30 inches in diameter at the mouth (Fig. 10). The hauls were taken either from a seine-boat loaned for the purpose (the "Dominion No. 1")

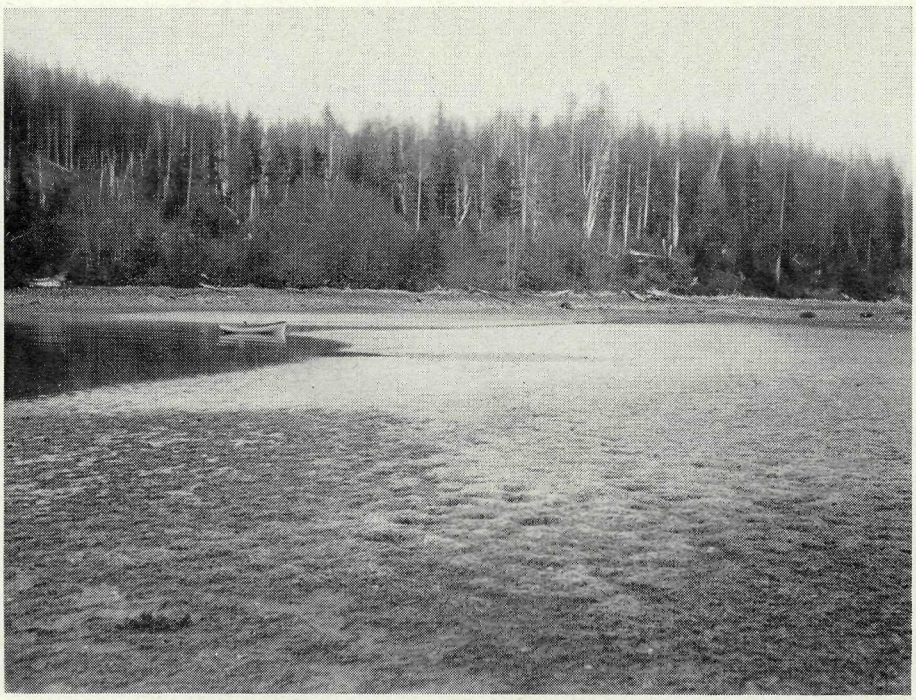

Fig. 8. Herring-spawn on eel-grass beds at Mayne Bay (Area 23). In the picture the spawn is whitish in colour, but in nature it is golden-yellow and can be spotted from a considerable distance at low tide.

Fig. 9. Herring-eggs on eel-grass collected by means of a special drag-rake when the spawning-grounds are submerged.

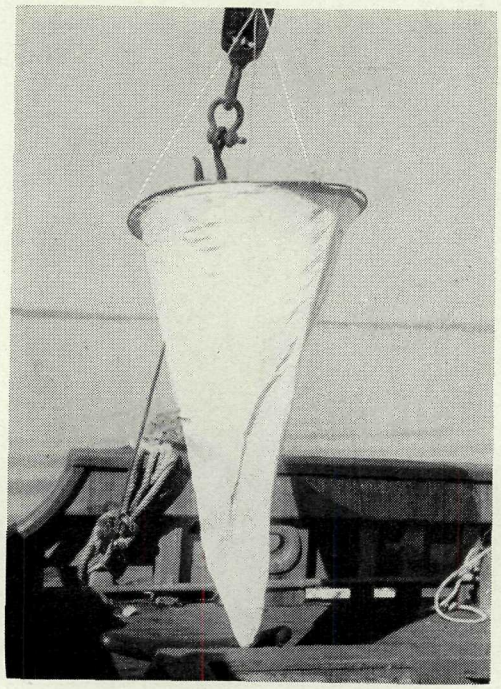

Fig. 10. Large plankton net used to collect larval herring. In practice, a small glass jar is attached to the narrow end to prevent the larvæ from being crushed by the pressure of the water while the net is being towed.

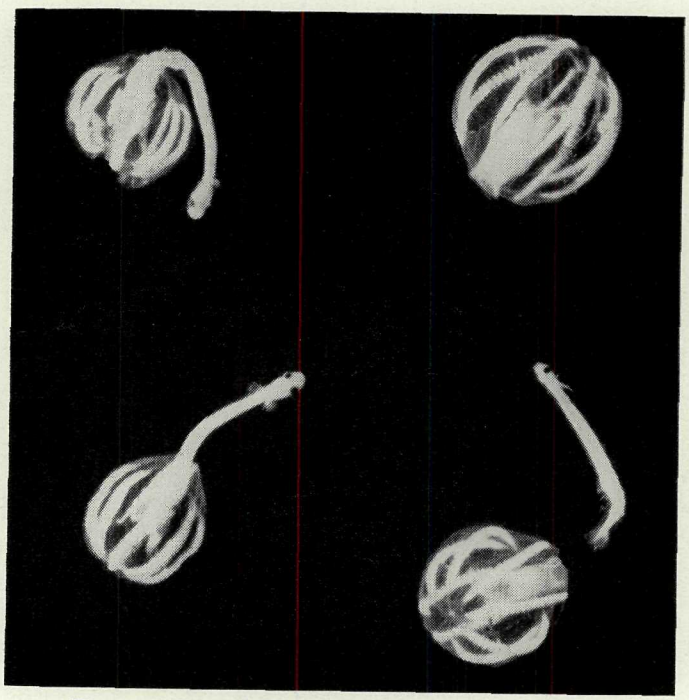

Fig. 11. Comb jellies (ctenophores) which have been feeding on larval herring. A larva has been engulfed in the digestive tract of the one in the upper right-hand corner; a larva in the process of being eaten was disgorged when the one in the lower right-hand corner was placed in preservative.

or from its tender, an 18-foot scout-boat. About three-quarters of the hauls were made in inshore localities immediately in the vicinity of herring-spawning grounds; the remainder were from (1) inshore localities where no spawnings had been reported and from which no larvæ were obtained, (2) intermediate localities within the sounds and inlets but away from the spawning-grounds, and (3) offshore localities out to 3 or 4 miles from the coast-line.

About 4,500 herring larvæ were taken in the course of the survey, of which about 95 per cent. came from hauls in four inshore localities which contained major spawnings—namely, Macoah Passage in Area 23, Whitepine Cove in Area 24, Refuge Cove in Area 24, and the Nuchatlitz Village to Rosa Island region of Area 25. This indicates that up until the end of the survey, at which time the larvæ were beginning to metamorphose (assume adult characteristics) and to school, there was a relatively small amount of dispersal from the spawning-grounds. An example of limited dispersal is contained in the data from Whitepine Cove, May 18th to 20th, where the average night haul contained 121.6 larvæ, whereas at the mouth of the cove it contained only 2.5 larvæ and 4 miles off the mouth it contained only 0.5 larvæ. In the Macoah Passage area the dispersal was relatively greater, probably due to the open nature of the shoreline. In this connection it might also be noted that the average length of larval herring taken in inshore localities of Area 23 was smaller than that from intermediate or offshore localities. This would be expected, since the larvæ which drifted from the spawning areas would tend to be older and therefore larger. On the other hand, in Areas 24 and 25, the average length in inshore localities was greater than that in intermediate or offshore localities, suggesting that the less open nature of these spawning-grounds resulted in less dispersal.

On the average, hauls taken during the night yielded about fifty times more young than those taken in the daytime. No herring were taken in daytime hauls after April 27th, and none taken in daytime hauls were greater than 15 millimetres in standard length. This suggests that after the larvæ attain this size they either develop a marked negative reaction to light or are able in some way to escape the net, or both.

The larvæ taken in both inshore and offshore hauls were generally most numerous in the 1¼–4-fathom depth zone. However, in the intermediate localities they were found to be most numerous in the 0–1¼-fathom zone. In the inshore areas the larvæ in the 1¼–4-fathom zone were of greater average length than those in the zones above and below. In intermediate and offshore areas this tendency was not found.

The night hauls taken between 12 p.m. and 1 a.m. in Whitepine Cove (May 18th to 20th) contained fewer larval herring than those taken between 10 p.m. and 12 p.m. or those taken between 1 a.m. and 2 a.m. Thus the larvæ were relatively more abundant after dusk and before dawn. It is interesting to note that fishermen frequently choose dusk and dawn as the best time to catch the adult herring. It was also found that the average length of successive samples of larval fish decreased as the night progressed.

A study of growth in length indicated that larval herring from late spawnings grew much faster than those from early spawnings. In Area 23, larvæ from late spawnings in Toquart Bay, Mayne Bay, and Macoah Passage attained the same average length in twenty-five days after hatching as those from early spawnings in Rainy Bay and Macoah Passage in forty days. There exists the possibility that some or most of the larvæ from the early Macoah Passage spawnings had metamorphosed, schooled, and thus escaped the net when sampling was carried out. However, if this were so, an unnoticed late spawning in Rainy Bay would have to be assumed. On the average, the young were 5 millimetres in length on hatching, and they began to metamorphose at 26 millimetres.

In several localities, notably Macoah Passage, Newcombe Channel, Mayne Bay, and Sechart Channel, young herring were found being eaten by jellyfish-like animals

called ctenophores (Fig. 11). In the last-named area two hauls showed that one ctenophore out of fifty was consuming either one or two larval herring. Considering the tremendous numbers of these animals at times and the fact that larval herring probably must pass through a dense mass of them in their upward movement at dusk and their downward movement at dawn, the ctenophores could be an important factor in reducing the number of larvæ. Large numbers of fish were seen in certain areas, presumably feeding on the larvæ, but no detailed data were obtained.

At the time of tagging operations during the spawning period, sixty-three samples of spawn were examined for dead eggs. In one sample from Refuge Cove (taken 6 to 10 feet above zero tide-level) 66 per cent. of the eggs had died, but this was the greatest mortality found. On the average the mortality was about 3 per cent. This is apart from loss of eggs caused by the feeding of gulls, scoters, etc.

An ultimate objective of this study is to estimate the actual abundance of larval and young herring derived from the spawnings of each year. This year's preliminary survey, which was carried out over a relatively short period of time and was handicapped by lack of equipment, was not expected to provide data which would allow an accurate estimate of abundance to be made, but it has brought to light the many difficulties which beset this object. An estimate of abundance was obtained from the data, but it is believed to be much too low. Factors which contributed to this underestimation and which show the complicated nature of the problem are briefly mentioned:—

(1) It was possible to sample larval herring only from about two-thirds of the spawnings in the West Coast Sub-district.

(2) Only larval herring were sampled, since during the early phases of metamorphosis the young were found capable of escaping the net. This suggests the possibility that the young from many early spawnings had metamorphosed prior to sampling, in which case larvæ from about half or less than half of the total spawnings were sampled.

(3) The larvæ were of slightly different age in each locality, and thus the abundance, as indicated by sampling, would not necessarily be comparable between localities.

(4) No feasible method of accurately checking the efficiency of the net was found. It was realized that much overflow took place and that slowing the speed of tow reduced this, but in hauling at reduced speeds it was observed that the motility of the more advanced larvæ was sufficient for many to escape the net. As a rough estimate it is believed that the net was about 50 per cent. efficient, or less.

(5) No hauls were taken beyond 4 miles offshore. Granted that the number of larvæ per haul would be extremely small beyond this area, the actual number in such a large body of water might be considerable. Likewise, although extremely few young were taken below 6 fathoms within the major areas, the number of young actually present might be great because of the large volume of water involved.

SUMMARY.

This is the first in a series of annual reports giving the results of an intensive investigation of the west coast of Vancouver Island herring population. The primary objects of the investigation are to determine the causes of natural fluctuations in abundance and to ascertain the average minimum spawning population necessary to produce maximum sustained yield. The ultimate object is to formulate a management policy for all herring-fisheries of British Columbia which will assure maximum utilization of the stock.

A record herring-catch of almost 59,000 tons was made in the 1946–47 season. Good catches in Area 23 (Barkley Sound) in late November and in December were followed by excellent fishing in Area 25 (Esperanza Inlet) in early January. Quota restrictions were removed on January 9th, but the sub-district was closed on January 25th after several days of poor fishing. Almost one-half of the catch was taken from Area 23, over one-third from Area 25, and the remainder from Area 24.

The availability (average catch per seine per day's active fishing) in 1946–47 was about the same as in 1945–46, showing a similar abundance of herring on the fishing-grounds during the fishing season. It was greatest in Area 25, where heavy fishing took place over a relatively short period of time.

After a lapse of several years, tagging was resumed on the West Coast in 1946 (28,148 fish tagged) and in 1947 (30,401 fish tagged), and it was continued to a lesser extent than previously in other sub-districts. Tags from the 1946 and previous taggings were recovered by tag detectors at Steveston and Kildonan and by magnets in various reduction plants.

Tag-detector returns showed that immigration of fish from other sub-districts to the West Coast was greater than emigration of West Coast fish to other sub-districts Returns from outside areas comprised about 10 per cent. of the tags recovered from West Coast catches. This is a somewhat higher percentage than has been found in previous years.

For the West Coast Sub-district the tendency for fish to return to the area of tagging was relatively weak, about 37 per cent. returning and 63 per cent. wandering to other west coast areas. A marked tendency for fish to wander to areas to the south-eastward, rather than to the north-westward, was noted.

Tests were carried out on all six West Coast reduction plants to determine the efficiency of recovery of tags from magnets, plant machinery, etc., and the time-lag involved in the passage of tags through the plants. The efficiency varied greatly between plants, ranging from 33 to 90 per cent. In some plants the time-lag was generally small (a few days), whereas in others it was apt to be great (several weeks).

An analysis of 380 decipherable tags recovered from six West Coast reduction plants and from five plants located elsewhere has not yet been completed.

The percentage age composition of eighty-three samples of herring taken from the 1946–47 West Coast fishery shows that the rich 1943 year-class, which comprised about three-quarters of the 1945–46 catch (as III's), constituted just under one-third of the 1946–47 catch (as IV's). The 1944 year-class, which dominated the 1946–47 catch (as III's), is apparently also above average abundance. Certain apparent irregularities in the "follow through" of age composition from 1945–46 to 1946–47 in individual areas are readily understandable when it is realized, as shown by tagging, that there was a partial shift of the runs in a south-easterly direction on their return to inshore waters in 1946–47.

In general the fish caught in 1946–47 were both smaller and lighter for a given age than those caught in the previous year, suggesting that either food conditions during the spring and summer of 1946 were poorer than in 1945 or that the population was larger and competition for food was keener.

Both the age composition and growth of most of the samples of fish taken on the spawning-grounds during the late winter and spring of 1947 were similar to those taken during the winter fishing season in the various areas. However, those from the second of two main spawning runs to Area 23 differed from the samples of the winter fishery in including a relatively large number of comparatively slow-growing fish of the 1944 year-class.

In view of the heavy catch in the winter of 1946–47, particular attention was given to spawning conditions during the subsequent February and March spawning season.

Detailed surveys revealed 32 miles of spawn, with particularly extensive depositions in Areas 23 and 25, the two areas which had yielded the largest catches. This indicates that additional schools of fish entered inshore waters to spawn after the close of the fishing season. A comparison with the results of rough surveys of previous years indicates that spawning in 1947 was less than in 1946, but not much less than the average over an eleven-year period. Weather conditions during the 1947 spawning period were ideal for maximum survival of eggs.

