Being the Ninetieth Annual Fisheries
Report of the Government of Canada

50146-0—1

To His Excellency The Right Honourable Vincent Massey, C.H.,
Governor-General and Commander-in-Chief of Canada.

May it Please Your Excellency:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Annual Report of the Department of Fisheries for the fiscal year 1956-57.

Respectfully submitted

J. Angus MacLean

Minister of Fisheries.

50146-0—2

To His Excellency The Right Honourable Vincent Massey, C.H.,
Governor-General and Commander-in-Chief of Canada.

May it Please Your Excellency:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Annual Report of the Department of Fisheries for the fiscal year 1956-57.

Respectfully submitted

Minister of Fisheries.

50146-0—2

To The Honourable J. Angus MacLean, M.P.,
Minister of Fisheries,
Ottawa, Canada.

Sir:

I submit herewith the Annual Report of the Department of Fisheries for the fiscal year 1956-57.

I have the honour to be, Sir,

Your obedient servant,

E. R. Clark.

Deputy Minister.

CONTENTS

APPENDIX

50146-0—2½

INTRODUCTION

CANADA'S fishing industry is a highly diversified one, with immense resources off both the North Atlantic and the North Pacific seaboards and in the many inland lakes and rivers. The year 1956-57 was a relatively good one for commercial fishermen and the industry generally.

The annual catch for the entire country now runs about two billion pounds, with a landed value in excess of $100 million and a marketed value in the neighbourhood of $200 million.

The ensuing report gives details of this catch and of the work of the various services of the Department of Fisheries and the Fisheries Research Board of Canada. The year under review saw very interesting changes and developments in the industry, including the continuing process of evolution in fishing craft and gear and technological improvements in the processing industry. The increasing use of mechanical aids and electronic devices tends to lessen manual labour in the fishing operations and to increase productivity. Management in the industry has shown keen interest in quality of product and the Department, with the co-operation of industry, is establishing operational standards for processing plants.

The Department has continued to expand its works in conservation and protection of the fisheries both in Canadian inland and coastal waters and on the high seas; the Government now has representatives on seven international commissions which recommend legislation to provide management, based on scientific research, of the fishery resources which are shared with other countries.

In addition to its work in research and management, the Department has continued its educational programme for fishermen, the processing industry and the public generally.

CONSERVATION AND DEVELOPMENT SERVICE

The year brought new problems caused by the expansion of the fishing fleets, technological development in catching and processing methods and, particularly in British Columbia, by a spectacular industrial growth. In the latter instance new projects requiring attention were so numerous that the existing staff of engineers, biologists and technicians was unable to keep pace with essential studies. The problems were raised by many changes in environment including hazards to the fishery brought about by power developments, water pollution, the construction of gas pipelines, water supply projects for irrigation, pulp making and other industrial uses, and the removal of gravel from spawning streams.

In general however, there was a continuing improvement in the public attitude towards conservation and development of both commercial and sports fisheries in Canada. This, in part at least, is a reflection of the work of Fishery Officers who, in addition to administering the regulations, are always prepared to instruct and advise those who wish to learn more about managing the fisheries resource. These officers also give information where required in other matters of mutual interest to the Department and the public, such as salt assistance to fishermen, fishing bounties and vessel insurance.

The results of educational work, carried out in co-operation with other services of the Department and the Fisheries Research Board of Canada, are particularly apparent with respect to lobster conservation. The explanation and discussion was followed by more efficient deployment of patrols and stricter enforcement. The co-operation of most of the fishermen has been striking even to the extent of requesting increases in size limits and other limitations because these would give rise to future benefits.

Fish Culture

Pacific Area

During recent years the problems facing the salmon fishery as a result of industrial development on rivers and harbours have been a prime concern of the fish culture staff of the Pacific Area establishment, and this year the problems were greater than ever before. There were so many new projects that the existing staff of engineers, biologists and technicians, for the first time in years, was unable to keep pace with needed investigations. Consequently an expansion was planned which would nearly double the 1956 staff by mid-1957, bringing the total to 11 engineers, 11 biologists and 20 technicians.

It was hoped that with the increased personnel, work on the expansion of the salmon fishery by fishway construction and other fish cultural techniques could be resumed. Such efforts were curtailed in 1956 in order that effects of the industrial growth on fisheries could be given all possible attention.

Because of the staff shortage and the increasing demands of industry, the owners of some of the larger and more urgent hydro-electric projects were requested to assist in the required fisheries surveys both in the matter of finance and in providing personnel. The proposed Somass project of the British Columbia Power Commission was notable in this connection. The Commission agreed to employ temporary staff to work on biological surveys under the supervision of the Fish Culture Branch, and to have its consulting engineers undertake a large part of the engineering surveys required to determine the effect of the project on the fishery.

In the same area, a storage dam project of the MacMillan and Bloedel Company at Great Central Lake also required urgent solution, and the company agreed to pay for overtime work by staff of the Fish Culture Branch to meet the problem. This involved the construction and testing of a hydraulic model at the University of British Columbia.

New hydro-electric projects which were studied during the year included three diversions of adjacent river systems into the Campbell River watershed, a proposed project on the Nass River (an important producer of all five species of Pacific salmon), a project at Moran on the Fraser River involving construction of a dam over 700 feet high, a new project for diversion of the Chilko River to the Pacific Coast, and a project on the Yukon River near Whitehorse. In addition, studies were continued on several completed hydro-electric projects including Jones Creek, Puntledge River, Theodosia River and Seton Creek, and on several under construction, among which were Alcan's Nechako-Kitimat project and the Cheakamus River project of the B.C. Electric Company.

A study of possible pollution problems increased tremendously with the planning and building of many new industrial plants. Some 20 separate projects were considered, and solutions arrived at for reducing the hazard to fish life to a minimum. Among the most important of these involved the effluents from a brewery at Prince George, a base metals mine on Vancouver Island, a uranium mine and mill on the North Thompson River, and increased effluents caused by the expansion of several pulp mills. A major new problem of this type was a proposal to spray forest areas on Vancouver Island with DDT to control an infestation of the black-headed budworm. This problem remained unsettled at the end of the year under review.

Increased human population accompanied the increase in industrialization and as a result there were sewage disposal projects in 10 separate areas of the lower mainland of British Columbia. Solutions to all these were devised to ensure that discharge of the effluent would not endanger fish life in the rivers and streams involved.

Miscellaneous projects which required study to prevent harm to the fisheries included construction of a natural gas pipeline across the province, various water supply projects for irrigation, pulp making and other industrial uses, and the removal of gravel from salmon spawning streams. In this connection all water licenses issued by the province were screened for possible harmful effects on the fisheries, as were all applications for special placer mining leases. In addition many applications for gravel leases were checked and in some cases altered or deferred through the co-operation of the Lands Department of the Provincial Government.

While construction of new fishways to overcome natural obstructions was reduced to a minimum because of the extra work load, one installation was completed on the Indian River near Butedale. Vertical slot fishways of reinforced concrete were built at the lowest falls on this river, near its mouth, and have already proved successful in releasing upstream passage for large numbers of salmon. Another pair of fishways was almost completed by the end of the fiscal year on the Naden River, Queen Charlotte Islands. These were built partly of concrete and partly of treated timber and plywood.

The co-operative programme with the Fisheries Research Board of Canada on the artificial spawning channel at Jones Creek was continued. The return of adult pink salmon from the eggs transplanted from the Skeena River in 1954 was very satisfactory when over 2,700 salmon returned to the channel to spawn successfully. An additional 1,000,000 eggs were transplanted from the Skeena watershed to bolster the run further.

In addition to this joint work with the Research Board, many of the projects mentioned in the foregoing required co-operative study with other fisheries agencies such as the International Pacific Salmon Fisheries Commission, the B.C. Game Commission, the Washington State Department of Fisheries and the United States Fish and Wildlife Service. Some of these programmes were aimed at increasing knowledge with respect to the general problems concerning power and fish; in this respect they were of much value. Expansion of such efforts was planned for the ensuing years.

Newfoundland

The activities of this branch in implementing measures to increase and perpetuate stocks of anadromous fish were extended in April, 1956, when the Province of Newfoundland requested the Government of Canada to take over the administration of all fisheries in inland waters.

Most of the work of the branch is devoted to the Atlantic salmon since this is one of the most important species that may be seriously affected by the increased use of the rivers for power development and other purposes. One of the main functions of the Fish Culture Development Branch is to investigate such developments where they might affect salmon and trout and to recommend ways and means to preserve these populations. The Newfoundland unit also has a continuing programme of overcoming natural obstacles in rivers and of opening up new areas, where possible, for salmon production.

During the year stream improvements of various kinds were crraied out on the Cape Roger River, the Bay de l'Eau River, Little Salmonier River and Northeast Brook (Clode Sound). At Pinchgut Lake, a pulp and paper company built a new wooden fishway through its logging dam. The fishway was designed by the Department, but paid for by the company, which is to be commended for its co-operation.

A detailed examination of Rattling Brook (Norris Arm) and its fish population was completed during 1956 to determine the effect a proposed power development would have on this stream.

Shorter surveys, including some made from the air, were carried out on several other streams proposed for power development. These included two streams on the west side of Notre Dame Bay, one stream on White Bay, and three rivers on the Burin Peninsula. An investigation was conducted on the effect of a logging dam on the salmon of a medium-sized river in Notre Dame Bay. Preliminary engineering surveys were made on natural and artificial obstructions on the Exploits River and one of its tributaries, and on Indian River (Hall's Bay). Short ground surveys were also conducted on specific areas of Middle Brook Arm (White Bay), Tommy's Arm River (Notre Dame Bay) and Burlington River (Notre Dame Bay).

A salmon count was made of the salmon entering four rivers (Rattling Brook, West River, Terra Nova River and Middle Brook), and estimates of the numbers taken by anglers there indicated that the catches ranged from 20 to 30 per cent of the runs.

Maritimes Area

General progress in its several phases is noted in the overall picture of fish culture in the Maritimes Area for 1956.

Nova Scotia hatchery stocks, brought into extreme jeopardy by heavy floods in January, suffered severe losses. Prompt action in effecting repairs, particularly at the Kejimkujik establishment, offset this damage to some extent by providing adequate rearing facilities for fry and fingerlings obtained from the eggs safely in incubation during the flood period.

In the hatchery service, priority was given to the rearing of larger Atlantic salmon parr. The objective set for this was 600,000 yearlings. The disastrous January floods rendered this impossible since many thousands of young salmon escaped from their retaining ponds in the No. 5 fingerling stage. These fish were not entirely lost but dispersed into waters other than those intended for their distribution. The final planned distributions of this yearling group amounted to about 400,000. Many of these fish had taken on the external characteristics of smolts before distribution, some even before reaching the yearling stage.

The total distributions of hatchery stocks were as follows: Atlantic salmon, 9,937,200; Speckled trout, 11,204,250; brown trout, 983,000; rainbow trout, 315,000; lake trout, 165,900; Arctic char, 7,250, or a total of 22,725,900.

In collections of eggs, parent Atlantic salmon stocks at New Mills and River Phillip fell far short of the supply anticipated. Fortunately this was offset by the re-opening of the Margaree Salmon Pond. Over 49,000,000 eggs were collected altogether; of these 27,800,000 were speckled trout, 19,470,200 Atlantic salmon and the remainder were brown trout, rainbow trout, Arctic char and landlocked salmon. Some lake trout eggs were imported from Manitoba and the United States, and a quantity of brown trout eggs also was imported from the United States.

A survey of all hatcheries and rearing ponds was begun early in the year, and pending the outcome of this, construction was limited although some projects were completed. These were chiefly in connection with increased rearing facilities for Atlantic salmon and the capture and retention of parent salmon stocks. Six

new rectangular ponds were built at Charlo and six at Miramichi; six circular ponds were built at Antigonish and one at Coldbrook, and a 500-foot fence and salmon trap were built at Margaree Harbour.

Many major repairs during the year were necessitated as a result of the January floods. These included, among others, the replacement of supply troughs at Grand Falls and the reconstruction of the dam and other installations at Kejimkujik.

Hatchery products were shown on a rather large scale at summer and early fall exhibitions at Saint John, St. Stephen, Fredericton, Sussex, Woodstock and St. Basile in New Brunswick, and Lunenburg, New Grafton, Kentville, Sherbrooke, Guysborough and Lawrencetown in Nova Scotia.

In the early spring of 1956 construction began on fishways at the Parnel and Zwicker dams, LaHave River, Nova Scotia. Repairs to the fishway at Indian Falls and to the ponds and grounds at Grand Lake were completed. A run-around fish pass was graded at Ernst Mill dam, Echo Lake, N.S., and repairs to the Sherbrooke and Wentzell dams, LaHave River, were started. Salmon fences were installed at Rogers Mills, Nictaux River, N.S., and Rocky Brook, N.B. In the fall fishways were completed at Lequille, Zwicker and Parnell dams. A new concrete wall was built for the sub-hatchery at Florenceville. Later fall and early winter saw the start of work to clear the last barriers on the upper LaHave River.

As in the preceding year, biologists and technicians of the service were employed largely in making surveys and carrying out projects chiefly affecting the programme of Atlantic salmon investigations. General surveys were completed on the Liscomb River and Salmon River, (Halifax County), Jordan, Wallace, Phillip and Salmon Rivers, (Guysborough County), in Nova Scotia, and on the Tabusintac, Jacquet, Nashwaak, Keswick, St. Croix, Nipisiquit and Pocologan Rivers in New Brunswick. General surveys of 18 lakes were carried out to obtain data on which to construct a plan of management.

Following the fish culture technique of eliminating fish populations of undesirable species, poison again was used as the controlling or eliminating agent for coarse fish. The first attempt at spring poisoning undertaken in the Maritimes Area was the treatment of Randall Lake, Lunenburg County, N.S. Later 5,000 speckled trout fingerlings were planted in the water as a biological control.

Experiments in fertilization and predator control in lakes in both New Brunswick and Nova Scotia were continued, as were studies on stream pollution and its prevention.

Experimental predatory bird control was continued on the Miramichi and St. Mary's Rivers. The number of American mergansers now on these streams shows that a very satisfactory annual reduction has been effected in the immediate areas. Each year since 1954 has shown a substantial reduction in the numbers of birds killed.

Oyster Culture

The Department of Fisheries and the Fisheries Research Board of Canada again co-operated during the year in carrying out investigations to improve the position of the oyster industry in the Maritime Provinces. The Department of

50146-0—3½

Fisheries efforts are supervised by the Director of the Department's Conservation and Development Service and the Fisheries Research Board's efforts by the Director of the Atlantic Biological Station. Field supervision was exercised from the Prince Edward Island Biological Station at Ellerslie, Prince Edward Island.

Mortalities in the New Brunswick and Nova Scotia Oyster Populations

Through the year 1956 mortalities in the oyster populations of New Brunswick and Nova Scotia increased alarmingly. By September of 1956 Miscou Harbour, Caraquet Bay and the north side of Miramichi Bay were the only areas in New Brunswick from which there was any market production. The Bras d'Or Lakes area in Nova Scotia has shown no serious losses. In all other areas the mortalities are from 80 to 90 per cent.

The principal work of the Fisheries Research Board's Oyster Investigations during 1956 was the study of the epidemic disease and the comparison of it with the disease commonly known as "Malpeque" which caused similar mortalities in the oyster producing waters of Prince Edward Island from 1914 to 1920. Although this research programme is far from complete, there is now sufficient bacterial, epidemiological and circumstantial evidence to indicate that the disease now active in the waters of New Brunswick and Nova Scotia is almost surely the same as that which was active in the waters of Prince Edward Island from 1914 to 1920.

Rehabilitation of Disease Stricken Areas

Investigations to date by the Fisheries Research Board indicate:

(*a*) That the epidemic disease now affecting the waters of Nova Scotia and New Brunswick is the same as that which affected the waters of Prince Edward Island from 1914 to 1920.

(*b*) That oysters now growing in the waters of Prince Edward Island are resistant to the disease and that their progeny will also bear this resistance.

(*c*) That if stricken areas are left to themselves a natural rehabilitation will occur in from 10 to 15 years, but that if even small quantities of disease-resistant stock are introduced to a stricken area the rehabilitation period can be reduced by from 5 to 7 years.

Based on these conclusions, the Department of Fisheries has initiated a programme for the rehabilitation of the disease stricken areas of New Brunswick and Nova Scotia over a three-year period. During this time 10,000 barrels of disease-resistant oysters, purchased by tender by the Department of Fisheries in Prince Edward Island, will be moved to the stricken areas in New Brunswick and Nova Scotia.

The first phase of this programme was planned for May and June of 1957 when 1,500 barrels of disease-resistant oysters will be transferred,—1,000 barrels to the Shippegan District of New Brunswick and 500 barrels to the Wallace-Malagash Area of Nova Scotia. These areas were chosen for the first transplant since both have suffered a 90 per cent mortality and since it is considered that stocks are most likely to be built up more quickly in areas where oyster farming is actively practised.

Only sub-standard oysters will be used throughout the rehabilitation programme since this Department has no desire to interfere with the normal market production of Prince Edward Island and since it is known that the market quality of oysters is environmental rather than hereditary.

Commercial Scale Trials

Trials of various methods and procedures of oyster culture on a commercial basis were continued through 1956 at the Department's Experimental Oyster Farms at Ellerslie, P.E.I., Orangedale, Nova Scotia, and Shippegan, New Brunswick.

Spat Collection

Tests of the efficiency of various types of spat collectors were continued in 1956 in all waters under investigation.

Oyster farmers require a set of about two well grown spat per square inch of collector for the set to be considered of "commercial" value. Conditions throughout the Maritimes during 1956, with the exception of the Bras d'Or Lakes area, provided an average set of less than 1.5 spat per square inch. The 1956 set was therefore of little "commercial" value with the exception of the Bras d'Or Lakes area where the set varied from 1.1 to 39.6 spat per square inch.

Rearing Oysters in Dyked Areas

Rearing tests of oysters in dyked areas were conducted on the tidal flats at the Department's Experimental Oyster Farm at Malagash, Nova Scotia. Since this was one of the areas recently hit by the epidemic oyster disease and all oysters growing under test have succumbed to the disease further rearing tests have been postponed until the rehabilitation of this area has been accomplished.

The natural deposit of large amounts of silt in dyked areas is the biggest problem in this method of oyster culture. For this reason, further tests and modifications of the hydro pump for the removal of silt from dyked areas were conducted during 1956.

Experimental Oyster Farming in Cape Breton

Trials to explore the economics of oyster farming in the Bras d'Or Lakes Area were continued in 1956 at the Department's Experimental Oyster Farm at Orangedale, Nova Scotia. As was the case during 1955, the paramount problem was the infestation of starfish on the experimental area.

It has been established that the greatest amount of starfish damage is done by the smaller starfish—$1\frac{1}{2}$ inches or less—to seed oysters and that it is therefore not economically sound to plant seed oysters directly on the bottom in this area. Seed oysters must first be reared on trays or by some other means that will protect them from starfish until they have reached "bedding" size. This will increase the production cost of this area considerably.

Starfish mopping was continued at intervals throughout the open water season. During 1956, 726 man-hours were expended in mopping 66,836 starfish. Since

starfish mopping was started in 1953 on this area, 1,251 man-hours have been expended in mopping 243,971 starfish.

Planting Seed Stock on Tidal Flats

Trials to establish a more economical method of rearing seed stocks were continued during 1956 on the tidal flats at Conway Narrows, Prince Edward Island. These trials were commenced in 1953 when eight barrels of separated spat were planted on the flats. During the summer of 1955 the planted area was opened to public picking and 40 barrels of "bedding" size oysters were removed from the area. The area was again opened for public picking during the summer of 1956 at which time an additional 40 barrels of "bedding" oysters were picked. A second planting of 13 barrels of separated spat was made on the area in 1956.

In the light of the highly successful results of these trials it is considered that this method of rearing small oysters can replace the present tray method when suitable bottom and hydrographic conditions are found on areas of tidal flats. Oyster farmers rearing spat on these tidal flats can overcome the high cost of rearing trays.

Oyster Leasing Programme

Revenue to the Department from oyster leases during 1956 amounted to $3,375.45.

As of March 31, 1957, there was a total of 1,340 oyster leases in effect in the three Maritime Provinces, which included a total of 3,130.8 acres under cultivation.

Oyster Lease Surveys

During the year 1956, 102 surveys of areas for oyster leases were completed as well as other work pertaining to these surveys and the maintenance of oyster lease boundaries in Prince Edward Island, New Brunswick and Nova Scotia.

Picking Oysters for Seed Stock

Oyster farmers throughout the Maritimes continue to look to picking of "wild" oysters as the main source of seed stock for their oyster farms. During the 1956 picking season which extended from June 1 to September 24, 493 permits were issued to pick oysters for stocking purposes.

Public Oyster Fishing in the Miramichi Area

During a check of oyster fishing conditions in Miramichi Bay, an extensive oyster bed was located off "Grand Dune" in water too deep to permit fishing with tongs or rakes. A thorough investigation of this bed was made with a drag during the early summer of 1956. At that time it was estimated that approximately 3,000 barrels of market size oysters could be taken from this bed by dragging. It was felt that if these oysters remained on the area for another season they would succumb to the epidemic oyster disease presently affecting oyster stocks in New Brunswick and Nova Scotia waters. Accordingly, special authority was granted by the Minister, under amendment SOR 56-303 to the New Brunswick Fishery Regulations, permitting public oyster fishing with drags on the "Grand Dune" area.

During the early part of the marketing season local fishermen using drags removed 1,161 barrels of oysters from this area at a landed value of $23,220.00.

A second examination of the area, made in late September of 1956, showed that a 50 per cent mortality had occurred in the remaining stock. It is, therefore, worthy of note that the Department's action in opening this area to fishing with drags provided local fishermen with a considerable income at a time when they were faced with the extinction of their regular tong fishery as a result of recent oyster mortalities in New Brunswick waters.

The Maritime Oyster Industry

The overall picture of the Maritime oyster industry during 1956 definitely showed the effect of the disease presently attacking oyster populations in New Brunswick and Nova Scotia. The annual production from the three Maritime Provinces reached its lowest level since 1921 at 19,000 barrels. The major portion of this production came from Prince Edward Island where stocks are resistant to the disease.

It can only be expected that over the next five years the Maritime oyster production will drop still further as other areas in New Brunswick and Nova Scotia, which are presently producing, become infected by the disease.

The strong market demand for oysters which results from the drop in New Brunswick and Nova Scotia production will continue for some time and should be a benefit to the Prince Edward Island oyster industry. There is now a strong demand for even poorly-shaped oysters which previously had little or no market value. This should result in the exploitation of beds producing poorly-shaped oysters that hitherto were unused and thus increase the Prince Edward Island production figure.

Protection

Pacific Area

The conservation and protection of Pacific salmon stocks was as usual of major concern. The Fishery Officers, strategically located, had to be fully aware of occurrences within their districts and to recommend closures or open seasons in accordance with their estimates of the fish populations. This actually involved hundreds of adjustments over the year but it is pleasing to report that these were soundly devised and efficiently carried through.

The protection officers also issued over 8,000 commercial fishing licences and 1,815 Indian Food Fishing permits. The latter fishery, which requires constant supervision by departmental officers, had a recorded catch of 262,000 salmon of all species. Other duties carried out by Fishery Officers included predator control (108 sea lions were destroyed), stream clearance work and fry salvage. The detail of this work is impressive.

The number of vessels on patrol duty in the Pacific Area, remained at 38 during 1956. However, construction was underway of two 42-foot boats, which

were more than half completed at the end of the fiscal year. One is for duty in the Bella Coola area, while the other will replace the "FD 101" based at Steveston and will see service in the Fraser River and in the Gulf of Georgia.

Five fast seaworthy outboard motorboats were provided for the use of Fishery Officers wherever they could be utilized to advantage. Trailers were supplied for two of these craft to permit the inspectors to move their boats into particular areas with the greatest possible speed and ease.

Action was taken to increase the efficiency of the Pacific Area fisheries radiotelephone communications system. Some obsolete equipment was replaced and new land stations were established at Bella Bella and Ocean Falls. Radar was installed on the "FPC Chilco Post" and arrangements were in hand for a similar installation in the "FDC Comox Post" which will bring to seven the number of Departmental vessels equipped with this device.

During the year there were 187 prosecutions for violations of the Fisheries Act and Regulations. Revenue amounted to $13,391.00 from fines and $637.86 from the sale of confiscated gear.

