Being the Ninety-second Annual Fisheries Report of the Government of Canada

ERRATA

Department of Fisheries of Canada, Annual Report, 1958-59.

Page 32, paragraph 1, line 4, the figure '1960' should read '1959'.

Page 51, paragraph 1, line 8, the figure '1947' should read '1957'.

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THE QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1960

Price 50 cents. Cat. No. Fs. 1-59

To His Excellency Major-General Georges P. Vanier, D.S.O., M.C., C.D.,
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 1958-1959.

Respectfully submitted

Minister of Fisheries.

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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 1958-1959.

I have the honour to be, Sir,

Your obedient servant

Deputy Minister.

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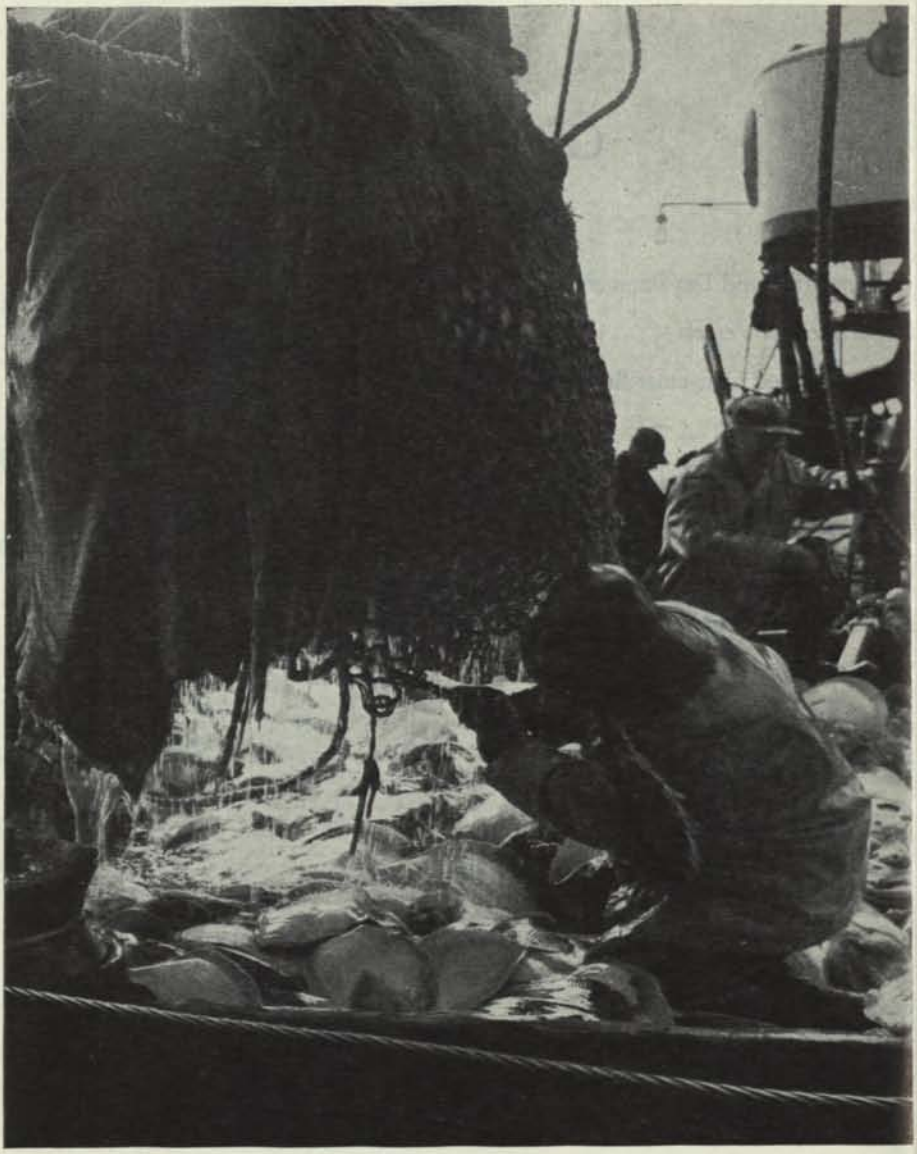
APPENDICES



Flounders being spilled into checkers on deck of an Atlantic trawler.

INTRODUCTION

WITH an annual catch of all species of fish and shellfish amounting to nearly two billion pounds, worth about $116 million to approximately 80,000 men engaged in commercial fishing, Canada ranks as a leading producer and exporter of the world's fishery products. The export value of the 1958 catch was $155 million, about two thirds of which came from the United States and most of the remainder from the United Kingdom, continental Europe and the Caribbean countries. Details of the catch and its disposal are contained in this report, together with an account of the work of the Department of Fisheries in all fields related to the sea and inland fishery resources.