A five-week survey of larval herring in April and May, 1947, resulted in the collection of about 4,500 herring larvæ in 267 ten-minute hauls with a large plankton net. Up to the beginning of metamorphosis, when the larval fish assumed adult characteristics, there was only a limited dispersal from the spawning-grounds; very few larvæ were taken in offshore localities. Hauls taken during the night were much more productive than those taken during the daytime, and after the young reached 15 millimetres in length, they could only be taken in night hauls. More were taken in the 1¼–4-fathom zone than in the zones above or below. Larval herring from the late spawnings tended to grow more quickly than those from the early spawnings.

Jellyfish-like animals (ctenophores) were found to eat larval herring. It is believed that mortality from this source in some places might be great.

The preliminary investigation of the early-life history of the herring has resulted in an appreciation of the difficulties involved in this type of study, which aims at estimating the abundance of larval and young herring, at determining the sources of mortality, and eventually at predicting the abundance of new year-classes entering the fishery.

ACKNOWLEDGMENTS.

The herring investigation has been greatly assisted during the course of the year by the co-operation of herring fishermen, fishing companies, and government departments.

Most of the herring fishermen have voluntarily submitted daily records of their catches in the Pilot-house Record Books, with which they have been supplied. We are grateful to those who have helped in this way, and we hope that all seine-boat skippers will submit this information in the future, thus contributing to a better understanding of the changes which take place in the availability of herring.

All fishing companies have been co-operative in submitting records of herring landed at their plants. Reduction-plant crews have also assisted by searching for tags and returning them with the requested information. British Columbia Packers, Limited, and the Canadian Fishing Company, Limited, have both allowed certain changes to be made in the unloading systems of their plants to facilitate the installation of tag detectors, and also have given every possible assistance in the operation of these throughout the season. British Columbia Packers, Limited, loaned the "W. No. 10" for general scientific work from November to the end of January, the "W. No. 10" and the "Dominion No. 1" for tagging and spawning-ground surveys from the middle of February to the end of March, and the "Dominion No. 1" for larval herring studies during April and May. The "Western Monarch" was loaned by Nelson Brothers Fisheries, Limited, for tagging and spawning-ground surveys during March. To the companies and many individuals who have rendered us assistance in these and in other ways, we express our sincere thanks. Without their help it would have been impossible to carry out many of the phases of investigation.

The Dominion Department of Fisheries has co-operated in the collection of catch statistics and has kept us posted on the course of the fishery during the fishing season and on spawnings which have been discovered by their officers during the spawning season. The spawning-ground observations which have been made by fisheries officers have been of great assistance in assessing the extent of spawn deposition.

The following field technicians in permanent or temporary employ of the Fisheries Research Board of Canada have assisted in the investigation: Messrs. A. G. Paul, R. S. Isaacson, R. Wilson, G. A. L. Thompson, D. A. Shinnan, and G. H. Griffin. Age determinations for the 1946–47 samples were made by Mr. J. H. Glover, Junior Biologist.

The investigation has been jointly financed by the British Columbia Provincial Fisheries Department and the Fisheries Research Board of Canada. To Mr. G. J. Alexander, Deputy Minister of Fisheries, and Dr. R. E. Foerster, Director of the Pacific Biological Station, we are greatly indebted for general supervision, advice, and assistance.

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Table I.—Catch (Tons), Fishing Effort (Total Number of Active Fishing-days expended by all Seine-boats), and Availability (Average Catch per Seine per Day's Active Fishing) for West Coast Sub-district Areas during 1946–47 Fishing Season.

Area.	Estimated Catch.	Fishing Effort.	Availability.
23	28,000	485	57.7
24	9,000	118	76.1
25	22,000	170	129.5
26	.....	4	.....
27	.....	.....	.....
Totals	59,000	777	75.9

Table II.—Test Tags recovered by Plant Crews from Magnets, etc., during 1946–47 Fishing Season.

Plant.	Date of Test.	Number used.	Number recovered.									Total.	Percentage recovered.
			Days of Plant Operation after Test.										
			1.	2.	3.	4.	5.	6–10.	11–20.	21–30.	?		
Ceepeecee	Jan. 14	49	4	.....	.....	.....	14	8	.....	.....	.....	26	53.0
	Jan. 20	50	9	6	9	.....	.....	.....	.....	.....	.....	24	48.0
Ecoole	Dec. 6	49	.....	.....	1	.....	.....	5	5	4	.....	15	30.6
	Dec. 17	48	.....	1	.....	.....	.....	12	5	.....	.....	18	37.5
	Jan. 8	46	.....	.....	4	5	.....	2	3	.....	.....	14	30.4
Hecate	Jan. 16	50	26	1	1	.....	.....	.....	.....	.....	.....	28	56.0
Kildonan	Dec. 8	49	2	3	.....	2	7	2	17	.....	.....	33	67.3
	Dec. 16	50	8	3	.....	3	.....	2	17	3	.....	36	72.0
	Dec. 17	50	7	.....	2	.....	.....	8	16	2	.....	35	70.0
	?	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	6	.....
Nootka	Dec. 10	48	7	6	.....	.....	.....	24	.....	.....	.....	37	77.1
Port Albion	Dec. 6	50	18	.....	.....	2	1	14	3	.....	.....	38	76.0
	Dec. 17	49	23	24	2	.....	.....	.....	.....	.....	.....	49	100.0
	Jan. 8	49	33	8	3	.....	.....	2	.....	.....	.....	46	93.9
Totals	.....	637	137	52	22	12	22	79	66	9	6	405	63.6

Table III.—Tags recovered by Tag Detectors during 1946–47 Fishing Season.

Area.	Code.	Place and Time of Tagging.	Area of Recapture.								Total.
			13.	14A.	14B.	17.	18.	23.	24.	25.	
7	8M	Gunboat Passage; March, 1944	.....	.....	.....	.....	.....	.....	.....	1	1
9	9K	Takush Harbour; March, 1945	1	.....	.....	.....	.....	.....	.....	.....	1
12	7N	Chatham Channel; April, 1943	1	.....	.....	.....	.....	.....	.....	.....	1
	8J	Retreat Passage; March, 1944	1	.....	.....	.....	.....	.....	.....	.....	1
	9G	Viner Sound; March, 1945	1	1	.....	.....	.....	.....	.....	1	3
	9J	Cramer Passage; March, 1945	1	.....	.....	.....	.....	1	.....	.....	2
13	8I	Deepwater Bay; March, 1944	3	.....	1	.....	.....	.....	.....	.....	4
	9F	Deepwater Bay; April, 1945	3	.....	.....	.....	2	.....	.....	1	6
	10S	Cahnish Bay; April, 1946	3	.....	.....	.....	.....	.....	.....	.....	3
14A	10D	Qualicum Bay; March, 1946	1	.....	.....	.....	10	1	.....	.....	12
	10E	Baynes Sound; March, 1946	4	7	.....	.....	13	.....	.....	.....	24
15	7D	Skuttle Bay; March, 1943	2	.....	.....	.....	.....	.....	.....	.....	2
	8D	Skuttle Bay; March, 1944	7	.....	1	.....	1	.....	.....	.....	9
	9E	Skuttle Bay; March, 1945	3	1	1	.....	.....	.....	.....	.....	5
	10G	Skuttle Bay; March, 1946	13	1	.....	.....	.....	.....	.....	.....	14
16	10F	Pender Harbour; March, 1946	6	23	6	1	3	.....	.....	1	40
14B	8E	Horswell Point; March, 1944	.....	.....	.....	.....	1	.....	.....	.....	1
	9C	Departure Bay; March, 1945	.....	.....	.....	.....	17	.....	.....	1	18
	10C	Departure Bay; March, 1946	.....	.....	.....	.....	13	.....	.....	.....	13
17	8G	Kuper Island; March, 1944	.....	.....	.....	.....	1	.....	.....	.....	1
	10B	Ladysmith Harbour; March, 1946	.....	.....	.....	.....	48	2	.....	.....	50
18	9D	Prevost Island; March, 1945	.....	.....	.....	.....	7	2	1	.....	10
	10A	Prevost Island; February, 1946	.....	.....	.....	.....	5	1	.....	.....	6
19	9A	Sooke; October, 1944	.....	.....	.....	.....	2	1	.....	.....	3
23	10I	Pipestem Inlet; February, 1946	.....	.....	.....	.....	1	4	.....	1	6
	10J	Banfield Inlet; February, 1946	.....	.....	.....	.....	.....	16	.....	1	17
24	5Y	Refuge Cove; March, 1941	.....	.....	.....	.....	.....	.....	.....	1	1
	8N	Matilda Inlet; March, 1944	.....	.....	.....	.....	.....	6	.....	4	10
	10K	Whitepine Cove; March, 1946	.....	.....	.....	.....	.....	13	1	.....	14
	10L	Refuge Cove; March, 1946	1	.....	.....	.....	1	6	3	2	13
	10M	Refuge Cove; March, 1946	.....	.....	.....	.....	.....	8	1	.....	9
25	10N	Ewin Inlet; March, 1946	.....	.....	.....	.....	1	2	2	4	9
	10P	Queen Cove; March, 1946	.....	.....	.....	.....	.....	2	1	16	19
26	10Q	Clanninick Cove; March, 1946	.....	.....	.....	.....	.....	4	.....	8	12
	10R	Clanninick Cove; March, 1946	.....	.....	.....	.....	.....	.....	.....	16	16
		Totals	51	33	9	1	126	69	9	58	356
		Tonnages examined	1,480	768	468	28	8,853	5,985	998	2,956	21,536
		Estimated catch	5,000	3,000	3,000	1,500	32,000	28,000	9,000	22,000	103,500

Table IV.—Number of Tags used, Probable Number in Catches, and Probable Percentage of Recovery for West Coast of Vancouver Island Taggings of 1946, based on Tag-detector Recoveries during 1946–47 Fishing Season.

Area.	Code.	Place and Time of Tagging.	Number used.	Probable Number in Catches from Areas.					Probable Percentage Recovery.
				23.	24.	25.	Outside.	Total.	
23	10I	Pipestem Inlet; February, 1946	3,914	19	.....	7	4	30	0.77
	10J	Banfield Inlet; February, 1946	3,545	75	.....	7	....	82	2.31
24	10K	Whitepine Cove; March, 1946	2,941	61	9	.....	....	70	2.38
	10L	Refuge Cove; March, 1946	2,947	28	27	15	7	77	2.61
	10M	Refuge Cove; March, 1946	1,574	37	9	.....	....	46	2.92
25	10N	Ewin Inlet; March, 1946	3,542	9	18	30	4	61	1.72
	10P	Queen Cove; March, 1946	3,961	9	9	119	....	137	3.46
26	10Q	Clanninick Cove; March, 1946	3,182	19	.....	60	....	79	2.48
	10R	Clanninick Cove; March, 1946	2,542	.....	.....	119	....	119	4.68
		Totals	28,148	257	72	357	15	701	2.49

Table V.—Taggings made during 1947 Spawning Season.

Code.	Area.	Place and Date of Tagging.	Number used.
11A	13	Cortes Island, Quartz Bay; Mar. 15, 1947	2,564
11B	14A	Lambert Channel; Mar. 14, 1947	496
11C	15	Skuttle Bay; Mar. 5, 1947	2,557
11D	14B	Departure Bay; Mar. 17, 1947	2,008
11E	17	Kulleet Bay; Mar. 8, 1947	3,525
11F	23	Banfield Inlet, head; Feb. 17, 1947	2,087
11G	23	Grappler Inlet, Port Desire; Feb. 21, 1947	499
11H	23	Macoah Passage; Feb. 24, 1947	2,670
11I	23	Macoah Passage; Feb. 25, 1947	1,017
11J	23	Macoah Passage; Mar. 1, 1947	2,074
11K	23	Toquart Bay; Mar. 15, 1947	2,637
11L	23	Toquart Bay; Mar. 20, 1947	994
11M	23	Mayne Bay; Mar. 16, 1947	2,191
11N	23	Mayne Bay; Mar. 19–20, 1947	1,011
11P	24	Refuge Cove; Mar. 12–13, 1947	3,499
11Q	24	Sydney Inlet, Flores Island; Mar. 7–8, 1947	3,084
11R	25	Ewin Inlet, near entrance; Mar. 17, 1947	2,021
11S	25	Kendrick Inlet, head; Mar. 15, 1947	1,005
11T	25	Kendrick Inlet, lagoon at head; Mar. 15, 1947	1,011
11U	25	Kendrick Inlet, lagoon at head; Mar. 16, 1947	1,011
11W	25	Nuchatlitz Inlet, near village; Mar. 4, 1947	2,622
11X	25	Nuchatlitz Inlet, near village; Mar. 5, 1947	968
		Total	41,551

Table VI.—List of Samples taken from Commercial Catches and Spawning Runs in West Coast Sub-district in 1946–47 Season.

Place and Date.	Number of Fish in Year of Age.											Number Males.	Number Females.	?	Number Immature.	Number Mature, not spent.	Number Mature, spent.	Total Number.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	?							
Area 23—Commercial Catches.																		
Mayne Bay, Nov. 28	....	11	33	31	7	1	....	....	....	....	4	41	45	1	8	79	....	87
Mayne Bay, Nov. 29	....	9	37	48	5	....	....	....	....	....	1	62	38	....	7	93	....	100
Mayne Bay, Nov. 30	....	9	27	27	2	3	1	....	....	....	1	38	32	....	6	64	....	70
Mayne Bay, Dec. 1	1	17	39	37	2	2	....	....	....	....	2	53	44	3	16	84	....	100
Sechart Channel, Dec. 3	....	10	35	42	11	....	....	....	....	....	2	72	28	....	4	96	....	100
Mayne Bay, Dec. 3	....	24	61	32	2	....	....	....	....	....	1	66	54	....	20	100	....	120
Forbes Island, Dec. 4	....	11	40	39	8	1	....	....	....	....	1	44	56	....	8	92	....	100
Forbes Island, Dec. 5	....	8	44	42	5	....	....	....	....	....	1	41	55	4	10	90	....	100
Mayne Bay, Dec. 5	....	12	42	42	3	1	....	....	....	....	....	64	36	....	2	98	....	100
Mayne Bay, Dec. 6	....	5	49	38	6	2	....	....	....	....	....	52	48	....	6	94	....	100
Peacock Channel, Dec. 7	....	4	37	46	8	2	1	....	....	....	2	64	36	....	5	95	....	100
Peacock Channel, Dec. 8	....	6	49	41	4	....	....	....	....	....	....	52	48	....	5	95	....	100
Western Channel, Dec. 9	....	1	42	46	8	3	....	....	....	....	....	57	42	1	5	95	....	100
Mayne Bay, Dec. 10	....	11	46	34	7	2	....	....	....	....	....	63	37	....	15	85	....	100
Western Channel, Dec. 11	....	6	56	32	6	....	....	....	....	....	....	53	47	....	14	86	....	100
Toquart Channel, Dec. 11	....	15	48	25	10	2	....	....	....	....	....	49	51	....	13	87	....	100
Mayne Bay, Dec. 12 (A)	....	10	60	25	5	....	....	....	....	....	....	61	37	2	10	90	....	100
Mayne Bay, Dec. 12 (B)	....	5	60	28	5	2	....	....	....	....	....	51	49	....	6	94	....	100
Sechart Channel, Dec. 13	....	3	38	28	7	1	1	....	....	....	....	46	32	....	7	71	....	78
Mayne Bay, Dec. 13	....	1	56	40	3	....	....	....	....	....	....	49	51	....	6	94	....	100
Mayne Bay, Dec. 14	....	8	61	30	....	1	....	....	....	....	....	57	43	....	17	83	....	100
Peacock Channel, Dec. 15	....	5	45	38	4	1	....	....	1	....	....	45	49	....	6	88	....	94
Mayne Bay, Dec. 15	....	11	51	30	6	2	....	....	....	....	....	56	44	....	12	88	....	100
Peacock Channel, Dec. 16	....	5	62	26	6	1	....	....	....	....	....	53	47	....	8	92	....	100
Western Channel, Dec. 16	....	1	41	48	8	2	....	....	....	....	....	49	50	1	10	90	....	100
Sechart Channel, Dec. 16 (A)	....	4	49	34	11	2	....	....	....	....	....	49	51	....	7	93	....	100
Sechart Channel, Dec. 16 (B)	....	11	61	26	2	....	....	....	....	....	....	41	58	1	22	78	....	100
Village Island, Dec. 17	....	3	67	25	4	....	....	....	....	....	....	55	44	....	15	84	....	99
Middle Channel, Dec. 17	....	3	33	54	7	3	....	....	....	....	....	57	42	1	3	97	....	100
Western Channel, Dec. 18	....	4	48	41	4	3	....	....	....	....	....	53	47	....	5	95	....	100
Mayne Bay, Jan. 5 (A)	....	3	53	29	11	3	1	....	....	....	....	44	56	....	5	95	....	100
Mayne Bay, Jan. 5 (B)	....	3	41	47	6	2	1	....	....	....	....	50	50	....	14	86	....	100
Double Island, Jan. 6	....	2	32	45	8	3	....	....	....	....	....	33	56	1	3	87	....	90
Mayne Bay, Jan. 6	....	....	32	38	21	7	1	1	....	....	....	44	56	....	4	96	....	100
Middle Channel, Jan. 7	....	2	37	48	6	3	3	1	....	....	....	62	38	....	2	98	....	100
Mayne Bay, Jan. 8	....	3	51	38	5	1	....	2	....	....	....	49	51	....	5	95	....	100