There were no outstanding runs of salmon expected in 1956 and with the exception of the chums, the returns generally appeared to be at levels comparable to those of the brood years. The Nass area, after several low production years, experienced excellent runs of all species.

For the second consecutive year the decline of the chum run to most areas of the coast was the outstanding feature. The chum salmon failure in the Queen Charlotte Island area was pronounced, and is the fourth consecutive season of poor chum runs to this area.

The pink salmon catch, while below the annual average, was still greater by approximately 2,000,000 fish than the brood year of 1954. Pink returns to the Queen Charlotte Island and Skeena River areas were disappointingly light.

The Rivers and Smith Inlet areas were credited with the top sockeye landings in the province when their combined totals accounted for 46 per cent of the 1956 sockeye catch. The sockeye escapement to the Fraser River spawning areas was considered satisfactory in spite of the fact that the commercial catch was approximately 56 per cent of the 1952 landings.

The spring salmon landings were the highest since 1953 while the escapement to most areas was reported as being well maintained. The coho escapement to most river systems of the province was well above the level of the brood year and catches of this species were the highest since the record year of 1951.

Newfoundland Area

One of the major fisheries requiring protection in Newfoundland is that for salmon which run into many of the rivers throughout the island and Labrador. To give adequate coverage 33 wardens and 114 guardians were employed.

Good runs of salmon were reported in practically all areas, and water levels, for the most part, provided ideal fishing conditions, so that from the anglers' point of

view the 1956 season was quite successful. The catch was heavy, 16,986 salmon having been landed as compared with 11,653 for the 1955 season. This was the second highest on record, the highest having been in 1948 when just over 17,200 were taken. The largest salmon recorded in 1956 weighed 35 pounds and was taken from Steady Brook, Humber River, on September 6.

As might be expected infractions of the regulations were frequent. There were 41 convictions against anglers for illegal fishing during the year, with the majority of offenders residents of the Avalon Peninsula and Corner Brook areas.

A new regulation was drawn up establishing a single opening date, May 15, for the commercial salmon fishery throughout the province, to go into effect in the 1957 season. The regulation stipulating a 24-hour tie-up of salmon nets each weekend was enforced. While there was resistance on the part of some fishermen, the regulation was generally observed.

There was a decline of approximately 700,000 pounds in the lobster catch in the open season from April 20 to July 15, probably due in the main to low water temperatures and stormy weather early in the season. Twenty-two officers assigned to protection during the season convicted 29 fishermen, a reduction from 37 prosecuted in 1955.

Following a shutdown which had lasted for several years, the whaling plant at Hawke's Harbour, Labrador, resumed operations in 1956, and four whale catchers were in operation for varying periods during the season. Seventy-nine whales of various species were taken.

On the recommendation of the International Commission for the Northwest Atlantic Fisheries, mesh size regulations designed to conserve stocks of cod and haddock were put into effect on March 13, 1957. This brought a new responsibility for which special men were trained early in the year.

A representative of the Department made two flights over the harp seal hunting area off the northeast coast of Newfoundland in the interests of conservation generally. The opening dates for harp seal hunting, March 5 for the Gulf of St. Lawrence and March 10 for the "Front", or Atlantic Ocean, which had been arrived at by international agreement, were closely observed.

The bounty paid for the killing of harbour seals, in effect for four years, was continued, and 1,708 of these seals, 292 of them adults and 1,416 young were destroyed. At the rate of $10.00 for each adult and $5.00 for each young seal, a total of $10,000 was paid.

The largest ship of the Department's patrol fleet in Newfoundland, the motor vessel "Eastern Explorer" was assigned to the south coast during the winter and spring for sea rescue operations and to enforce the Coastal Fisheries Protection Act. During one cold snap, the harbours in the vicinity of Rose Blanche were frozen over, and the "Eastern Explorer" was employed in breaking ice and keeping the harbours open so that fishing boats could get out and food supplies could be taken in. Several boats which had been adrift were towed safely to port. During the summer and fall months the "Eastern Explorer" carried out routine transportation and patrol work off the northeast coast from LaScie to Cape Bauld.

50146-0—4

All other vessels of the fleet operated continuously throughout the year on various assignments, and 40 smaller boats were chartered for a few months to convey officials to various areas for lobster inspection work and protection work on salmon rivers. On many occasions vessels of the regular fleet carried out emergency missions such as carrying seriously ill people to hospital when no other form of transportation was available.

Essential services to various branches of the Department were provided by the two helicopters which are available to the Newfoundland area. Poor flying weather continued to be an obstacle, but many field assignments were carried out with far greater despatch than could otherwise have been possible, if indeed they could have been attempted at all.

Maritimes Area

The conservation and development of both commercial and sport fisheries becomes increasingly difficult each year. This is to be expected, particularly with regard to anadromous and freshwater fish, as the Maritime Provinces develop, bringing increased exploitation of hydro resources, danger of pollution from waste materials, construction of new roads and highway improvements, which make more inland fishing waters readily accessible, and a general increase in anglers.

To carry out the work of enforcing the regulations, 519 men were employed in 1956. Of these 109 were Fishery Officers, 94 Fishery Wardens, 193 Fishery Guardians, and 123 officers and men who man the 31 vessels used to patrol coastal waters.

The fisheries of the Maritimes vary with the seasons, but over the greater part of the area fishing for one species or another is carried on throughout the year. During the early part of 1956, the weather was stormy with considerable fog in the Atlantic and Bay of Fundy regions, and as a result inshore fishing operations were somewhat curtailed. From August until the end of the year, dry and warm weather prevailed, and with the exception of a heavy gale on December 30, the inshore fleet lost little time. The offshore fleet had a good year, with operations seldom hampered by bad weather.

Lobsters constitute the most valuable fishery in the Maritimes Area, providing $15,577,000 or 42 per cent of the total value of the overall annual catch, which amounts to $36,129,000. For economic reasons, the Maritimes Area is divided into 10 separate lobster fishing districts, with each one having its own open and closed seasons and minimum size limits. Hundreds of thousands of lobsters are measured each year by the field staff of the Department. Strict control is maintained; in 1956, out of a total of 634 prosecutions for various offences, 440 were for illegal lobster fishing.

Control of shellfish areas is a time consuming task which has undoubtedly been enlarged by the present depleted stocks of soft-shelled clams. Many shellfish areas contaminated by sewage and other effluents were closed during the year on the advice of the Department of National Health and Welfare and these areas had to be closely guarded. In addition other stocks were invaded by a toxicity derived from a food organism.

Of the 634 prosecutions for violations of the Fisheries Act and regulations during the year, there were 584 convictions. Fifty cases were dismissed on technicalities and lack of evidence. Fines levied amounted to $12,158. In addition to the prosecutions there were 1,656 confiscations of gear and equipment in illegal use.

The number of patrol vessels in use during the year, 31, was an increase of one over the previous year. A new class of 42-foot Cape Island type boat was built and registered under the name "Serpula". The largest vessel of the fleet, "Cygnus", as in previous years, was used for offshore patrols and in the lobster fishery of the Gulf area. During most of the year, "Harengus" was employed by the Fisheries Research Board of Canada in herring investigations.

Central Area

The protection staff in the Central Area employed mainly on Great Slave Lake includes three fishery officers, three guardians and one automotive mechanic. Both the Department's patrol boats on Great Slave Lake, N.W.T., the motor vessels "Mareca" and "Marila", were engaged continuously in protection work over the entire fishing area of the lake during the summer of 1956. The "Marila", with its long-cruising range, kept up a constant patrol in the East Arm, which provided 60 per cent of the summer production of fish, and the "Mareca", with much shorter range, patrolled the areas closer to Hay River and Yellowknife, its refueling points.

Seven companies took part in the summer fishery, and six in the winter operation. A number of bombardier-snowmobiles went through the ice during the winter but no lives were lost and all the vehicles were recovered. Three departmental bombardiers were in operation throughout the season on protection and enforcement work on Great Slave Lake. They patrolled a distance of 10,445 miles without any major breakdowns. Radio-telephone communications were maintained with a consistently high degree of efficiency between the Hay River base station and the bombardiers. An aircraft was used for patrol work before the opening of the winter season and intermittently thereafter.

Two aerial surveys were made over the Churchill area of Hudson Bay to determine the extent of the beluga (white whale) herds, which support a modest industry at Churchill, Manitoba. Populations appeared to be of fair size to withstand the catch quota of 800 animals.

Departmental Vessels, 1956-57

A fleet of 83 vessels, ranging from one with a tonnage of 581 and a length of 155′ 4″ to the launches used for river work, is necessary for the protection of the fisheries. They patrol the waters off the coasts of the Maritime Provinces, Newfoundland and British Columbia and, during the summer season, maintain a constant vigil over the fishing areas of Great Slave Lake.

They also keep guard on inshore areas enforcing, for instance, the strict regulations of the lobster fishery, and protect salmon rivers from fishermen who operate illegally.

50146-0—4½

Details of some of the activities of these vessels, including work outside their regular orbit, such as rescue operations and unscheduled emergency trips with ill or injured people, are included in the previous paragraphs on the work of the Protection Branch. The fleet, as divided by Areas, is as follows:

Name	Tonnage	Length	Crew
MARITIMES AREA—			
Acartia	7.16	37′	2
Alosa	52	62′5″	5
Alvania	15	45′	3
Cardita	15	45′	3
Cratena	56	65′	5
Cumella	65	65′	6
Cygnus	581	155′4″	32
Diala	16	42′	3
Fabia	12	32′	2
Harengus	107	76′6″	9
Hyperia	11.39	40′	2
Ilea	10	40′	2
Lacuna	61	64′5″	5
Limanda	61	64′5″	5
Macoma	13	34′	3
Marcia	15	45′	3
Menidia	launch	24′	1
Modiolus	13	35′	2
Modiolus II	13	34′	2
Mya	13	34′	2
Mya II	13	34′	2
Obelia	8	36′	2
Osmerus	25	40′	3
Paphia	15	45′	3
Rossia	12	38′	2
Sabella	58.28	65′	5
Serpula	13	42′	2
Tegula	15	45′	3
NEWFOUNDLAND AREA—			
Arctica	313	135′6″	15
Aurelia	29	48′	3
Gros Morne	48	57′	3
Boltenia	29	48′	3
Cinderella	28	56′5″	3
Crago	13	36′	1
Eastern Explorer	52	73′5″	8
Louise Ruth	20	41′8″	2
Nebelia	29	48′	3
Pecten	13	34′	2
Point May	31	53′	3
Porella	29	48′	3
Sabinea	15	40′	2

Name	Tonnage	Length	Crew
CENTRAL AREA—			
Mareca (Great Slave Lake)	15	32′7″	2
Marila (Great Slave Lake)	15	45′	2
PACIFIC AREA—			
Agonus	19	37′	2
Ardea	10	36′	1
Arrow Post	44	54′6″	4
Atlin Post	45	61′5″	5
Atolla	16	37′3″	1
Babine 1	launch	20′	1
Babine Post	52	55′7″	4
Beldis	21	47′	3
Black Raven II	25	46′5″	3
Bonila Rock II	23	47′	3
Brama	19	42′	1
Branta	10	36′	1
Chilco Post	48	63′	5
Ciona	14	34′5″	3
Clavella	38	52′	4
Clupea	25	46′2″	3
Comox Post	45	54′2″	4
Daphnia	13	34′	1
Diaphus	16	39′6″	1
Egret Plume II	25	46′5″	3
F.D. 101	8	33′	1
F.D. 102	11	34′1″	1
F.D. 201	10	33′3″	2
F.D. 202	18	38′2″	2
Gavia	17	40′7″	2
Howay	198	115′7″	15
Kitimat	79	79′7″	9
Laurier	201	113′	15
Nicola Post	48	63′	5
Onerka II	25	46′5″	3
Pholis	16	37′3″	1
Pursepa	21	47′	3
Rissa	10	36′	1
Sarda	8	31′9″	1
Sooke Post	52	55′7″	4
Statistic	10	30′	2
Sterna	10	36′	2
Stuart Post	44	54′6″	4
Swantail II	19	40′3″	3

INSPECTION AND CONSUMER SERVICE

DURING 1956, satisfactory progress continued in the Atlantic provinces in the development and assessment of practical standards of quality for fresh and frozen fish. Additional staff made it possible to extend the experimental application of new inspection techniques to a larger number of ports of landing although not all processing plants can be serviced until the staff organization is completed.

By the end of the year, minimum standards for the construction, equipment and sanitary operation of fish plants were available for all fishing areas and plans completed for their voluntary application on a national scale in 1957. For many plants, a programme of improved facilities and the installation of new equipment was indicated by the proposed standards. A most satisfactory degree of co-operation was shown by industry in this respect.

It was not possible to begin experimental work on quality standards for Pacific and freshwater species of fish in 1956 due to insufficient staff and laboratory facilities. So little work of a systematic nature in this field has been done in these areas in the past that a major task confronts both the Department and industry for the next two or three years in establishing practical objective and subjective standards of quality for fresh and frozen salmon, halibut, cod, whitefish, lake trout, yellow pike and other commercially valuable species.

In general, no serious difficulties arose in the application of mandatory inspection to canned, salted, smoked and other types of fish products for which regulations exist. Progress was made in developing a uniform inspection code for salted fish of Atlantic origin. At present, separate standards of grade for this product are applied in Newfoundland and the Maritime Provinces.

Maritimes Area

A total of 13,104 separate inspections under the Fish Inspection Act and Regulations involving 85,040,743 pounds of fishery products including fresh and frozen lobster meat and Irish moss was carried out during 1956 by the Inspection field staff in the Maritimes Area. This represents a decrease of 1,148,900 pounds from the previous year. This decrease is accounted for by a marked decline in oyster production.

The amounts of fish of various species inspected were as follows: groundfish (cod, cusk, haddock, hake and pollock) dry and semi-dry 54,942,093 pounds; green salted (boneless) 8,359,638 pounds; semi-boneless 149,250 pounds; fibred 206,521 pounds; bits and trimmings 2,152,292 pounds. Bloaters smoked 4,522,392 pounds; smelts 2,808,310 pounds; oysters 3,011,000 pounds. Irish moss 4,642,880 pounds. Pickled fish: alewives 5,939,750 pounds; herring 2,265,595 pounds; mackerel

2,405,590 pounds; mackerel fillets 856,180 pounds; salmon 12,650 pounds. A total of 445,145 containers was inspected during the year under review. Bloater boxes accounted for the largest proportion of the total.

During the year, a total of 2,862,292 pounds of fresh and frozen lobster meat was inspected. This was a decrease of slightly over 787,000 pounds when compared with the previous year. The decrease in the production of fresh and frozen lobster meat is accounted for by an increase in the production of processed canned lobster.

The following quantities of canned fish were graded and inspected by the laboratory: 6,900 cases of canned fish graded; 2,343 cases of canned fish inspected. This compares with a total of 10,240 cases graded and 8,066 cases inspected in 1955.

The quantities of imported canned fish and shellfish subjected to inspection continued to increase during 1956. All samples of imported canned fish from Sault Ste. Marie, Ont., east to the Atlantic coast are withdrawn from shipments by departmental inspectors and are forwarded to the Fish Inspection Laboratory at Halifax for examination. A total of 1,462 lots of imported canned fish was inspected by the Laboratory. The samples from these imports amounted to over 20,000 tins. The total number of cases of canned fish represented by these samples was 239,792 cases of 48 cans each exclusive of sardines, which amounted to an additional 105,170 cases of 50 cans each.

The inspection field force of the Maritimes Area during the year examined shipments of fish purchased by government agencies under standards set up by the Canadian Government Specifications Board. A total of 114,400 pounds of fish was inspected at the request of the Department of National Defence.

During the year under review, the proposals for maintaining quality control in fresh and frozen fish plants were placed in operation on a voluntary basis. The inspection procedure involved the detailed checking of the location, type of construction, equipment, sanitation and operating methods of all fresh and frozen fish plants in the Maritimes.

The response by industry to this voluntary programme has been most gratifying and tremendous improvements have been made to a great number of plants in the past year.

A senior supervising inspector was employed as a training officer in the field and instructed the inspecting staff in techniques involved in the inspection and grading of cured fish products, oysters, fresh fish, fish canneries and plants. Instruction was given to fishermen and the industry in approved methods of handling, curing and preparing fish products for market. Technical assistance was given with plant processing equipment, plant construction and operating methods. Members of the trade and fishermen were instructed on requirements of the various acts and regulations.

During the summer, a number of inspectors visited the Newfoundland Area and were conducted on an extensive tour of fresh fish processing plants. This was part of a training programme designed to broaden the knowledge of officers of the Maritimes and Newfoundland areas.

Bacteriological and organoleptic examinations were made of samples of lobster meat collected daily from each operating plant. The results of such analyses served as indices of the effectiveness of plant sanitation programmes. A total of 3,060 lobster meat samples was analysed.

Considerable educational work was carried on by the inspectors in the field and the staff of the fish inspection laboratory. Instruction was given to fishermen and plant operators in the handling, curing and preparation for market, etc., of various fish products. In addition, the inspectors and laboratory staff interpreted and explained requirements of the various acts and regulations to fishermen and other members of the trade.

Circulars, dealing with the preparation of many kinds of fish products, were prepared and distributed. An increasing number of requests was received from the trade for inspectors and laboratory staff to demonstrate and to train help in various operations involving canning, filleting, salting, drying and smoking. Requests for information of a technical nature were received from provincial governments, foreign countries and trade associations. A number of research problems were undertaken during the year. These included work on canned lobsters, lobster meat and clam purification studies.

The fish inspection laboratory operates an analytical service on fish products and the raw materials used in the fishing industry. Nominal fees are charged for this work. During the year, analyses were made on fish meals, fishery salts, fish wastes, fish glue, etc.

Routine shellfish plant inspections were made by local inspectors and field officers to make certain that sanitary practices required by the International Agreement between Canada and the United States were effectively maintained at all times. Bacteriological surveys of polluted areas were carried out in several areas. Over 860 separate inspection visits were made to shellfish plants during the year. This compares with 750 in 1955.

Inspectors and members of the staff of the fish inspection laboratories made continuous inspections of fish plants, canneries and shellfish plants. Purpose of the checks was to ensure that all fish products were cured and proceessd under sanitary conditions as required by the Fish Inspection Act and the Meat and Canned Foods Act. A total of 11,409 checks was made of establishments by the inspection field staff and personnel of the laboratory.

Central Area

During the year, 13,620 individual shipments of whitefish, totalling 17,934,782 pounds, were inspected prior to export by officers of the Department's Central Area as required by the Whitefish Export Inspection Regulations. This represents a decrease of 264,861 pounds inspected from the previous year.

In addition, at the request of industry and as a further step toward reaching a higher quality both in domestic and export sales, officers of the Department's Central Area inspected 2,704 shipments of pike, pickerel, lake trout, tullibee, etc. totalling 5,133,012 pounds. This is a decrease from last year of 32 per cent in the number of inspections of these species.

During the year, the inspection field force of Central Area carried out 2,911 inspections involving 498,827 cases of imported canned fish. This is an increase of 1,211 shipments and 120,727 cases inspected over the previous year.

Label checks of shipments of fresh, frozen and processed fish commenced on August 1. A total of 345 inspections was carried out.

A number of new lakes in the province of Manitoba were surveyed. Federal assistance was given in the work by the Survey Analysis Service of the Department at Winnipeg.

The educational programme for the improvement in quality of all fresh and frozen fish products was continued by the field staff whenever time and facilities were available to make patrols into the field in order to make direct contact with the producers. There is no doubt that this programme is of value, for it is quite noticeable that the quality of fish offered for certification is steadily improving.

Officers of the Central Area during the year attended fresh fish grading courses at South Bay Mouth, Ontario, and Halifax, Nova Scotia.

Pacific Area

The Canned Fish Inspection Laboratory in Vancouver inspected 2,103 parcels of British Columbia canned salmon totalling 1,114,038 cases during the year under review. This was a decrease of 21 per cent from the previous year. Shipments of canned herring were up in 1956 but the total number of cases inspected was down 48 per cent when compared with the previous year.

The Laboratory also inspected 1,578 parcels of imported canned fish and shellfish representing 500,000 cases imported into Canada through ports of entry west of the Great Lakes. This represents an increase of 640 shipments and 282,230 cases inspected over last year.

In the inspection of canned salmon and canned herring, the Department charges a nominal fee of one half cent per 48-pound case which resulted in total collection of $7,476 for the year.

All shipments of Japanese frozen tuna were inspected and found to be free from radioactivity.

Label checks of shipments of imported fresh, frozen and processed fish commenced on August 1. During the balance of the year 139 shipments entering through British Columbia ports were inspected.

Joint examinations of canned salmon with a committee from industry were continued through the 1956 cannery season to study the possibility of bringing about standards for two or more quality grades within the present broad specifications for canned salmon.

Experimental work was carried out to study possible differences in breading pick-up of fish sticks and methods of analysis for per cent breading on frozen fish sticks.

During 1956, a bacteriologist was appointed to the Laboratory staff.

Newfoundland Area

The staff of the Inspection Service carried out, during the year, 3,725 inspections for which certificates were issued. These inspections were made on light and heavy salted codfish and scale fish, pickled herring, pickled turbot and dried squid. Numerous inspections were also conducted in fresh fish processing plants, for which no certificates were required. In addition, 493 separate inspections were carried out in canneries, herring packing factories, salted fish packing premises, cooperages, etc., prior to licensing. These licensed factories were inspected periodically throughout the year.

The quantities of fish by species inspected during the year, excluding fresh fish, were as follows: light salted cod, 34,270,960 lbs; heavy salted cod, 11,880,768; scale fish 57,040; pickled herring, 4,423,533; pickled turbot, 909,400; dried squid, 36,150.

Supervisory Inspectors travelled extensively throughout the year visiting exporters and inspectors frequently in order to maintain uniformity in grades of salted codfish going to the various markets.

The voluntary inspection programme in fresh and frozen fish plants throughout the Newfoundland Area continued during the year with satisfactory results. To assist industry, a training course was held at the Fish Inspection Laboratory for fresh fish plant foremen. This course was similar to that given to Fishery Officers engaged in fresh fish inspection, and covered the latest developments in fresh fish handling and processing. Additional assistance was given industry by having Fishery Officers make trips to the fishing banks in draggers to advise on the proper methods of handling and icing fish at sea. The results of this programme have been highly successful.

During the summer, a number of Fishery Officers from the Maritimes Area visited Newfoundland and were conducted on an extensive tour of fresh fish processing plants. This was part of a training programme designed to broaden the knowledge of officers in the Newfoundland and the Maritimes Areas.

The herring fishery, although not as great as in former years, required considerable attention. Inspections were also carried out on the pickled turbot production.

The Department's special service to Labrador fishermen was continued in 1956. Two officers spent approximately three months along the coast, primarily to assist and encourage fishermen in the production of a higher quality product. These officers carried out other duties such as the enforcement of the Culling Regulations and the collection of monthly statistics.

In addition to the duties referred to above, field personnel also assisted with the collection of statistics, Conservation and Indemnity work, as required.

The Fish Inspection Laboratory of the Department is the scientific side of the Inspection Service. During 1956-57, a total of 7,343 samples was received for analysis and examination as compared with 3,351 samples in the previous year.

Chemical analysis was performed on samples submitted from four agencies, the federal Department of Fisheries, the Department of National Health and Welfare, the Provincial Government and commercial firms.

Consumer Branch Activities

The Consumer Branch operates a test kitchen at Ottawa where it develops and tests recipes for publication in cookbooks, filmstrips and newspaper and radio releases prepared by the Information and Educational Service. The branch has regional offices at Vancouver, Winnipeg, Toronto and Montreal. In January an additional office was opened at Halifax.

The test kitchen at Ottawa, in co-operation with the Information and Educational Service, is responsible for the production of teaching materials. One new filmstrip and companion cookbook, "Let's Serve Shellfish", was completed and production was undertaken on another filmstrip and cookbook, "Let's Serve Canned Salmon". Food photography was carried on at headquarters during the year and pictures of fish dishes were supplied to newspapers and magazines.

Fish luncheons were served in the Test Kitchen to two interesting groups, the Russian Fisheries Delegation and the C.B.C. Fish and Farm Broadcasters.