On the Pacific coast British Columbia's Centennial Year, 1958, was one of record-breaking proportions in the fishing industry, the highlight being an exceptionally high return of Adams River sockeye salmon to the Fraser River system. In the Maritime Provinces results were considered satisfactory by comparison with other years both with regard to catch and landed values, although some segments of the industry still suffered from low returns for products in relation to continuing increased costs of production. Overall results of fishing activities in Newfoundland were disappointing. In spite of an increase in numbers of fishermen there, total landings of all species were substantially lower than in the previous year, and the production of salted fish was the lowest on record.

The Canada Fisheries Act was proclaimed in Newfoundland to be effective May 1, 1958. This Act is a comprehensive one, the main points covered being the powers of the Minister of Fisheries and fishery officers, the conservation and protection of various species of fish, authority for fishery regulations, the problem of pollution and obstruction of streams and the licensing of fishing vessels and fishermen.

On January 28-29, 1959, federal fisheries officials met with representatives of the inland provinces to discuss fisheries matters of mutual interest. This was the first meeting of its kind to be held for several years, and provided a forum for the consideration of common problems in fisheries management.

In discharging its responsibilities to the fishermen, the processing industry, the general public and the resource itself, the Department encountered and dealt with new problems, especially in the field of conservation and development, which are outlined in the next chapter. During 1958 agreement was reached with the industry on processing standards to be adopted for fresh and frozen fish, these standards to be issued by the Canadian Government Specifications Board. Developmental projects in the interest of the fishing industry were undertaken in several fields, including exploratory fishing and experimental work with new catching devices and processing equipment. The Department continued to utilize press, radio, television, motion pictures, filmstrips, and talks as well as its own publications

and pamphlets to inform the public as well as those directly concerned with the fisheries of all new trends and developments, and to acquaint consumers with fishery products so that the industry and individual fishermen might benefit through increased consumption of fish on the home market.

During 1958-59 discussions were held between departmental economists and representatives of the Dominion Bureau of Statistics and the Fisheries Research Board of Canada, with a view to improving the timeliness and accuracy of statistical services in the Maritime Provinces. As a result of these discussions, a comprehensive survey yielding a quantitative description of the characteristics of the fishing population, with the enterprise as a basic unit, was designed and completed, and a permanent register of this information is planned. In continued co-operation with the International Passamaquoddy Commission, a general survey of the principal fisheries as well as reports on particular aspects of the industry in the Passamaquoddy area were completed. These were necessary because of the proposed tidal power development in the Bay of Fundy.

An increased amount of effort over that of previous years was employed in special regional economic studies aimed at the accurate planning and appraisal of public investment. These studies dealt with the Department's bait assistance programme for fishermen, the performance of subsidized fishing vessels and the economic impact on individual communities of public works projects.

On the Pacific coast the growing emphasis on development of the fishing industry resulted in an increased number of requests for statistical and economic information. Statistical reports published include monthly and annual catch statistics, an annual report on production and investment, and weekly production and market reports. The results of a survey on sport fishing begun in 1957 were published as a supplement to the Sport Fishery Statistical Report for 1958, and the record of fishing licenses in British Columbia was maintained. Special studies were begun on the fisheries of the Northwest Territories and others continued on the British Columbia salmon and halibut fisheries. A dogfish subsidy programme was put into operation to help reduce the predations of this species on valuable commercial stocks.

One chapter of this report gives a brief account of the biological, technological and oceanographic work of the Fisheries Research Board of Canada, which functions under the authority of the Minister of Fisheries and as such is the scientific arm of the Department. Details of the Board's investigations and experiments connected with practical and economic problems connected with marine and freshwater fisheries, flora and fauna are contained in the Board's own report, published annually.

The Fisheries Prices Support Board, which also operates under the Minister of Fisheries, is made up of five representatives from the fishing industry who attend meetings of the Board on call and a permanent chairman. The year 1958-59 was one of comparatively good prices to fishermen in all producing areas and no specific measures of support were necessary. At the request of the Minister the Board met on two occasions to deal with a serious problem of income deficiency over a widespread area of Newfoundland, where failure of the catch resulted in a sharp reduction in the production of salted cod. While the problem could not be alleviated

under the provisions of the Fisheries Prices Support Act the Board recommended and the Government approved a programme calling for the construction of 20 "community stages" in the most seriously affected areas.