Table VI.—List of Samples taken from Commercial Catches and Spawning Runs in West Coast Sub-district in 1946–47 Season—Continued.

Place and Date.	Number of Fish in Year of Age.											Number Males.	Number Females.	?	Number Immature.	Number Mature, not spent.	Number Mature, spent.	Total Number.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	?							
Area 23—Commercial Catches—Continued.																		
Western Channel, Jan. 8	....	....	40	50	8	1	....	1	....	....	....	45	55	....	2	98	....	100
Middle Channel, Jan. 9	....	1	49	32	12	3	2	1	....	....	....	36	62	2	4	96	....	100
Mayne Bay, Jan. 9	....	1	29	56	9	5	....	....	....	....	....	40	60	....	....	100	....	100
Western Channel, Jan. 10	....	6	41	28	7	6	2	....	....	....	....	50	40	....	3	87	....	90
Double Island, Jan. 10	....	5	45	42	6	2	....	....	....	....	....	40	60	....	7	93	....	100
Mayne Bay, Jan. 10	....	8	60	26	5	....	1	....	....	....	....	57	43	....	5	95	....	100
Mayne Bay, Jan. 12	....	4	52	28	4	2	....	....	....	....	....	39	50	1	2	88	....	90
Western Channel, Jan. 12	....	7	46	33	7	6	1	....	....	....	....	44	56	....	4	96	....	100
Mayne Bay, Jan. 15	....	4	42	41	9	2	2	....	....	....	....	45	54	1	3	97	....	100
Western Channel, Jan. 16	....	4	21	52	11	2	....	....	....	....	....	43	47	....	2	88	....	90
Mayne Bay, Jan. 16	....	3	37	48	8	2	1	1	....	....	....	48	52	....	2	98	....	100
Mayne Bay, Jan. 20	....	7	42	44	7	....	....	....	....	....	....	43	57	....	....	100	....	100
Forbes Island, Jan. 21	....	2	41	48	5	3	1	....	....	....	....	45	55	....	1	99	....	100
Mayne Bay, Jan. 22	....	3	23	48	9	6	....	....	....	....	....	26	63	....	1	88	....	89
Area 24—Commercial Catches.																		
Sydney Inlet, Nov. 29	....	6	58	31	5	....	....	....	....	....	....	54	46	....	2	98	....	100
Sydney Inlet, Dec. 1	....	1	67	25	5	1	1	....	....	....	....	61	39	....	....	100	....	100
Sydney Inlet, Jan. 6	....	18	67	14	....	1	....	....	....	....	....	58	42	....	6	94	....	100
Sydney Inlet, Jan. 12	....	....	77	16	4	1	....	....	1	....	....	52	47	....	2	97	....	99
Sydney Inlet, Jan. 13 (A)	....	2	66	23	6	3	....	....	....	....	....	55	45	....	....	97	3	100
Sydney Inlet, Jan. 13 (B)	....	3	74	21	1	1	....	....	....	....	....	39	61	....	2	98	....	100
Sydney Inlet, Jan. 14	....	9	78	11	....	1	....	....	....	....	....	40	59	....	4	95	....	99
Sydney Inlet, Jan. 15	....	6	61	29	1	3	....	....	....	....	....	57	43	....	....	99	1	100
Area 25—Commercial Catches.																		
Hecate Channel, Jan. 6	....	3	71	20	4	1	1	....	....	....	....	50	50	....	3	97	....	100
Esperanza Area, Jan. 7	....	2	55	28	6	5	3	1	....	....	....	52	48	....	3	97	....	100
Esperanza Area, Jan. 8	....	3	53	33	2	3	5	1	....	....	....	58	42	....	1	99	....	100
Espinoza Inlet, Jan. 9	....	4	56	26	7	5	1	1	....	....	....	46	54	....	2	98	....	100
Esperanza Area, Jan. 9 (A)	....	3	62	24	2	4	2	2	....	....	....	56	43	....	1	98	....	99

Esperanza Area, Jan. 9 (B)	....	3	51	38	5	2	....	1	....	....	....	48	52	....	3	97	....	100
Espinoza Inlet, Jan. 10	....	3	51	30	9	3	3	1	....	....	....	36	64	....	3	97	....	100
Esperanza Area, Jan. 10	....	7	55	28	8	1	1	....	....	....	....	57	43	....	....	100	....	100
Espinoza Inlet, Jan. 11	....	....	45	24	16	6	1	5	1	2	....	46	54	....	1	99	....	100
Esperanza Area, Jan. 12	....	....	45	33	10	7	4	1	....	....	....	49	51	....	1	99	....	100
Espinoza Inlet, Jan. 12	....	4	55	32	3	4	2	....	....	....	....	60	40	....	5	95	....	100
Esperanza Area, Jan. 13	....	2	51	32	5	7	2	....	1	....	....	51	49	....	1	99	....	100
Queen Cove, Jan. 14	....	7	58	20	7	5	2	1	....	....	....	39	61	....	5	95	....	100
Espinoza Inlet, Jan. 14	....	3	66	21	6	1	2	1	....	....	....	50	50	....	1	99	....	100
Esperanza Area, Jan. 15	....	2	49	32	9	5	1	2	....	....	....	53	47	....	2	98	....	100
Espinoza Inlet, Jan. 16	....	3	47	30	10	4	6	....	....	....	....	55	45	....	2	98	....	100
Esperanza Area, Jan. 19	....	2	67	26	2	....	1	1	....	....	....	59	40	....	3	96	....	99
Queen Cove, Jan. 20 (A)	....	2	52	32	5	3	4	1	....	....	....	43	56	....	2	97	....	99
Queen Cove, Jan. 20 (B)	....	2	53	28	9	5	2	1	....	....	....	48	52	....	....	100	....	100
Espinoza Inlet, Jan. 20	....	3	62	28	3	2	....	2	....	....	....	57	43	....	2	98	....	100
Esperanza Area, Jan. 20	....	5	47	36	3	5	....	4	....	....	....	43	57	....	1	99	....	100
Esperanza Area, Jan. 21	....	2	54	22	13	6	2	1	....	....	....	49	51	....	2	98	....	100
Tahsis Inlet, Jan. 22	1	6	60	25	6	1	1	....	....	....	....	55	44	1	4	95	1	100
Tahsis Inlet, Jan. 23	....	3	52	32	8	2	2	1	....	....	....	48	52	....	....	100	....	100
Tahsis Inlet, Jan. 25	....	1	58	28	5	7	1	....	....	....	....	48	52	....	2	98	....	100
Area 23—Spawning Runs.																		
Banfield Inlet, Feb. 16	....	2	37	36	14	6	2	....	2	....	1	48	52	....	6	....	94	100
Macoah Passage, Feb. 24	....	....	56	37	4	3	....	....	....	....	....	42	58	....	1	99	....	100
Macoah Passage, Feb. 25	....	....	36	36	8	....	....	....	....	....	....	43	30	7	....	44	36	80
Macoah Passage, Mar. 1	....	....	49	44	7	....	....	....	....	....	....	57	43	....	3	97	....	100
Toquart Bay, Mar. 15	....	3	80	14	2	1	....	....	....	....	....	60	40	....	1	99	....	100
Mayne Bay, Mar. 16	....	3	72	19	6	....	....	....	....	....	....	54	46	....	....	100	....	100
Toquart Bay, Mar. 17	....	....	84	14	2	....	....	....	....	....	....	54	46	....	....	100	....	100
Mayne Bay, Mar. 20	....	6	85	8	1	....	....	....	....	....	....	66	34	....	....	30	70	100
Area 24—Spawning Runs.																		
Sydney Inlet, Mar. 7	....	....	62	31	4	1	2	....	....	....	....	56	44	....	....	100	....	100
Refuge Cove, Mar. 12	....	....	74	22	3	1	....	....	....	....	....	61	39	....	....	100	....	100
Area 25—Spawning Runs.																		
Nuchatlitz Inlet, Mar. 3	....	1	57	30	9	....	3	....	....	....	....	50	50	....	....	83	17	100
Nuchatlitz Inlet, Mar. 4	....	1	59	30	4	3	3	....	....	....	....	49	51	....	....	57	43	100
Kendrick Inlet, Mar. 14	....	6	62	22	6	2	2	....	....	....	....	48	52	....	....	100	....	100
Kendrick Inlet, Mar. 15	....	4	71	14	9	2	....	....	....	....	....	38	62	....	....	77	23	100
Kendrick Inlet, Mar. 16	....	3	82	7	4	3	1	....	....	....	....	50	50	....	....	30	70	100
Ewin Inlet, Mar. 17	....	4	61	21	3	5	3	3	....	....	....	59	41	....	....	70	30	100

Table VII.—Average Percentage Age Composition of Samples from Commercial Catches and from Spawning Runs during 1946–47 Season.

COMMERCIAL CATCHES.

Area.	In Year of Age.									
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
23	0.02	6.15	45.54	38.93	6.79	2.00	0.40	0.14	0.02	.....
24	.....	5.64	68.70	21.28	2.76	1.38	0.12	.....	0.13	.....
25	0.04	3.00	55.07	28.35	6.52	3.76	1.96	1.12	0.08	0.08
All*	0.02	4.96	53.03	32.07	5.97	2.50	0.90	0.46	0.06	0.03

SPAWNING RUNS.

23—Early	.....	0.50	46.84	40.59	8.78	2.26	0.50	.....	0.50	.....
Late	.....	3.00	80.25	13.75	2.75	0.25	.....	.....	.....	.....
Both	.....	1.75	63.55	27.17	5.77	1.26	0.25	.....	0.25	.....
24	.....	.....	68.00	26.50	3.50	1.00	1.00	.....	.....	.....
25	.....	3.17	65.33	20.67	5.83	2.50	2.00	0.50	.....	.....
All	.....	2.06	64.77	24.65	5.51	1.69	1.00	0.19	0.13	.....

* Average percentage age composition for each area weighted to number of fish caught, rather than to weight of fish caught as in the case of data included in the text.

Table VIII.—Number of Fish (in Millions) of each Age in West Coast Catches of 1946–47; Numbers of Fish in Total weighted to Numbers of Fish caught in each Area (A) and weighted to Tonnage caught in each Area (B).

Area.	In Year of Age.										Total.
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	
23	0.05	15.79	116.88	99.93	17.42	5.14	1.03	0.36	0.05	.....	256.65
24	.....	5.52	67.30	20.85	2.70	1.35	0.12	.....	0.12	.....	97.96
25	0.08	5.71	104.74	53.92	12.41	7.16	3.73	2.13	0.15	0.15	190.18
Totals (A)	0.13	27.02	288.92	174.70	32.53	13.65	4.88	2.49	0.32	0.15	544.79
Totals (B)	0.11	26.45	284.14	174.38	32.77	13.82	5.07	2.59	0.32	0.16	539.81

Table IX.—Average Sex Ratio (Females/Males) and Stage of Development for Samples of Commercial Catches and Spawning Runs during 1946–47 Season.

COMMERCIAL CATCHES.

Area.	Sex Ratio.	Percentage.		
		Immature.	Mature, unspent.	Mature, spent.
23	1.03	7.1	92.9	.....
24	0.96	2.0	97.5	0.5
25	1.02	2.0	98.0	+
All	1.02	5.0	94.9	0.1

SPAWNING RUNS.

23—Early	0.98	2.6	63.2	34.2
Late	0.72	0.2	82.2	17.5
Both	0.85	1.4	73.0	25.6
24	0.72	....	100.0	.....
25	1.07	....	69.5	30.5
All	0.92	0.7	75.1	24.2

Table X.—Average Length (Millimetres) and Average Weight (Grams) for each Age in Samples from Commercial Catches, with Numbers of Fish on which Averages are based indicated in Parentheses.

AVERAGE LENGTH.

In Year of Age.	Area 23.	Area 24.	Area 25.	All Areas.
I	(1) 86.0	.....	(1) 105.0	(2) 95.5
II	(301) 165.7	(45) 164.4	(75) 169.1	(421) 166.2
III	(2,231) 186.8	(548) 182.1	(1,375) 189.3	(4,154) 187.0
IV	(1,896) 202.6	(170) 199.2	(708) 203.6	(2,774) 202.6
V	(330) 211.7	(22) 212.8	(163) 214.3	(515) 212.6
VI	(96) 221.5	(11) 219.0	(94) 222.2	(201) 221.7
VII	(19) 229.2	(1) 220.0	(49) 228.3	(69) 228.4
VIII	(7) 231.6	.....	(28) 233.3	(35) 233.0
IX	(1) 235.0	(1) 235.0	(2) 234.5	(4) 234.8
X	.....	.....	(2) 230.0	(2) 230.0
?	(15) 193.9	.....	.....	(15) 193.9

AVERAGE WEIGHT.