The Home Economists carry on the bulk of their educational programme by working with women's groups, schools and universities. A total of 240 demonstrations was given to grade 8 secondary school and university students, dietetic interns, home economics teachers, women's groups, and restaurant and hotel operators and hospital cooks. In addition, the Home Economists were guests on 28 radio programmes and eight TV shows during the year. They participated at various meetings and gave 28 illustrated talks. Almost 100,000 cookbooks, leaflets and bulletins were distributed to the public.

To maintain and make new contacts, the Home Economics Service took part in the following conferences and conventions: Canadian Home Economics Convention; Canadian Dietetic Convention; American Home Economics Convention; Canadian Restaurant Convention; Hotel and Restaurant Show (Montreal); Sportsmen's Show in Saskatchewan; and the Ontario Hospital Convention.

In addition, contacts have been made with various provincial departments, fisheries associations, sportsmen's groups, the Canadian Association of Consumers, public utilities, provincial nutritionists, food technologists' associations, extension services, retail and wholesale merchants and food editors of newspapers and magazines, as well as members of the fishing industry.

In the educational field, progress has been made by working with school systems in the provinces as well as the universities. This has resulted in a more efficient coverage of the secondary schools. An increased interest in the use of fish has been evidenced by more experimental fish cookery carried on at universities. The co-operation of the fishing industry was enlisted at one university and the Fisheries Research Board underwrote a research problem in basic fish cookery at another university.

50146-0—5½

An important development during the past year was the increase in co-operation between the Home Economics Section and the industry. At the request of industry the home economists participated in product recipe development, testing of label directions and, across Canada, played an important part during National Fish Week which was sponsored by the Fisheries Council of Canada. Fish cookery demonstrations, radio and TV shows were given in conjunction with National Fish Week.

Liaison with the Department of National Health and Welfare has resulted in the participation of the home economists in the schools for cooks of small hospitals held in the various provinces. Several of the home economists have had the opportunity of working with Canadian Restaurant Association groups. The Halifax home economist gave fish cookery demonstrations to Nova Scotia Hotel and Resort Owners at their Annual Short Course.

The bilingual home economist in co-operation with the Quebec Department of Fisheries conducted a campaign in the Richelieu Valley designed to help increase the consumption of fish in that area through demonstrations of fish cookery to homemakers and demonstrations of fish handling to retailers.

The home economists have made contacts with other home economists employed in departmental stores, public utilities, food manufacturers, food advertising and public relations agencies. This has resulted in more publicity for fish directed through the channels of the co-operating agencies.

Contacts with hospital dietitians were increased by personal visits. In some areas in co-operation with the Inspection Service, steps were taken to improve the supply and quality of fish used in the hospitals.

ECONOMICS SERVICE

IN relation to the type of economic problem they present, Canada's varied and diverse fisheries may be classified in two broad groupings. In those fisheries in advanced stages of development, certain urgent economic problems result from the application of measures of control or management, primarily in the interests of conservation. Other problems may arise in the maintenance and expansion of domestic and foreign outlets for the products of these fisheries. In contrast, the undeveloped fisheries present problems arising from inadequate capital resources, delay in technological innovation and unsatisfactory marketing organization.

The activities of the Economics Service tend to be equally diverse. They include a) provision of a regular flow of statistical and "qualitative" information on the industry and its markets for the use of the Government and the interested public and b) maintenance of a research programme in the same fields, as an aid to industrial and governmental policy-making. These activities are carried out for the most part in close collaboration with other branches of the Department and with other federal and provincial government agencies.

Because the main responsibilities of the federal Department of Fisheries are concentrated in the Pacific and Atlantic regions, the Service maintains units in the Chief Supervisors' offices at Vancouver, British Columbia, Halifax, Nova Scotia and St. John's, Newfoundland. These units exist primarily for the assembly, compilation and analysis of statistical and other data on the regional industry and trade. They also provide a direct economic service to the Area administration and to the local business community. A decentralized organization of this kind is necessary for the efficient operation of an agency that serves such a far-flung and diversified constituency as the Canadian fisheries. The work of the Service as a whole is co-ordinated through headquarters at Ottawa.

During the year 1956-57, a number of special tasks were undertaken. The most important was the preparation of a report on the fisheries of Canada, at the request of the Royal Commission on Canada's Economic Prospects. While the Economics Service undertook responsibility for the preparation of the report, all branches of the Department contributed directly or indirectly to it—a major contribution being made by the Fisheries Research Board. The report, which will be available to the public before this Annual Report is published, is the first comprehensive review of the problems and prospects of the Canadian fisheries. It attempts a broad survey of 1) the historical development of the fisheries, 2) the extent and quality of fish resources, 3) the structure of the primary fishing industry, 4) that of the processing industry and the fish trade, 5) the marketing of fishery products, including consideration of factors affecting the domestic and foreign demand for the products of the Canadian industry, and 6) trends in employment and capital and credit requirements in the fisheries of Canada.

Special reports and other documentation were also prepared from time to time as required for departmental purposes, for inter-departmental meetings on production and trade matters and in response to requests from fishery and other organizations in Canada and abroad.

More or less continuous consultation is maintained, and a number of joint investigations have been undertaken, with other government departments, on such matters as harbour improvement and local water transport services in coastal areas, provision of cold storage facilities where fishery interests are affected, the regulation of employment on fishing vessels and the development of statistical services.

During the summer months, particularly, instruction is provided for overseas students (officials of fishery administrations, for the most part) visiting Canada under the auspices of FAO and Colombo Plan technical assistance programmes. This work is making greater demands on staff time, especially at the Area offices.

A major part of the work of the Service's unit in the Pacific Area is the maintenance of current statistical and related services. Under a special arrangement with the Bureau of Statistics, reports on the statistics of the Pacific coast fisheries are published each year and some basic series are released weekly. During the year under review the unit undertook a number of special investigations, the most important of which were a survey of the sport fisheries in B.C. tidal waters, an analysis of fishing licenses—to refine statistics of the labour force in the primary fishing industry—an investigation of the use of fish for mink feeding on the fur farms of the province and several studies in the evaluation of fish resources in relation to requirements for hydro-power development in the rivers of British Columbia. A monthly report on the regional market outlook is prepared regularly for headquarters' use.

In addition to the usual services of economic intelligence provided for the Chief Supervisor, the Service staff assist in training courses for fishery officers and furnish information in various forms as requested by provincial government agencies, the fishing industry and the general public in the Pacific Area. The volume of such requests tends to increase year by year.

The major project in the Maritimes Area unit during 1956-57 was the development of a new statistical service. Surveys were carried out throughout the year in the coastal districts of the Maritime Provinces to obtain knowledge of the organization of the industry and to introduce the programme among fish buyers. Fishery officers were instructed in the operational details of the programme. The new service was put into effect in January, 1957, and, despite a complete change in methods of collecting and compiling data, the innovation was effected smoothly. In February the first statistical reports were released at Halifax and drew favourable comment from the fishing industry. The service is a co-operative venture with the Bureau of Statistics—the latter agency providing part of the clerical staff and the tabulating equipment in the Area office.

Among a number of other activities of the Maritimes Area unit were investigations connected with requests for assistance in the construction of bait storage facilities and of public cold storages to serve the fishing industry. The staff also

assisted in a survey of harbour structures in western Nova Scotia and in field work for the study of operations of modern fishing craft conducted by the Service in co-operation with provincial government agencies.

Many of the activities of the Service in the Newfoundland Area parallel those carried out in the Maritimes Area as just described. In addition, the Newfoundland staff participated in a costing study at the Bonavista experimental fish-curing plant and undertook a comprehensive appraisal of the operations of the bait service maintained by the Department in this province. A report on the latter was in preparation at the year's end. Adequate staffing and conditions of travel and communication present special difficulties in Newfoundland and, on that account, progress in the work of the Economics Service in the Area has been retarded.

Reverting to the work of the Service in general, some progress was made in 1956-57 toward developing a programme of economic research. The Economic Research Branch of the Service reached full strength for the first time and, as a result, several projects were instituted and others expanded to meet the need for better information on the primary fisheries and the fish-processing industry.

A comprehensive report on a study of salmon fishermen's incomes in British Columbia was prepared for publication. The incomes of fishermen in different types of fishing operations and in various occupational categories are treated in detail. Significant relationships between earnings and time spent at the occupation of fishing and between earnings and the investment in fishing equipment are established. A further progress report (the fifth) on the findings of the study of operations of modern fishing craft in Atlantic coast waters was issued during the year. This report sustained previous findings, including the noticeable increase in productivity resulting from employment of larger craft and newer fishing devices. Aspects of the organization and financing of fishing operations are also stressed.

A special investigation of the costs aspect of some quality-control problems in the processing of groundfish fillets was carried out in the Atlantic coast region, to provide guidance in the formulation of inspection procedures and regulations. A report on the results, in economic terms, of experimental projects in the mechanical drying of salt fish was prepared for publication. These and similar studies are carried out in co-operation with the Industrial Development Service and the Fisheries Research Board. Plans were also being laid for research in marketing problems, with particular reference to the demand for Canadian salt fish products.

In addition to contributing to the general responsibilities referred to earlier, the Economic Intelligence Branch maintains the Department's close liaison with Trade and Commerce and other federal departments on such matters as foreign trade policy and the development of the domestic fishing industry in all its phases. Inquiries about sources of supply of fishery products and the possibilities for investment and employment in the Canadian fisheries, and requests for material for things like term papers, university theses and press articles, both "serious" and "journalistic", continue to grow in number. Insofar as these lie within the competence of the Economics Service, they are dealt with by the staff in charge of economic intelligence.

INFORMATION AND EDUCATIONAL SERVICE

THE Information and Educational Service is actively associated with the Department's efforts to bring constantly to the attention of the Canadian public the importance of the fisheries to the national economy; to stress the value of fishery products to Canadians as consumers; to provide all sections of the fishing industry with news of developments of interest to them, including new regulations or changes in existing statutes, and to provide specialized assistance to other Services of the Department.

The fulfilment of these duties calls for a diversified operation which entails direct communication with the daily and weekly press, magazines, radio and television authorities, other departments of government, scientists and technologists, home economists and many other individuals whose activities affect or are affected by some phase of the fishing industry.

As part of the Department's educational programme, the Service also arranges for participation in exhibitions by means of displays, and the setting up of permanent exhibits. In this connection, during the year under review, officials of the Service co-operated with the Government's Exhibition Commission in the preparation of a display for the Canadian Pavilion at the International Trade Fair at Brussels, to be held in 1958. As in past years, the Department took a prominent part in the Nova Scotia Fisheries Exhibition and Fishermen's Reunion at Lunenburg by providing a fish products display, a consumer exhibit, a live fish display and by operating a fish cookery school. Exhibits also were arranged on behalf of the Consumer Section for conventions of organizations such as the Canadian Restaurant Association and groups of home economists and dietetic experts.

The public aquarium at Vancouver, B.C., constructed during the previous year, was officially opened in June, 1956. Its $300,000 cost had been shared by the federal Government, the Province of British Columbia and the City of Vancouver. Containing specimens of the aquatic life of the North Pacific, tropical freshwater fishes and other marine animals, it has proved to be exceedingly successful both as a popular attraction and as a valuable educational medium.

Providing information on fisheries matters of all kinds, the Department's monthly publication, *Trade News*, continued to go out to a distribution list of those engaged or interested in fisheries. Numerous feature articles on various aspects of Canada's fisheries, published in this magazine, were reprinted in other periodicals both at home and abroad. The Service also edits and supervises the publication of *The Canadian Fish Culturist* and the Department's annual report. *The Canadian Fish Culturist*, containing papers by Canadian scientists on all phases of fish culture, goes out periodically to those concerned with fish culture practices, and is recognized both in Canada and abroad as a most valuable publication in this field.

Educational material produced for the Department includes *Fisheries Fact Sheets*, a series of processed articles on most of Canada's commercial fishes, the methods of catching them, and the fisheries in general. These have proved to be of great value to school children and teachers. Other teaching aids are a series of educational booklets on the Pacific salmons, the Atlantic salmon, oceanography, science in the fisheries and methods of fishing. Two of these, those on the salmons, have gone into second printings, and the one dealing with the Atlantic salmon has been adopted for use in the schools of Nova Scotia, New Brunswick, Quebec and Newfoundland.

In the field of consumer education, a monthly release titled "Featuring Fish" goes out to about 150 English and French weekly newspapers, and a similar release to about 50 English and French dailies. This service is augmented by a food photograph and matrix service. "Fisheries Flashes," a similar release designed for radio, is sent to 95 radio stations across Canada as well as to about 50 teachers and demonstrators. All these releases are sent at the request of those receiving them. The Information Service also co-operates with the Department's Inspection and Consumer Service in the preparation of filmstrips and pamphlets.

Using the services of the National Film Board of Canada, the Department, during the year, completed a motion picture film on the Pacific salmons, "The Salmon's Struggle for Survival," in relation to the growth of industrial development and consequent increased use of water for power and other needs in British Columbia. Another film, produced for the Inspection and Consumer Service, "Fish Spoilage Control," was completed. This is one of an educational series on various aspects of the fisheries, and won first prize in its category at the Fourth Annual Golden Reel Film Festival in New York. Using an animated technique, it was produced for the benefit of fishermen and plant workers, and stresses not only how fish can rapidly lose its goodness if not properly handled but also how fish should be preserved and stored after being taken from the water.

In addition to maintaining a steady flow of information to the general public through departmental publications, press releases, radio and television broadcasts and a limited advertising campaign, the Information and Educational Service carried out liaison work for the Fisheries Research Board of Canada for the meetings of various national and international commissions and committees, such as the International Commission for the North Pacific Fisheries and the federal-provincial Co-ordinating Committee on Atlantic Salmon.

Area Information Officers of the service are attached to the offices of the Chief Supervisors of Fisheries in St. John's, Nfld., Halifax, N.S., and Vancouver, B.C. They maintain close contact with local newspapers and radio stations, and with the CBC Fishermen's Broadcasts. Material provided for these broadcasts in all three areas includes market prices for seasonal and year-round fisheries and general news of Department and Research Board activities. The Area Information Officers also arrange most of the showings of documentary films on fisheries in the Department's educational film programme in the field. Another of their duties is to provide articles for departmental publications and photographs of fishing and allied activities to accompany articles sent from headquarters to publications both in Canada and abroad.

50146-0—6

INDUSTRIAL DEVELOPMENT SERVICE

THE Industrial Development Service encourages private industry to carry out industrial and scientific development work consistent with the most urgent needs of the fishing industry in its progress towards modernization.

The Service is assisting in the development of those fishing areas where it can be demonstrated that existing and potential resources can, with improved catching and processing equipment and facilities, expand the industry and provide an improved standard of living for the fisherman.

During the course of the year under review one of the principal developments affecting the Service was the establishment of an Industrial Development Committee, the membership of which comprises the Directors of the Industrial Development Service and the Economics Service, the Chairman of the Fisheries Prices Support Board, and the Vice-Chairman of the Fisheries Research Board of Canada. The principal function of this Committee is to co-ordinate the work of the various services of the Department and of the Fisheries Research Board as they are related to industrial development projects. The degree of co-ordination already achieved through the functioning of this Committee has justified its establishment.

Considerable progress has been made in securing active participation by private industry in various development projects. The participation referred to involves not only the fishing industry, but manufacturers of fish catching and processing equipment and the suppliers of new materials used in the manufacture of gear and equipment. Advantage is being taken of offers of assistance, both in research work and in the practical application of findings, from large industrial corporations and also smaller manufacturing companies. The establishment of an effective liaison between the manufacturing industries located in the industrial areas of Canada and the fishing industry located on the coastline of the country is being developed on an increasing scale.

Preliminary steps have been taken to establish a liaison with national associations dealing with packaging, plastics and materials handling equipment with a view to having these industrial groups set up special technical committees, comprised of experts in the various fields of their activities, directly or indirectly related to fisheries, to advise the Industrial Development Service on problems as they arise in connection with special projects undertaken by the department.

Projects carried out under the Industrial Development Service vote during the year included continued work on the application of refrigerated sea water in the holding and transporting of fresh fish, further experiments with a midwater trawl, exploratory fishing, continued development of metal lobster-catching devices, various projects related to fish by-products and work on the development of equipment to assist the industry generally.

The project in which the Service was principally involved during the year was the continued work on the construction and equipping of the Fish Processing Experimental Plant in Valleyfield, Newfoundland, on which work commenced in 1955. The plant is designed and equipped to develop new methods and new products in the processing of commercially important fish, particularly cod, taken off Canada's east coast. Developments will be carried into the pilot plant scale so that factors such as production, storage, packaging, transportation and marketing can be reliably assessed and costings obtained. The plant will commence operations in 1957.

Another important project was the development of a large continuous mechanical salt fish dryer. The continued increase in the cost of fish drying operations by the spreading of fish on flakes to dry in the sun, and also the relatively high handling costs involved in the mechanical drying of fish by the batch method in conventional dryers led to the development of a continuous dryer in which labour costs are expected to be reduced considerably. The continuous dryer, located in Catalina, Newfoundland, is scheduled to go into operation in 1957.

During the course of the year the Service was assigned responsibility for the administration of the regulations respecting assistance in the construction of vessels of the dragger or long-liner type and the regulations for providing assistance in the construction of bait storage facilities. The vessel assistance programme, which is calculated to encourage the development of a modern fishing fleet on the Atlantic coast, is having decidely beneficial effects on the incomes of increasing numbers of fishermen. The assistance in the provision of bait storage facilities, designed to make bait supplies more readily accessible to fishermen, continues to be made available in areas where bait freezing and holding facilities are inadequate.

50146-0—6½

FISHERMEN'S INDEMNITY PLAN

THE Fishermen's Indemnity Plan now in its fourth year of operation is a measure designed to protect fishermen against hardship in the event of loss of or serious damage to their fishing vessels. The Plan is administered by the Department under regulations established by Order in Council. Fishermen who wish to have their vessels covered under the Plan must have such vessels appraised and pay an annual premium of one per cent of the appraised value. The Plan is available to all fishermen in Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, Quebec and British Columbia who have vessels valued between $250 and $10,000. The upper limit previously set at $7,500 was increased in 1957 to $10,000 in recognition of the increased cost and value of vessels since the inception of the Plan.

Experience has shown that the hazard of storm damage particularly is much less on the Pacific Coast than on the more exposed fishing areas of the Atlantic region. Consequently the financial results have been more favourable in British Columbia than in the other provinces. Accordingly rates of indemnity have been adjusted to provide for payment of 70 per cent of the appraised value in the case of total loss, and in the case of partial loss all costs in excess of 15 per cent of the appraised value are paid to British Columbia fishermen. On the Atlantic Coast indemnity paid for total loss has remained at 60 per cent of the appraised value and costs in excess of 30 per cent of the appraised value are paid when partial loss occurs.

The financial experience over the period August, 1953 to March 31, 1957 is shown in Table 1.

The Plan has been well received by fishermen in all areas and the number and value of vessels covered has increased materially from year to year. The growth of the Plan is indicated in Table 2.

Over the four year period, a total of 348 fishermen benefited under the Plan to the extent of $269,278. Total loss claims were made by 216 of them and these fishermen received $230,940. The balance of the claims were for partial loss. Of the total number of losses during the period under review, 74 resulted from fire, 206 from storms and 68 from all other causes which included collision, disappearance without trace, foundering, stranding, ice conditions and mechanical failure of engines and special equipment. Although there were only 74 fire losses, the indemnity paid out was $111,562 compared with $85,907 for storm losses and $71,809 for losses due to all other causes.

Newfoundland fishermen experienced 128 losses for which indemnity of $86,882 was paid. Most of these losses were the result of storms with hurricanes Edna and Ione in 1954 and 1955 being responsible for 28. Losses in the Maritime Provinces totalled 72 and the indemnity paid amounted to $66,719. In these provinces, as in Newfoundland, storm losses were the most numerous with 43 recorded. Quebec fishermen sustained 104 losses and received indemnity of $39,900.

TABLE 1—RECEIPTS AND DISBURSEMENTS TO MARCH 31, 1957

(Vessels)

Province	Net Premiums	Claims Paid	Excess Net Premiums Over Losses
	$	$	$
Newfoundland	35,996.98	86,881.93	−50,884.95
Nova Scotia	42,570.25	52,844.07	−10,273.82
New Brunswick	8,673.06	9,798.00	− 1,124.94
Prince Edward Island	4,661.73	4,076.60	585.13
Maritimes Sub-total	55,905.04	66,718.67	−10,813.63
Quebec	8,563.06	39,914.49	−31,351.43
Atlantic Coast Sub-total	100,465.08	193,515.09	−93,050.01
British Columbia	117,653.24	75,762.99	41,890.25
Canada	218,118.32	269,278.08	−51,159.76

TABLE 2—FISHERMEN'S INDEMNITY PLAN—VESSELS

Growth of the Plan

Area	Number and Insured Value of Vessels as at March 31							
	1954		1955		1956		1957	
	No.	$	No.	$	No.	$	No.	$
Newfoundland	873	688,309	1,044	886,129	915	903,522	919	1,012,877
Maritimes	360	667,648	679	1,143,189	998	1,541,421	1,413	2,130,755
Quebec	100	81,290	199	159,338	320	247,535	387	311,880
(Atlantic Coast)	1,333	1,437,247	1,922	2,188,656	2,233	2,692,478	2,719	3,455,512
Pacific	182	672,390	437	1,747,951	766	3,369,662	1,157	5,158,599
Canada	1,515	2,109,637	2,359	3,936,607	2,999	6,062,140	3,876	8,614,111

Again, storms accounted for most of the losses, with 79 claims being settled for $26,138. Hurricanes Edna and Ione struck Quebec before passing over Newfoundland and were the cause of 37 of the storm losses. Fishermen on the Pacific Coast made 44 claims against the Plan and received $75,763 in indemnity. In this area, losses from causes other than fire and storm were the most numerous at 23 and accounted for nearly $32,500 of indemnity.

TABLE 3—NUMBER OF LOSSES AND INDEMNITY PAID DURING FOUR FISCAL YEARS ENDING MARCH 31, 1957

(Vessels)

Area	Total Losses		Partial Losses		All Losses	
	No.	$	No.	$	No.	$
Newfoundland	66	73,713	62	13,169	128	86,882
Maritimes	60	60,600	12	6,119	72	66,719
Quebec	66	33,462	38	6,452	104	39,914
(Atlantic Coast)	192	167,775	112	25,740	304	193,515
Pacific	24	63,165	20	12,598	44	75,763
Canada	216	230,940	132	38,338	348	269,278

In an effort to meet a demand for some form of insurance on fishermen's gear and equipment other than vessels, a Plan was provided to cover lobster traps. Under the regulations set up for this purpose a fisherman is able to secure indemnity for losses in excess of normal destruction through wear and tear. The rate of premium, depending on the value of the traps, has been kept low and the indemnity on excessive losses is set at approximately 50 per cent of the value of the traps. While offering a reasonable measure of protection in all lobster fishing areas, particularly in those where heavy storms are frequent, this Plan has not met with widespread acceptance by fishermen despite the fact that indemnity payments against claims have been almost three times the amount of premium collected.

TABLE 4—RECEIPTS AND DISBURSEMENTS TO MARCH 31, 1957

(Lobster Traps)

Province	Net Premiums	Claims Paid	Excess Net Premiums Over Losses
	$	$	$
Newfoundland	7,215.11	22,060.00	−14,844.89
Nova Scotia	34,459.40	98,123.00	−63,663.60
New Brunswick	543.00	947.75	− 404.75
Prince Edward Island	4,660.01	14,117.00	− 9,456.99
Maritimes Sub-total	39,662.41	113,187.75	−73,525.34
Quebec	6,963.09	10,966.75	− 4,003.66
Atlantic Coast	53,840.61	146,214.50	−92,373.89

The Fisheries Department in co-operation with the Fisheries Research Board and manufacturers of metal products have been experimenting over the past four years in an effort to produce a modestly priced metal lobster catching device which will be able to withstand the periodic storms that cause widespread damage of the traditional wooden traps. The problem of durability has been overcome but to date costs have been too high relative to the wooden traps. The financial experience of the lobster trap operation under the Fishermen's Indemnity Plan is shown in Table 4 on page 40.

FISHERIES PRICES SUPPORT BOARD

A continuous review of prices and income to fishermen was maintained throughout the year. Although there were weaknesses in some fisheries, the over-all situation was buoyant and returns to fishermen were about 15 per cent higher than in the previous year. This improvement was common to the fisheries of all the major fishing provinces and as a result no direct prices support action was called for.