The year 1958-59 was one of further extension and progress under the Fishermen's Indemnity Plan which provides low cost protection against loss of or damage to fishing boats valued under $10,000, and to lobster traps.

The growth of the vessel part of the Plan during the year was quite substantial, with 785 vessels being added to the insured fleet. All areas in varying degrees contributed to the growth. The insured value at March 31, 1959, had reached an all time high of $14.62 million. With a larger insured fleet, it was not surprising that more claims were paid during 1958-59 than in any previous fiscal year. Despite that fact, however, only three per cent of the total number of policies underwritten since the inception of the Plan in mid-1953 had produced claims.

The programme of insuring lobster traps was continued. There was a slightly greater acceptance of this phase of the Plan than in previous years, but the increase in premiums was insignificant compared to the very substantial increase in claims resulting from severe ice conditions and storms, particularly in Newfoundland and the Maritime Provinces. In Quebec, the operation was reasonably successful throughout 1958-59.

The Department is called upon to see that Canada's responsibilities under treaties with other countries for conservation of the resources of the high seas and international fresh waters are carried out. The work of the seven international commissions on which this country are represented are dealt with in this report.

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CONSERVATION AND DEVELOPMENT SERVICE

THERE is no doubt that during the fiscal year 1958-59, the Conservation and Development Service of the Department was still being faced with a flood of problems in its efforts to maintain and expand the Canadian fishery resource. The pressures of increasing efficiency in fishing and of the effects of industrial development continued to be heavy. It is, however, encouraging to note that in several important areas, notable successes were evident.

The year 1958 will probably be remembered as the year of record catches for sockeye salmon on the Pacific coast and the large total pack of all species of salmon. There can be no doubt that this is attributable to scientific research, the results of which have been wisely applied in the regulation and fish culture development fields. The heavy return to the Adams River from the 1954 seeding is an outstanding tribute to the soundness of the work of the scientists of the International Pacific Salmon Fisheries Commission and the protection agencies which enforced the regulations.

In the Newfoundland and Maritimes Areas, the largest catch of Atlantic salmon, commercial and angling, for a number of years, gave cause to feel that the efforts to protect and improve the fishery have not been entirely in vain.

Success is being obtained in re-establishing the oyster stocks in those areas in New Brunswick and Nova Scotia where they were almost completely wiped out by disease. Scientific results had indicated that the Prince Edward Island stocks, which in the 1920's were exposed to a similar epidemic, might be resistant. The resistant stock transferred in 1957 confirmed this by showing only normal mortality, growing well and spawning. The transfers have been continued in order to provide, as quickly as possible, a nucleus for propagation.

The service continues to be pressed in carrying out its routine duties of protection and fish culture development for other species in other areas. In spite of this, it is gratifying that the organization seems to have met the demands in many fields with increasing success.

Fish Culture

(*See also Appendix 2*)

Pacific Area

A noticeable slackening in the rate of developments of new industrial projects in British Columbia during the year permitted the fish culture staff to complete analyses of the effects of the many such projects previously undertaken, and to give more attention to a positive programme of development.

The main hydroelectric project involving major fish facilities under study was the Whitehorse Rapids development of the Northern Canada Power Commission on the Yukon River. Discussions with the Commission during the year resulted in the approval of construction of adult fish passage facilities costing more than $500,000. These consist of a powerhouse collection system, barrier dam, and fishway over the 60 ft. high main dam. Only partial completion was possible during the year, so that temporary measures involving netting and trucking were necessary to pass the runs during the summer.

Studies of the British Columbia Power Commission's proposed Ash, Stamp, and Sproat river developments also required a major effort on the part of the biological and engineering staff during the year. The Ash River project was under construction and fish facilities were developed after discussion with the Commission's technical staff, but final agreement had not been reached by the end of the year. The Stamp and Sproat developments were delayed pending solution of the complex fisheries problems, which included the provision of satisfactory spawning grounds for the main sockeye runs to Great Central Lake. The fish now spawn on beaches of the lake at depths of up to 70 feet, and these spawning areas will be considerably changed by conversion of the lake to a storage reservoir with over 20 feet of surface fluctuation annually.

Studies of the Puntledge River project of the B.C. Power Commission were completed during the year, and a report on the fisheries problems, together with recommended solutions, was prepared. Discussions with the Commission continued with the purpose of agreeing on a solution based on these recommendations.