I	(1) 7.0	.....	(1) 12.0	(2) 9.5
II	(209) 57.2	(41) 54.3	(41) 58.9	(291) 57.1
III	(1,421) 86.0	(330) 77.0	(823) 89.7	(2,574) 86.0
IV	(1,115) 112.5	(108) 101.3	(414) 115.7	(1,637) 112.6
V	(197) 130.0	(12) 124.8	(105) 138.6	(314) 132.7
VI	(50) 146.8	(8) 145.5	(59) 154.8	(117) 150.7
VII	(15) 161.3	.....	(33) 173.7	(48) 169.8
VIII	(5) 166.8	.....	(18) 187.4	(23) 183.0
IX	(1) 164.0	.....	(1) 190.0	(2) 177.0
X	.....	.....	(2) 172.0	(2) 172.0
?	(14) 100.9	.....	.....	(14) 100.9

Table XI.—Average Length (Millimetres) in Samples from Spawning Runs, with Numbers of Fish on which Averages are based indicated in Parentheses.

In Year of Age.	Area 23.			Area 24.	Area 25.
	Early.	Late.	Both.		
II	(2) 167.5	(12) 158.7	(14) 159.9	.....	(19) 153.8
III	(178) 189.1	(321) 179.4	(499) 182.9	(136) 185.7	(392) 184.1
IV	(153) 205.4	(55) 201.0	(208) 204.2	(53) 203.1	(124) 204.4
V	(33) 215.0	(11) 213.8	(44) 214.7	(7) 211.6	(35) 215.5
VI	(9) 227.4	(1) 227.0	(10) 227.4	(2) 221.5	(15) 222.0
VII	(2) 237.5	.....	(2) 237.5	(2) 226.5	(12) 229.2
VIII	.....	.....	.....	.....	(3) 231.3
IX	(2) 234.5	.....	(2) 234.5	.....	.....
?	(1) 203.0	.....	(1) 203.0	.....	.....

Table XII.—List of Spawnings which occurred on the West Coast of Vancouver Island in 1947, including Intensity and Extent of each.

VL=Very Light. L=Light. M=Medium. H=Heavy. VH=Very Heavy.

Date.	Location of Grounds.	Intensity.	Miles of Spawn.
	Area 23—Barkley Sound Vicinity.		
Feb. 4–7	Snug Basin	M	0.13
Feb. 4–8	Useless Inlet	H	0.96
Feb. 10–13	Mud Bay	H	0.34
Feb. 10–13	Useless Inlet	H	0.45
Feb. 14–18	Banfield Inlet, head	L	0.63*
Feb. 19–28	Macoah Passage, east of Maggie River	M	2.48*
Feb. 24–28	Uchucklesit Inlet	L	0.04
Feb. 28	Rainy Bay	L	0.17
Feb. 23–Mar. 1	Macoah Passage, west of Maggie River	M–H	4.20*
Mar. 3	Sunshine Bay	L	0.06
Mar. 15–19	Toquart Bay	H	1.15*
Mar. 15–19	Macoah Passage, near Toquart Bay	H	1.04*
Mar. 15–19	Stopper Islands	H	0.35*
Mar. 16–21	Mayne Bay, south-east shore	H	1.15*
			13.15
	Area 24—Clayoquot Sound Vicinity.		
Feb. 7	Hesquiat Harbour, head	VL	0.23
Mar. 3–4	Cypress Bay, Quait Bay	H	2.54
Mar. 3–7	Sydney Inlet, Flores Island shore	H	0.75*
Mar. 11–18	Refuge Cove, head, east shore	L	0.40*
Mar. 11–18	Refuge Cove, head, west shore	M	0.63*
Mar. 16–18	Whitepine Cove, south shore	H	1.04*
Mar. 16–18	Whitepine Cove, island at entrance	M	0.46*
			6.05
	Area 25—Nootka Sound Vicinity.		
Feb. 21–26	Nuchatlitz Inlet, Port Langford	H	0.80
Feb. 21–25	Nuchatlitz Inlet, Colwood Island vicinity	H	1.40
Mar. 1–6	Esperanza Inlet, opposite Centre Island	M	0.57*
Mar. 2–6	Nuchatlitz Village tide-flats, etc.	H–VH	1.15*
Mar. 14	Nuchatlitz Village area	VH	0.80
Mar. 26–29	Bay opposite Rosa Island	M	0.80*
Mar. 26–29	Rosa Island	VH	0.68
Mar. 15–17	Nootka Sound, Kendrick Inlet, head	M	1.42*
Mar. 17–25	Nootka Sound, Ewin Inlet vicinity	M–H	1.70*
			9.32
	Area 26—Kyuquot Sound Vicinity.		
Feb. 16–17	Malksope Inlet, islands and east shore	M	0.28
Feb. 16	Clanninick Cove, west shore	VL	0.09
Feb. 16–17	Nasparte Inlet, west shore	L	0.23
Feb. 26	Malksope Inlet, islands	M	0.11
Mar. 3	Nasparte Inlet, head	L	0.03*
Mar. 3–4	Clanninick Cove, west shore	VL	0.11
Mar. 3–4	McLean Island, south-east corner	VL	0.06
Mar. 9–10	Union Island, bay, south-west side	M	0.85*
Mar. 19	Malksope Inlet, head	VH	0.06*
Mar. 25–26	Clanninick Cove, west shore	M–H	0.62*
Apr. 9	Amai Inlet, head	M	0.06
			2.50
	Area 27—Quatsino Sound Vicinity.		
Feb. 25 (?)	Klaskish Inlet	H	0.09*
Feb. 25 (?)	Klaskish Inlet	L	0.20*
Feb. 25 (?)	Klaskino Inlet	M	0.28
Feb. 27–28	Forward Inlet, west of and opposite Greenwood Point	L	0.31*
Mar. 27	Leeson Harbour, west shore	M	0.57
			1.45
	Grand total		32.47

* Spawning-grounds surveyed by scientific investigators.

Table XIII.—Tags inserted during 1947 Spawning Season.

Code Letters.	Tagging Code.	Area.	Place.	Date.	No.
IJJI	11F	23	Banfield Inlet	Feb. 17, 1947	524
IKKI	11F	23	Banfield Inlet	Feb. 17, 1947	535
ILLI	11G	23	Grappler Inlet	Feb. 21, 1947	499
IMMI	11H	23	Macoah Passage	Feb. 24, 1947	513
INNI	11Q	24	Sydney Inlet	Mar. 7, 1947	530
IOOI	11Q	24	Sydney Inlet	Mar. 8, 1947	510
IPPI	11P	24	Refuge Cove	Mar. 12, 1947	516
ISSI	11P	24	Refuge Cove	Mar. 12, 1947	535
IXXI	11P	24	Refuge Cove	Mar. 12, 1947	516
JBBJ	11P	24	Refuge Cove	Mar. 12, 1947	529
JCCJ	11P	24	Refuge Cove	Mar. 12, 1947	484
JDDJ	11P	24	Refuge Cove	Mar. 13, 1947	479
JEEJ	11P	24	Refuge Cove	Mar. 13, 1947	440
JHHJ	11K	23	Toquart Bay	Mar. 15, 1947	517
JIIJ	11K	23	Toquart Bay	Mar. 15, 1947	466
JKKJ	11K	23	Toquart Bay	Mar. 15, 1947	591
JLLJ	11K	23	Toquart Bay	Mar. 15, 1947	544
JMMJ	11K	23	Toquart Bay	Mar. 15, 1947	519
JNNJ	11M	23	Mayne Bay	Mar. 16, 1947	526
JOOJ	11M	23	Mayne Bay	Mar. 16, 1947	593
JPPJ	11M	23	Mayne Bay	Mar. 16, 1947	559
JSSJ	11M	23	Mayne Bay	Mar. 16, 1947	513
JTTJ	11J	23	Macoah Passage	Mar. 1, 1947	519
JUUJ	11J	23	Macoah Passage	Mar. 1, 1947	526
JWWJ	11W	25	Nuchatlitz Inlet	Mar. 4, 1947	517
JXXJ	11X	25	Nuchatlitz Inlet	Mar. 5, 1947	473
JYYJ	11X	25	Nuchatlitz Inlet	Mar. 5, 1947	495
JZZJ	11S	25	Kendrick Inlet	Mar. 15, 1947	496
KAAK	11Q	24	Sydney Inlet	Mar. 7, 1947	1,064
KBBK	11W	25	Nuchatlitz Inlet	Mar. 4, 1947	1,068
KCCK	11F	23	Banfield Inlet	Feb. 17, 1947	1,028
KDDK	11W	25	Nuchatlitz Inlet	Mar. 4, 1947	1,037
KEEK	11R	25	Ewin Inlet	Mar. 17, 1947	1,048
KHHK	11H	23	Macoah Passage	Feb. 24, 1947	1,101
KIIK	11R	25	Ewin Inlet	Mar. 17, 1947	973
KJJK	11H	23	Macoah Passage	Feb. 24, 1947	1,056
KLLK	11I	23	Macoah Passage	Feb. 25, 1947	1,017
KPPK	11J	23	Macoah Passage	Mar. 1, 1947	1,029
KSSK	11C	15	Skuttle Bay	Mar. 5, 1947	1,058
KTTK	11E	17	Kulleet Bay	Mar. 8, 1947	1,013
KUUK	11E	17	Kulleet Bay	Mar. 8, 1947	1,011
KWWK	11E	17	Kulleet Bay	Mar. 8, 1947	1,004
KYYK	11A	13	Cortes Island	Mar. 15, 1947	1,063
KXXK	11Q	24	Sydney Inlet	Mar. 7, 1947	980
KZZK	11A	13	Cortes Island	Mar. 15, 1947	1,001
LAAL	11S	25	Kendrick Inlet	Mar. 15, 1947	509
LBBL	11T	25	Kendrick Inlet	Mar. 15, 1947	506
LCCL	11T	25	Kendrick Inlet	Mar. 15, 1947	505
LDDL	11U	25	Kendrick Inlet	Mar. 16, 1947	505
LEEL	11U	25	Kendrick Inlet	Mar. 16, 1947	506
MAAM	11C	15	Skuttle Bay	Mar. 5, 1947	501
MBBM	11C	15	Skuttle Bay	Mar. 5, 1947	499
MCCM	11C	15	Skuttle Bay	Mar. 5, 1947	499
MDDM	11E	17	Kulleet Bay	Mar. 8, 1947	497
MEEM	11B	14A	Lambert Channel	Mar. 14, 1947	496
MHHM	11A	13	Cortes Island	Mar. 15, 1947	500
MIIM	11D	14B	Departure Bay	Mar. 17, 1947	496
MJJM	11D	14B	Departure Bay	Mar. 17, 1947	500
MKKM	11D	14B	Departure Bay	Mar. 17, 1947	507
MLLM	11D	14B	Departure Bay	Mar. 17, 1947	505
MNNM	11N	23	Mayne Bay	Mar. 19–20, 1947	507
MOOM	11N	23	Mayne Bay	Mar. 19–20, 1947	504
MPPM	11L	23	Toquart Bay	Mar. 20, 1947	503
MSSM	11L	23	Toquart Bay	Mar. 20, 1947	491

INVESTIGATIONS ON COMMERCIAL CLAMS.

By Ferris Neave, Pacific Biological Station, Nanaimo, B.C.

In line with previous reports on the commercial production of clams in British Columbia, the following statement is presented relating to the season 1945–46. The statistics are again based on reports received by the Pacific Biological Station through the co-operation of officers of the Federal Department of Fisheries and the industry. The season is taken as beginning on October 1st, this being the legal opening-date for the commercial taking of butter-clams, the most important element in the total clam-catch of the Province.

CATCH BY SPECIES.

Total quantities reported were as follows:—

Species.	1944–45. Lb.	1945–46. Lb.
Butter-clams	3,508,342	4,021,230
Littleneck-clams	368,880	547,586
Razor-clams	144,860	216,577

Increased production of butter and littleneck clams is evident, the catches quoted above being greater than those reported for several years previously.

Butter-clams.

A comparison between the distribution of the catches reported in 1945–46 and those of the previous season is presented in the following table:—

Area.	1944–45. Lb.	1945–46. Lb.
Northern British Columbia	602,009	1,989,848
Queen Charlotte Islands	----------	325,489
Central British Columbia	472,260	179,560
Queen Charlotte Strait and Johnstone Strait	1,066,008	337,374
Northern Strait of Georgia	367,225	270,999
South-east coast of Vancouver Island	1,000,840	917,960
Totals	3,508,342	4,021,230

The most striking features of this table are (*a*) the maintenance of the high production reported during 1944–45 in the southern part of the Strait of Georgia, which area has been exploited for some forty years but in recent seasons has made only relatively small contributions to the total catch, and (*b*) the greatly increased production of Northern British Columbia in 1945–46, with exploitation extended to the Queen Charlotte Islands for the first time in recent years.

As a measure of availability, average catches in pounds per man-tide for the more important clam-producing areas are shown in the following table:—

Area.	1939–40.	1940–41.	1941–42.	1942–43.	1943–44.	1944–45.	1945–46.
Northern British Columbia	.....	.....	558.1	352.2	300.6	418.9	289.5
Queen Charlotte Islands	.....	.....	.....	.....	.....	.....	341.2
Central British Columbia	.....	182.7	272.3	287.4	282.1	259.1	341.4
Queen Charlotte Strait, etc.	200.7	198.2	186.7	248.2	274.7	280.5	.....
South-east coast of Vancouver Island—							
Chemainus district	120.0	124.7	153.8	175.2	198.0	212.2	.....
Sidney district	138.0	149.9	159.1	202.4	218.9	229.3	216.0

The above figures for 1945–46 show a relatively high availability of clams in all districts.

LITTLENECK-CLAMS.

The bulk of the catch, as usual, was made on and near the south-east coast of Vancouver Island. In 1946 small contributions were also reported from Sooke (34,170 lb.) and the Jervis Inlet area (25,506 lb.). The following figures show the average production per man-tide for clams taken during the summer months in the South-east Vancouver Island district (constituting the major part of the fishery) for the past six years: 1941, 129.8 lb.; 1942, 127.8 lb.; 1943, 152.7 lb.; 1944, 127.2 lb.; 1945, 184.2 lb.; 1946, 152.2 lb.

RAZOR-CLAMS.

Records of razor-clam production from the beaches of the northern shore of Graham Island were again provided by the Masset Co-operative Association for the digging season of 1946 (March 12th to July 3rd, inclusive). A comparison between the catches of 1943, 1944, 1945, and 1946 is presented below:—

Year.	Man-tides.	Production.	Average Catch per Man-tide.
		Lb.	Lb.
North Beach.			
1943	1,518	118,400	78.0
1944	2,661	147,300	55.4
1945	1,787	104,675	58.5
1946	2,507	146,769	58.5
Middle Beach.			
1943	806	82,350	102.2
1944	458	30,450	66.5
1945	173	8,803	50.9
1946	308	18,833	61.1
South Beach.			
1943	1,631	189,075	115.9
1944	1,303	120,650	92.6
1945	518	31,382	60.6
1946	775	50,975	65.8
All Beaches.			
1943	3,955	389,825	98.6
1944	4,422	298,400	67.5
1945	2,478	144,860	58.5
1946	3,590	216,577	60.3

In spite of the statistical indications of reduced availability of clams since 1943, the figures are not regarded as a reliable index of the variation in abundance of clams in these beaches. Production is markedly affected by weather conditions, varying ability of diggers, and the availability or otherwise of the latter during favourable tidal periods.

INVESTIGATIONS AT SEAL ISLAND.