The position however of the Atlantic Coast fishermen dependent on the production and marketing of salted fish products was not entirely satisfactory and the Government continued to provide Salt Assistance as in the previous year.

Fisheries Salt Assistance

Vote 636 of the Appropriation Act No. 6, 1956 provided $582,000 for payment of assistance subject to terms and conditions approved by the Governor in Council, to producers of salted fish on products designated by the Governor in Council in the amount of 50 per cent of the laid down cost of salt used in their 1956 production and for payment of assistance in respect of such portions of the 1955 production as had not been paid prior to March 31st, 1956. The Vote included authority to charge the administrative costs of the measure to Vote 160 of the Main Estimates 1956-57 which provided for the cost of administering the Fisheries Prices Support Act. The staff of the Prices Board was charged with the responsibility of administering the salt assistance programme. Regulations were established under Order in Council P.C. 1956-1413 dated the 13th of September 1956.

Administrative procedures had already been established in connection with the programme for the production year 1955 and these were slightly modified for 1956 in the light of previous experience. Schedules to be completed by fishermen and fish processing plants in making application for assistance were simplified. The schedules were distributed during the month of September and under certain conditions applicants were allowed to complete and submit their applications after September 28th. However, in the majority of cases, operations for the calendar year 1956 were not completed until December 31st and where this was the case applications were submitted early in 1957.

By the end of the fiscal year under review, 5,700 individual payments had been made to fishermen and amounted to $388,713.03. The breakdown by provinces was as follows:

Province	Number	Amount
		$
Newfoundland	4,515	317,168.57
Nova Scotia	677	53,628.22
New Brunswick	40	2,103.54
Prince Edward Island	48	1,352.81
Quebec	420	14,459.89

Of the above, 144 claims for a total of $5,947.86 arose from the production year 1955. In many instances, applications came from fishermen operating under a share or partnership arrangement with other fishermen.

At the close of the fiscal year, 330 payments to fish processing plants had amounted to $193,286.81. Of these totals, 108 claims for $67,196.34 were for the 1955 production year. The claims and payments were as follows:

Province	Number	Amount
		$
Newfoundland	50	46,996.78
Nova Scotia	104	74,291.45
New Brunswick	121	37,092.54
Prince Edward Island	19	12,822.47
Quebec	36	22,083.57

The unpaid claims arising from the 1955 production that are referred to in the two previous paragraphs required a total disbursement of $73,144.20 from the appropriation of $582,000, leaving only $508,855.80 for claims in respect of the 1956 production. It is estimated that this latter amount will be some $150,000 less than the total required for 1956 payments. At the close of the fiscal year, arrangements had been made to seek authority from Parliament to pay the outstanding 1956 claims from funds provided for the 1957 production year.

Fishermen's Indemnity Plan

The Chairman and the Executive Director of the Board are responsible for the administration at Headquarters of the Fishermen's Indemnity Plan. As at March 31, 1957, 3,876 fishing vessels valued at $8,614,111 were insured under the Plan.

Research

In co-operation with the Markets and Economics Service of the Department of Fisheries, the staff of the Board continued to carry on surveys and other specialized studies of fishermen's costs and returns in Quebec and the Maritime Provinces. In addition, the staff, working in co-operation with the Department of Trade and Commerce, maintained a continuous review of the markets for various fishery products.

Officers and members of the Board are: Chairman, I. S. McArthur, Ottawa; Vice-Chairman, W. S. Lee, Halifax, N. S.; Members: Louis Bérubé, Ste-Anne de la Pocatière, Qué.; K. F. Harding, Prince Rupert, B.C.; H. I. Mifflin, Catalina, Nfld; Francis Millerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.

50146-0—7

FISHERIES RESEARCH BOARD

THE Fisheries Research Board conducts much of the Canadian Government research on fishes and other aquatic animals from the standpoint of their environment, the biology of their stocks, and means of capturing them. Also studied are the handling, processing and utilization of the catch. During the fiscal year 1956-57 a steady but controlled expansion of the Board's work and staff continued, commensurate with the increasing diversity of problems undertaken.

The Board itself is an advisory, consultative and administrative body which, in addition to the full-time Chairman, in 1956 consisted of 16 members: 10 from among the foremost scientists in Canadian universities, experts in fields related to the Board's work, five from leaders in Canada's fishing industry, and one representative of the Department of Fisheries. The Board meets annually in Ottawa for a general review of its programmes and to consider reports of its various committees. Among these are the Executive Committee, which meets three times a year to consider personnel and financial matters, and the Eastern, Central, and Western Regional Advisory Committees, each of which meets once or twice a year at one or another of the Board's establishments, and again in Ottawa at the time of the annual meeting of the Board, to review in more detail the programmes, operations and facilities of the Board's establishments and to make recommendations to the Board concerning progress and priorities in its researches. Continuity of administration and supervision of the Board's work as a whole is provided by the Chairman and his associates through the Office of the Chairman at Ottawa.

Fisheries research and services by the Board in the fields of oceanography, limnology and biology during the period of this report continued principally through its Biological Stations at St. Andrews, N.B., St. John's, Nfld., Winnipeg, Man., and Nanaimo, B.C., its Arctic Unit at Montreal, Que., and its Atlantic and Pacific Oceanographic Groups associated respectively with the St. Andrews and Nanaimo Stations. Temporary headquarters at Sault Ste. Marie, Ont., for Canadian studies of sea lamprey control in the Great Lakes were transferred in part as of January 1, 1957, to a new Biological Station established in London, Ont., during 1956 for researches on freshwater fisheries of central Canada. For economy and convenience in covering the wide areas over which the work of these establishments extends, field units are maintained at appropriate places and observers at the principal fishing ports.

The Board's research and services relating to marine fisheries products continued mainly through its Technological Stations at Halifax, N.S., Grande-Rivière, Qué., and Vancouver, B.C., and its Technological Unit at St. John's, Nfld. Early in 1957 the nucleus of a Technological Unit for corresponding studies relating to freshwater fisheries products was established at London, Ont., in conjunction with the new Biological Station.

Co-operation and participation in the work of the several international fisheries commissions and other bodies described in another section of this report materially increased the work requested of the Board, with consequent necessary increase of its staff and facilities. The research aspects of several of the Department's Industrial Development Service projects described in still another section continued to be supervised and carried out by Board staff through funds provided in the vote of that Service for special projects. Several contracts for research requiring special facilities that the Board lacks were continued with universities and individuals having those facilities. The Board repeated its last year's grant of $25,000 for graduate study scholarships in its fields of interest. These scholarships, some continuing and others new, are administered by the National Research Council.

Many results of the year's work were directly applied through the operation of the Department and by the industry; other results contributed to the store of research information that forms the basis for applications yet to be developed. A summary and some details of the Board's work during the period covered by this report, together with a list of its scientific staff and various publications, will be found in the separate Annual Report of the Board for 1956-57; therefore, only some important and typical results are given under the following three headings.

Oceanographic Investigations

Most of the Board's oceanographic work is conducted as a contribution to the national effort in oceanography programmed by the Canadian Joint Committee on Oceanography, a planning and co-ordinating body representing the Board, the Royal Canadian Navy, the Defence Research Board, the National Research Council, and the Hydrographic Service. Facilities such as ships supplied by Navy, equipment and personnel are used mutually and the oceanographic data collected are worked up mainly by the Board's two Oceanographic Groups for availability to all five participating organizations.

On the Atlantic coast nine oceanographic surveys were made during the period under review. Special attention was given to the Gulf of St. Lawrence, where the first winter surveys of its waters were conducted in February-March of 1956 and 1957; additional surveys during the intervening months yielded detailed information about the summer water circulation in the central part of the gulf. Extensive work in various waters off Newfoundland included commencement of a study of certain fjord-like inlets on the east coast of that province. Features and circulation patterns of waters on and beyond the Scotian Shelf continued to receive attention; the downward trend in year-round average temperature of the coastal sea water, which commenced a year or two ago after an upward trend had persisted during the previous 30 years, was observed to be continuing and may eventually have an effect on some fisheries. Other Atlantic coast programmes included work on some oceanographic aspects of the proposed Passamaquoddy Bay tidal power project under joint Canada-United States auspices.

In the Arctic, re-observations at many of the Foxe Basin and Husdon Strait positions visited in 1955 were made in 1956 for comparison of water conditions in the two years. Coverage was extended to additional waters between Baffin Island

50146-0—7½

and the mainland. Plankton and other collections by a member of the Board's Arctic Unit augmented the usual physical and chemical oceanographic observations.

A major feature of the Board's oceanographic work on the Pacific coast was participation in the second and third international synoptic surveys of North Pacific Ocean waters conducted jointly by Canada, the United States and Japan. The area assigned for Candian study was covered in August 1956 and February 1957, co-ordinated with plankton studies and exploratory fishing. Associated with these surveys was the continuation of a monitoring series of oceanographic observations from a weathership stationed about 500 miles off the British Columbia coast. The oceanographic results, dealing principally with water temperature gradients and mass movements of water with its plankton and dissolved nutrient chemicals, are outstanding contributions to a possible solution of important international Pacific Ocean fishery problems. Lengthy studies of the Strait of Georgia and its connecting waters neared conclusion, and plans were made for expanding offshore investigations. Collection of sea water data from coastal lighthouses continued. Construction of a large outdoor model of the Hecate Strait region, in which tidal and other phenomena can be simulated for more rapid study than is possible in the actual localities, neared completion.

Biological Investigations

In the year just past the Board received an increasing number of requests for information concerning the fishes and other commercial animals of our seas and fresh waters. Even with an enlarged staff the Board is hard pressed to answer them. In addition to national requests, very substantial biological information is required by a number of international bodies for their proper functioning. Among these are the International Commission for the Northwest Atlantic Fisheries (ICNAF), the International North Pacific Fisheries Commission (INPFC), the international Great Lakes Fishery Commission, the International Convention for the Regulation of Whaling, the International Passamaquoddy Fisheries Board, and others to a lesser degree.

Canada's participation in ICNAF is for the purpose of assuring a continued major supply of fish off our eastern shores—cod above all. In general the *cod* stocks of the northwest Atlantic are sufficient to meet the current demand, although in some of the inshore areas there has been a reduction in the density of stock and a shift to smaller sizes in the catch. More valuable pound for pound than cod, *haddock* are also more variable in numbers. Special sampling by the Board shows that after 1949 no further important reproduction of haddock took place at St. Pierre Bank until 1955; this brood should become usable first in 1959 or 1960. On the Grand Bank there are several haddock broods of fair to good size, and these are expected to provide a more sustained stock and fishery than on St. Pierre. In 1956 it was recognized that our *redfish* stocks consist of two types or subspecies—a deepwater big-eyed form with a beaked chin, and a larger form taken in shallower water with a smaller eye and more yellowish in colour. The deepwater form is the one which makes up our principal commercial stocks. Although not a major commercial fishery in terms of total poundage, the *Atlantic salmon* are of first-rate importance to several local economies and are a prized sport fish. In 1956 the

Newfoundland catch was only average for recent years, but the largest mainland river, the Miramichi, had much the largest run of recent record. Unfortunately, DDT from spruce budworm control operations badly damaged one branch of this river as a salmon rearing area: in addition to the three broods of salmon killed directly by the spray, subsequent broods suffer from the continued dearth of stream insects suitable for the larger parr.

Exploration by the Board demonstrated supplies of *herring* in the Gulf of St. Lawrence. Their adequate use depends on better means of exploitation, or improved methods of locating commercial schools. In the Bay of Fundy area the fishery is mainly for the small herring—which abound in the Passamaquoddy Bay and adjacent waters. Some of these stocks are now again threatened by a proposed tidal power development; the possible effects of this upon all the fisheries of the region are under investigation.

The Maritimes *oyster* industry received a set-back in 1955-56 when a bacterial disease increased its range along the mainland coast and decimated many productive beds. For the future, introductions of disease-resistant Malpeque oysters are under way, which will eventually replenish the affected areas. The *lobster* industry remains in flourishing condition. An exceptional production of larvae in Northumberland Strait in 1952 was evidently partly responsible for unusually large lobster catches made in that area in 1956. So valuable are lobsters, and so heavily exploited, that it is worth while to experiment with rather minute changes in seasons, size limits or kinds of gear, in an effort to increase the size of the stocks or the yield taken from them. Even a small increase in stock contributes importantly to the fishermen's returns.

In eastern Newfoundland the catch of pilot or pothead *whales* has increased dramatically from 6,000 in 1955 to nearly 10,000 in 1956, and is now the basis for a flourishing mink-rearing industry. Pilot whales were found to have a slower breeding rate and greater length of life than have the large whalebone whales. The size of the available stock is under study.

On its Pacific coast, Canada shares a number of fisheries with the United States, but other nations have not yet entered into the picture. However, concern for the potentialities of the situation prompted Canada's participation in the Canada–United States–Japan treaty which established INPFC. To obtain information needed for a 1958 review of the provisions of this treaty, the Board is studying the distribution of *salmon* in the Pacific, both along the continental shelf and in the open sea.

In 1956 night sets of floating gill nets took salmon at all locations visited, west to the Aleutian Islands and south to a warm-water boundary of temperature about 58° F. All five kinds of salmon were taken 1,000 miles and more out to sea, as also were steelhead trout. Both young and older salmon were tagged for later recognition. In order to identify the origin of salmon taken at sea, the details of body form and the kinds of parasites found in different stocks are being studied. On the Skeena River, "test" fishing above the commercial boundary is now providing a closer check on amount of escapement of all species of *salmon*. The 1956 run of *sockeye* still suffered from the effects of the disastrous Babine River slide that occurred

in 1951, but two large migrations of smolts enumerated by the Board are now at sea and should contribute to the 1957-59 commercial stocks. The supply of *chum* and *pink* salmon in British Columbia continues to fluctuate, mainly as a result of the instability of their stream environment—an instability which grows as increasing areas of British Columbia watersheds lose the deep humus cover associated with old forest growth. This development, and the increased value of these fish, has stimulated research on methods for providing salmon eggs with more stable conditions for hatching. Artificial spawning channels, controlled water in natural channels, and economical "natural" hatchery techniques are all under active development. An encouraging experiment in 1956 concerned the future pink salmon stock of the Fraser River, where a 1954 experimental planting of eggs from the Skeena River produced a fairly good return in 1956—4000 adults, or 0.4 per cent of the fry. This opens the prospect that the even-numbered years—long barren of pinks on the Fraser—may eventually become productive. Total catches of *chum* and *spring* (or chinook) salmon have been far more stable than those of the other species. Although British Columbia is not yet heavily injured as a salmon-rearing area, quite a number of fine spawning streams and nursery areas have been blocked or badly damaged by hydroelectric and other developments. Work on methods of remedying some of these and avoiding future losses is proceeding in two directions. In the first place, the Board and other agencies are conducting experiments to discover what exactly are the maximum and the sustained speeds of flow which adult and young salmon can withstand, and what are their reactions to light, sounds, and so on. In other words, what will their behaviour be at dams and other obstructions? On the other hand, prototypes have been developed of "deflectors" which guide young fish away from dangerous areas and into by-passes. Research on British Columbia *herring* stocks has delimited the spawning grounds of the several population units, and has shown that a large recruitment and production is obtained from spawnings of only moderate size. Further development of several types of mid-water trawl demonstrated the usefulness of this versatile gear in various situations.

Inland, the Board's continued checking of the Great Slave Lake fishery shows that the present nine million pound catch limit is within the productive capacity of the lake, in spite of its northern location, cold water and short growing season. This catch is taken by a fishing effort about 1/200 of what is used on Lake Erie—a lake of similar size. The parasite (*Triaenophorus*) problem, involving tullibee and whitefish in prairie lakes, may have come one step closer to solution, for the campaign to control infestation by reducing pike in an experimental lake seems finally to be bearing fruit. In addition, the discovery that infestation varies, slowly, with time, offers a possibility of using more lakes for the export fishery during periods of low incidence.

Farther east, establishment of the international Great Lakes Fishery Commission in 1956 resulted in continuance of the Board's work on lamprey control in the Canadian waters, which it has handled for several years under other auspices. All important Lake Superior streams have now been provided with barriers—usually an electrical field maintained across the river near its mouth—to prevent ascent and reproduction of these pests.

Canada's Arctic native population still depends heavily on local food supplies—fish, seals, walrus or beluga. New developments in the north have made it important to establish the reserves and permissible exploitation of these animals, and Board parties have worked at this for the past several years. In the Mackenzie Delta region rather large quantities of fish are available, as well as beluga or white whales. The Foxe Basin region is primarily walrus country, and the reproduction of these large animals was given special study. The ubiquitous ringed seal of the Arctic was also under observation. Some distance south of the Arctic coast, a caribou-hunting tribe has been under pressure because of failure of the "deer", and it was possible to show that sizeable fish stocks existed in nearby lakes.

Technological Investigations

At the Halifax Station research on maintenance of quality in fresh and frozen fish products continued. Studies of what effects seasonal changes, geographical distribution, and differences in vessels and their management have on quality of landed fish added much to the knowledge of factors contributing to spoilage of fish in fishing boats at sea. Classification of the odours produced by cultures of fish-spoiling bacteria grown on known chemical constituents of fish flesh led to useful clues for identifying some types of such bacteria, and examination of the benefits of antibiotics for delaying the onset of spoliage by bacteria gave with Atlantic coast fish results similar to those obtained in earlier work at the Vancouver Station on Pacific coast fish. Further experiments on allowing refrigeration temperatures to rise temporarily during transportation of frozen fish confirmed previous observations that such rises accelerate subsequent deleterious changes in quality of the product. Advances were made in determining the molecular architecture of the structural and other proteins of fish muscle, and in separating and identifying the various fatty acid units that individualize different fish oils. A procedure for converting fish viscera into a nutritious dried meal suitable for animal feed and possibly in food for man, was developed to a pilot-plant stage with estimation of production costs; extraction of useful secondary products from artificially digested viscera was also explored. Large experimental batches of the practically white, odourless and tasteless "fish flour" developed last year from fresh fish offal were prepared for further tests of its use as a nutritious protein-rich supplement for regular bakery flour. Industry appreciation of results of the Station's engineering research on design and materials for holding-pens in fishing vessels and on equipment and procedures for processing fish continued to increase.

The technological Station at Grande-Rivière furthered its researches on causes of the changes that occur in fatty constituents during the preparation of salt fish, on conditions that deter the growth of the two principal kinds of bacteria that cause reddening in salt fish, and on electrical means of determining the salt content of this product. A codflesh-salt paste dried in moulds aroused interest as a possible new type of salt fish comestible. Initial experiments on substituting a continuous brine salting procedure for the usual dry salting process used in making "Gaspé cure" cod showed promise, and the preservative effect of a dip in a chlortetracycline (CTC) antibiotic solution at a certain stage of the Gaspé cure was established. Additional

studies were made of the mechanism of acid digestion of cod proteins to yield useful secondary products, and of natural enzymic digestion of whole herring to yield oil and a spray-dried meal. Engineering work included study of problems relating to storage and artificial drying of salt fish and to smoking of herring.

The Newfoundland Technological Unit was engaged principally in the Board's assistance to the Department's Industrial Development Service projects for developing the processing of salted fish and other Newfoundland fish products. Many design and consulting services were accorded to private fish companies.

Although laboratory facilities for the newly instituted Technological Unit at London were not yet available, the staff made useful contacts with neighbouring freshwater fishing industries through visits and meetings, and consulting services commenced.

On the Pacific coast, the Vancouver Technological Station followed up its researches on recognized antibiotics as fish preservatives so successfully that commercial application of two of them, CTC and oxytetracycline (OTC), is now allowed under the Canada Pure Food and Drug Regulations for use with fresh fishery products to delay bacterial spoilage. Further experiments on the injection of CTC into just-harpooned whales demonstrated that this antibiotic offers considerable promise for retarding the severe bacterial decomposition that sometimes occurs in whale carcasses before they can be processed. Use of tanks containing sea water refrigerated to about 30° F., with or without an added antibiotic, was described in previous reports as having certain advantages over ice for holding fish. Experiments with such tanks installed on a commercial fish-packing vessel continued to demonstrate these advantages with fish, and a large commercial shipment of live crabs was successfully held for five days under modified conditions in a tank on this vessel. Six tanks were installed during construction of a large commercial fishing vessel, which landed salmon and halibut in excellent condition up to seven and 15 days after catching, with good maintenance of quality during an experimental further holding for one and two weeks at the Station. Improved designs of refrigerating equipment for such tanks were worked out and tested, and commercial installations are now offered by several firms to meet the increasing interest on the Pacific coast in this system for holding fishery catches. The effect on colour and on curd formation in the flesh when salmon so held are canned was examined, and considerable progress was made in devising colour measurement procedures for prediction, from the colour of raw salmon flesh, what the probable colour after canning will be.

Ascorbic acid was confirmed as the best inhibitor of oxidative rancidity in fats of frozen fish, and feeding tests with young poultry were instituted in further trials of antioxidants for protecting the oil in stored herring meal. The pilot plant designed for research on condensed fish solubles was completed and tested in an investigation of herring solubles as produced by modified procedures from the stickwater recovered during the manufacture of herring meal. Poultry feeding tests are also in progress for assessing the relative nutritive values of these herring solubles. A thorough study was made of the enzyme actions responsible for liberating certain constituents present in only minor amounts in fish flesh, but which sometimes adversely affect the

processing of some products. Because the more that can be learned about the life processes of fish-spoiling organisms the greater is the likelihood of discovering even better methods of protecting fish against spoilage, research on the essential life-process requirements of several marine bacteria was pursued with vigour. Among these requirements are sodium and potassium compounds, the variable relative amounts of which in fish flesh were also investigated from several other important standpoints including the effect of holding fish in refrigerated sea water. Considerable progress was made in studies of the nature of phosphorus compounds in salmon livers, and of sterols in the fatty material of several marine invertebrates.

Testing of various synthetic fibres used in fishing nets and gear, and making available advice on specifications for such materials and their care, continued to be an active phase of the Station's programmes.

A project conducted for the Board at the University of Toronto revealed much interesting information on the relative taste appeal of fish flesh cooked at different temperatures whether directly from the frozen state or after thawing in several ways.

INTERNATIONAL COMMISSIONS

CANADA, a pioneer in the establishment of international commissions dealing with fishery resources, is now signatory, with other countries, to seven conventions the aims of which are to conserve and develop the resources of the sea and inland lakes. Three are bilateral agreements between Canada and the United States, and deal with Pacific salmon and halibut and the fisheries of the Great Lakes; the other four include other countries in Europe and Asia and are concerned with the resources of the Atlantic and Pacific Oceans.

Accounts of the work of these international commissions follow:

The International Pacific Salmon Fisheries Commission

The International Pacific Salmon Fisheries Commission was appointed under a Convention ratified in 1937 between Canada and the United States for the protection, preservation and extension of the sockeye salmon fisheries in the Fraser River system. For 19 years the Commission has been conducting scientific investigations of these sockeye runs in order to perform successfully its obligations under the terms of this Convention. Since 1946 the Commission has been recommending to the two national governments, fishing regulations considered necessary to the fulfilment of the Convention. Such regulations must provide, insofar as is practicable, equal division of the allowable catch of Fraser River sockeye between the fishermen of the two nations. The investigations carried on by the Commission deal with practically all phases of the life cycle of the sockeye salmon as they may affect or assist in the fulfilment of the Commission's duties. In addition, an increasing amount of time is being devoted to protection of the fishery from possible adverse effects of general water use development resulting from population and industrial growth in the Fraser River watershed.

Among the most important factors arising from the researches is the basic evidence of the intimate relations of the sockeye salmon throughout its whole life history with its environment. Their life cycles are on strictly hereditary time schedules which are set by the unvarying cycle of the run. Throughout their lives their reproductive functions, growth and migrations coincide with the environmental conditions and this precise inter-relation is absolutely essential to their survival. The appreciation of this general fact of hereditary sensitivity is of practical importance in the programmes for the rehabilitation and extension of the runs of sockeye salmon, and is extremely pertinent in relation to considerations of the possible adverse effects of industrial and other water use developments on the river system.

Recommendations for regulations governing the 1956 sockeye fishery in Convention waters were adopted by the Commission on April 13, 1956 as the Orders and Regulations controlling the taking of sockeye in Convention waters during 1956.