Studies of the diversion of three rivers, the Salmon, Quinsam and Heber, into the adjacent Campbell River watershed were also continued. In the meantime interim arrangements were made with the Power Commission for release of water to protect the fisheries below the diversions.

In the proposed Kokish River development of the B.C. Power Commission a solution to the minor fisheries problems involved was developed. After reaching agreement with the Commission, they were advised that there would be no objection, from a fisheries viewpoint, to their proceeding with the development.

Discussions with the Power Commission on the proposed Chilko-Homathko project revealed that certain schemes of development appeared possible without harm to the fishery. At the end of the year the Commission was continuing investigation of the economics of these schemes.

Biological surveys of the Nass, Nimpkish and Clearwater rivers were made because of the possibility of power development.

Studies of the Cheakamus, Seton, and Jones Creek projects of the B.C. Electric Company were continued to determine the effectiveness of solutions previously applied to fisheries problems.

Several other industrial projects involving water use were studied, and satisfactory arrangements were made to protect the fishery. Among these were the screening of the cooling water for the new Burrard Thermal Generating Station of the B.C. Electric Company, provision of flows for fisheries maintenance below the

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new Seymour Dam of the Greater Vancouver Water Board, and the screening of an irrigation intake on the Thompson River by B.C. Fruitlands.

A number of new industrial projects with effluents potentially dangerous to the fishery were examined, and agreements reached as to treatment or disposal in such a manner as to prevent injury to fish. Among these were several mines on Vancouver Island and several new chemical industries on Burrard Inlet and the lower Fraser River. In addition a number of new proposals for discharging domestic sewage into the Fraser and other rivers were examined and similar agreements made.

The threat to the salmon resource by insecticide spray programmes, which was brought into prominence in 1957, when 150,000 acres of forest land on northern Vancouver Island were sprayed with D.D.T., fortunately decreased in 1958. No further spraying was required in that area. A smaller programme was initiated in a different area, using benzene hexachloride to control infestations of ambrosia beetles. This programme was carefully evaluated and controlled to prevent injury to the fishery.

The practice of reviewing all applications for water rights and special placer mining leases to determine if a detrimental effect might result to the fishery was continued with the co-operation of the provincial Government. In addition many applications for foreshore and streambed leases were reviewed and representations made to the provincial Lands Department in cases where harm to the fishery might result. Through the co-operation of that department many leases were altered to prevent detrimental results.

The Fraser River Board released its preliminary report on flood control and hydroelectric power during the year. Fish Culture engineers and biologists were responsible for the compilation of the fisheries section of the report, and assisted with other sections which affected fisheries.

Two construction projects involved in the development of the fishery resource were started before the end of 1958. Removal of the rock slide in Hagwilget Canyon was expected to be completed early in 1959. It is hoped that the removal of this obstruction will overcome the last obstacle in the rehabilitation of the Lower Bulkley and Morice river systems. In addition, construction of an artificial spawning channel at Robertson Creek below Great Central Lake, near Alberni, was scheduled for completion about the middle of 1959 for use in the same year.

While the construction programme during 1958 was comparatively small, planning for future work proceeded rapidly. Surveys and plans for additional fishways at obstructions on the Indian River near Butedale were completed, and surveys progressed on obstructions at Meziadin Falls on the Nass river system, and Maggie River on Vancouver Island. Preliminary investigations were made on other obstruction removal projects.

A new programme for the rehabilitation of fish populations in streams depleted of salmon was started with the planting of pink salmon in Wilfred or Coal Creek on the east coast of Vancouver Island. Approximately two million salmon eggs were taken from Tsolum River spawners, eyed, and planted in Wilfred Creek. In

addition 900 adults were successfully transferred from the Tsolum to Wilfred Creek, where they spawned naturally. The project will be continued, utilizing the method that appears to be most successful after checking the fry production from the 1958 programme. Preliminary surveys were made of a combined rehabilitation and controlled flow project on the Big Qualicum River farther south on Vancouver Island. More detailed surveys are planned for 1959.

Particular note should be made of the excellent continuing co-operation which the engineering and biological staff received from other technical groups and agencies. These included the Fisheries Research Board of Canada, the International Pacific Salmon Fisheries Commission, the Fish and Game Branch of the British Columbia Department of Recreation and Conservation, and various agencies in the United States.

Nearly-constructed fishway on Great Rattling Brook, a major tributary of the Exploits River in Newfoundland. This fishway was built to allow the relocation of an entire run of Atlantic salmon, transferred from its original stream, Rattling Brook, to the headquarters of Great Rattling Brook by means of specially designed tanks carried on trucks. The installation will allow the progeny of the relocated salmon to reach the new spawning grounds. The transfer was made because hydro development on Rattling Brook threatened the continued existence of the run.