The Seal Island beach, near Comox, was dug commercially in 1946 for the fifth consecutive year since this area was set aside for experimental studies in productivity. Digging was opened to all comers on January 28th and a catch-limit of 100 tons was imposed, this being the approximate quantity removed during each of the two preceding years. A large number of diggers was on hand for the operation and the quota was reached in seven consecutive nights' digging.

Production and digging effort during the period of the investigation are shown in the following table:—

Year.	Man-tides.	Man-hours.	Catch.	Average Catch.	
				Per Man-tide.	Per Man-hour.
			Lb.	Lb.	Lb.
1942	393	1,586	235,757	599.89	148.64
1943	394	1,588	236,825	601.08	149.09
1944	264	1,160	209,211	792.57	180.38
1945	484	2,108	207,160	435.60	98.26
1946	442	1,918	196,072	443.60	102.23

It will be seen that the yield per unit of effort was practically the same in 1946 as in the previous year, indicating that the beach is supporting this degree of exploitation in a satisfactory manner and maintaining a very high level of productivity.

REPORT ON INVESTIGATIONS OF THE INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION FOR 1946.

By B. M. Brennan, Director.

The International Pacific Salmon Fisheries Commission, conforming to the terms of the treaty, began regulation of the commercial fishery for the first time during the 1946 season. It so happened that the first year of regulation coincided with the return of the great South Thompson-Adams River run of sockeye salmon, presenting the Commission with a most difficult problem.

Six meetings were held by the Commission in 1946. The first meeting was held at Vancouver, B.C., on March 8th, 9th, and 10th, and members of the Advisory Board were present to discuss the pending regulations. At a second meeting held April 17th, 18th, 19th, and 20th, with the Advisory Board again in attendance, the final details of regulations were agreed upon. During the fishing season the Commission held four additional meetings in Bellingham, Wash.—the first on August 29th, the second on September 7th, the third on September 21st, and the fourth on October 4th. At these meetings the Commission observed the progress of the run of salmon, studied reports of its biological staff, and put into effect the emergency closures to ensure a proper escapement to the spawning-grounds.

A total of 7,791,383 sockeye were taken in treaty waters from the 1946 run, of which 3,551,761 sockeye salmon were landed by the United States fishermen, while Canadian fishermen landed 4,239,622.

On the whole, the escapement to all districts in the 1946 season was most satisfactory. Some 2,400,000 sockeye were found in the South Thompson system—sufficient seeding, in the opinion of the Commission and its staff, to guarantee a good return in the cycle-year 1950. The escapement to the spawning-grounds of the Upper Fraser was exceptionally good, with only the runs to the Stuart Lake district showing no increase. From a count of 34,105 spawning sockeye in the Chilko River and Lake in the brood-year, a return of 59,000 was found in 1946. The Bowron River, with 1,826 spawners in 1942, had an escapement of 6,951 sockeye in 1946. But most phenomenal was the increase in the run to the Stellako River, for, from an escapement of 48,640 in the brood-year, 245,779 fish were found in 1946 in the river alone. This does not include the large number of sockeye that entered Francois Lake to spawn but which our observers were unable to count.

The escapement to the tributaries of the Lower Fraser was less sensational, but satisfactory. The 1946 run to the Birkenhead River was equal to the numbers present in 1942. The Cultus Lake run was about 11 per cent. smaller than its brood-year, while the number of sockeye that entered Weaver Creek to spawn was nearly twice as large.

The increase in the numbers of fish on the spawning-grounds resulting from the operation of the fishways at Hell's Gate and Bridge River Rapids, combined with the delayed opening of the commercial fishery, is a most promising beginning in the rehabilitation of the Fraser River system.

In 1946 the Indian fishery took 50,127 sockeye, compared to 46,708 fish in 1942.

The main fishways at Hell's Gate functioned perfectly over the range of water-levels for which they were designed to operate. The returns from the 31,041 fish tagged above and below the former obstruction showed plainly that there was no block of salmon.

During the 1946 season the Fraser River at Hell's Gate reached a high of 79 feet in June and a low of 12 feet in November, and it is unusual that these exceptionally high-water and low-water conditions should occur in the same year. The early races bound for the Stuart Lake district and proceeding through Hell's Gate in June and early July experienced difficulty at the high-water levels. At this time the main fish-

ways were under water, and our observations disclosed that some of these early salmon were held up, battered, and bruised during their migration through this stretch of water. On the basis of these investigations the Commission, at its meeting on September 7th, authorized construction of a high-level fishway on the right bank of the river at Hell's Gate, to be completed in time for the 1947 run.

The total length of the high-level fishway is 120 feet, with ten baffles spaced approximately 12 feet apart. Its inside width is 13 feet 8 inches. The high-level fishway is built parallel to but at a higher elevation than the main fishway. Its entrance lies immediately above the entrance to the main fishway but is transposed into the bank the full width of the principal fishway, or 20 feet. The outer wall, floor, and baffles are of reinforced concrete, while the inner wall is of native rock.

The type of baffle is unique and differs from those used in the principal fishways. Each baffle is flat, about 23 feet in height, with two slotted openings of unequal size—one slot 4 feet in width and the other 1 foot 8 inches. The narrow and wide openings alternate in each successive baffle, with the wide opening first on the right and then on the left hand side. The drop in water through each baffle will not exceed 8 inches.

The highest elevation of the deck of the high-level fishway is 82 feet, as compared with the highest elevation of 63 feet for the principal fishway. Both fishways operate between 53 and 54 feet, but above 54 feet the right-bank principal fishway will submerge and the high-level structure will continue to operate efficiently to approximately elevation 70 feet (at the lower Hell's Gate gauge). The overlapping of operating levels will permit a smooth change from one fishway to the other as the water rises or lowers but is especially designed to prevent the trapping of fish in the high-level fishway as the water lowers.

Because of extreme low-water conditions during the fall when the main fishways were completely out of water, the latter part of the South Thompson run experienced some difficulty in passing the Gate. Although no serious mortality of fish occurred, a longer time was taken for the fish to pass the Gate than at the higher levels. Even though this low-water condition may not occur again for years to come, the Commission authorized the design of a low-level fishway that could be installed to counteract any such blockade in the future.

The fishways constructed during the winter of 1945 at Bridge River Rapids were completed and in operation for the 1946 season. No delay of fish at this location was indicated by the tag-recoveries, and the large increase in sockeye salmon reaching the upper spawning-grounds of the Fraser in 1946 was conclusive evidence that the run had experienced little difficulty at Bridge River Rapids.

An engineering survey has been completed to solve the problem of low-water conditions in Weaver Creek. Insufficient flow of water that occurs every fall prevents the salmon from migrating from Morris Lake into the spawning stream. Rehabilitation measures will be undertaken in 1947.

Engineering and biological studies have been completed at Farwell Canyon, on the Chilcotin River, where a stretch of difficult water conditions has caused mortality to the Chilko sockeye runs. The Commission has authorized the construction of five baffle-type fishways in this area that will begin in 1947.

A change in membership of the Commission took place in 1946. Mr. Charles E. Jackson, one of the original United States Commissioners, resigned. He was succeeded by Mr. Milo Moore, Director of the State Department of Fisheries of the State of Washington. Membership on the Commission as of this date is as follows:—

Canadian Commissioners: A. L. Hager, chairman; A. J. Whitmore, member; Tom Reid, M.P., member.

United States Commissioners: Fred J. Foster, secretary; Edward W. Allen, member; Milo Moore, member.

SALMON-SPAWNING REPORT, BRITISH COLUMBIA, 1946.

By F. Warne, Acting Chief Supervisor of Fisheries.

GENERAL.

Sockeye.—Good supplies were found in the Nass, Skeena, Bella Coola, Rivers Inlet, and Smith Inlet areas. In the Fraser River system, due in part to the later opening-date for sockeye-fishing in the commercial fishing areas, in conjunction with improved conditions at Hell's Gate, there was a general increase in the numbers of spawning fish over practically the whole watershed. Increases of exceptional note occurred in the Fraser-Francois, Upper Bowron, and Chilcotin River systems. The heavy, late run to Adams River was up to expectations, although possibly slightly less in numbers than in 1942. Satisfactory supplies reached the grounds tributary to the lower portion of the Fraser.

Springs.—With few exceptions, the seeding of spring salmon was fairly satisfactory, and generally indicates a slight improvement over recent years.

Cohoes.—The supply in the northern district was below brood-year levels. Fairly satisfactory seedings occurred in the Nass, Lower Skeena, and Grenville-Principe areas, but numbers in the remaining areas ranged from light to medium. In the southern portion of the Province, supplies were light in all areas.

Pinks.—The run of pink salmon was disappointingly light, late in making an appearance, and the individual fish unusually small in size. Due in part to the extra conservation measures, the escapement to the more important northern areas, excepting the Nass, was medium. There was also a fair seeding of the grounds in the upper portion of the east coast of Vancouver Island area. Supplies in the Nass and other parts of the Province were light. It was the " off year " in the Fraser River area.

Chums.—Generally speaking, supplies in the more important chum-salmon areas over the Province were fairly satisfactory, particularly so in District No. 3.

IN DETAIL.

Queen Charlotte Islands Area (North).

Fair supplies of cohoe were found on the spawning-grounds tributary to this area. Although the run of pink salmon to Masset Inlet and Naden Harbour was very light, there was a medium escapement to all streams. A light seeding of chums occurred over the area, exceptions being a medium seeding of the Ain River in Masset Inlet and a heavy run to Naden River. Extra conservation measures were enforced to protect the pink-salmon run.

Queen Charlotte Islands Area (South).

There was a light to medium escapement of cohoe. The seeding of pinks was generally light, with the exception of a heavy escapement to Copper and Skeedans Rivers, and a very heavy showing in Pallant River, Cumshewa Inlet. The chum seeding was medium in Skidegate Inlet, heavy in Pallant Creek, and light in the other streams in Cumshewa Inlet, light in the area between Cumshewa Inlet and Lockeport and heavy in the area south of Lockeport to Cape St. James. Unusual conservation measures were enforced in this area, as well, to protect the chum-salmon runs.

Nass Area.

A satisfactory escapement of sockeye occurred to the Meziaden Lake area, the principal spawning-grounds of this variety in the Nass system. The inspecting officers report a slightly larger run than that which occurred in 1945. Good supplies of spring

salmon reached the several streams, with the exception of the Tseaux River, where the escapement was small. The supplies of cohoe were satisfactory. The pink-salmon seeding over the whole area was light. The chum seeding was satisfactory over the area, especially so in the Warke Channel and Portland Canal areas. A marked improvement was also noted in Khutzeymateen Inlet.

Upper Skeena Area.

The inspecting officer reports a satisfactory seeding of sockeye over the area. Good supplies reached the Babine Lake and River area. The numbers observed on the grounds in the individual streams compared favourably with the runs of the brood-year of 1942. The fish were of good average size, and it is estimated that females formed 60 per cent. of the run. Good supplies also reached the Morice Lake area, tributary to the Bulkley River, but the numbers reaching the Kispiox and Kitwancool systems were somewhat below the levels of the brood-years of 1941 and 1942. The spring-salmon seeding was fairly satisfactory. Medium to heavy supplies appeared in the Babine and Morice Lake areas, but the runs to the Kispiox system and other streams were not quite so heavy. Although the cohoe salmon were fairly numerous in some areas, the general seeding can only be considered light. The number of parent pink salmon reaching the streams in this area was small.

Lower Skeena Area.

A fairly satisfactory escapement of sockeye occurred to this area. Good supplies were observed in Williams Creek, the principal spawning-grounds tributary to Lakelse Lake, but the smaller streams received only a light seeding. The run to the Kalum Lake area was just fair, somewhat smaller than that of the cycle year of 1942. Satisfactory numbers reached Shawatlans Creek, and there was a medium showing in the Ecstall River system. The spring-salmon seeding was good, especially so in the Ecstall River system and Kalum Lake area. The escapement of cohoes was satisfactory. Fair supplies reached the Lakelse area, a good escapement to the Ecstall River, and a heavy run to the Kalum Lake area. The pink-salmon seeding of the streams tributary to the Lower Skeena was light, but the coastal streams were well supplied with this variety. The number of chums on the spawning-grounds was small.

Lowe Inlet Area.

A medium escapement of sockeye was reported to all streams in the area frequented by this variety, with the exception of Minktrap Bay, where the seeding was fairly heavy. The cohoe-supply was normal. Due in part to the extra conservation measures, pink-salmon supplies in the northern portion of this area were satisfactory, especially so in the Porcher Island area, Alpha Bay, Kumealon Inlet, and Salmon River. The seeding of the southern portion of the area was not as heavy. Chum-supplies were only fair.

Butedale Area.

The sockeye streams in this area received a medium seeding. The supply of cohoe was also medium, and in comparing the run with the brood-year, although there was some decrease in the numbers observed in the larger streams, there was a definite increase in the quantities found in the smaller streams. Again, in this area, due in part to extra conservation measures, medium supplies of pinks reached the spawning-streams. Surprisingly good seedings occurred in the Kitimat, Kildala, and Kitkiata Rivers. The chum-salmon escapement was fair, the heaviest seedings occurring in Kynoch Inlet, Poison Cove, and Bottleneck Creek in Higgins Pass.

Bella Bella Area.

Supplies of sockeye were light; in general, somewhat below the level of the brood-year. Decreases were most notable in the stocks in the Koeye, East Tuno, and Kisemete Rivers. There was a light seeding of cohoe generally over the area, the largest supplies appearing in Koeye River and the Gullchuck streams. Due again, in part, to extra conservation measures, a medium seeding of pinks occurred over the area; although light to medium supplies reached some of the streams, there was a heavy escapement to others. The run to Koeye River was disappointingly small. The supply of chum salmon was satisfactory to all streams. A noteworthy feature was the heavy early migration to Roscoe Inlet during August.

Bella Coola Area.

The supply of parent sockeye was fairly satisfactory. Moderate supplies were observed in Kimsquit Lake, the main spawning-grounds of the Kimsquit River system. A medium to heavy seeding took place in the Bella Coola-Atnarko system. The main spawning area between Lonesome and Tenas Lakes was well covered with parent sockeye. Although the early migration of cohoe was light, the late run was of large enough proportions to assure a medium seeding. The supply of spring salmon was satisfactory. Parent pink salmon were observed in the streams in medium numbers. There was an excellent run of chums present in all streams.

Rivers Inlet Area.

As usual, two inspections of the spawning-grounds in the Owekano Lake area were carried out—the first between September 9th and 13th and the second between October 15th and 24th. Good supplies of sockeye were found on all spawning areas. It was difficult to determine which streams received the best seeding. They were all well seeded, but the best showing might have been at the Quap, Genesee, and Dallec, and probably the Shumahault. The showing at Whannock was good. The Indian and Waukwash were also good, but spawning had finished when these streams were reinspected, during October. The Asklum was good, but spawning was not of great intensity during October. The runs were composed chiefly of large-sized fish. "Runts" were not numerous. The following remarks of the inspecting officer, concerning special conservation measures enforced during the sockeye-fishing season, are of interest:—

"The moving of the commercial fishing boundary during the last week of fishing operations had a most beneficial effect on the 1946 escapement, and when it is acknowledged that some 65,000 cases were taken commercially, coupled with a very good escapement, the sockeye season for Rivers Inlet can and should be considered good."