In the High Seas Convention waters, the Commission recommended that the taking of sockeye be permitted from June 28 until August 5 by troll fishing only, with no restrictions in hours of fishing. In Canadian Convention waters it was recommended that there be 96-hour weekly closed periods from June 28 to August 14, 120-hour weekly closed periods from August 15 to September 13, and that there be no fishing from 7.00 a.m. September 13 to 7.00 a.m. September 19. In United States Convention waters it was recommended that there be 72-hour weekly closed periods from June 28 to September 2.

Three modifications were made to these regulations, as adopted by the respective authorities of the two governments.

The first modification was a 24-hour extension of the weekly close time in Canadian Convention waters commencing Friday, August 3 and extending to Wednesday, August 8. This action was deemed necessary to provide escapement and to obtain division of the catch between the two countries.

The second amendment to the Orders and Regulations affecting Canadian Convention waters was issued on September 7. This amendment closed Canadian waters to linen gill nets of less than eight inches extension measure and nylon gill nets of less than $8\frac{3}{4}$ inches extension measure during the period commencing at 7.00 a.m. September 10 and extending to 7.00 a.m. September 14 in order that the run of white spring salmon might be reasonably exploited.

Upon termination of the closure of Canadian Convention waters from September 14 to September 19 for the protection of sockeye, the statutory weekly close times of the Department of Fisheries were in effect until October 12 when an additional 24 hours per week was imposed for the protection of chum salmon stocks.

A special closure to allow for spawning escapement of species other than sockeye was imposed by the Department of Fisheries from 8.00 a.m. October 29 to 8.00 a.m. November 12. All salmon net fishing closed for the balance of the season at 8.00 a.m. November 15.

By August 6 the extremely heavy concentration of fishing gear in United States Convention waters made it evident that a stringent curtailment of fishing time was necessary if the Commission was to fulfill its terms of reference under the Convention. Consequently the Orders and Regulations of April 13 were amended to add 39 hours to the weekly closed time for the second week in August making it extend from 5.00 a.m. August 8 to 8.00 p.m. August 12. Also at this time the weekly closed time for the period August 12 to September 2 was increased from 48 hours to 72 hours. After September 2 the United States fishery reverted to a 48-hour weekly closed time under regulations issued by the Director of the Washington State Department of Fisheries.

In recent years each annual report of the Commission has emphasized the serious effect of increasing gear efficiency and the increasing numbers of fishing units on the regulations affecting the United States fishery. It has become obvious that the changeover from linen to nylon gill nets in 1951, the addition of the power block to the purse seine in 1955, and the increasing numbers of gill nets can only result

in less fishing time. Fishing efficiency in United States waters is becoming so high that the fishing period is too short for sound economic operation and stable administration.

In respect to the excessive gear efficiency in United States waters it should be emphasized that the Commission is specifically restricted from controlling gear in any manner except in regard to fishing time. Partial-day fishing would be advantageous to the proper management of the fishery since it would reduce the daily catch, balance the catch more evenly throughout the fishing area and increase the number of days during which fishing would be conducted. Partial-day fishing involves serious patrol problems since gill net fishing would of necessity have to start or stop during the hours of darkness. Such a measure also would not be the answer to the whole problem created by increased efficiency of gear. For these reasons the Commission has been reticent to recommend partial-day fishing but would do so if such action were acceptable to the national enforcement agencies and the industry in general. In any event either control of gear or partial-day fishing, or both, is essential to the solution of a problem which currently is being solved by the unsatisfactory three-day fishing week.

The basic problem in gear regulation in Canadian Convention waters has been created by the addition of Juan de Fuca Strait as an effective gill net and purse seine fishing area. The historic Fraser River gill net fishery for many years has been capable of taking an estimated 98 per cent of the fish available to it when operating. In addition to this high efficiency there has been a super-saturation of gear which allows a substantial reduction in the number of units of gear normally operating without any measurable reduction in fishing efficiency.

A large fleet of gill net boats can leave the Fraser River area for Jaun de Fuca Strait without reducing the 98 per cent fishing efficiency of the residual Fraser River fishing fleet. The catch of the gill net fleet in Juan de Fuca Strait is now reaching substantial proportions and when combined with the increasing catch of purse seines in the same area it is obvious that a substantial reduction must be made in the fishing time of both areas if adequate escapement is to be secured.

The Commission, under the proposed Pink Salmon Protocol presented for the approval of the two governments at the end of 1956, would have the power to recommend area restrictions to fishing in the Convention waters of the United States and Canada. The approval of the Protocol would permit the design of a new fishing policy in Canadian waters which would eliminate the conflict between the two major fishing areas.

Under the provisions of the present Convention which requires uniform regulations for both Juan de Fuca Strait and the Fraser River the increasing fishing fleet in Juan de Fuca Strait can only result eventually in a two-day fishing week throughout the Canadian fishery. Such a fishing week is entirely impractical both to the industry and to the management agency.

The total 1956 run of sockeye to the Fraser River system including the commercial catch, Indian catch and the escapement was 2,743,000 fish, representing a decline of 14.4 per cent over the run of the previous cycle in 1952. In spite of

substantial increases in fishing efficiency the fishing regulations were so designed that the total escapement of 879,000 to all spawning areas actually increased by 3.2 per cent over the escapement in 1952.

The 1956 escapement was considered to be satisfactory. The Chilko run is now the principal supporter of the cycle run and the escapement to this area was actually estimated at 147,000 fish more than is believed to be required to produce a maximum returning run. Substantial numbers of fish were found spawning in non-productive areas which is a positive indication over and above spawning density studies that some surplus escapement occurred.

The excess escapement to Chilko which resulted from emergency closures in the fishery is direct evidence of the serious management problem involved in an increasing fishery having an increasing efficiency. Fishing time is so restricted and the open period of fishing in the several major fishing areas so effective that a minor change in fishing time for the purpose of either providing the desired escapement or equal division of the allowable share of the catch has a major effect on the catch, escapement and division of the catch. Post season calculations indicate that the escapement would have been better distributed if a three-day fishing week had prevailed throughout the season instead of the permitted four-day week with a two-day special closure during the main part of the Chilko run.

Increased fishing time through the reduction of the fishing fleet, fishing efficiency or fishing area depending upon which method or methods are most practical is essential to eliminating the danger of underfishing, overfishing or unbalanced catch between the fishermen of Canada and the United States.

The decline in the 1956 run as well as the decline in the 1955 run is believed to be caused by poor ocean survival.

Rehabilitation of barren streams continued to play an important part in the Commission's activities. Investigation continued of the possible use of artificial spawning grounds adjacent to suitable lake rearing areas lacking in natural spawning grounds. Results of the 1955 experiment at Horsefly Lake indicated survival from eggs to fry of 40 to 71 per cent for various conditions of egg deposition, gravel type and flow of water. A total of 264,000 fry were released to Horsefly Lake in the spring of 1956. The migration of these fish from the lake will be checked in the spring of 1957. In the fall of 1956 the artificial spawning ground was modified slightly to give better control of the flow of water and 247 adult sockeye and 1,098,000 green fertilized eggs were introduced to provide a measure of survival for heavy seeding conditions. Transplantations of eyed eggs were again made to the Upper Adams River. Such transplants have now been made in three out of four cycle years. Transplants were also made to the Barriere River in which obstructing dams have now been removed, and in a tributary of Nadina Lake which does not at present have a sockeye run.

The protection of the Fraser River sockeye and the river which forms their fresh water environment becomes increasingly a more complex problem each year and requires the careful attention of the Commission's staff. The Department of Fisheries is vested with the legal authority to obtain fish protection in the case of

water use development and the Commission acts as technical advisers to the Department in dealing with those projects affecting sockeye in the Fraser River system. During 1956 much interest was directed by public and private power companies to the possibility of development of hydroelectric power on the Fraser River and its tributaries. The B.C. Electric Company made a grant of $50,000 to the University of B.C. for a survey of existing knowledge and research on salmon fishery problems related to hydroelectric power developments on the Fraser River. The Moran Power Development Ltd. made a proposal for the construction of a 720-foot dam on the Fraser River at Moran. This structure would affect from 40 to 60 per cent of the production of Fraser River sockeye and the proposal has required the careful and continuing attention of the Commission. The B.C. Power Commission proposed the development of power based on the diversion of water from the Chilko and Taseko Lakes. This proposal was a modified version of the original plans prepared by the Water Rights Branch, which it was hoped would satisfy fishery requirements for the preservation of the Chilko sockeye run. The Commission, after careful consideration, reaffirmed the conclusions previously reached in the Interim Report on the Chilko River Watershed in which it was opposed to any alteration to the natural inflow of Chilko Lake. Negotiations are continuing with the Power Commission with the object of determining a mutually acceptable method of power development based on a diversion from Taseko Lake.

Research continued on methods for guiding downstream migrant sockeye away from hazardous paths at large hydroelectric dams. This research has been underway since 1953 and although small scale experiments have given promising results, the same principles applied to full scale tests have been entirely without success. Research also continued on the characteristics of sockeye spawning nests and the hydraulics of flow of water through these nests. This work is directed toward understanding the causes of the low natural survival in nests as compared with survival in hatcheries or artificial spawning grounds, and determining if corrective measures are possible. Prevention of pollution in the Fraser River and its estuarial waters presented an ever-increasing problem. During 1956 discussions were held with 10 new industries regarding pollution prevention measures and 11 applications for disposal of raw or settled domestic sewage were reviewed. Following the discovery of a high water block to the early Stuart sockeye run in 1955 at a rapids near Yale, a survey was made of the block site in the spring of 1956 and remedial measures were planned for completion by the spring of 1957 in order to prevent a recurrence of the blockade during the dominant cycle early Stuart run in 1957. It is estimated that the blockade in 1955 will result in a loss of over $400,000 to the industry before the affected run can be rehabilitated.

The Commission held six meetings during the year at Seattle, Washington, Vancouver, B.C., Bellingham, Washington and New Westminster, B.C. Senator Thomas Reid, H. R. MacMillan, and A. J. Whitmore, Chief Supervisor of Fisheries, Pacific Area, represented Canada on the Commission. The Chairman for 1956-1957 was Robert J. Schoettler, Director of the Washington State Department of Fisheries. Other United States Commissioners were Elton B. Jones and Arnie J. Suomela.

International North Pacific Fisheries Commission

The International Convention for the High Seas Fisheries of the North Pacific Ocean came into force on June 12, 1953. The Convention provided for establishment of the International North Pacific Fisheries Commission with four members each from Canada, Japan and the United States. The Commission has no regulatory powers but can make recommendations to the contracting parties for the conservation of stocks of fish on the high seas of the North Pacific Ocean under joint exploitation by two or more of the signatory countries.

The Commission's third annual meeting was held in Seattle, Washington, from November 12 to 16, 1956, under the Chairmanship of Edward W. Allen, U.S.A. Canada was represented at this meeting by the following Commissioners: George R. Clark, Deputy Minister of Fisheries and Vice Chairman of the Commission, J. M. Buchanan, Vancouver, B.C., James Cameron, Pender Harbour, B.C. and R. T. Hager, Vancouver, B.C. The Canadian members of the Commission were accompanied by a number of advisers, including Dr. J. L. Kask, Chairman of the Fisheries Research Board, Mr. A. J. Whitmore, Dr. A. W. H. Needler, Dr. R. E. Foerster, Dr. F. Neave, and others.

The programme of research being carried out by the International North Pacific Fisheries Commission is concerned with two principal problems. The first of these is assigned to the Commission by the Protocol to the Convention. The Commission is instructed to investigate the waters of the Convention area to determine if there are areas in which salmon originating in the rivers of Canada and the United States of America intermingle with salmon originating in the rivers of Asia, and, if such areas are found, to conduct suitable studies to determine a line or lines which best divide salmon of Asiatic origin from salmon of Canadian and United States origin. The Convention established a provisional line, located at approximately 175° West Longitude, subject to adjustments if a more equitable dividing line can be determined. The second problem undertaken by the Commission is a study of the king crab stocks of the eastern Bering Sea for the purpose of determining if joint conservation measures are needed.

The Commission relies on its Standing Committee on Biology and Research for the development of research programmes. The Committee on Biology and Research is composed of one Commissioner and two Advisers from each national section, with the Executive Director and the Assistant Director of the Commission staff as *ex officio* members. At the 1954 Annual Meeting the Committee outlined a basic programme of research on the two problems mentioned above. This programme has been carried out with continually-increasing intensity since that time.

The Commission has not assigned any phase of the actual conduct of its investigations directly to its own staff. It has arranged to rely on the fisheries research organizations of its member governments to execute and report on the research assignments from the general research programme adopted by the Commission and co-ordinated through the efforts of the Committee on Biology and Research and the Commission's staff. The research agencies of the member governments have carried out the Commission's programme of investigations on a broad and highly efficient basis.

In 1956 a total of 12 research vessels from the three countries conducted studies of the offshore distribution of salmon and collected data and samples for studies of the question of continental origin of the high seas salmon. Most of the waters of the North Pacific Ocean and the Bering Sea where salmon are found were covered by the cruises. Using drifting gillnets of various mesh sizes as their primary apparatus, the research vessels caught a total of about 59,000 salmon, including 21,000 sockeye, 6,000 pinks and 27,500 chums. Catch data indicate that the five species are distributed more or less continually from the American to the Asian coast. It is also apparent that the southern limit of salmon distribution changes seasonally and that there are differences in distribution of the various species of salmon.

The catches of salmon by most of the research vessels were preserved by freezing and shipped to shore laboratories. In addition to the frozen salmon retained from research vessel catches, many thousands of sets of biometric measurements and scales were collected throughout the marine and fresh water range of the genus. Research agencies of the three countries are devoting a major share of their efforts to the question of determining the continental origin of the stocks.

Research workers in the United States used a combination of seven meristic characters to study racial differences in a total sample of approximately 9,000 sockeye and chum salmon collected in 1955. The results from 1955 made it clear that success in solving the problem would depend on increasing the scope and size of the samples of salmon. Strong efforts to greatly expand the sampling operations were successful in 1956 and over 24,000 specimens were collected.

The analysis of these more adequate samples, when completed, should add greatly to the knowledge of continental origin of the high seas stocks. Every method of analysis being used to determine areas of origin points to success in the separation of Asian and North American stocks of salmon.

Study of the various characteristics of scale patterns of red salmon has resulted in an assignment to correct areas of origin of 80 to 90 per cent of the samples of fish whose scales were examined on a test basis. Stimulated by this result, the scale investigations have been expanded and applied to larger collections of scales from 1956 samples.

Canadian workers have undertaken studies of the osteology of Pacific salmon, using material collected throughout the North Pacific. The first phase, a description of the skeletal anatomy by species of the changes which take place as maturity approaches, was completed in 1956. The second phase, a search for differences between stocks of the same species, was started in 1956.

Samples of sockeye, pink and chum salmon collected by the three countries in 1955 were examined for parasites by workers in Canada and the United States. Results indicated that several species of parasites, through their presence or absence and/or relative abundance, might be useful in determining the continental origin of salmon taken on the high seas. An enlarged programme for collection of samples of salmon for parasitic studies was undertaken by all three countries in 1956. Analysis of 1956 sockeye and chum salmon samples has been almost completed and

the results of the analyses are expected to contribute greatly to solution of the problem of determining the continental origin of salmon.

Workers in the United States and Japan have developed and applied methods of measuring significant serological differences between populations of salmon from different geographical regions. The techniques being applied give promise of allowing determination of the origin of individual fish taken on the high seas.

All three member countries tagged salmon during 1956 for the purpose of making direct studies of the movements of salmon. Outstanding results were obtained from an extensive high seas salmon tagging operation conducted by the United States. Using specially-built purse seines for capturing fish in viable condition and employing carefully developed equipment and techniques for handling them aboard the two vessels, it was possible to tag about 7,400 salmon, principally sockeye and chums. Tagging operations took place principally along the Aleutian Chain, as far west as Kiska Island. The period of operation extended from May 2 to September 14, but bad weather practically prohibited seining operations until June 7. The tags used were principally plastic tubes, the so-called spaghetti tags, passed through the body tissue beneath the dorsal fin and knotted. Recoveries have been reported from Alaska, the U.S.S.R., the island of Hokkaido, Japan, and the Japanese high seas mothership fishery.

All of the vessels engaged in the research programme made observations of sea temperatures and collected water samples at various depths throughout their cruises as a matter of routine. In addition, each of the three countries operated a special oceanographic research vessel in the Convention area in 1956. The data from these and previous investigations of the area are being compiled, standardized and analysed in order that the environmental factors influencing the distribution and movements of salmon and other fish in the North Pacific may be understood.

The Commission's programme of investigation of the status of the king crab stocks is confined to the area of the eastern Bering Sea. The objective is to determine if joint conservation measures should be undertaken by the contracting parties exploiting the stocks, i.e., Japan and the United States. Investigations are being carried out by scientists of these two countries. Data on the commercial king crab fisheries of both countries have been compiled and analysed. United States workers tagged approximately 4,000 king crabs in the eastern Bering Sea during 1956 and a small number of tags was affixed by Japanese research workers to study movement and growth of crabs. Although a few tags have been recovered from the tagging operations of 1956 and previous years, the recoveries are not sufficient to draw any conclusions at the present time on movement and growth of crabs in this area. Basic biological characteristics of the king crab stocks, such as rate of growth, age, mortality rates, etc., are under investigation.

At its 1956 Annual Meeting the Commission established an ad hoc committee to study reports submitted by Canada and the United States in relation to the qualifications of certain stocks for continued abstention from fishing by Japan and Canada. No determination as to whether or not abstention should be continued on the stocks in question may be made by the Commission until after the fifth

anniversary of the Convention, which occurs in 1958. The report submitted by Canada covers salmon and herring stocks along the British Columbia coast and the halibut stocks jointly managed by Canada and the United States. The United States reports cover salmon and herring stocks of the United States and Alaska and the halibut stocks jointly managed by Canada and the United States.

Details of the Commission's activities and research progress during 1956 may be found in the Annual Report of the International North Pacific Fisheries Commission for that year. The next annual meeting of the Commission will be held in Vancouver, British Columbia, beginning on November 4, 1957, under the Chairmanship of Mr. George R. Clark of Canada.

International Pacific Halibut Commission

With the close of the 1956 fishing season, the Commission completed 25 years of management of the Pacific halibut fishery. During this period of controlled fishing, the supply of halibut and the yield of the fishery were both substantially increased.

Fishing in 1956 was conducted under regulations adopted by the Commission in January. The regulations which continued the multiple-season method of regulation initiated in 1954, were approved by the Governor General of Canada in Council on March 21 and by the President of the United States on April 10.

The Pacific halibut production during the year by the combined fleets of Canada and the United States amounted to 67.4 million pounds. This was 8.3 million pounds more than in 1955, though below the all-time high catch of 71.2 million pounds taken in 1954 when the first year of the multiple-season method of regulation was first applied. The Canadian fleet took its accustomed proportion of the catch.

The halibut regulations in 1956 were not significantly different from those of 1955. Abnormal fishing conditions during the 1955 fishing season had so obscured the effectiveness of the multiple-season method that the Commission decided against any change that would appreciably alter either the amount or distribution of fishing.

The five regulatory areas of 1955 were continued without change: Area 1A, south of Heceta Head, Oregon; Area 1B, from Heceta Head to Willapa Bay, Washington; Area 2, from Willapa Bay to Cape Spencer, Alaska; Area 3A, from Cape Spencer to Kupreanof Point near the Shumagin Islands, Alaska; and Area 3B, all convention waters west of Area 3A including those of Bering Sea.

The catch limits of 26.5 million pounds in the first season in Area 2 and 28.0 million pounds for the first season in Area 3A were retained. Fishing in other areas and in other seasons was again controlled by limiting the lengths of the seasons. Closed nursery areas, minimum size limits, prohibition of the use of nets for the capture of halibut, and provision for the landing of halibut caught incidentally by setline vessels in closed areas were also continued.

All areas were opened to fishing on May 12 but little fishing was done until May 20 due to a voluntary delay in fishing by both the United States and Canadian fleets. During this delay the fleets adopted a voluntary "lay-in" programme under

which each boat would stay in port for a period of seven days between trips to increase the period of fishing and reduce market gluts.

The first season in Areas 1B and 2 was closed on June 27 and the first season in Areas 3A and 3B on August 24, when the Commission deemed the catch limits set for Areas 2 and 3A respectively would be attained. Second seasons of seven days in Areas 1B and 2, and of nine days in Areas 3A and 3B, were opened on September 9, 16 days after the first closure of Area 3A. A third season of 23 days in Area 3B was opened on September 30 and closed on October 23. Area 1A was closed on October 23 with the final closure of Area 3B.

The first seasons in the areas with catch limits were prolonged by the 8-day delay in commencing fishing, and by the voluntary 7-day lay-in between trips. The prolongation of the first season in Area 3A had the effect of delaying the opening of the second and third seasons and of extending halibut fishing over a disproportionately longer period of the year.

Landings from Areas 1A and 1B combined, all by the United States fleet, were approximately 600,000 pounds, moderately below the total in 1955.

The total catch from Area 2 was 35.2 million pounds, approximately 6.5 million pounds more than in 1955. The landings from the first season of 38 days amounted to 26.8 million pounds, approximately the catch limit set in the regulations. The catch during the seven-day second season, commencing on September 9, amounted to 7.4 million pounds, about midway between the 9.4 and 5.3 million pounds taken during the second seasons in 1954 and 1955 respectively.

Landings of halibut caught incidentally to fishing for other species under permit in Area 2 after the area was closed to halibut fishing totalled 756,000 pounds. This amount was below the levels of 1954 and 1955. Permit fishing in September, normally a very active period of blackcod fishing, was reduced in 1956 by the occurrence of the second halibut fishing seasons in that month.

The combined total catch from Areas 3A and 3B amounted to 31.6 million pounds, compared to 29.7 million pounds in 1955 and 33.8 million in 1954. The catch during the first season in Area 3A, which lasted 96 days, was approximately 29.3 million pounds, about 1.3 million pounds over the catch limit provided in the regulations for that season.

During the second season of nine days in Area 3A a catch of 1.5 million pounds was taken. This was about the same as during the corresponding season in 1955, but considerably below the 3.4 million pounds taken in 1954.

During the first and second seasons in Area 3B only 479,000 pounds were caught, including 294,000 pounds of dead fish taken by the Commission's tagging vessel. Fishing vessels largely remained to the eastward while Area 3A was open, as in 1954 and 1955.

During the third fishing season in Area 3B, commencing on September 30 and lasting 23 days, the catch amounted to 264,000 pounds compared to 934,000 pounds and 611,000 pounds in 1955 and 1954 when the third season occurred in September. The decrease in 1956 resulted from the prolongation of the first season in Area 3A

which delayed the third season in Area 3B until October, an unattractive fishing month because of weather conditions. Part of the Area 3B catch was taken in Bering Sea.

The Commission intensified its work upon the statistical and biological research required to fulfill the Halibut Convention's objectives, the attainment of maximum justifiable yield from present stocks and the ultimate attainment of maximum sustainable yield.

Analysis of fishing records showed that the availability of halibut, as indicated by the poundage caught per skate of gear fished, was higher in each major section of Areas 2 and 3A than during 1955 in which prolonged bad weather interfered with effective fishing. During the second seasons the catch per skate was higher in Area 2 and lower in Area 3A than in their first seasons. In Area 3B the catch per unit of effort was not comparable to that of 1955 on account of the lateness of the third fishing season and poor weather conditions.

Some individual grounds did not reflect the general increase in availability from the 1955 low. In Area 2 the Cape Scott and Goose Island grounds, which are important to the Vancouver and Seattle fleets, showed no recovery in the first season and some decline in the second. Some sections of Area 3A showed little or no recovery during the first season and a distinct decline in the second.

Comparisons of the distribution of fishing and catches from 1954 to 1956 with corresponding data for earlier years showed that the application of multiple seasons had, as intended, had the effect of increasing the amount of fishing and the catch on some grounds which had been underfished under the previous single-season method of regulation. Similarly, the catch per skate indicated that the stocks on the previously underfished grounds were sustaining the increase in fishing satisfactorily. However, they also suggested that some other grounds which had been heavily fished prior to 1954 were being fished beyond their present productive capacity under the multiple-season method of regulation, and that some modification of the fishing seasons on those particular grounds might be necessary.