Newfoundland Area

The main effort of the Fish Culture Development Branch in Newfoundland is directed towards the maintenance and increase of stocks of anadromous fish, particularly Atlantic salmon, as well as resident fresh water species. The returns from the 1958 commercial and sport fisheries indicated that more Atlantic salmon were available than in the year before, which in turn had been more productive than the several preceding years.

With the addition to the staff of another biologist, it was possible to begin investigating the feasibility of making some 3,500 square miles of additional watershed of the Exploits River, the largest in Newfoundland, available for the production of salmon. Natural and man-made obstructions in the river system have in the past prevented production in this area. Preliminary engineering surveys of these obstructions, carried out in previous years, were expanded for completion during 1959, and additional biological work is also being carried out.

General stream investigation was carried out in 1958 at a somewhat slower pace than in former years, because the staff was fully occupied with other projects. The major activity of the fishway construction crew was the excavation of rock in preparation for construction of a fishway in 1959 over a 35-foot obstruction at Camp No. 1, Great Rattling Brook, a major tributary of the Exploits River. This fishway is the first step in making the aforementioned unused areas of the Exploits watershed accessible to Atlantic salmon.

Negotiations with the Anglo-Newfoundland Development Company resulted in agreement by that organization to construct a suitable fishway through a 20-foot high logging dam at Tote Brook, a tributary of Great Rattling Brook.

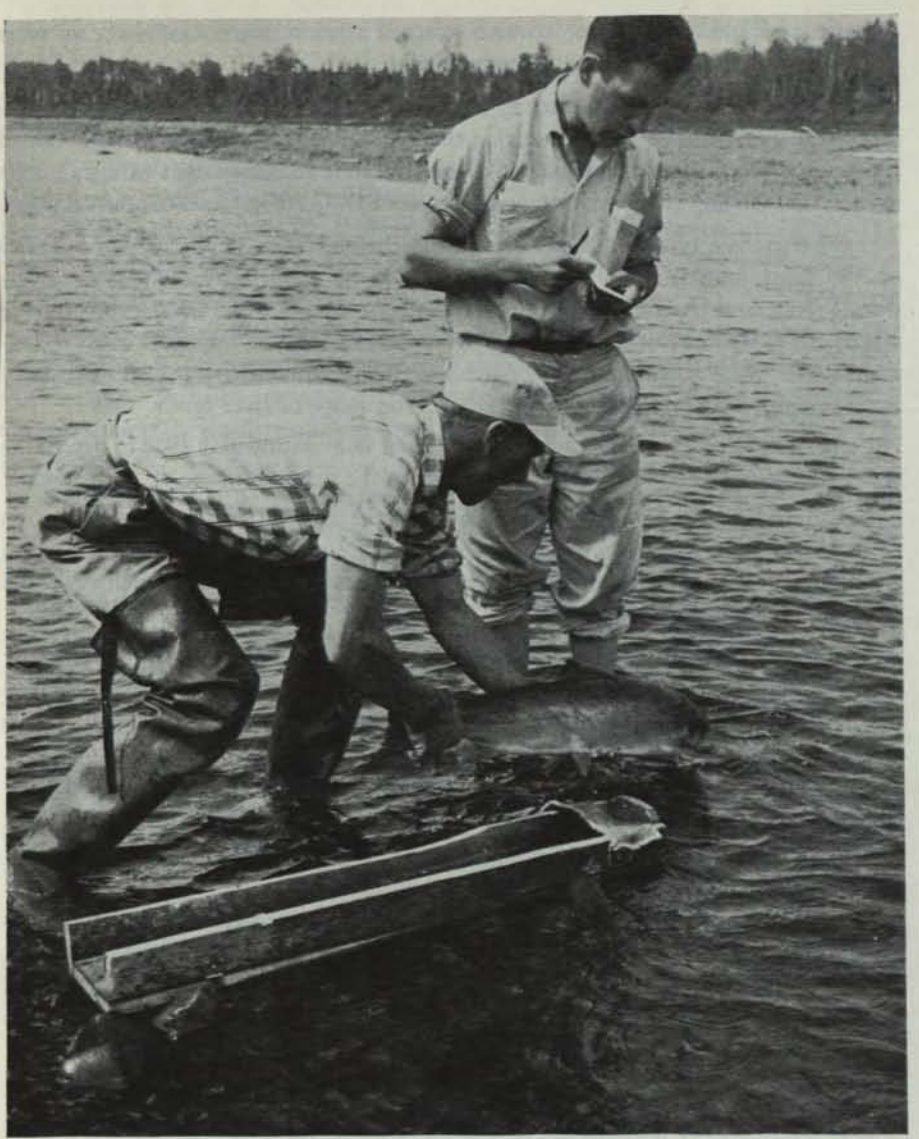
General engineering surveys were carried out at several stream obstructions in different parts of the province to determine the feasibility of remedial work. Minor repairs and additions were made to several fishways.