The supplies of cohoe were poor. The seeding of pink salmon was generally light over the area. The escapement of chums was very good to all streams.

The Department's inspecting officer was accompanied by a representative of the industry on the final trip of inspection over this area.

Smith Inlet Area.

The sockeye-supplies are reported to be very good. The Geluck and Delabah Rivers, the principal spawning-grounds of this variety, were well seeded. The outward movement of the commercial fishing boundary, during the last week of sockeye-fishing, was a factor that contributed, in part, to conditions there. The seeding of cohoe was light in all streams. There was a fair escapement of pink salmon. Chum-salmon supplies were heavy over the area.

Fraser River Watershed.

Prince George Area.—There was a noteworthy increase in the number of parent sockeye appearing in this area. The estimated stock of 8,000 parent fish in 1938

increased to 42,000 in 1942, while this year the number observed was approximately 311,000. Supplies in the Stuart Lake system were slightly greater than in the brood-year. The large increase was in the Fraser-Francois system, where approximately 300,000 fish spawned, compared with 40,000 in the brood-year. Supplies of spring salmon were satisfactory. The showing in the streams tributary to the Fraser, east of Prince George, was better than during any recent year.

Quesnel Area.—Approximately 75,000 sockeye were observed on the spawning-grounds of the Chilcotin River system, compared with 25,000 in the brood-year. In the Bowron system some 7,000 fish were counted, compared with 1,500 in the brood-year. About 60 sockeye were observed in the Horsefly River, which is the main spawning area of the Quesnel Lake system. This river has been barren for several years in this cycle. No sockeye were reported in any other stream in the Quesnel system, with the exception of Mitchell River, where one pair was observed spawning. The supply of spring salmon was average, there being a slight increase in the Chilcotin system, a slight decrease in the Bowron River, while runs to other streams were similar to those of the brood-year.

Kamloops Area.—The early runs of sockeye to Raft River, tributary to the North Thompson River, and Seymour River, tributary to Shuswap Lake, were considerably larger than those of the brood-years. The late run to Adams River, although possibly slightly less in numbers than that of the brood-year, was very heavy. There was an increase in the spring-salmon supplies throughout the area. The run to the Nicola River was the largest for a number of years. The run of cohoes to the area was also the best in recent years.

Pemberton Area.—Upwards of 75,000 sockeye spawned in the Birkenhead River, which compares very favourably with the spawning of the past several years. In addition, some 400 fish spawned in Anderson Lake, Seton Creek, and Portage Creek. The run of spring salmon to the area was above average, especially in Tyaughton Creek, Portage Creek, and Gates Creek. Supplies of cohoes were only fair. The runs to the Squamish River, in the lower part of the area, and to Gates Creek and Portage Creek in the upper part, were fair, but the supply to Seton Creek was poor. Chum-supplies in the Squamish River were good, but the other streams in Howe Sound received only a light seeding.

Chilliwack Area.—The run to the Cultus Lake area, where approximately 33,000 fish were counted, was good. A small, early run of sockeye spawned in the outlets of the streams tributary to Chilliwack Lake. This run is becoming progressively smaller each year. Spring-salmon supplies were fairly good. The seeding of cohoe was generally light over the area, with the exception of the Chilliwack River, where a medium run spawned early in the season. Approximately 700 cohoe were counted in the Cultus Lake area. There was a medium run of chums to the Vedder, Chilliwack, and Sweltzer Creek areas. There were no chum salmon observed in the Coquihalla River, and the seeding in all other streams was exceptionally light.

Harrison Area.—The seeding of Weaver and Steelhead Creeks, tributary to Morris Creek, where upwards of 30,000 sockeye spawned, was good. There was also a better-than-average spawning in Harrison River rapids. The seeding of the other streams tributary to Harrison Lake was light. Supplies of spring salmon were small. The cohoe seeding was disappointingly light. Chums appeared in satisfactory numbers in the Harrison and Chehalis Rivers.

Pitt Lake Area.—A normal run of sockeye spawned in the Upper Pitt River and tributaries. Supplies of cohoes, pinks, and chums were light over the whole area.

Lower Fraser Area.—The seeding of cohoe was very light in all streams. The number of this variety frequenting the Serpentine and Nicomekl Rivers was less than usual this year. Chums, in fair numbers, appeared in the Alouette and Coquitlam Rivers, as well as Kanaka and Whonnock Creeks, but the supply present in all other streams was small.

North Vancouver Area.—There was a slight increase in the number of cohoe in Capilano and Seymour Rivers, when compared with the brood-year. The seeding in Indian River and other streams in the area was very light. A medium run of chums occurred to Indian River, but the supply in the other North Shore streams was only fair.

ALERT BAY AREA.

The sockeye seeding of the Nimpkish River, although not quite as heavy as in the brood-year of 1942, was satisfactory. Medium supplies, comparable with the brood-year, appeared in Fullmore, McKenzie, Kleena Kleene, Nahwitti, Kahweeken, and Keogh Rivers, with McKenzie and Kahweeken showing an increase over 1942. The seeding of spring salmon was very satisfactory in all the main streams. Cohoe-supplies were generally light, somewhat less than the brood-year, exceptions being the heavy seeding of Nimpkish River and Cohoe Creek, and the medium escapement to Kleena Kleene, Wakeman, Kingcome, and Adams Rivers. Although the run was light, the pink streams were fairly well seeded. The main run, which appeared while most of the seine-boats were in Area No. 17, was lightly exploited. Practically all chum-salmon streams were well seeded, a very heavy escapement occurring to several of the more important streams.

QUATHIASKI AREA.

The sockeye seeding at Hayden Bay was average, comparable with the brood-year. Phillips River was also well seeded, showing quite an improvement over 1942. Spring salmon in very satisfactory numbers appeared in Campbell, Salmon, and Phillips Rivers, as well as in the streams at the head of Bute Inlet. The cohoe seeding over the area was much lighter than in the brood-year. The supplies of pink salmon were surprisingly good, although somewhat less than in the brood-year. A heavy chum-salmon seeding occurred in practically all streams, a considerable improvement over the brood-year.

COMOX AREA.

The seeding of spring salmon in Puntledge River was the best in recent years. Cohoe-supplies were generally light. The seeding of Courtenay and Oyster Rivers, as well as the streams in Baynes Sound, was fairly satisfactory, but it was distinctly poor in the streams in the lower portion of the area. While the return of spawning pinks was very light, the number appearing on the spawning-grounds was in improvement over the brood-years. Supplies of chum salmon over the area were very satisfactory, an improvement over the brood-year, excepting Englishman River, where the run was disappointingly small.

PENDER HARBOUR AREA.

The sockeye seeding at Saginaw Creek, although an improvement over the brood-year, was light. The supplies of springs were normal. The return of parent cohoe was the lightest in the past five years, although it was very similar to that of the brood-year of 1943. The pink-salmon seeding was also very light. There was a medium supply of chum salmon over the area.

NANAIMO-LADYSMITH AREA.

Cohoe-supplies were the lightest in the past five years. Pinks do not frequent this area in commercial quantities. However, this year some 2,000 parent fish spawned in the Nanaimo River. The chum-salmon seeding was the best in recent years, especially so in the Chemainus River, where the escapement was heavy and of long duration.

COWICHAN AREA.

The supply of spring salmon was average. The number of parent fish passing Skutz Falls was estimated between twelve and fifteen thousand. The return of cohoe

was the lightest for some years, estimated in numbers to be about 25 per cent. of the brood-year of 1943. Chum-supplies were the heaviest in recent years. The steelhead run is being well maintained.

Victoria Area.

The cohoe seeding was light. In the Sooke Basin area the chum seeding was heavy in Sooke River and smaller streams, as well as at Goldstream, an improvement over the brood-year. In the streams lying west of Sooke Harbour spawning was light. Only the late-run fish entered these streams, due to low-water conditions in the early fall.

Alberni Area.

The seeding of sockeye in the Somass system, including the Sproat and Great Central Lake areas, was satisfactory. Good supplies, fully equal to the brood-year, also appeared at Anderson Lake and Hobarton Lake, in the Nitinat area. Supplies of spring salmon were very good in the Somass, Nahmint, Sarita, and Toquart Rivers. The spawning run of cohoe up Somass River was heavier than that of the brood-year. The actual count of fish over Stamp Falls was 11,734 cohoe, compared with 9,643 in 1943. In the other streams of the area, including Nitinat and Port Renfrew, the seeding was light to medium and generally below expectations. Chum-supplies were satisfactory in all streams, although the escapement was not quite as large as in the brood-year.

Clayoquot Area.

In the Kennedy Lake system the sockeye seeding was heavy, comparable to the brood-year and heavier than in 1945. At Megin Lake, spawning was heavier than in the brood-year but lighter than in 1945. Spring-salmon supplies were the best in the past six years. An unusually large percentage of very large fish was present. The cohoe seeding was the lightest in recent years. On the other hand, the seeding of chums was the heaviest in some years.

Nootka Area.

Spring-salmon supplies in the Gold and Burman Rivers were somewhat lighter than normal. The usual small numbers of cohoe were present. The streams of this area have never been large producers of this variety. The seeding of chums, the heaviest in the past three years, was satisfactory, although slightly less in numbers than in the brood-year.

Kyuquot Area.

The number of parent cohoe was somewhat lighter than normal over the area. The seeding of chums in practically all streams was found to be very satisfactory, somewhat better than in the brood-year.

Quatsino Area.

There was the usual small supply of sockeye on the grounds. Spring-salmon supplies were average in Marble Creek, which is the principal spawning-ground, as well as in other streams in the area, with the exception of Klashkish River, where a light spawning occurred. There was a medium seeding of cohoe over the area, not as good as last year, but a slight improvement over the brood-year. The escapement of pinks was much heavier than during the brood-year and is reported the best since 1936. The supply of chums was fairly satisfactory, better than last year and comparable to that of the brood-year.

STATISTICAL TABLES.

PACK OF BRITISH COLUMBIA SALMON, SEASON 1946.

SHOWING THE ORIGIN OF SALMON CAUGHT IN EACH DISTRICT.

District.	Sockeye.	Springs.	Steel-heads.	Cohoe.	Pinks.	Chums.	Total.
Fraser River	341,957	1,096½	178	9,168½	429	60,713	413,542
Queen Charlotte Islands	.....	.....	5	1,192	8,024	32,414	41,635
Nass River	12,511	472	134	4,239	7,147	13,810	38,313
Skeena River	52,928	2,439	2,366	26,281½	10,737	11,161	105,912½
Rivers Inlet	73,320	1,108½	314	9,524½	1,641½	37,395½	123,304
Smith Inlet	14,318	45	33	177	235	8,369	23,177
Central Area	12,611½	656	934	19,589	81,584½	221,958	337,333
Vancouver Island	35,381½	2,283½	151½	29,983	6,809½	190,313	264,922
Totals	543,027	8,100½	4,115½	100,154½	116,607½	576,133½	1,348,138½

NOTE.—2,914 cases of bluebacks are combined with cohoes in this table for Vancouver Island.

STATEMENT SHOWING THE TOTAL SALMON-PACK BY SPECIES FROM 1938 TO 1946.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	1938.
Sockeye	543,027	329,001½	247,714	164,889	666,570	455,298	366,402	269,887	447,450
Spring	8,100½	12,801	19,362	10,658	24,744½	51,593	17,740	16,098	15,356
Chum	576,133½	350,188½	255,316½	363,347½	633,834	926,801	643,441	386,590	541,819
Pink	116,607½	825,513	389,692	530,189	270,622½	427,774	213,904	620,595	400,876
Cohoe	100,154½	218,886½	181,546½	186,043	211,138	430,513	224,522	245,097	301,081
Steelhead	4,115½	2,922	3,926½	3,095	4,649	3,454	1,207	796	1,036
Totals	1,348,138½	1,739,312½	1,097,557½	1,258,221½	1,811,558	2,295,433	1,467,216	1,539,063	1,707,798

STATEMENT SHOWING THE TOTAL SALMON-PACK OF BRITISH COLUMBIA BY DISTRICTS.

TOTAL PACKED BY DISTRICTS IN 1938 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	1938.
Fraser	413,542	221,351½	130,883½	126,541½	549,617	431,299	152,363	199,241	277,084
Skeena	105,912½	221,471½	149,948½	133,589	152,418½	200,497	195,355	205,604	223,413
Rivers Inlet	123,304	135,412	59,391	79,697½	105,539	138,650	88,665	83,502	122,363
Smith Inlet	23,177	21,682	6,194½	21,942	23,777	32,109	33,998	28,727	44,921
Nass River	38,313	54,980½	61,096	52,333½	100,142½	71,330	60,441	55,946	113,970
Vancouver Island	264,922	492,281½	193,459	347,710½	536,803½	985,835	419,579	590,736	458,554
Other districts	378,968	592,133½	496,587	496,407	343,260½	398,152	516,815	375,307	467,493
Cold storage	.....	.....	.....	.....	.....	46,561	.....	.....	.....
Grand totals	1,348,138½	1,739,312½	1,097,557½	1,258,221½	1,811,558	2,295,433	1,467,216	1,539,063	1,707,798*

* Including 5,779 cases of Alaska sockeye and 26,828 cases of Alaska cohoe packed at Skeena River.

TABLE SHOWING THE TOTAL SOCKEYE-PACK OF THE FRASER RIVER, ARRANGED IN ACCORDANCE WITH THE FOUR-YEAR CYCLE, 1895–1946.

British Columbia	1895— 395,984	1896— 356,984	1897— 860,459	1898— 256,101
Washington	65,143	72,979	312,048	252,000
Total	461,127	429,963	1,172,507	508,101
British Columbia	1899— 480,485	1900— 229,800	1901— 928,669	1902— 293,477
Washington	499,646	228,704	1,105,096	339,556
Total	980,131	458,504	2,033,765	633,033
British Columbia	1903— 204,809	1904— 72,688	1905— 837,489	1906— 183,007
Washington	167,211	123,419	837,122	182,241
Total	372,020	196,107	1,674,611	365,248
British Columbia	1907— 59,815	1908— 74,574	1909— 585,435	1910— 150,432
Washington	96,974	170,951	1,097,904	248,014
Total	156,789	245,525	1,683,339	398,446
British Columbia	1911— 58,487	1912— 123,879	1913— 719,796	1914— 198,183
Washington	127,761	184,680	1,673,099	335,230
Total	186,248	308,559	2,392,895	533,413
British Columbia	1915— 91,130	1916— 32,146	1917— 148,164	1918— 19,697
Washington	64,584	84,637	411,538	50,723
Total	155,714	116,783	559,702	70,420
British Columbia	1919— 38,854	1920— 48,399	1921— 39,631	1922— 51,832
Washington	64,346	62,654	102,967	48,566
Total	103,200	111,053	142,598	100,398
British Columbia	1923— 31,655	1924— 39,743	1925— 35,385	1926— 85,689
Washington	47,402	69,369	112,023	44,673
Total	79,057	109,112	147,408	130,362
British Columbia	1927— 61,393	1928— 29,299	1929— 61,569	1930— 103,692
Washington	97,594	61,044	111,898	352,194
Total	158,987	90,343	173,467	455,886
British Columbia	1931— 40,947	1932— 65,769	1933— 52,465	1934— 139,238
Washington	87,211	81,188	*128,518	352,579
Total	128,158	146,957	180,983	491,817
British Columbia	1935— 62,822	1936— 184,854	1937— 100,272	1938— 186,794
Washington	54,677	59,505	60,259	*135,550
Total	117,499	244,359	160,531	322,344
British Columbia	1939— 54,296	1940— 99,009	1941— 171,290	1942— 446,371
Washington	*43,512	*63,890	110,605	263,458
Total	97,808	162,899	281,895	709,829
British Columbia	1943— 31,974	1944— 88,515	1945— 79,977	1946— 341,957
Washington	*19,117	*37,509	*53,055	*268,561
Total	51,091	126,024	133,032	610,518

* These figures are corrected according to latest advice from the Department of Fisheries, State of Washington, dated May 22nd, 1947.