Studies of the changes in the size composition of commercial catches showed that, despite the increased entry of young noted in Area 2 in 1955, the numbers of chicken halibut (5 to 10 pounds) declined and the numbers of large (over 60 pounds) increased in the very important section of Area 2 between Goose Island and northern Hecate Strait. Similar changes were observed in the Portlock-Albatross section of Area 3A.

The age composition of landings from the Goose Island section of Area 2 showed that the 6- and 7-year olds which entered the fishery strongly in 1955 were dominant in numbers in 1956. However, the older age classes and particularly those over 12 years of age were dominant in weight and largely maintained the catch.

In Area 3A, halibut of the strong 1944 brood were still dominant and the catch in that area continued to depend mainly on 11-to 16-year olds. Eight and 10-year olds made a strong entry into the fishery in 1956. Individuals of the 8-year group were more numerous than in any of the preceding 13 years, indicating a good future yield from the 1948 brood.

In Area 3B, on the Shumagin and Makushin Bay grounds, the same strong year classes were present as on grounds to the eastward in Area 3A.

An interesting concentration of halibut was found by the Commission's tagging vessel on a "spot" on the 100-fathom edge northwest of Unimak Pass in Bering Sea. It showed the same strong age classes as were found south of the Alaska Peninsula. It also contained numerous older fish, some up to 31 years of age, whose average weight at each age was well below that found elsewhere in Area 3B. The composition of the catch suggested that the spot might contain a semi-isolated segment of stock such as has been discovered from time to time elsewhere on the coast during the past history of the fishery.

Studies of growth, begun in 1955, were intensified using measurements of the widths of growth zones in the otoliths to determine growth at different ages in different years and in different places. Preliminary results showed that profound changes had occurred in growth from early to recent years on various grounds and particularly in Areas 3A and 3B. These appeared to be associated with changes in the density of the halibut stocks.

Additional tagging experiments were begun in 1956 to further the study of the effects of the multiple seasons on availability and utilization of halibut on different grounds. Tagging was done in Area 3B during the spring and summer and on the spawning grounds in Area 3A during the winter.

The halibut vessel *Polaris* was chartered and operated from mid-April to mid-September in Area 3B. Seven trips were made near the Shumagin Islands, Unalaska Island and in Bering Sea. A total of 4,674 fish, weighing approximately 194,000 pounds, were tagged.

Three experiments were begun near the Shumagin Islands, two on the Bering Sea side of Unalaska Island and two on the "edge" between Unimak Pass and the Pribilof Islands. The experiments in each location were separated by sufficient time to permit the use of tag recoveries in subsequent years for study of seasonal differences in availability.

Fishing was conducted as far north as Cape Newenham and the Pribilof Islands during the tagging operations and indicated a virtual absence of halibut in that section of Bering Sea. Halibut were found in reasonable abundance along the north side of Unalaska Island and in considerable abundance on the previously mentioned spot upon the "edge" northwest of Uminak Pass. A large number were tagged in two experiments in the latter location and should help to explain the peculiar composition of the catches taken there.

The halibut vessel *Pacific* also was operated for six weeks in November and December on the Yakutat and "W" spawning grounds in the Gulf of Alaska. Halibut were difficult to locate and only 588 fish, weighing 23,000 pounds, were tagged. The operations of the *Pacific* were so hampered by bad weather that there was doubt as to whether the fish had been late in reaching the spawning grounds or the abundance of spawners had been below that of earlier years.

To resolve these questions, the charter of the *Pacific* was resumed in January for one more trip to the same spawning grounds. Much better fishing was

encountered, indicating that the spawning season had probably been later than usual. An additional 504 halibut, weighing 25,000 pounds, were tagged.

Tag recoveries in 1956 totalled 1,573, compared with 783 and 1,584 in 1955 and 1954 respectively. New experiments on Goose Island in 1955 accounted for more than one-third of the year's recoveries, which was not unexpected in view of the large size of the experiments and the high intensity of the fishery upon the Goose Island grounds.

Recoveries from 1955 experiments on the Masset and Timbered Islet nursery grounds were very low. In this they agreed with first-year returns from a 1947 Masset experiment. The migration of halibut from the nursery areas is a gradual process.

The rate of utilization of the halibut on different sections of the coast appeared to vary greatly from one ground to another. The rate of utilization indicated by tag recoveries was relatively high for most of Area 2 and as far north as the Yakutat grounds in Area 3A, but became progressively lower on the grounds farther to the westward. Tag returns suggested that the stock on the far-western grounds was not being fully utilized but were not in agreement with the results of statistical and age-composition studies. Decision in this matter must be deferred until the causes of the discrepancies in the results obtained by the three methods are ascertained.

Studies of the early bottom life of the halibut, begun in 1955 to increase knowledge of the factors that determine recruitment of young into the commercial stock were continued in 1956. The University of Washington's research vessel *Commando* was chartered for two months in two periods between June and September and was operated between the north end of Vancouver Island and Sitka Sound in southern Alaska.

As in 1955, these investigations consisted chiefly of exploratory fishing with various types of experimental gear. They were directed primarily toward increasing knowledge of the habitat of the young halibut and learning how to capture them. Fishing was conducted from the surfline to depths as great as 70 fathoms.

A total of 86 halibut in the zero to 3-year old age classes, ranging from 3 to 23 inches in length, were caught. Though no concentrations of small fish were located, much was learned regarding methods of sampling, both as to gear and locality. Results showed that considerably more exploratory work must be done before standardized quantitative sampling techniques could be applied.

The members of the Commission from Canada in 1956 were: Mr. S. V. Ozere, Ottawa, elected Vice-Chairman; Mr. Harold S. Helland, Prince Rupert; and Mr. Richard Nelson, Vancouver. The United States members were: Mr. Seton H. Thompson, Washington, D.C., elected Chairman; Mr. Mattias Madsen, Seattle; and Mr. J. W. Mendenhall, recently of Ketchikan, Alaska.

The annual meeting of the Commission was held at the Commission's research headquarters in Seattle, Washington from January 28 to January 31 inclusive, 1957. The results of investigations and regulations in 1956 were reviewed in conferences

with representatives of halibut fishermen's vessel owners' and wholesale dealers' organizations, and industry proposals regarding regulation in 1957 were discussed. Thereafter, the Commission approved a research programme and adopted regulations for the 1957 fishing season.

At the close of the annual meeting Mr. Richard Nelson was elected Chairman and Mr. Seton H. Thompson was elected Vice-Chairman for the ensuing year.

International Commission for the Northwest Atlantic Fisheries

The regulations proposed by the Commission in 1955-56 for cod and haddock trawl fisheries in Subareas 3, 4, and 5, i.e. the whole area from Long Island to Belle Isle included a minimum mesh size of $4\frac{1}{2}$ inches in Subareas 4 and 5 (New England and the Maritimes-Quebec), and 4 inches in Subarea 3 (Newfoundland).

A regulation of this importance, comprising the two main commercial fishes, covering a vast area, and affecting the fishing fleets of nine nations could not of course be expected to be effected to its full extent immediately. Some countries ratified rather soon while others were concerned with some of the details of the regulations. Therefore, at the 1956 Annual Meeting the Commission proposed two amendments to the regulations, one dealing with exemptions to avoid impairment of other fisheries taking small quantities of cod and haddock, the other with the use of saving gear.

The regulations were enforced by Canada, Spain, and U.S.A. in January 1957. Italy and Portugal are preparing the enforcement for the very near future. The United Kingdom will enforce the regulations in January 1958; her trawlers are already observing them voluntarily. France will introduce the regulations together with the new amendment of the saving gear clause.

International regulations of the haddock trawl fisheries have been in force in the New England waters since 1952. Their effects have been closely studied by the U.S.A. scientists.

During the first half of March 1956 a meeting of the Committee on Research and Statistics was held in Biarritz, France, the main purpose being to consider methods in use in the study of fisheries problems: sampling of stocks, measuring of nets, age determinations; the activities of the salt cod fleet, special problems connected with the biology of cod, halibut, and redfish as well as transport of fish larvae and eggs and migrations of fish were considered.

At the 1956 annual meeting the Committee continued this work, especially the study of the Commission's research needs and outlined long range programmes of research on the commercially more important fishes, and on several subjects that apply to all species, namely population dynamics, causes of natural mortality and techniques of fisheries and of researches. A programme as vast as this was found to be beyond the capacity of any single member country and can only be carried out by close co-operation by all member countries. The Committee urged the member countries to increase their research efforts.

As a result of this planning the member countries agreed to make provision for an adequate sampling of their catches at sea and also ashore. A considerable amount of sample data has already been reported to the Commission's Secretariat for compilation and publication.

The general result of this reporting was that the Commission noted a considerable increase in the research work in several of the subareas. This increase was partly due to greater activity by the countries already working in the subareas, and partly to other countries extending their researches over larger areas or commencing research work in the Convention Area.

Early in 1957 West Germany ratified its adherence to the International Convention for the Northwest Atlantic Fisheries; thus the Commission will include the following countries: Canada, Denmark, France, Germany, Iceland, Italy, Norway, Portugal, Spain, United Kingdom, and the United States of America.

During the year under review the officials of ICNAF were: Commission Chairman, Captain Tavares de Almeida (Portugal); Commission Vice-Chairman, Mr. Klaus Sunnanaa (Norway); Chairman Panel 1, Mr. B. Dinesen (Denmark); Chairman Panel 2, Commander H. Barbier (France); Chairman Panel 3, Mr. C. L. Chicheri (Spain); Chairman Panel 4, Mr. J. H. MacKichan (Canada); Chairman Panel 5, Mr. F. W. Sargent (U.S.A.).

Chairman Standing Committee on Finance and Administration, Mr. J. H. MacKichan (Canada).

Chairman Standing Committee on Research and Statistics, Dr. Lionel A. Walford (U.S.A.).

The Commissioners from Canada during the past year have been: Mr. George R. Clark, Deputy Minister of Fisheries, Mr. J. Howard MacKichan, General Manager of the United Maritime Fishermen Ltd., and Mr. John T. Cheeseman, Minister of Fisheries, Newfoundland.

Great Lakes Fishery Commission

The Great Lakes Fishery Commission was established by the joint action of Canada and the United States under the terms of the Great Lakes Fishery Convention ratified October 11, 1955.

The following Commissioners were appointed at the organizational meeting in April, 1956: For Canada, Dr. A. L. Pritchard, Director, Conservation and Development Service, Department of Fisheries, Ottawa; Dr. W. J. K. Harkness, Chief, Division of Fish and Wildlife, Ontario Department of Lands and Forests, Toronto, and Dr. A. O. Blackhurst, Manager, Ontario Council of Commercial Fisheries, Port Dover, Ontario. For the United States, Claude Ver Duin, Grand Haven, Michigan; Lester P. Voigt, Madison, Wisconsin, and John L. Farley, Arlington, Virginia.

Mr. Farley was elected as Chairman and Dr. Pritchard, Vice-Chairman. Dr. James W. Moffett was made Acting Executive Secretary, pending the selection of a permanent appointee to this position. The Commission established a Scientific Advisory Committee and adopted a budget for the fiscal year 1956-57. It agreed that the proportion of contributions toward lamprey control expenses should be

on the basis of sixty-nine percent by the United States and thirty-one percent by Canada until it determines otherwise as a result of further studies; and that the costs of Administration be shared equally. Authorization was granted to the United States national section of the Commssion to contract for work on sea lamprey control in the United States. In Canada, the Fisheries Research Board of Canada was approved as agent for the work during the 1956-57 fiscal year.

At subsequent meetings the Commission selected Ann Arbor, Michigan, as the seat of the Commission; offices were established at 1319 North University Avenue in space provided by the University of Michigan.

The Commission appointed the following to its Scientific Advisory Committee: Dr. W. A. Kennedy, Fisheries Research Board of Canada; Mr. Norman S. Baldwin, Ontario Department of Lands and Forests; Dr. James W. Moffett, U. S. Fish and Wildlife Service; and Dr. Charles Dambach, Natural Resources Institute, Ohio State University.

At its annual meeting in Ann Arbor, November 19-20, 1956, the Commission reviewed the progress of sea lamprey control efforts, research in sea lamprey control and research on other Great Lakes fishery problems. Considered further were budget estimates and programmes for 1958-1959, problems of extending the sea lamprey control network, development of specific larvicides for control of ammocoetes in streams and lake trout rehabilitation plans.

The formulation and implementation of a comprehensive programme for the purpose of eradicating or minimizing sea lamprey populations is a most pressing responsibility of the Commission. The decline in the production of lake trout in Lake Superior, the only lake still containing appreciable numbers of this valuable fish, is gathering speed. The catch in 1956 was about one-half of the long term average.

The most effective device for controlling the sea lamprey so far developed is the electrical barrier which prevents the lampreys from reaching suitable spawning sites in streams. The Commission's agents have added to the already existing network and operated 68 barriers on Lake Superior streams in 1956. These destroyed some 21,000 sea lampreys. The number killed in streams in the United States was double that killed in the previous year. Control devices on 19 streams tributary to Lake Michigan destroyed almost 55,000 sea lampreys.

A check on the possible utilization of some 200 streams by spawning lampreys was maintained by survey parties and by the use of traps set near the mouths of streams to take incoming migrants. Divers checking the hulls of 51 vessels passing between Lakes Superior and Huron found a minor movement of sea lampreys through the locks.

A direct current electrical guiding device has been developed to control the upstream migration of sea lampreys and fish and guide them into traps. Its use in 1956 greatly reduced the kill of valuable species at several electrical barriers.

After hatching in streams, young sea lampreys live for four or five years as larvae in the mud before beginning the parasitic phase of their life in the lake. Many streams tributary to Lake Superior contain large numbers of these potential predators

and their destruction would greatly ease the critical situation facing the already reduced trout populations. It has not been found possible to kill these small individuals with the electric field, so effective in killing or preventing adults from spawning. The search for poisons to accomplish this measure advanced markedly in 1956. Six compounds were found that exhibited differential toxicity to larval lamprey and fish and could be used without injuring valuable species. Two have been selected for further testing.

Surveys of lamprey spawning were carried out by the conservation agencies of states bordering on the Great Lakes and the Province of Ontario, as well as the Commission's agents. The surveys have aided in the location of barriers and have provided information on the number of control devices required on the Upper Great Lakes.

Intimate knowledge of the habits and life history of the sea lamprey is required in order to control its numbers. Among the studies conducted in 1956-1957 were those dealing with spawning requirements, distribution and movements. The reaction of the sea lamprey to electrical current was also investigated.

The Commission has not seen the necessity or desirability of formulating a new research programme during its first year of operation. There has been a long history of co-operation and co-ordination of research activities on the Great Lakes fisheries by scientists of both nations and substantial programmes were underway when the Commission was formed. These were approved and are being expanded.

North Pacific Fur Seals Convention

A new convention for the management of the fur seals of the North Pacific Ocean was signed in Washington on February 9, 1957, by representatives of Canada, the United States, the U.S.S.R., and Japan. The negotiations preceding the signing had lasted for 14 months, and the new treaty replaced one which had been signed originally by the same four countries in 1911.

Since 1942 Canada and the United States had been the only countries sharing the annual catch of fur seals taken on the Pribilof Islands, which are in the Bering Sea, north of the Aleutians and about 300 miles west of Alaska. Canada's share had been one-fifth, which had represented a gross annual income to this country of about $1,000,000.

Before 1911 pelagic sealing, or the killing of seals at sea, had been carried out by the nationals of many countries and the depletion of the herds showed the need for conservation. The 1911 treaty, known as the (North Pacific) Pelagic Sealing Convention, prevented pelagic sealing while the animals were migrating to and from the Pribilofs, on which most of them breed. The signatory countries were the United States, Canada, Russia and Japan, and the treaty was one of the first to be concerned with the resources of the sea. Russian participation in the convention ended in 1924 and Japan abrogated the treaty in 1940. In 1942 a provisional agreement between the United States and Canada replaced the 1911 convention.

Under the 1957 convention, there will be controlled catches on the Pribilof Islands, which harbour the main herds, estimated at 2,000,000 seals during the

breeding season, and on the nearby Commander and Robben Islands, each of which have estimated populations of 100,000 seals.

During the fiscal year 1956-57, four sales were held at Montreal to dispose of Canada's share of the catch. At these sales 13,228 skins were sold at public auction for an average price of $91.56 per skin. The expenses, including processing, selling, transportation, etc., averaged $30.44 per skin, thus yielding a net profit to the Government of $61.12 per skin. The total gross receipts, including a refund of sales tax, were $1,510,239.48 and disbursements amounted to $681,719.77, leaving a net profit of $828,520.71.

International Whaling Commission

Canada is one of 17 member countries of the International Convention for the Regulation of Whaling, and was represented at the eighth annual meeting of the International Whaling Commission, held in London, July 16-21, 1956, by Alistair Fraser, Canadian Commissioner for that year. The Commission recommends catch quotas and methods of taking whales to the contracting governments.

The meeting adopted reports submitted by the Commission's Scientific and Technical Committees, containing suggestions for research into the stocks of whales and methods of marking. The Commission decided to continue marking operations and endorsed the suggestion that helicopters might be used in this connection. It was decided that the number of whales taken in the Antarctic should not exceed 15,000 blue whale units in any one season, but it was stipulated that for the 1956-57 season the limit should be 14,500. The bulk of scientific opinion was in favour of a reduction in the 15,000 limit.

Commissioners at the eighth annual meeting represented Australia, Canada, Denmark, France, Iceland, Japan, Mexico, the Netherlands, New Zealand, Norway, Panama, Sweden, the Union of South Africa, the U.S.S.R., the United Kingdom and the United States of America. Brazil was not represented. Observers were present from Italy, Portugal, the Food and Agriculture Organization of the United Nations and the International Council for the Exploration of the Sea.

SPECIAL COMMITTEES

Co-ordinating Committee on Atlantic Salmon

The federal-provincial Co-ordinating Committee on Atlantic Salmon has co-ordinated Canada's research and management programme for the betterment of the country's Atlantic salmon resources since 1949. The committee is made up of representatives of the federal Government and the Governments of all the Atlantic provinces.

The 1957 meeting of the Co-ordinating Committee, held on February 6, followed a joint meeting held the previous day by the newly-formed Advisory Committee, which is made up of two representatives from each of the Atlantic provinces, one from the commercial fishery and the other from anglers' associations.

The Co-ordinating Committee recommends all proposals for research and management. The Fisheries Research Board of Canada undertakes many of the recommended investigations and is responsible for co-ordinating the research effort among the various interested agencies. The Conservation and Development Service of the federal Department of Fisheries applies the techniques developed through research in Newfoundland and the Maritime Provinces, while in Quebec the provincial Department of Fisheries is responsible for such application.

The research programme was organized in 1950 and revised slightly in 1954. Plans were finalized only after a careful review of the information already obtained by scientists in Canada, the United Kingdom and other countries where the same species of salmon occurs. The programme, of course, is always subject to revision as new problems develop. In 1956 research projects were carried forward by the Fisheries Research Board mainly on the Pollett and Miramichi Rivers in New Brunswick and the Little Codroy River in Newfoundland, and by the province of Quebec on the Port Daniel River in the Gaspé Peninsula.

Systematic surveys of selected salmon rivers have been made each year since 1953. In 1956 surveys were completed on seven rivers in New Brunswick, six in Nova Scotia, and 17 in Quebec. Aerial surveys by helicopter were carried out on several streams in Newfoundland. To date nearly 200 salmon streams have been surveyed. Counting traps have been operated in several rivers to determine the size and time of the salmon runs to specific areas. More than 8,100,000 Atlantic salmon were distributed as advanced fry or fingerlings by the federal Department of Fisheries during 1956 in selected rivers from hatcheries in New Brunswick, Nova Scotia and Prince Edward Island, and significant numbers were produced and distributed in Quebec by the provincial Department of Fisheries. General stream improvements were carried out on several salmon rivers to ease the passage of migrating salmon.

Assistance and co-operation were received, as in the past, from all government agencies concerned, industrial firms, anglers' associations and interested individuals.

THE FISHING INDUSTRY

CANADA'S commercial fishermen, on the whole, enjoyed a relatively good year in 1956. During the year slightly more than two billion pounds of fish were landed—253 million pounds more than in 1955. Most of this increase was due to greater landings of Pacific herring, Atlantic cod and other groundfish. Landings of Pacific salmon were considerably lower than in 1955.

The total landed value of fish and fishery products in 1956 was about $104 million or 13 per cent greater than in the previous year. The marketed value of fishery products increased to $198.9 million from $182.5 million in 1955.

In terms of value, exports of Canadian fish and fishery products during 1956 increased by about $5 million over the previous year and totalled $133.7 million. Most of the increase in exports is attributable to larger sales of fresh and frozen fish in the United States. Exporters of salt cod met increased competition in their traditional markets and sales of this product declined somewhat, even though the production was slightly higher than in 1955. Imports of fishery products in 1956 increased to $17.5 million from $12.5 million in 1955, largely due to additional purchases of canned salmon from Japan.

Pacific Area

The total value of fish and fishery products as marketed by the fishing industry in British Columbia in 1956 was $68.9 million, an increase of nearly $7.5 million from 1955. The corresponding landed value in 1956 was $36.6 million which was the second highest on record and about $8.3 million more than in the previous year. The above values do not include slightly more than two million pounds of halibut caught by British Columbia fishermen and landed in Alaska but the marketed value of tuna, canned by British Columbia companies from frozen tuna imported from Japan, is included.

Prices paid to fishermen for all species of salmon in 1956 were significantly higher than in 1955. As a result, although landings were lower, salmon fishermen's incomes were above those of 1956.

The only disruption in fishing activity during the year was the cessation of herring seining from October 15 to December 5, pending a price settlement between fishermen and operators.

A total of 113.5 million pounds of salmon valued at $21.4 million was landed during the year, as compared with 131.0 million pounds valued at $18.5 million in 1955. Average annual landings for the previous five years (1951-1955) amounted to 168 million pounds. For the second year in succession, the chum salmon fishery was virtually a failure. The landings of sockeye were not large but were in line with expectations. There was an encouraging run of pink salmon and the catch of coho was exceptionally good.

The total canned salmon pack during the year was 1,112,459 cases, the smallest since 1944. Product value at the plant totalled $31.8 million, compared with $32.5 million in 1955. Average annual production of canned salmon during the period 1952-1956 was 1,477,000 cases, and 1,539,635 cases during the previous five-year cycle. The sockeye pack increased slightly from 1955 and totalled 320,096 cases or about 121,000 cases below the 1952-1956 average. Landings of chum salmon were considerably lower than was anticipated and only 203,709 cases were produced. The year 1956 was an "off year" for pinks in the southern area and, while the run in the northern area was well in excess of the cycle year, the fish were quite small and resulted in a pack of 363,634 cases as compared with 335,550 cases in the cycle year 1954. Coho landings totalled 23.2 million pounds and a pack of 212,115 cases was the largest since 1951. Landings of spring salmon during the year were about ten per cent above those of 1955. This increase, along with an increase in prices as landed and marketed, resulted in the highest values ever recorded for this species.

At the opening of the salmon canning season in June, 1956, the carryover from the previous year's operations was normal. The demand for this product in the domestic market remained relatively firm throughout the year. A shortage of Canadian sockeye was supplemented by imported Japanese canned salmon which was marketed under Canadian brand names. The export demand weakened later in the year and it appeared that there would be a larger than normal carryover into the 1957 season.

In physical terms, exports of canned salmon during 1956 were about 25 per cent less than in the previous year. Purchases by the United Kindgom were about 30 per cent above the previous year, while shipments to the United States were down by about one-half. Export sales to Belgium, Italy and the Netherlands were also below 1955 levels.

Landings of Pacific herring during the 1956 calendar year amounted to 245,700 tons, the largest in the history of this fishery, and produced correspondingly large quantities of meal and oil. Marketing conditions for these commodities remained favourable. Fish meal prices were firm during the first three months, declined during the summer months but soon strengthened and continued firm throughout the remainder of the year. Despite strong competition from menhaden and vegetable oils, the market for herring oil remained firm and this oil sold at $9\frac{1}{4}$ cents per pound throughout the season. In total, the marketed value of herring products reached $10.7 million, some $3.3 million greater than in 1955. The unusually heavy landings were made from herring stocks in the waters adjacent to the Queen Charlotte Islands during the months of February and March of 1956.