The transfer of the adult salmon population from Rattling Brook (Norris Arm, Notre Dame Bay) to Great Rattling Brook, initiated as a result of hydro development on Rattling Brook in 1957, was continued. More than 800 adult salmon were transferred by a specially constructed tank truck to upstream areas of Great Rattling Brook which were not previously accessible to salmon. Observed mortality during the transfer was 2.7 per cent. The transfer is to continue until the major part of the salmon run to Rattling Brook has been established in the new area. Indications are that the transferred fish have adapted well to their new location. Special efforts are being made to determine the spawning success of these fish.

During late 1958 the Department was advised that Middle Brook, Bonavista Bay, was proposed for hydro development in 1960. An aerial survey of this stream was conducted during the late fall and enough data were available from the operations of the Middle Brook fishway to make a reasonable evaluation of the salmon run to that stream. A preliminary report has been compiled on the effect that this proposed power development might have on this run, and the measures that would be required to maintain the run if the development takes place. Discussions are being held with the company concerned with reference to the necessary fish facilities.

Counting traps were operated on all major fishways during the year, including the Indian River fishway, completed in late 1957. All counts showed a significantly larger number of fish moving through the fishways than was the case in 1957, which had the largest escapement of adult fish in recent years. Approximately 1,000 fish were counted at the Indian River installation. It is probable, however, that as many or more moved upstream at suitable water levels when they had no need to utilize the fishway, which was designed to pass fish over the obstruction when water levels are critically low.

The start of an investigation of the resident freshwater species of fish in the waters of Newfoundland was made late in 1958 when Butt's Pond was examined in some detail during a survey of the Middle Brook drainage system. An interesting feature of the Butt's Pond survey was the confirmation of the existence there of a substantial population of landlocked char. Many other waters are known to contain landlocked char and landlocked salmon, but more investigation is required to determine the feasibility of their further exploitation.



Department of Fisheries technicians releasing Atlantic salmon into the headwaters of Great Rattling Brook, Newfoundland, to which it was transferred from Rattling Brook, where hydro development threatened the run. Scale samples were taken and the fish was measured before being released. This transfer of an adult salmon run was an important project of the Fish Culture Development Branch.

Maritimes Area

With the continued emphasis in the Maritime provinces on the conservation and rebuilding of runs of Atlantic salmon, the Fish Culture Development Branch again gave top priority to studies associated with salmon problems. The scope of the Saint John River programme was increased to include studies designed to obtain basic information on the habits of juvenile and adult salmon in the lower river where future flow regulation may be affected by hydro development. Studies of the returns

of early and late salmon runs to two selected streams were continued, as were experimental predator bird control programmes.

Preliminary juvenile salmon migration studies on the Tobique River, commenced in 1957, were continued during the 1958 season. Negative results obtained from downstream migrant studies in May and June indicated that salmon smolts do not move in any concentration at this time of the year in the Tobique drainage.

The passage of adult salmon at the Beechwood Dam skip-hoist fish facilities on the Saint John River was hampered in 1958 by abnormally high water levels during July and August. In spite of periodic delays over 4,500 salmon were efficiently passed over the dam. Following the analysis of the 1958 data, recommendations were submitted for some minor modifications to the facilities which would improve passage conditions over a greater range of river levels.

Tagging of adult salmon at Beechwood Dam was continued in 1958 to determine the influence of the recently filled head pond on the migration time of adult salmon.

Fall and winter studies were initiated to determine the degree of utilization of the Saint John River below Beechwood Dam by spawning and juvenile salmon populations. Water conditions were adverse but some evidence obtained indicated that the area is used for rearing.

Studies were continued on two selected streams to determine whether "early-run" salmon produce "early-run" progeny and conversely if "late-run" salmon produce "late-run" progeny. In 1958, for the second consecutive year, all salmon ascending the "early-run" river were examined for marks. It was again found that a significant number of the "early-run" salmon were "marked" fish. Difficulties encountered on the "late-run" river made it necessary to cease operations at a critical time of the migration period. As a result this experiment will be moved to a different river system.