STATEMENT SHOWING THE SALMON-PACK OF BRITISH COLUMBIA, BY DISTRICTS AND SPECIES.

FRASER RIVER, 1931–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	341,957	79,977	88,515	31,973½	446,371	171,290	99,009	54,296
Springs	1,096½	6,130½	12,577½	3,505½	9,688	34,038	4,504	5,993
Chums	60,713	27,610	13,803½	52,149	82,573	95,070	35,665	30,150
Pinks	429	95,748½	130	29,860½	134	102,388	12	95,176
Cohoes	9,168½	11,615	15,564½	8,809	10,542	28,265	13,028	13,557
Steelheads	178	270½	293	244	309	248	145	69
Totals	413,542	221,351½	130,883½	126,541½	549,617	431,299	152,363	199,241

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	186,794	100,272	184,854	62,822	139,238	52,465	65,769	40,947
Springs	4,308	5,444	15,126	9,401	16,218	5,579	28,701	9,740
Chums	58,778	20,878	31,565	8,227	104,092	34,391	14,948	251
Pinks	63	94,010	.....	111,328	2,199	92,746	385	13,307
Cohoes	27,127	11,244	28,716	24,950	11,392	13,901	16,815	8,165
Steelheads	14	.....	.....	.....	.....	.....	23	657
Totals	277,084	231,848	260,261	216,728	273,139	199,082	126,641	73,067

SKEENA RIVER, 1931–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	52,928	104,279½	68,197	28,268½	34,544	81,767	116,507	68,485
Springs	2,439	2,382	1,500½	1,783	6,374	4,985	6,118	4,857
Chums	11,161	9,264	8,741½	6,597	11,421	10,707	4,682	7,773
Pinks	10,737	69,783½	48,837	54,509	52,767	50,537	47,301	95,236
Cohoes	26,281½	34,201½	20,191½	40,479½	44,081½	50,605	20,614	29,198
Steelheads	2,366	1,561	2,481	1,952	3,231	1,896	133	55
Totals	105,912½	221,471½	149,948½	133,589	152,418½	200,497	195,355	205,604

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	47,257	42,491	81,973	52,879	70,655	36,506	59,916	93,023
Springs	4,318	4,401	4,551½	4,039	8,300	3,297	28,269	9,857
Chums	16,758	10,811	15,297½	8,122	24,388	15,714	38,549	3,893
Pinks	69,610	59,400	91,389	81,868	126,163	95,783	58,261	44,807
Cohoes	52,821	15,514	25,390	23,498	54,456	39,896	48,312	10,637
Steelheads	42	21	33	14	114	267	404	768
Totals	190,806	132,638	218,634	170,420	284,096	185,463	233,711	162,986

STATEMENT SHOWING THE SALMON-PACK OF BRITISH COLUMBIA, BY DISTRICTS AND SPECIES—*Continued.*

RIVERS INLET, 1931–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	73,320	89,735	36,582½	47,602½	79,199	93,378	63,469	54,143
Springs	1,108½	1,191½	805	765	985	1,692	1,226	745
Chums	37,395½	16,793	2,705	11,448	15,874	15,442	9,025	5,462
Pinks	1,641½	9,916	5,289½	8,347	954	4,807	3,329	12,095
Cohoes	9,524½	17,516½	13,921	11,466	8,467	23,202	11,561	10,974
Steelheads	314	260	88	69	60	129	55	83
Totals	123,304	135,412	59,391	79,697½	105,539	138,650	88,665	83,502

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	87,942	84,832	46,351	135,038	76,923	83,507	69,732	76,428
Springs	1,209	917	581½	429	436	449	459	325
Chums	7,759	9,415	11,505	7,136	895	677	944	429
Pinks	9,063	7,536	6,432½	4,554	2,815	5,059	3,483	5,089
Cohoes	16,285	6,012	7,122½	8,375	4,852	3,446	7,062	6,571
Steelheads	105	70	19	39	79	82	29	32
Totals	122,363	108,782	72,011½	155,571	86,000	93,220	81,709	88,874

SMITH INLET, 1931–46, INCLUSIVE.*

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	14,318	15,014	3,165	15,010	15,939	21,495	25,947	17,833
Springs	45	26	66	118	8	124	142	215
Cohoes	177	560	343	541	1,813	1,955	1,102	3,880
Pinks	235	2,362	498½	556	527	749	755	3,978
Chums	8,369	3,692	2,122	5,693	5,490	7,741	6,015	2,771
Steelheads	33	28	666	24	.....	45	37	50
Totals	23,177	21,682	6,194½	21,942	23,777	32,109	33,998	28,727

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	33,894	25,258	12,788	31,648	14,607	37,369	25,488	12,867
Springs	68	21	30	216	164	354	48	122
Cohoes	1,058	241	310	1,201	3,941	5,068	273	112
Pinks	1,761	483	65	4,412	6,953	19,995	1,148	824
Chums	8,076	9,494	1,653	12,427	15,548	8,841	165	133
Steelheads	64	5	42	24	43	87	20	36
Totals	44,921	35,502	14,888	49,928	41,256	71,714	27,142	14,094

* Previously reported in Queen Charlotte and other districts.

STATEMENT SHOWING THE SALMON-PACK OF BRITISH COLUMBIA, BY DISTRICTS AND SPECIES—*Continued.*

NASS RIVER, 1931–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	12,511	9,899	13,083	13,412½	21,085	24,876	13,809	24,357
Springs	472	202	681½	1,002½	1,515	519	1,716	708
Chums	13,810	4,981½	9,143	10,146½	12,518	6,246	5,461	2,500
Pinks	7,147	35,918½	31,854	17,669	49,003½	22,667	29,278	26,370
Cohoes	4,239	3,895	6,102	9,768	15,487	16,648	10,060	1,996
Steelheads	134	84½	232½	335	534	374	117	15
Totals	38,313	54,980½	61,096	52,333½	100,142½	71,330	60,441	55,946

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	21,462	17,567	26,562½	12,712	28,701	9,757	14,154	16,929
Springs	773	1,251	2,167	560	654	1,296	4,408	1,439
Chums	15,911	10,080	20,620½	17,481	2,648	1,775	14,515	392
Pinks	61,477	8,031	75,887½	25,508	32,964	44,306	44,629	5,178
Cohoes	14,159	12,067	11,842	21,810	9,935	3,251	7,955	8,943
Steelheads	188	46	496	143	311	49	10	.....
Totals	113,970	49,042	139,575½	78,214	75,213	60,434	85,671	32,881

VANCOUVER ISLAND DISTRICT, 1931–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Sockeyes	35,381½	5,988	5,288½	7,185	51,961	40,273	15,177	16,259
Springs	2,283½	2,323	3,068½	2,937	5,407	8,038	2,454	2,889
Chums	190,313	136,724	56,029½	132,843	383,005	593,016	279,064	212,949
Pinks	6,809½	242,590½	49,092	130,825	14,474	177,292	33,785	235,119
Cohoes*	29,983	104,528	79,813½	73,846½	81,837½	166,908	88,885*	123,388
Steelheads	151½	128	165	74	119	308	214	132
Totals	264,922	492,281½	193,459	347,710½	536,803½	985,835	419,579	590,736

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Sockeyes	27,965	25,427	32,696½	22,928	27,282	18,397	27,611	22,199
Springs	4,254	2,359	6,340	6,525	1,630	4,875	10,559	4,055
Chums	266,566	203,900	347,951	143,960	210,239	96,642	70,629	16,329
Pinks	70,108	318,780	82,028½	191,627	54,526	172,945	33,403	81,965
Cohoes*	89,471	52,244	90,625	104,366	78,670	60,019	63,637	50,953
Steelheads	190	88	105	21	.....	147	91	40
Totals	458,554	608,798	559,746	469,427	372,347	353,025	205,930	175,541

* Bluebacks are included with the cohoe-pack for Vancouver Island.

STATEMENT SHOWING THE SALMON-PACK OF BRITISH COLUMBIA, BY DISTRICTS AND SPECIES—*Continued.*

QUEEN CHARLOTTE ISLANDS, 1937–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	1938.	1937.
Sockeyes	.....	.....	157	53	1	149	16	1	179	2
Springs	.....	4	20	.....	38	236	62	36	66	140
Chums	32,414	12,132	81,916	35,370	43,801	76,745	164,911	45,519	40,882	72,689
Pinks	8,024	4,809	90,993	313	83,329	524	44,966	2,123	57,952	13
Cohoes	1,192	1,108	19,615	14,488	16,935	27,421	8,897	3,020	16,616	4,631
Steelheads	5	.....	1	.....	41	11	.....	.....	.....	.....
Totals	41,635	18,053	192,702	50,224	144,145	105,086	218,852	50,699	115,695	77,475

CENTRAL AREA, 1937–46, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.	1938.	1937.
Sockeyes	12,611½	24,109	32,715	21,101	17,470	20,854	32,042	26,158	36,178	29,987
Springs	656	542	643	547	723½	460	1,518	655	540	1,641
Chums	221,958	138,992	80,793	109,101	79,152	111,587	135,802	79,384	127,089	110,493
Pinks	81,584½	364,385	162,986	288,109½	69,434	66,130	54,478	150,498	130,842	97,321
Cohoes	19,589	45,462½	25,823	26,645	31,274	45,218	49,886	44,426	56,716	25,009
Steelheads	934	590	666	397	355	330	506	392	433	614
Totals	337,333	574,080½	303,626	445,900½	198,408½	244,579	274,232	301,513	351,798	265,065

STATEMENT SHOWING THE SOCKEYE-PACK OF BRITISH COLUMBIA, BY DISTRICTS, 1931 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.	1940.	1939.
Fraser River	341,957	79,977	88,515	31,973½	446,371	171,290	99,009	54,296
Skeena River	52,928	104,279½	68,197	28,268½	34,544	81,767	116,507	68,485
Rivers Inlet	73,320	89,735	36,582½	47,602½	79,199	93,378	63,469	54,143
Smith Inlet	14,318	15,014	3,165	15,010	15,939	21,495	25,947	17,833
Nass River	12,511	9,899	13,083	13,412½	21,085	24,876	13,809	24,357
Vancouver Island	35,381½	5,988	5,288½	7,185	51,961	40,273	15,177	16,259
Other districts	12,611½	24,109	32,883	21,437	17,471	22,219	32,484	34,514
Totals	543,027	329,001½	247,714	164,889	666,570	455,298	366,402	269,887

	1938.	1937.	1936.	1935.	1934.	1933.	1932.	1931.
Fraser River	186,794	100,272	183,120	62,822	139,238	52,465	65,769	40,947
Skeena River	47,257	42,491	81,973	52,879	70,655	30,506	59,916	93,023
Rivers Inlet	87,942	84,832	46,351	135,038	76,923	83,507	69,732	76,428
Smith Inlet	33,894	25,258	12,788	31,648	14,607	37,369	25,488	12,867
Nass River	21,462	17,567	28,562½	12,712	28,701	9,757	14,154	16,929
Vancouver Island	27,965	25,427	34,430½	22,928	27,282	18,397	27,611	22,199
Other districts	36,357	29,989	27,584	32,417	20,438	26,106	21,685	29,071
Totals	441,671*	325,836	414,809	350,444	377,844	258,107	284,355	291,464

216 cases of Alaska sockeye packed in British Columbia canneries are not shown in the above table for the year 1936.
* 5,779 cases of Alaska sockeye packed at Skeena River are not shown in the above table for the year 1938.

STATEMENT SHOWING THE SPRING-SALMON PACK OF BRITISH COLUMBIA, BY DISTRICTS, 1935 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.*
Fraser River	1,096½	6,130½	12,577½	3,505½	9,688	34,038
Queen Charlotte Islands	.....	4	20	.....	38	236
Nass River	472	202	681½	1,002½	1,515	519
Skeena River	2,439	2,382	1,500½	1,783	6,374	4,985
Rivers Inlet	1,108½	1,191½	805	765	985	1,692
Smith Inlet	45	26	66	118	8	124
Central Area	656	542	643	547	723½	460
Vancouver Island	2,283½	2,323	3,068½	2,937	5,407	8,038
Alaska	.....	.....	.....	.....	6	383
Totals	8,100½	12,801	19,362	10,658	24,744½	50,475

	1940.	1939.	1938.	1937.	1936.	1935.
Fraser River	4,504	5,993	4,308	5,444	15,126	9,401
Queen Charlotte Islands	62	36	66	140	227	63
Nass River	1,716	708	773	1,251	2,167	560
Skeena River	6,118	4,857	4,318	4,401	4,551½	4,039
Rivers Inlet	1,226	745	1,209	917	581½	429
Smith Inlet	142	215	68	21	30	216
Central Area	1,518	655	540	1,641	830	687
Vancouver Island	2,454	2,889	4,254	2,359	6,340	6,525
Totals	17,740	16,098	15,536	16,174	29,853	21,920

* In addition to the above there were packed 1,118 cases of springs out of cold-storage stocks, catch of 1940.

STATEMENT SHOWING THE COHOE-SALMON PACK OF BRITISH COLUMBIA, BY DISTRICTS, 1935 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.*
Fraser River	9,168½	11,615	15,564½	8,809	10,542	28,265
Queen Charlotte Islands	1,192	1,108	19,615	14,488	16,935	27,421
Nass River	4,239	3,895	6,102	9,768	15,487	16,648
Skeena River	26,281½	34,201½	20,191½	40,479½	44,081½	50,605
Rivers Inlet	9,524½	17,516½	13,921	11,466	8,467	23,202
Smith Inlet	177	560	343	541	1,813	1,955
Central Area	19,589	45,462½	25,823	26,645	31,274	45,218
Vancouver Island	29,983	104,528	79,813½	73,846½	81,837½	166,908
Alaska	.....	.....	173	.....	701	31,187
Totals	100,154½	218,886½	181,546½	186,043	211,138	391,409

	1940.	1939.	1938.	1937.	1936.	1935.
Fraser River	13,028	13,557	27,127	11,244	28,716	24,950
Queen Charlotte Islands	8,897	3,020	16,616	4,631	19,920	5,461
Nass River	10,060	1,996	14,159	12,067	11,842	21,810
Skeena River	20,614	29,198	52,821	15,514	25,390	23,498
Rivers Inlet	11,561	10,974	16,285	6,012	7,122½	8,375
Smith Inlet	1,102	3,880	1,058	241	310	1,201
Central Area	49,886	44,426	56,716	25,009	45,824	41,831
Vancouver Island	88,885	123,388	89,471	58,244	90,625½	104,366
Alaska	20,489	14,658	26,828	527	.....	.....
Totals	224,522	245,097	301,081	133,489	229,750	231,492

* In addition to the above there were packed 39,104 cases of cohoe out of cold-storage stocks, catch of 1940.