Halibut landings by Canadian fishermen at British Columbia ports totalled 23.3 million pounds, the market value of which was the highest on record at $6,600,000. The season began favourably with a small carryover from the 1955 fishery. At the beginning of the fishing season prices were very good. The British Columbia fishermen's union in co-operation with United States fishermen instituted a compulsory lay-over system between trips, thereby spreading the landings over a longer period of time. Early halibut landings averaged 21.7 cents

per pound as compared with 13.0 cents in 1955. At the end of the year, however, prices dropped sharply. Larger than normal holdings of this fish in the frozen form were carried over into the 1957 marketing year.

Landings of soles and flounders continued to increase and totalled 8.3 million pounds, with a market value of $0.9 million. The export demand for crab meat was somewhat weaker during 1956 and production declined to 3.8 million pounds from 4.5 million in the previous year. As compared with 1955, shrimp and prawn production increased to 1.2 million pounds, just under the record production of 1954. Sales of fish to mink farmers were the highest on record with a market value of more than $0.4 million for 11.0 million pounds.

Sports fishermen in British Columbia tidal waters during 1956 landed 304,000 salmon, or 11.0 per cent more than in 1955.

A total of 8,093 commercial fishing boats were reported in use at the end of 1956, valued at $43.1 million, and fishing gear on hand at this date was valued at $7.7 million. No new types of gear were introduced during the year, but in the Fraser River pink and sockeye fisheries fishermen began using mile-long gillnets in operations outside territorial waters. This innovation was so successful as to pose an important conservation problem and became the subject of negotiations between Canada and the United States for a modification of the convention between these two countries protecting the Fraser River salmon fishery.

The Maritime Provinces

Landings of all species of fish in the Maritime Provinces during 1956 totalled 655.9 million pounds, valued at $35.5 million, or an increase of 39 million pounds and $2.1 million over 1955. The marketed value was estimated at $76 million, compared with $71 million in 1955. The most significant increases were recorded in the landings of cod, haddock, hake, redfish, sardine (herring) and lobster. Cod and sardine alone accounted for 71 per cent of the total increase, or 37 million pounds. In terms of value, lobster landings showed the most pronounced increase and accounted for more than one-third of the total increase during the year.

The largest decrease occurred in the landings of plaice which were 13.3 million pounds below the 1955 catch. Landings of pelagic and estuarial species, with the exception of sardines, were also smaller than in 1955. The catch of mature herring was about three million pounds below that of 1955. No significant reduction took place in the take of other species, with the exception of oysters which fell short of the 1955 harvest by 3.3 million pounds due to an outbreak of the so-called "Malpeque" disease.

The overall increase in fish landings was attributed largely to abundant supplies of fish on the grounds throughout the year.

Modernization and development of the industry continued in 1956, with new vessel construction on much the same scale as in the previous five years. About 15 new long-liners and 22 draggers, in addition to several scallop draggers and one large trawler, were added to the fleet during the year. There was a further reduction in the number of dory-schooners in operation—only 14 such vessels were fishing

in 1956. One new filleting and freezing plant and two curing plants (equipped for mechanical drying) were constructed in Nova Scotia during the year. Many additions and improvements were made to existing processing facilities in all three provinces.

The pattern of fishery production in 1956 showed little change from the previous year. Some experimentation was carried out with new products, notably fish and chips.

The production of fresh and frozen groundfish products, including round or dressed fish, fillets and blocks, exceeded the levels reached in 1955. The greatest increase occurred in the production of fresh and frozen groundfish in the round or dressed form: from about 26 million pounds in 1955 to 41 million in 1956. As compared with the previous year, the production of groundfish fillets in 1956 increased by about nine per cent to 84.3 million pounds and the production of groundfish blocks by about one-third to 4.2 million pounds. The production of smoked cod fillets increased significantly also in 1956: to 4.6 million pounds.

The output of kippered and boneless herring in 1956 was almost 40 per cent below the 1955 production. This reduction was attributed not only to a reduced volume of landings but also to the relatively high quality of the landed product, permitting the sale of a larger quantity in the fresh state at attractive prices. The production of canned sardine herring almost doubled from 1955 to 1956, that is from 368,520 to 702,440 twenty-pound cases. An increase in lobster landings in 1956 was reflected in a higher production of the canned product as well as in larger sales of lobster in the shell. The pack of lobster meat, on the other hand, was almost 0.7 million pounds less than in 1955.

Meal and oil production showed significant gains over the previous year. The output of herring meal rose from 213 tons in 1955 to 4,531 tons in 1956. During the year, 25,559 tons of fish meal of all kinds were manufactured, an increase of 8,465 tons from the year previous. The production of marine oils was 539,518 gallons, compared with 368,791 gallons in 1955.

Newfoundland

The Newfoundland fishing industry continued to exhibit the trends evident over the past few years. Of particular significance was the continued decrease in the numbers of inshore fishermen, from 16,000 in 1954 to 14,000 in 1956. There was an increase in the offshore fleet and a decrease in the number of inshore boats. While no particularly significant developments took place in the filleting-and-freezing sector of the industry, the drying capacity of the curing sector increased considerably with the introduction of several new mechanical dryers. The majority of these dryers will not be in full production until 1957, when it is anticipated that a substantial increase in the output of mechanically dried salt fish will take place.

Total landings for the year were 589.2 million pounds valued at $14.5 million, or an increase of 35 million pounds and $0.8 million over the previous year. In terms of weight, 67 per cent of the landings consisted of codfish. As the result of a more successful trap fishery in 1956 than in 1955, landings of cod were about 21.6 million pounds or 5.7 per cent higher. The increase in total landings was also due to

larger catches of haddock, plaice, witch flounder and redfish. The herring fishery again reflected the downward trend which has characterized the catch of this species for several years. Landings of both lobster and mackerel were considerably below 1955 levels.

Prices to fishermen on the whole were slightly lower than in the previous year, although there was a slight increase in the prices paid for light and heavy-salted saltbulk codfish. The difference, however, was more than offset by increased landings and, since there were fewer fishermen in 1956, the overall effect was an improvement in the economic position of most fishermen.

A good trap fishery, together with a decrease in the utilization of cod in the freezing plants, resulted in an increase in the production of salt codfish in 1956. The trend in the pattern of salting which was in evidence last year continued during 1956. The production (wet weight) of heavy-salted fish increased by 116,752 cwts.* while the output (dry weight) of light-salted fish decreased by 10,385 cwts. With a lower production of "shore-cure" and a small carryover from 1955, marketing conditions were relatively favourable for this product. In spite of the increase in the output of heavy salted fish, the market remained quite firm throughout the year. Most of the heavy-salted saltbulk was marketed on the Canadian mainland, but a larger proportion than the previous year was dried in mechanical dryers located in the province. About 74 per cent of total cod landings were salted during the year.

The production of frozen groundfish continued to increase in 1956, although the rate of increase slackened off from that of earlier years. One new plant began operations during the year and two plants, established in 1955, came into full production. The increase in production was associated with heavier landings by the offshore fishing fleet. Total production was 62.8 million pounds, an increase of three million pounds from the previous year and a record for this sector of the industry. Freezing of cod amounted to 32.0 million pounds or 2.2 million pounds less than in 1955, but the increase in output of other species more than offset this difference. As a result of the stabilization of demand for "fish-sticks" in the United States, the output of frozen fish in block form was somewhat lower than in 1955. There was a considerable increase, however, in the production of ordinary cod fillets. The quantity of cod used for freezing amounted to 101.6 million pounds valued at $2 million, as compared with 103.9 million pounds valued at $2.3 million in 1955.

The herring fishery was again disappointing. Although some herring were caught in scattered regions, this species failed to appear in quantity in the traditional producing areas. Total landings for the year amounted to 25.9 million pounds, as compared with 28.8 million in 1955 and 32 million pounds in 1954. Pickled herring production in 1956 was 21,562 barrels, or about 4.7 thousand barrels less than in 1955. Prices were somewhat higher in 1956. Mackerel landings for the year reached a total of 1.2 million pounds as compared with 3.3 million pounds in 1955.

*Cwt. = 112 lbs.

Landings of salmon continued to decline and only 1.6 million pounds, valued at a little over $0.4 million, were landed in 1956 as compared with 1.7 million pounds, valued at about $0.5 million, in 1955. The salmon catch on the Labrador increased somewhat while landings in White Bay and the St. George's area were about the same as in the previous year and the fishery in other areas was virtually a failure.

Lobster fishermen landed a total of 4.8 million pounds valued at $1.35 million, as compared with 5.5 million pounds valued at $1.4 million in 1955—a decrease of 12.5 per cent in volume and 4.4 per cent in value. The average price paid to fishermen during the year increased to 28 cents from 26 cents during 1955. Squid was in good supply, with landings estimated at 17 million pounds for the year. Of this amount, about eight million pounds were used by the fishermen of the province for bait. The turbot fishery was more successful in 1956, with landings at 1.7 million pounds being 0.3 million above those of the preceding year, and prices were slightly lower. Fish meal production increased by one million pounds to 19.5 million pounds in 1956, and the output of marine oils increased by about 0.2 million gallons to 1.3 million gallons in 1956.

Three vessels, and crews totalling 202 men, prosecuted the seal fishery in the spring of 1956, with one sealer making a second trip to the ice fields. The total number of seals taken by these vessels was 72,586, as compared with 47,881 in 1955—the total take by landsmen declined, from 7,680 to approximately 5,000.

The whale fishery was more successful in 1956 than in 1955. A total of 9,800 pilot whales or "potheads" were driven ashore in the Bonavista and Trinity Bay areas. The principal form of utilization was in the frozen state for mink feeding.

Quebec

Landings in 1956 were the largest since 1918. Fishermen landed 135 million pounds valued at nearly $4.0 million—an increase of about eight million pounds and one million dollars from the previous year. The market value of fish products was estimated at about $7.5 million.

Cod landings increased to 75 million pounds from 45 million in the previous year and the landed value increased more than proportionately to $1.8 million. The lobster catch increased from 2.7 million to 3.4 million pounds in 1956, and the harvest of redfish was three times greater than in 1955. However, herring landings decreased by 20 million pounds to about 39 million pounds in 1956.

The commercial fishing fleet increased considerably during the year and 30 draggers and 12 long-liners were fishing. In 1955 only 27 draggers and 6 long-liners were in operation. A large modern filleting-and-freezing plant began operations near Gaspé in 1956.

Freshwater Fisheries

The total catch by inland fishermen declined slightly, from 118.8 million pounds valued at about $13.1 million in 1955 to 111.0 million pounds with a landed value of $13.6 million in 1956. Landings of freshwater fish in Ontario and Quebec were very similar to those of the preceding year. Moderate declines were registered in Manitoba and Saskatchewan, but landings increased in Alberta and in the Northwest Territories.

Great Slave Lake fishermen enjoyed a relatively good year and landings in 1956 were approximately the same as in 1955. During the year beginning December 1, 1956, commercial fishermen landed a total of 7.1 million pounds of fish valued as landed at about $0.8 million and with a market value of about $1.5 million.

Exports of inland fish increased by 5.9 million pounds, as compared with the previous year, to a total of 69.1 million pounds valued at $20.2 million. In terms of weight, exports of all the major species of freshwater fish increased with the exception of whitefish and trout, for which moderate declines were registered.

STATISTICS OF THE FISHERIES

The following tables have been selected to provide a broad picture of some aspects of the Canadian fishing industry:

Fish and Shellfish—Landings and Values, 1955

(Principal Species)

	Landings	Landed Value	Marketed Value
	'000 lb.	$'000	$'000
Pacific Coast			
Salmon	131,010	18,481	42,625
Herring	305,692	4,187	7,380
Halibut	19,679	2,555	3,924
Tuna	—	—	980[1]
Soles & Flounders	6,993	338	710
Ling Cod	3,625	274	399
Sablefish	1,215	143	265
Grayfish	653[2]	102	132
Central Area			
Pikeperch (Pickerel)	31,809	4,541	6,141
Whitefish	21,990	3,726	6,019
Lake Trout	6,011	859	1,469
Maritimes and Quebec			
Lobster	43,060	15,056	21,911
Cod	202,912	6,115	17,988
Herring[3]	172,250	1,677	7,813
Haddock	83,976	2,922	7,086
Mackerel	24,862	894	2,022
Halibut	4,007	879	1,208
Smelt	6,035	662	1,019
Salmon	892	416	845
Newfoundland			
Cod	376,651	8,252	[4]
Lobster	5,508	1,414	[4]
Haddock	51,597	1,392	[4]
Flounder and Greysole	19,166	569	[4]
Salmon	1,752	476	[4]
Rosefish	17,503	380	[4]
Herring	28,839	369	[4]

(1) Includes imported tuna processed in British Columbia

(2) Livers only

(3) Including sardine, i.e. immature herring

(4) Not available

Fish and Shellfish—Landings and Value by Provinces and Areas, 1956

	Landings[1]	Landed Value[2]	Marketed Value[2]
	'000 lb.	$'000	$'000
Sea Fisheries—TOTAL	2,054,900	90,500	178,400
Atlantic Coast—TOTAL	1,379,600[3]	53,600[3]	109,500[4]
Nova Scotia	428,900[3]	24,000[3]	48,000[4]
Newfoundland	589,200[3]	14,500[3]	26,000[4]
New Brunswick	186,700[3]	7,800[3]	23,500[4]
Quebec	134,500[3]	3,900[3]	7,500[4]
Prince Edward Island	40,300[3]	3,700[3]	4,500[4]
Pacific Coast—TOTAL	675,300	36,600	68,900
Freshwater Fisheries [4]—TOTAL	111,000	13,600	20,500
Ontario	45,000	7,000	8,500
Manitoba	30,000	3,500	6,500
Saskatchewan	10,000	800	1,800
Alberta	10,000	800	1,500
Northwest Territories	7,000	800	1,500
Quebec	3,000	500	500
New Brunswick	6,000	200	200
Grand Total	2,165,900	104,100	198,900

(1) Excluding whales, seals, livers, etc.
(2) Including all fishery products.
(3) Preliminary figures.
(4) Estimated figures.

Fish and Shellfish—Exports, by Types of Product, 1956

	Quantity	Value
	lb.	$
Fresh and Frozen Fish, whole or dressed	146,676,000	28,492,000
Fresh and Frozen Fillets	135,920,000	31,102,000
Smoked Fish	12,185,000	1,755,000
Pickled Fish	30,627,000	3,374,000
Salted and Dried Fish	107,911,000	17,706,000
Canned Fish	45,514,000	17,450,000
Molluscs and Crustaceans (fresh and canned)	29,648,000	20,554,000
Fish Oils (gallons)	2,414,000	2,240,000
Miscellaneous	—	11,033,000
Total	—	133,706,000

Number of Fishermen in Canada, by Areas, 1955

SEA FISHERIES—	
British Columbia	12,836
Maritimes and Quebec	31,823
Newfoundland	16,000(1)
FRESHWATER FISHERIES	17,962
Total	78,621

(1) Preliminary estimate

Value of Fishing Craft and Gear in Canada, by Areas, 1955

	$	
SEA FISHERIES—		
British Columbia	48,975,000	
Maritimes and Quebec	37,962,000	
Newfoundland	14,755,000	(1954)
FRESHWATER FISHERIES	12,112,000	
Total	113,804,000	

APPENDIX

FINANCIAL STATEMENTS 1956-57

COMPARATIVE SUMMARY OF EXPENDITURE

Appropriation	1956-57	1955-56	Increase or Decrease—
	$	$	$
Minister's Salary and Motor Car Allowance	17,000.00	17,000.00	
GENERAL SERVICES			
Departmental Administration	298,973.45	271,099.36	27,874.09
Information and Educational Service	155,834.83	162,047.39	— 6,212.56
Markets and Economics Service	251,045.60	209,153.11	41,892.49
Industrial Development Service	828,045.62	641,453.26	186,592.36
Fishing Bounty	159,857.20	159,365.30	491.90
FIELD SERVICES			
Field Services Administration	770,866.36	717,196.13	53,670.23
Protection Branch—			
Operation and Maintenance	3,278,590.83	3,029,228.15	249,362.68
Land, Buildings and Equipment	223,820.43	228,054.35	— 4,233.92
Inspection Branch—			
Operation and Maintenance	1,110,944.98	1,012,459.27	98,485.71
Land, Buildings and Equipment	140,126.77	39,063.19	101,063.58
Fish Culture and Development Branch—			
Operation and Maintenance	794,617.32	720,416.01	74,201.31
Land, Buildings and Equipment	188,482.41	212,284.84	— 23,802.43
Consumer Branch	44,275.65	47,899.83	— 3,624.18
Fishermen's Indemnity and Loan Plan—			
Administrative Expenses	189,247.14	181,558.49	7,688.65
Destruction of Harbour and Gray Seals	32,852.31	37,808.12	— 4,955.81
FISHERIES RESEARCH BOARD			
Headquarters Administration	121,699.21	111,069.05	10,630.16
Operation and Maintenance	2,404,492.28	1,995,589.71	408,902.57
Land, Buildings and Equipment	519,691.64	174,196.08	345,495.56
Research on Great Lakes	476,918.14	333,448.25	143,469.89
INTERNATIONAL COMMISSIONS			
International Pacific Halibut Commission	94,432.17	73,108.57	21,323.60
International Pacific Salmon Fisheries Commission	166,228.04	132,734.77	33,493.27
International Whaling Commission	1,294.90	2,500.00	— 1,205.10
International Commission for the Northwest Atlantic Fisheries	6,033.52	9,022.94	— 2,989.42
International Northwest Pacific Fisheries Commission	23,425.80	25,024.01	— 1,598.21
International Great Lakes Fishery Commission	17,976.11		17,976.11
GENERAL			
Exchequer Court Awards	1,063.30		1,063.30
Gratuities to Families of Deceased Employees	1,825.00	565.00	1,260.00

COMPARATIVE SUMMARY OF EXPENDITURE—
Concluded

Appropriation	1956–57	1955–56	Increase or Decrease—
	$	$	$
SPECIAL			
Newfoundland Bait Service—			
Operating Expenses	239,445.05	237,448.07	1,996.98
Educational Work Among Fishermen	79,996.58	75,948.72	4,047.86
Fisheries Prices Support Board—			
Administration	52,593.13	61,795.15	— 9,202.02
Net Operating Loss for the year— 1955–56		646,983.68	— 646,983.68
Assistance in Construction of Vessels of the Dragger and/or Long Liner Type	389,837.25	265,488.30	124,348.95
Assistance in Construction of Bait Freezing and Storage Facilities	28,657.00		28,657.00
Contribution towards Construction of Public Aquarium at Vancouver, B.C.	17,241.32	82,758.68	— 65,517.36
Assistance to Producers of Salted Fish	581,999.84	487,903.74	94,096.10
Grant to Permanent Fisheries Exhibit at Pacific National Exhibition Vancouver, B.C.		10,000.00	— 10,000.00
Recoup Lobster Trap Indemnity Account—fiscal years 1953–54, 1954–55 and 1955–56	57,680.00		57,680.00
Destruction predator dogfish on Pacific Coast	2,198.60		2,198.60
Recoup Lobster Trap Indemnity Account—fiscal year 1956–57	27,400.00		27,400.00
Totals	13,796,709.78	12,411,671.52	1,385,038.26

COMPARATIVE SUMMARY OF REVENUES

	1956–57	1955–56	Increase or Decrease—
	$	$	$
Return on Investments	863,276.01	553,441.56	309,834.45
Privileges, Licenses and Permits	90,199.28	87,591.30	2,607.98
Proceeds from Sales	92,455.62	66,908.58	25,547.04
Service and Service Fees	14,055.43	14,001.10	54.33
Refund of Previous Years' Expenditures	15,388.28	9,061.29	6,326.99
Miscellaneous	44,717.26	33,589.95	11,127.31
Totals	1,120,091.88	764,593.78	355,498.10

PROTECTION AND INSPECTION SERVICES

DISTRIBUTION OF EXPENDITURES BY PROVINCES AND ESTABLISHMENTS

Newfoundland Area

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
Protection and Inspection—				
Inspection Officers	242,386.42	3,555.00	53,796.53	299,737.95
Protection Officers	11,340.00		3,532.26	14,872.26
Wardens	85,074.46		36,414.08	121,488.54
Guardians		63,780.85	1,706.74	65,487.59
Departmental Boats—				
Gros Morne	3,818.64	1,491.36	50,599.87	55,909.87
Pecten			731.88	731.88
Crago			1,120.11	1,120.11
Sabinea			603.81	603.81
Cinderella	5,040.00	1,868.13	6,943.75	13,851.88
Louise Ruth	2,580.00	1,912.85	2,686.19	7,179.04
Eastern Explorer	10,837.15	6,160.83	12,707.55	29,705.53
Point May	6,910.00	170.00	3,982.81	11,062.81
Porella	4,946.18	2,040.00	4,366.57	11,352.75
Nebalia	4,548.66	2,032.27	6,452.79	13,033.72
Aurelia	5,040.00	2,040.00	5,570.90	12,650.90
Boltenia	5,002.72	2,040.00	5,092.32	12,135.04
Little Bay Islands—House—Office			989.90	989.90
Fish Inspection Laboratory	37,489.17		10,655.31	48,144.48
Fisheries Area Office	10,320.00		165.15	10,485.15
M.V. "Belle Bay" (Floating Laboratory)			71,696.50	71,696.50
Miscellaneous			17,369.15	17,369.15
Totals	435,333.40	87,091.29	297,184.17	819,608.86

Maritimes Area

Particulars	Officers		Wardens		Guardians		Miscellaneous			Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$	$	$
Nova Scotia—										
Inspection Branch—District No. 1	68,450.12	17,560.96							1,591.54	87,602.62
District No. 2	58,342.50	17,350.20							1,544.10	77,236.80
Protection Branch—District No. 1	46,117.50	13,605.85	19,688.40	6,379.34	11,491.66	108.92			1,558.87	98,950.54
District No. 2	77,226.83	26,459.11	24,199.54	8,749.03	19,883.24	191.50			4,773.31	161,482.56
District No. 3	31,650.00	9,541.40	16,696.50	3,927.43	23,538.80	467.44			4,655.76	90,477.33
District No. 4	38,495.70	15,565.36	7,120.00	2,178.37	10,442.70	181.34			3,389.78	77,373.25
Fish Inspection Laboratory—Halifax							67,825.71	3,188.96	57,542.94	128,557.61
Miscellaneous							6,537.50		804.64	7,342.14
Prince Edward Island—										
Inspection Branch—District No. 4B	28,326.81	8,099.71								36,426.52
Protection Branch—District No. 9	47,035.50	16,948.10	13,261.63	2,056.20	2,117.45	522.89				81,941.77
Fish Inspection Laboratory—Charlottetown							5,140.00	1,121.94	4,098.73	10,360.67
Miscellaneous									5,588.95	5,588.95
New Brunswick—										
Inspection Branch—District No. 3	27,900.00	4,737.35							719.77	33,357.12
District No. 4A	40,412.79	16,373.57						780.00	2,352.60	59,918.96
Protection Branch—District No. 5	22,192.00	5,486.99	10,056.60	1,760.03	4,790.88	40.48			1,590.25	45,917.23
District No. 6	34,387.71	10,325.62	30,178.29	4,200.42	17,688.90	764.44			4,445.75	101,991.13
District No. 7	67,281.47	19,735.32	36,196.22	5,018.74	12,184.42	517.47			5,719.78	146,653.42
District No. 8	27,517.50	9,045.63	10,797.15	3,477.85	5,103.05	54.60			2,777.78	58,773.56
Fish Inspection Laboratory—Shediac							5,602.00	1,672.39	4,962.26	12,236.65
Fish Inspection Laboratory—St. Andrews							11,467.50		1,110.34	12,577.84
Miscellaneous							1,261.00		56.23	1,317.23
East—										
Eastern Area Fisheries Office							12,240.00		47,373.52	59,613.52
Miscellaneous									14,547.40	14,547.40
Totals	615,336.43	190,835.17	168,194.33	37,747.41	107,241.10	2,849.08	110,073.71	6,763.29	171,204.30	1,410,244.82