A number of meetings were held with the Maritime Marshland Rehabilitation Administration in connection with the design of fish passage facilities for the Annapolis River aboideau at Annapolis Royal. A programme is being developed to obtain preliminary data on the Annapolis River fish runs in connection with future studies in the area.

Three river sections known to have been subjected to polluting effluents from food processing plants and other sources were re-examined by departmental biologists. In two of these areas lethal conditions were found to exist and remedial action has been recommended. In the third area a recheck, made by the Department of National Health and Welfare and the Department of Fisheries, indicated that conditions were not serious. A fourth river section known to receive effluent from a canning plant was found to be polluted and remedial measures have been recommended.

The experimental American merganser control programmes, initiated in 1954 on streams in Nova Scotia and New Brunswick, were continued during 1958, with the approval of the Canadian Wildlife Service which administers the Migratory Birds Act. The large number of birds killed on the Nova Scotia river in 1958 reversed the trend of the preceding four years. An increase in the number of broods,

more suitable water conditions and the use of two additional hunters all contributed to the increased kill. The number of birds available on the New Brunswick stream was so small, as a result of the four years of control, that the programme will be modified in 1959.

A second year of pre-predatory bird control studies on the Margaree River, Nova Scotia, undertaken by the Canadian Wildlife Service, the Fisheries Research Board of Canada and the Department of Fisheries, was completed in 1958. The work involved merganser banding and enumeration and salmon parr census in preparation for a merganser control programme.

During 1958 engineering surveys were completed at the Walton Dam on the Great Salmon River, New Brunswick, preparatory to the construction of a fishway at this point. Detailed drawings and estimates of these facilities were also prepared. Construction of a small reinforced concrete fishway at Ship Harbour, Nova Scotia, was completed.

Minor engineering projects completed during the year included repairs and maintenance to a number of fishways and fish culture stations. Counting traps and fences were constructed for various phases of Atlantic salmon studies.

During the year the Department's Maritime hatchery system distributed approximately 13,500,000 speckled trout (one per cent over-yearlings) 8,000,000 Atlantic salmon (eight per cent over-yearlings) 1,500,000 brown trout, over 100,000 Sebago salmon, 275,000 lake trout, 54,000 Rainbow trout and 5,000 Arctic char (details in Fish Distributed by Species, 1958, Appendix 2).

The total 1958 egg collections exceeded sixty-six million for all species. Of these approximately 65 per cent were speckled trout, 29 per cent Atlantic salmon, five per cent brown trout with the balance Sebago salmon and Atlantic salmon pond stock (details in the Collection and Disposal Statement, Appendix 2).

Substantial numbers of Atlantic salmon eggs were shipped to St. Johnsbury, Vt., Fort Edward, N.Y., Bucksport, Me., and Greenland. Speckled trout eggs were shipped to Banff, Waterton and Jasper National Parks and to Winnipeg, Manitoba.

Oyster Culture

The Department of Fisheries and the Fisheries Research Board of Canada continued to co-operate during the year 1958-59 in carrying out investigations to improve the position of the oyster industry in the Maritime Provinces. The Department of 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 Board's Biological Station at St. Andrews, N.B. Field supervision was exercised from the P.E.I. Biological Station at Ellerslie, P.E.I.

Mortalities in The New Brunswick and Nova Scotia Oyster Population

The epidemic oyster disease continued to spread through the waters of New Brunswick and Nova Scotia. During the summer of 1958 heavy mortalities occurred on the public fishery and leased areas in Caraquet Bay and in Little Lameque and

Lameque Bays in New Brunswick. In Nova Scotia the heaviest mortalities occurred in the Amet Sound area and Merigomish Harbour.

With the exception of a small isolated population in Miscou Harbour in Northern New Brunswick, the native oyster population of this province has been wiped out from a commercial standpoint. The same situation extends along the Nova Scotia shore as far as Cape George. The only Nova Scotia waters still producing oysters are Antigonish Harbour, Tracadie Bay and the Bras d'Or Lakes area. It is possible that these areas will also be affected within the next two or three years. The disease, which has played havoc with the oyster stocks, is not harmful to humans.