STATEMENT SHOWING THE PINK-SALMON PACK OF BRITISH COLUMBIA, BY DISTRICTS, 1935 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.
Fraser River	429	95,748½	130	29,860½	134	102,388
Queen Charlotte Islands	8,024	4,809	90,993	313	83,329	524
Nass River	7,147	35,918½	31,854	17,669	49,003½	22,667
Skeena River	10,737	69,783½	48,837	54,509	52,767	50,537
Rivers Inlet	1,641½	9,916	5,289½	8,347	954	4,807
Smith Inlet	235	2,362	498½	556	527	749
Central Area	81,584½	364,385	162,986	288,109½	69,434	66,130
Vancouver Island	6,809½	242,590½	49,092	130,825	14,474	177,292
Alaska	.....	.....	12	.....	.....	2,680
Totals	116,607½	825,513	389,692	530,189	270,622½	427,774

	1940.	1939.	1938.	1937.	1936.	1935.
Fraser River	12	95,176	63	94,010	.....	111,328
Queen Charlotte Islands	44,966	2,123	57,952	13	89,355	1,479
Nass River	29,278	26,370	61,477	8,031	75,887½	25,508
Skeena River	47,301	95,236	69,610	59,400	91,389	81,868
Rivers Inlet	3,329	12,095	9,063	7,536	6,432½	4,554
Smith Inlet	755	3,978	1,761	483	65	4,412
Central Area	54,478	150,498	130,842	97,321	246,378	94,190
Vancouver Island	33,785	235,119	70,108	318,780	82,028½	191,627
Totals	213,904	620,595	400,876	585,574	591,535½	514,966

STATEMENT SHOWING THE CHUM-SALMON PACK OF BRITISH COLUMBIA, BY DISTRICTS, 1935 TO 1946, INCLUSIVE.

	1946.	1945.	1944.	1943.	1942.	1941.*
Fraser River	60,713	27,610	13,803½	52,149	82,573	95,070
Queen Charlotte Islands	32,414	12,132	81,916	35,370	43,801	76,745
Nass River	13,810	4,981½	9,143	10,146½	12,518	6,246
Skeena River	11,161	9,264	8,741½	6,597	11,421	10,707
Rivers Inlet	37,395½	16,793	2,705	11,448	15,874	15,442
Smith Inlet	8,369	3,692	2,122	5,693	5,490	7,741
Central Area	221,958	138,992	80,793	109,101	79,152	111,587
Vancouver Island	190,313	136,724	56,029½	132,843	383,005	593,016
Alaska	.....	.....	63	.....	.....	3,908
Totals	576,133½	350,188½	255,316½	363,347½	633,834	920,462

	1940.	1939.	1938.	1937.	1936.	1935.
Fraser River	35,665	30,150	58,778	20,878	31,565	8,227
Queen Charlotte Islands	164,911	45,519	40,882	72,689	69,304	86,298
Nass River	5,461	2,500	15,911	10,080	20,620½	17,481
Skeena River	4,682	7,773	16,758	10,811	15,297½	8,122
Rivers Inlet	9,025	5,462	7,759	9,415	11,505	7,136
Smith Inlet	6,015	2,771	8,076	9,494	1,653	12,427
Central Area	135,802	79,384	127,089	110,493	99,592	125,953
Vancouver Island	279,064	212,949	266,566	203,900	347,951	143,960
Alaska	2,816	82	.....	.....	.....	.....
Totals	643,441	386,590	541,819	447,760	597,488	409,604

* In addition to the above there were packed 6,339 cases of chums out of cold-storage stocks, catch of 1940.

STATEMENT SHOWING THE QUANTITY OF PILCHARD PRODUCTS PRODUCED IN BRITISH COLUMBIA, 1930 TO 1946.

Season.	Canned.	Meal.	Oil.
	Cases.	Tons.	Gals.
1930–31	55,166	13,934	3,204,058
1931–32	17,336	14,200	2,551,914
1932–33	4,622	8,842	1,315,864
1933–34	2,946	1,108	275,879
1934–35	35,437	7,628	1,635,123
1935–36	27,184	8,666	1,634,592
1936–37	35,007	8,715	1,217,087
1937–38	40,975	8,483	1,707,276
1938–39	69,473	8,891	2,195,850
1939–40	7,300	906	178,305
1940–41	59,166	4,853	890,296
1941–42	72,498	11,437	1,916,191
1942–43	42,008	11,003	1,560,269
1943–44	94,512	15,209	2,238,987
1944–45	78,772	8,435	1,675,090
1945–46	79,536	5,812	1,273,329
1946–47	4,359	699	81,831

STATEMENT SHOWING THE QUANTITY OF HERRING PRODUCTS PRODUCED IN BRITISH COLUMBIA, 1935 TO 1946.

Season.	Canned.	Dry-salted.	Pickled.	Meal.	Oil.
	Cases.	Tons.	Tons.	Tons.	Gals.
1935–36	26,143	14,983	.....	5,313	328,639
1936–37	20,914	16,454	.....	10,340	786,742
1937–38	27,365	10,230	.....	14,643	1,333,245
1938–39	23,353	7,600	.....	18,028	1,526,117
1939–40	418,021	7,596	.....	22,870	1,677,736
1940–41	640,252	5,039	892	10,886	923,137
1941–42	1,527,350	.....	779	8,780	594,684
1942–43	1,253,978	.....	502	4,633	323,379
1943–44	1,198,632	.....	591	7,662	512,516
1944–45	1,190,762	.....	26	9,539	717,655
1945–46	1,307,514	302	100	5,525	521,649
1946–47	1,634,286	5,807	129½	7,223	484,937

The above figures are for the season, October to March 31st, annually.

STATEMENT SHOWING THE QUANTITY OF MEAL, OIL, AND FERTILIZER PRODUCED FROM SOURCES OTHER THAN HERRING AND PILCHARD, 1935 TO 1946.

Season.	From Whales.			From Fish Livers.	From other Sources.	
	Whalebone and Meal.	Fertilizer.	Oil.	Oil.	Meal and Fertilizer.	Oil.
	Tons.	Tons.	Gals.	Gals.	Tons.	Gals.
1935–36	211	354	426,772	.....	2,226	260,387
1936–37	332	687	763,740	.....	2,857	356,464
1937–38	268	527	662,355	.....	2,445	266,009
1938–39	273	512	543,378	.....	2,059	186,261
1939–40	.....	.....	.....	.....	3,559	331,725
1940–41	181	434	361,820	.....	4,998	415,856
1941–42	270	561	619,025	.....	5,410	405,340
1942–43	130	205	255,555	916,723	4,768	338,502
1943–44	62	90	134,553	822,250	4,332	60,000
1944–45	.....	.....	.....	545,736	2,721	301,048
1945–46	.....	.....	.....	445,858	4,560	513,442
1946–47	.....	.....	.....	211,914	4,208	453,008

CATCH OF FISH TAKEN FROM NON-TIDAL WATERS, 1945–46 SEASON.

Lakes and Rivers.	Kind of Licence.			Trout.		Kokanee.		Lake-trout.		White-fish.		Carp.		Ling.		Squaw-fish.		Suckers.		Other Fish.		No. of Fish taken.	Approximate Weight (Lb.).
	Fur-farm.	Ordinary.	Sturgeon.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.		
Burns Lake	1	1	....																				
Christina Lake	....	9	....	50	8	1,280	360			95	80	32	110	138	685	28	78	265	735			1,888	2,056
Cluculz Lake	2	....	....	31	35			4	48	820	1,183			472	2,248	2,377	1,733	3,518	7,860	5,233	2,255	12,455	15,362
Cobb Lake	1	....	....	29	32			4	47	819	1,882											852	1,961
Chief Lake	2	....	....													124	182	195	297			319	479
Columbia River and sloughs	2	....	....													161	218	55	79			216	297
Dahl Lake	1	....	....																				
Decker Lake	1	....	....																				
Duck Lake	....	1	....																				
Eaglet Lake	2	....	....											186	143	637	374	509	294	1,548	311	2,880	1,122
Finger Lake	2	....	....	45	22					775	262							808	405			1,628	689
Francois Lake	1	7	....					87	266	181	395			50	189			53	25	59	414	430	1,289
McLeod Lake	1	....	....							300	325					100	200	150	175			550	700
Moberly Lake	....	3	....							3,800	7,600											3,800	7,600
Norman Lake	1	....	....																				
Nulki Lake	2	....	....	16	21					1,177	920	1,337	868	50	243	1,239	1,272	483	502	1,167	1,006	5,469	4,832
Nechako River	....	....	1															Sturgeon		2	190	2	190
Okanagan Lake	....	58	....	67	73	49,708	17,066	20	600			3,332	10,000			17	52					53,144	27,791
Ootsa Lake	2	....	....	21	30	1,500	250			14	15			355	1,198	291	102	275	302			2,456	1,897
Pinkut Lake	1	....	....																				
Pinchi Lake	1	....	....																				
Squakum Lake	....	1	....																				
Stuart Lake	2	....	....							413	423			17	44	264	513	579	882			1,273	1,862
Swan Lake	....	2	....							314	1,047							156	388	101	230	571	1,665
Sinclair Lake	2	....	....	21	29	1,500	250			15	16			61	204	113	179	211	231			1,921	909
Sinkut Lake	1	....	....									2,410	8,965			655	1,042	192	426			3,257	10,433
Tamarack Lake	1	....	....															210	215			210	215
Tachick Lake	1	....	....																				
Tatuk Lake	2	....	....	45	23	517	259			775	262							802	405			2,139	949
Takalaska Lake	1	....	....																				
Takysie Lake	1	....	....															2,733	4,027			2,733	4,027
Watson Lake	1	....	....																				
Windermere Lake and sloughs	2	....	....													650	760	345	410			995	1,170
Canal between Woods and Long Lakes	....	1	....																				
Totals	....	....	....	325	273	54,505	18,185	115	961	9,498	14,410	7,111	19,943	1,329	4,954	6,656	6,705	11,539	17,658	8,110	4,406	99,188	87,495

Number of non-tidal fishing licences issued for 1945–46 season—

Fur-farm fishing licences	25
Ordinary fishing licences	84
Sturgeon fishing licences	1
Total	110

CATCH OF FISH TAKEN FROM NON-TIDAL WATERS, 1946–47 SEASON.

Lakes and Rivers.	Kind of Licence.			Trout.		Kokanee.		Lake-trout.		White-fish.		Carp.		Ling.		Squaw-fish.		Suckers.		Other Fish.		No. of Fish taken.	Approximate Weight (Lb.).
	Fur-farm.	Ordinary.	Sturgeon.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.	No.	Lb.		
Arrow Lake	3	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Burns Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bowron Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bickle Lake	....	1	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	146	314	154	322	.....	.....	300	636
Bobtail Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cluculz Lake	2	....	....	23	23	.....	.....	2	20	2,124	2,662	.....	.....	344	1,747	2,965	1,463	3,137	7,777	3,507	1,325	12,102	15,017
Cobb Lake	2	....	....	24	24	.....	.....	2	20	2,124	2,662	.....	.....	344	1,748	2,965	1,462	3,138	7,778	3,507	1,345	12,104	15,039
Chief Lake	2	....	....	.....	.....	.....	.....	.....	.....	458	534	.....	.....	70	375	642	1,269	2,167	5,084	.....	.....	3,337	7,262
Cameron Lake	....	3	....	.....	.....	.....	.....	250	2,500	1,000	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,250	6,500
Clatlatiently Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Christina Lake	....	21	....	.....	.....	2,955	665	.....	.....	.....	.....	.....	.....	.....	.....	100	350	.....	.....	.....	.....	3,055	1,015
Columbia River and sloughs	3	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	260	247	23	26	.....	.....	283	273
Decker Lake	1	....	....	.....	.....	150	75	.....	.....	.....	.....	.....	.....	60	300	200	600	375	550	.....	.....	785	1,525
Eaglet Lake	3	....	....	.....	.....	30	10	.....	.....	.....	.....	.....	.....	38	164	338	210	303	213	910	192	1,619	789
Francois Lake	1	8	2	.....	.....	40	15	214	1,631	251	711	.....	.....	46	254	28	67	235	741	.....	.....	814	3,419
Finger Lake	2	....	....	115	103	683	342	.....	.....	1,000	350	.....	.....	.....	.....	.....	.....	942	280	.....	.....	2,740	1,075
Granby River	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McLeod Lake	....	1	....	.....	.....	.....	.....	.....	.....	300	240	.....	.....	.....	.....	250	250	400	300	.....	.....	950	790
Moberly Lake	....	3	....	.....	.....	.....	.....	250	2,500	1,000	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,250	6,500
Nulki Lake	2	....	....	14	17	.....	.....	.....	.....	379	350	.....	.....	51	291	1,138	1,228	503	524	757	493	2,842	2,903
Naltesby Lake	1	....	....	.....	.....	650	325	.....	.....	.....	.....	.....	.....	.....	.....	670	800	225	505	.....	.....	1,545	1,630
Nechako River	....	....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Okanagan Lake	....	62	....	.....	.....	10,449	3,896	.....	.....	.....	.....	253	1,006	.....	.....	7	12	6	9	.....	.....	10,715	4,923
Ootsa Lake	2	....	....	22	31	500	250	.....	.....	14	15	.....	.....	61	170	95	121	244	272	.....	.....	936	859
Otter Lake	....	3	....	.....	.....	.....	.....	.....	.....	.....	.....	12	40	.....	.....	.....	.....	.....	.....	.....	.....	12	40
Pinkut Lake	....	1	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pinchi Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richardson Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stuart Lake	2	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150	300	.....	.....	.....	.....	150	300
Swan Lake	....	3	....	.....	.....	.....	.....	.....	.....	95	386	.....	.....	83	285	.....	.....	82	243	17	167	277	1,081
Sinkut Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	3,510	999	.....	.....	1,669	823	370	774	.....	.....	5,549	2,596
Smelter Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sinclair Lake	2	....	....	22	30	500	250	.....	.....	14	14	.....	.....	60	170	94	120	243	271	.....	.....	933	855
Tatuk Lake	2	....	....	114	103	683	342	.....	.....	1,000	350	.....	.....	.....	.....	.....	.....	942	280	.....	.....	2,739	1,075
Tahtsa River	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Takysie Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Takalaska Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tatalrose Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tachick Lake	1	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Whatshan Lake	3	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Watson Lake	....	2	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	145	315	154	323	.....	.....	299	638
Woods Lake	....	2	....	.....	.....	.....	.....	.....	.....	.....	.....	250	1,000	.....	.....	.....	.....	.....	.....	.....	.....	250	1,000
Windermere Lake and sloughs	2	....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	260	248	22	27	.....	.....	283	276
Totals	....	....	....	334	331	16,640	6,170	718	6,671	9,759	16,274	4,025	3,045	1,158	5,505	12,122	10,199	13,665	26,299	8,698	3,522	67,119	78,016

Number of non-tidal fishing licences issued for 1946–47 season—

Fur-farm fishing licences	30
Ordinary fishing licences	99
Sturgeon fishing licences	3
Total	132

No sturgeon were taken by licence-holders.

VICTORIA, B.C.:
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