Maritimes—Patrol

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NOVA SCOTIA—				
Cratena	7,787.23	7,309.18	6,818.04	21,914.45
Marcia	8,470.40	2,656.09	5,280.17	16,406.66
Mya	1,086.92	3,476.28	754.36	5,317.56
Modiolus	5,542.21	1,156.36	795.18	7,493.75
Limanda	10,879.37	3,731.59	11,769.16	26,380.12
Lacuma	4,147.93	6,827.45	9,422.07	20,397.45
Sabella	6,337.19	7,211.91	10,689.08	24,238.18
Mya II			2,986.09	2,986.09
Modiolus II			1,771.69	1,771.69
Serpula	2,098.67	143.08	13,912.75	16,154.50
Chartered Boats		1,509.49	903.02	2,412.51
PRINCE EDWARD ISLAND—				
Obelia		4,962.29	3,174.47	8,136.76
Menidia	1,197.97	1,071.41	897.05	3,166.43
Macoma		4,478.26	2,626.97	7,105.23
Diala	1,117.21	4,983.26	2,623.44	8,723.91
Fabia		4,947.72	3,109.70	8,057.42
Acartia		4,480.19	3,024.69	7,504.88
Chartered Boats	798.59	11,525.30	8,033.21	20,357.10
NEW BRUNSWICK—				
Rossia		4,614.76	3,029.00	7,643.76
Ilea		2,869.36	2,600.17	5,469.53
Tegula		6,110.76	4,234.50	10,345.26
Alosa	7,278.66	7,283.73	12,545.58	27,107.97
Osmerus	2,499.79	4,741.48	3,934.21	11,175.48
Cardita	60.23	6,097.41	4,894.28	11,051.92
Paphia		6,462.90	3,355.03	9,817.93
Alvania		8,191.43	5,592.23	13,783.66
Cumella	12,993.70	4,995.00	11,286.04	29,274.74
Hyperia		4,612.36	3,078.48	7,690.84
EAST—				
Cygnus	28,156.31	64,398.45	72,460.98	165,015.74
Harengus	13,385.80	13,772.66	18,464.15	45,622.61
Totals	113,838.18	204,620.16	234,065.79	552,524.13

Central Area

	Officers		Guardians		General		Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$
Quebec	11,467.50	5,284.34				5,083.27	21,835.11
Ontario	54,009.80	14,033.11				18,763.93	86,806.84
Manitoba	46,625.00	2,328.98				11,524.11	60,478.09
Saskatchewan	12,180.00	2,482.98				1,633.02	16,296.00
Alberta	12,180.00	1,163.55				1,609.17	14,952.72
Yukon Territory						616.51	616.51
Northwest Territories	28,389.01	11,681.58	9,205.38	2,440.87	7,032.58	29,875.37	88,624.79
Patrol Boat "Marila"						725.73	725.73
Patrol Boat "Mareca"						951.47	951.47
Miscellaneous						3,404.46	3,404.46
Totals	164,851.31	36,974.54	9,205.38	2,440.87	7,032.58	74,187.04	294,691.72

Pacific Area

	Officers		Guardians		Miscellaneous			
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$	$	$	$	$
British Columbia—								
District No. 1	50,880.00	25,312.43	8,020.22	3,816.81			8,730.07	96,759.53
District No. 2	79,853.97	35,266.76	34,603.05	10,329.75			33,643.28	193,696.81
Queen Charlotte City—House—Office							1,640.93	1,640.93
Bella Bella—House—Office							1,535.64	1,535.64
Bella Coola—House—Office							979.02	979.02
Massett—House—Office							2,549.57	2,549.57
Ocean Falls—House—Office							1,414.80	1,414.80
Sandspit—House—Office							2,098.48	2,098.48
District No. 3	91,384.80	35,811.64	10,760.07	2,061.93			644.13	140,662.57
Quatsino—House—Office							2,644.08	2,644.08
Campbell River—House—Office							966.62	966.62
Alert Bay—House—Office							1,152.02	1,152.02
Pender Harbour—House—Office							771.80	771.80
Kuyquot—House—Office							1,647.92	1,647.92
Tofino—House—Office							7,371.31	7,371.31
Westview—House—Office							8,069.29	8,069.29
Western Area Fisheries Office					15,547.50		71.09	15,618.59
Fisheries Station—Prince Rupert					4,928.29		2,825.54	7,753.83
Fisheries Station—New Westminster					25,362.08	14,646.40	9,015.24	49,023.72
Fish Inspection Laboratory—Vancouver					27,090.00		20,628.32	47,718.32
Miscellaneous							35,209.72	35,209.72
Totals	222,118.77	96,390.83	53,383.34	16,208.49	72,927.87	14,646.40	143,608.87	619,284.57

Pacific—Patrol

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
British Columbia—				
General:				
Howay	33,971.61	26,717.12	59,393.22	120,081.95
Kitimat	26,173.23	11,122.46	30,792.71	68,088.40
Laurier	30,369.51	21,164.71	67,037.70	118,571.92
District No. 1—				
Gavia	10,215.63		3,269.84	13,485.47
Chilco Post	15,586.96	3,721.34	10,986.39	30,294.69
F.D. 101	5,018.17	872.82	1,707.93	7,598.92
Diaphus	9,179.27		2,741.74	11,921.01
Swantail II	11,766.48	787.50	2,533.87	15,087.85
Rissa	4,877.59	2,471.93	4,968.26	12,317.78
Ardea		1,699.64	1,977.73	3,677.37
District No. 2—				
Arrow Post	14,580.48	2,101.32	9,210.06	25,891.86
Babine I	229.87	1,344.32	343.67	1,917.86
Babine Post	13,351.82	3,634.95	10,252.14	27,238.91
Beldis	8,601.87	2,903.18	4,497.68	16,002.73
Bonila Rock II	8,619.18	1,831.09	6,750.98	17,201.25
Clupea	8,410.09	1,593.23	5,281.08	15,284.40
Egret Plume II	7,562.75	2,296.61	4,553.45	14,412.81
F.D. 202	8,365.00	118.00	2,162.24	10,645.24
Nicola Post	16,670.08	2,865.57	8,463.30	27,998.95
Onerka II	9,203.77	2,685.57	3,764.54	15,653.88
Sooke Post	10,568.45	3,328.00	8,028.81	21,925.26
Skeena			455.78	455.78
Agonus	6,567.42	109.09	2,484.19	9,160.70
Clavella	11,080.53	2,408.58	7,523.52	21,012.63
Branta	4,044.00		1,165.48	5,209.48
Sterna	7,058.01		3,033.03	10,091.04
Chartered Boats		46,282.56	42,063.41	88,345.97
District No. 3—				
Atlin Post	19,492.49	3,569.23	10,358.35	33,420.07
Black Raven II	9,798.27	2,194.00	8,323.57	20,315.84
Comox Post	14,152.57	3,036.65	8,898.25	26,087.47
F.D. 102	4,957.86		1,746.90	6,704.76
F.D. 201	5,860.19	83.74	2,864.36	8,808.29
Daphnia	5,308.78		3,170.88	8,479.66
Pholus	4,064.97		3,074.42	7,139.39
Pursepa	8,962.88	3,434.45	5,576.32	17,973.65
Stuart Post	14,863.91	2,401.81	12,333.42	29,599.14
Atolla	4,125.00		1,873.88	5,998.88
Ciona	4,179.00		2,134.68	6,313.68
Sarda	4,125.00		6,827.74	10,952.74
Statistic	4,820.27		2,285.86	7,106.13
Brama	5,417.63		3,667.84	9,085.47
Chartered Boats		49,663.50	30,762.81	80,426.31
Air Services—				
District No. 1			1,813.33	1,813.33
District No. 2			24,483.33	24,483.33
District No. 3			22,846.66	22,846.66
Totals	392,200.59	206,442.97	458,485.35	1,057,128.91

PROTECTION AND INSPECTION SERVICES

Summary

——	Newfoundland	East General	Nova Scotia	Prince Edward Island	New Brunswick	Quebec	Ontario	Central General	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon Territory	Total
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
Newfoundland Area	819,608.86														819,608.86
Maritimes Area		74,160.92	729,022.85	134,317.91	472,743.14										1,410,244.82
Maritimes—Patrol		210,638.35	145,472.96	63,051.73	133,361.09										552,524.13
Central Area						21,835.11	86,806.84	3,404.46	60,478.09	16,296.00	14,952.72		90,301.99	616.51	294,691.72
Pacific Area												619,284.57			619,284.57
Pacific—Patrol												1,057,128.91			1,057,128.91
Totals	819,608.86	284,799.27	874,495.81	197,369.64	606,104.23	21,835.11	86,806.84	3,404.46	60,478.09	16,296.00	14,952.72	1,676,413.48	90,301.99	616.51	4,753,483.01

FISH CULTURE DEVELOPMENT

Expenditure by Provinces and Establishments

Establishment	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NEWFOUNDLAND—				
General	15,540.00	3,074.11	20,400.74	39,014.85
NOVA SCOTIA—				
Antigonish Hatchery	25,247.50	1,929.50	11,787.14	38,964.14
Bedford Hatchery	7,050.00	3,490.44	9,016.15	19,556.59
Codequid Hatchery	8,460.00	3,635.11	16,895.76	28,990.87
Coldbrook Rearing Station	3,780.00	3,262.13	4,601.86	11,643.99
Kejemkujik Rearing Station	3,825.00	4,795.05	9,447.39	18,067.44
Lindloff Hatchery	6,960.00	7,528.80	6,495.02	20,983.82
Margaree Hatchery	9,592.50	7,366.82	9,133.03	26,092.35
Margaree Retaining Ponds		2,425.15	4,739.46	7,164.61
Middleton Hatchery	7,853.37	2,618.20	3,317.99	13,789.56
River Philip Retaining Pond		441.00	1,057.42	1,498.42
Sackville Retaining Pond		1,066.72	177.11	1,243.83
Yarmouth Hatchery	6,960.00	5,845.20	7,829.87	20,635.07
Grand Lake Rearing Station	4,200.00	3,850.65	7,395.23	15,445.88
Mersey River Rearing Station	3,480.00	1,298.80	4,506.58	9,285.38
General	6,095.48	135.00	939.39	7,169.87
Total	93,503.85	49,688.57	97,339.40	240,531.82
PRINCE EDWARD ISLAND—				
Southport Hatchery	4,200.00	1,779.40	1,376.19	7,355.59
Cardigan Retaining Pond	6,330.00	1,896.00	7,434.31	15,660.31
General	9,711.25		1,500.81	11,212.06
Total	20,241.25	3,675.40	10,311.31	34,227.96
NEW BRUNSWICK—				
Florenceville Hatchery	6,407.01	8,448.00	9,913.58	24,768.59
Grand Falls Hatchery	6,750.00	4,143.12	7,556.56	18,449.68
Miramichi Hatchery	7,380.00	8,954.00	13,941.34	30,275.34
Miramichi Retaining Pond		2,484.45	2,576.97	5,061.42
New Mills Retaining Pond	3,780.00	4,413.00	5,227.14	13,420.14
Saint John Hatchery	10,140.00	9,166.22	24,654.16	43,960.38
Charlo Hatchery	9,720.00	6,611.85	19,331.24	35,663.09
Haley Brook Rearing Pond		2,290.21	3,841.84	6,132.05
General	3,630.00		2,104.88	5,734.88
Total	47,807.01	46,510.85	89,147.71	183,465.57
EAST—				
General	83,634.15	54,018.38	120,738.15	258,390.68
BRITISH COLUMBIA—				
District No. 1		2,818.55	1,665.24	4,483.79
District No. 2	14,432.12	2,052.00	55,376.17	71,860.29
District No. 3	11,370.00	6,792.25	21,695.48	39,857.73
General	64,435.13		46,831.91	111,267.04
Total	90,237.25	11,662.80	125,568.80	227,468.85
Grand Total	350,963.51	168,630.11	463,506.11	983,099.73

FISHERIES RESEARCH BOARD OF CANADA

(Operation and Maintenance)

Expenditure 1956-57

Particulars	Gross Expenditure	Revenue	Net Expenditure
	$	$	$
Administration — General	127,745.49	6,046.28	121,699.21
Biological Stations:			
St. John's, Nfld.	170,850.44		170,850.44
St. Andrews, N.B.	418,621.69		418,621.69
Montreal, Que. (Arctic)	77,917.63		77,917.63
Winnipeg, Man.	70,368.19		70,368.19
Nanaimo, B.C.	651,641.83		651,641.83
Technological Stations:			
St. John's, Nfld. (Units)	26,133.85		26,133.85
Halifax, N.S.	253,735.77		253,735.77
Grand River, Que.	81,108.25		81,108.25
Vancouver, B.C.	201,708.35		201,708.35
Oceanographic Groups:			
St. Andrews, N.B.	77,330.27		77,330.27
Nanaimo, B.C.	137,922.96		137,922.96
Contracts for Research:	29,000.00		29,000.00
Scholarships:	24,800.00		24,800.00
Vessels:			
St. John's Nfld.: "*Investigator II*"	47,708.53		47,708.53
"*Marinus*"	31,929.57		31,929.57
"*Parr*"	3,640.31		3,640.31
St. Andrews, N.B.: "J. J. Cowie"	21,918.77		21,918.77
"*Mallotus*"	6,899.39		6,899.39
"*Pandalus*"	11,094.66		11,094.66
"*Gulf Explorer*"	50.00		50.00
Arctic: "*Calanus*"	15,252.92		15,252.92
Nanaimo, B.C.: "*Investigator I*"	23,891.58		23,891.58
"*Alta*"	10,800.88		10,800.88
"*Siliqua*"	231.98		231.98
"*Loligo*"	8,581.67		8,581.67
"*Noctiluca*"	1,352.79		1,352.79
Total	2,532,237.77	6,046.28	2,526,191.49

BAIT SERVICE—NEWFOUNDLAND

Receipts and Payments—1956-57

RECEIPTS:		
Sales of Bait		$86,787.90
Storage and Other Service Charges		5,508.97
Total Receipts		$92,296.87
PAYMENTS:		
Operating Expenses:		
Purchase of Bait	$31,188.77	
Salaries and Wages	117,341.74	
Overtime	2,978.40	
Professional and Special Services	112.00	
Travelling and Removal Expenses	2,441.74	
Freight, Express and Cartage	1,837.01	
Postage	250.00	
Telephones and Telegrams	1,307.86	
Office Stationery, Supplies and Equipment	800.05	
Materials and Supplies	31,707.48	
Repairs and Upkeep of Buildings, etc.	24,061.70	
Rentals of Buildings	2,970.00	
Repairs and Upkeep of Equipment	10,900.89	
Rentals of Equipment	1,519.00	
Light, Heat and Power	4,857.99	
Unemployment Insurance	77.16	
Sundries	319.67	
		$234,671.46
		$142,374.59
CAPITAL EXPENDITURES:		
Acquisition and Construction of Buildings	$3,140.32	
Acquisition of Equipment	$1,633.27	
		$4,773.59
Excess of payments over Receipts		$147,148.18

FISHING BOUNTY PAYMENTS 1956-57

Province and County	Boats	Men	Amount	Vessels	Tons	Men	Amount	Total Amount
			$				$	$
NOVA SCOTIA—								
Annapolis	74	102	1,190.90	3	31	6	96.70	1,287.60
Antigonish	47	71	824.45	1	12	4	55.80	880.25
Cape Breton	117	189	2,185.70	62	1,553	228	4,049.60	6,235.30
Cumberland	8	13	150.35	10	112	22	352.90	503.25
Digby	148	244	2,818.95	50	619	116	1,889.20	4,708.15
Guysboro	310	444	5,170.95	42	1,176	167	3,004.65	8,175.60
Halifax	396	570	6,637.50	48	1,853	356	5,751.20	12,388.70
Inverness	56	84	975.80	16	344	69	1,099.55	2,075.35
Kings	25	38	441.10	3	52	7	128.65	569.75
Lunenburg	341	371	4,402.60	37	2,224	585	8,626.35	13,028.95
Pictou	4	5	58.75	1	16	2	37.90	96.65
Queens	97	147	1,706.65	21	350	56	963.20	2,669.85
Richmond	194	309	3,577.55	29	531	110	1,735.50	5,313.05
Shelburne	372	590	6,832.50	223	3,512	594	10,016.30	16,848.80
Victoria	126	177	2,064.15	19	266	58	901.10	2,965.25
Yarmouth	85	173	1,979.35	56	1,222	230	3,740.50	5,719.85
Total	2,400	3,527	41,017.25	621	13,873	2,610	42,449.10	83,466.35
PRINCE EDWARD ISLAND—								
Kings	156	227	2,641.65	11	365	56	978.20	3,619.85
Prince	364	620	7,153.00	4	65	9	163.55	7,316.55
Queens	119	223	2,560.85	1	32	4	75.80	2,636.65
Total	639	1,070	12,355.50	16	462	69	1,217.55	13,573.05

NEW BRUNSWICK—								
Charlotte	75	123	1,417.60	71	1,206	218	3,593.10	5,010.70
Gloucester	328	602	6,919.90	76	2,105	314	5,543.30	12,463.20
Kent	122	215	2,476.25	46	520	99	1,604.05	4,080.30
Northumberland	30	62	708.90	23	293	54	884.30	1,593.20
Restigouche	5	8	92.60	.....	.....	.....	.....	92.60
Saint John	7	12	138.40	.....	.....	.....	.....	138.40
Westmorland	65	102	1,181.90	.....	.....	.....	.....	1,181.90
Total	632	1,124	12,935.55	216	4,124	685	11,624.75	24,560.30
QUEBEC—								
Bonaventure	162	278	3,201.85	17	306	64	1,006.80	4,208.65
Gaspe	518	794	9,207.20	60	1,182	216	3,545.50	12,752.70
Magdalen Islands	442	1,003	11,424.85	18	380	59	1,026.05	12,450.90
Matane	53	76	885.20	.....	.....	.....	.....	885.20
Saguenay	493	682	7,960.05	.....	.....	.....	.....	7,960.05
Total	1,668	2,833	32,679.15	95	1,868	339	5,578.35	38,257.50
Grand Total	5,339	8,554	98,987.45	948	20,327	3,703	60,869.75	159,857.20

DISTRIBUTION OF EXPENDITURES AND REVENUES BY PROVINCES 1956—1957

DISTRIBUTION OF EXPENDITURES

—	General	Newfoundland	East General	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$	$
Minister's Salary and Motor Car Allowance	17,000.00					
Departmental Administration	298,973.45					
Information and Educational Service	133,708.31	5,122.34	5,255.18	5,414.63		
Markets and Economic Service	123,774.82	38,946.07	49,138.35	954.68		305.86
Industrial Development Service	80,149.80	579,193.72	62,589.39			
Fishing Bounty				83,466.35	13,573.05	24,560.30
Field Services Administration	131,249.97	325,342.95	105,380.50	14,913.75	8,581.20	18,807.33
Protection Branch		394,552.05	254,129.41	581,096.78	150,029.54	488,013.66
Inspection Branch		425,056.81	30,669.86	293,399.03	47,340.10	118,090.57
Fish Culture and Development Branch		39,014.85	258,390.68	240,531.82	34,227.96	183,465.57
Consumer Branch	20,302.36		3,268.94	197.25		
Fishermen's Indemnity and Loan Plan—Administrative Expenses	11,557.02	65,580.45	25,991.07	18,926.87	4,276.65	7,880.83
Destruction of Harbour and Gray Seals		10,000.00		2,970.00	315.00	2,440.00
Fisheries Research Board	175,499.21	611,831.19	459,502.00	259,893.07	25,428.94	136,310.73
International Pacific Halibut Commission						
International Pacific Salmon Fisheries Commission						
International Whaling Commission	1,294.90					
International Commission for the Northwest Atlantic Fisheries	6,033.52					
International North Pacific Fisheries Commission	23,425.80					
International Great Lakes Fishery Commission						
Gratuities to Families of Deceased Employees	1,825.00					
Exchequer Court Awards	1,063.30					
Newfoundland Bait Service		239,445.05				
Educational Work Among Fishermen				29,237.02	5,363.90	11,399.08
Fisheries Prices Support Board—Administrative Expenses	51,333.05	278.20		399.81	42.80	539.27
Assistance in Construction of Vessels		10,352.10		203,106.75		112,567.95
Assistance in Construction of Bait Freezing and Storage Facilities		14,500.00		14,157.00		
Assistance to Producers of Salted Fish		364,165.35		127,919.67	14,175.28	39,196.08
Contribution towards Construction of Public Aquarium at Vancouver, B.C.						
To recoup the Lobster Trap Indemnity Account Fiscal Years 1953–54, 1954–55 and 1955–56	57,680.00					
Destruction of Predator Dogfish on the Pacific Coast						
To recoup the Lobster Trap Indemnity Account Fiscal Year 1956–57	27,400.00					
	1,162,270.51	3,123,381.13	1,254,315.38	1,896,868.42	303,591.65	1,143,577.23

DISTRIBUTION OF REVENUE

	General	Newfoundland	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$
Return on Investments	863,176.56		99.45		
Privileges, Licenses and Permits		3,630.06	22,063.72	4,012.64	11,847.18
Proceeds from Sales	1,201.32	88,873.29	224.11	37.40	1,794.50
Service and Service Fees		7,067.97	18.00	10.00	
Refund of Previous Years' Expenditure	13,070.50	2,317.78			
Miscellaneous	.43	1,102.00	23,477.32	1,648.05	5,453.81
	877,448.81	102,991.10	45,882.60	5,708.09	19,095.49

BY PROVINCES 1956-57

Quebec	Ontario	Central General	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Terri-tory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	17,000.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	298,973.45
.....	.....	.....	.....	.....	.....	6,334.37	.....	.....	155,834.83
.....	.....	.....	.....	.....	.....	37,925.82	.....	.....	251,045.60
.....	.....	.....	.....	.....	.....	85,591.54	.....	.....	828,045.62
38,257.50	.....	.....	.....	.....	.....	.....	.....	.....	159,857.20
2,029.21	5,520.00	26,089.44	2,640.00	.....	.....	127,396.00	.....	2,916.01	770,866.36
1,280.39	.....	367.75	.....	8.00	.....	1,628,952.79	616.51	3,364.38	3,502,411.26
20,554.72	86,806.84	3,036.71	60,478.09	16,288.00	14,952.72	47,460.69	.....	86,937.61	1,251,071.75
.....	.....	.....	.....	.....	.....	227,468.85	.....	.....	983,099.73
3,209.89	5,762.81	6.71	5,853.62	377.42	10.38	5,286.27	.....	.....	44,275.65
28,449.74	.....	.....	.....	.....	.....	26,584.51	.....	.....	189,247.14
.....	.....	.....	.....	.....	.....	17,127.31	.....	.....	32,852.31
117,877.19	476,918.14	.....	51,006.19	.....	.....	1,144,095.58	.....	64,439.03	3,522,801.27
.....	.....	.....	.....	.....	.....	94,432.17	.....	.....	94,432.17
.....	.....	.....	.....	.....	.....	166,228.04	.....	.....	166,228.04
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,294.90
.....	.....	.....	.....	.....	.....	.....	.....	.....	6,033.52
.....	.....	.....	.....	.....	.....	.....	.....	.....	23,425.80
.....	17,976.11	.....	.....	.....	.....	.....	.....	.....	17,976.11
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,825.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,063.30
.....	.....	.....	.....	.....	.....	.....	.....	.....	239,445.05
24,000.00	.....	.....	.....	.....	.....	9,996.58	.....	.....	79,996.58
.....	.....	.....	.....	.....	.....	.....	.....	.....	52,593.13
63,810.45	.....	.....	.....	.....	.....	.....	.....	.....	389,837.25
.....	.....	.....	.....	.....	.....	.....	.....	.....	28,657.00
36,543.46	.....	.....	.....	.....	.....	.....	.....	.....	581,999.84
.....	.....	.....	.....	.....	.....	17,241.32	.....	.....	17,241.32
.....	.....	.....	.....	.....	.....	.....	.....	.....	57,680.00
.....	.....	.....	.....	.....	.....	2,198.60	.....	.....	2,198.60
.....	.....	.....	.....	.....	.....	.....	.....	.....	27,400.00
336,012.55	592,983.90	29,500.61	119,977.90	16,673.42	14,963.10	3,644,320.44	616.51	157,657.03	13,796,709.78

BY PROVINCES 1956-57

Quebec	Ontario	Central General	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Terri-tory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	863,276.01
200.00	.....	.....	24.00	.....	.....	38,539.27	296.00	9,586.41	90,199.28
.....	.....	.....	.....	.....	.....	.....	325.00	.....	92,455.62
.....	.....	.....	.....	.....	.....	6,959.46	.....	.....	14,055.43
.....	.15	.....	25.00	.....	.....	13,000.40	.....	10.10	15,388.28
200.00	.15	.....	49.00	.....	.....	58,499.13	621.00	9,596.51	44,717.26
									1,120,091.88