Rehabilitation of Disease Stricken Areas

The second phase of the Department's three-year programme to transplant 10,000 barrels of disease-resistant oysters from the waters of Prince Edward Island to the waters of New Brunswick and Nova Scotia was carried out from May 5 to June 11, 1958. During this period 4,500 barrels of disease-resistant oysters were fished in the Bedeque Bay area in P.E.I. and transported by departmental vessels to New Brunswick and Nova Scotia where the following plantings were made:

	barrels
Shippegan, N.B.	
Leased Areas	100
Miramichi Bay Area, N.B.	
Leased Areas	361
Public Fisheries	2,439
Kent County, N.B.	
Richibucto Public Fishery	400
Buctouche Public Fishery	800
Cocagne Public Fishery	300
Pictou-Caribou Area, N.S.	
Leased Areas	25
Public Fishery	75

The oysters used for these transplants were all of substandard quality since they were required only as breeding stock. The quality designation of oysters depends on the shape of the shell. They were purchased by tender by the Department and thus provided the P.E.I. oyster fishery with an outlet for oyster stocks heretofore unmarketable due to their poor quality. It should also be noted that the removal of large quantities of these poorly shaped oysters from overcrowded beds, where the overcrowding contributed to a large extent to the poor quality, should result in the future production of improved quality from these beds and thus increase the market production of the P.E.I. oyster fishery.

With the completion of this second phase of the transplant a total of 6,000 barrels of disease-resistant oysters have been transplanted from P.E.I. waters to the waters of New Brunswick and Nova Scotia.

An examination of these transplanted oysters was made in September of 1958 at which time it was ascertained that over 90 per cent had survived the transplant. All showed remarkably good growth and a spawning had occurred during the summer of 1958.

Shortage of Seed Stock and Oyster Seed Farming

Aside from the oyster disease the industry's greatest problem is a shortage of seed stock. Oyster farmers in P.E.I. continued to look to the picking of "wild" oysters as the main source of seed for their oyster farms. A total of 298 picking permits were issued in P.E.I. in the following order: Enmore-Percival Area, 157; Malpeque Bay area, 91; Bedeque Bay area, 43; Cascumpeque Bay area, 5; Seven Mile Bay area, 1; Wood Islands area, 1. Natural production can only supply approximately 10 per cent of the industry's seed requirements.

Recent trials over the past three years have shown that oysters can be successfully and quickly reared from spat to bedding size on shallow flats where suitable bottom conditions exist, thus eliminating the use of costly rearing trays. On this basis the Department has undertaken a seed farming operation with two main objectives in mind, (a) to provide the industry with as much seed stock as possible and (b) to establish an economical method of seed farming that can be utilized by the industry.

This operation was started in the summer of 1958 when 19,000 egg-case filler type spat collectors were set out in P.E.I. waters to obtain disease-resistant spat. The heavy spat set in 1958 has thus provided a substantial start to this operation.

Thirty-five hundred collectors were thrashed in the fall of 1958 which yielded approximately 22 barrels of small separated spat which were planted on the Conway Narrows seed farming area. The remaining collectors were for thrashing in the spring of 1959. Thus a comparison of survival and growth from spring and fall thrashing can be made to establish which is the best method for the purpose.

It is hoped that with a good growing season in 1959 between 700 and 800 barrels of "bedding size" seed will be available to the industry.

In an effort to find a more economical form of collector material a limited trial was made with concrete coated trap lath. The results of this trial were encouraging enough to promote an extensive test of this material in 1959.

Spat Collection

The 1958 spat set was the heaviest since 1954 and this set occurred in all areas except the Bras D'Or Lakes.

A total of 27,000 egg-case filler type spat collectors as well as 103 bushels of mussel shell were set out in various parts of the Maritimes as follows:

Egg-Case Fillers

Prince Edward Island—Bideford River, 14,800; Freeland River, 3,120; Trout River, 1,000; Conway Narrows, 80.

New Brunswick—Shippegan, 100; Kent County and Miramichi, 400.

Nova Scotia—Malagash, 7,000; Orangedale, 500.

Mussel Shell

Prince Edward Island (for test purposes only)—Conway Narrows, 75 bushels; Cooper Bed, 25 bushels; Bideford River, 3 bushels.

The resulting average catch on egg-case filler type collectors was as follows: Prince Edward Island, 1,400 spat per collector; Shippegan, N.B., no significant number but a heavy natural catch occurred in this area; Malagash, N.S., 562 spat per collector; Orangedale, N.S., no significant number.

Mussel shell put out as collectors in P.E.I. failed to obtain a significant catch. Shell that was suspended in bags of wire or net obtained a fair catch but shell that was spread on the bottom silted over and did not catch. It is therefore indicated that this is not a suitable collector material for catching spat to be reared as "separated seed".

Test collectors set out in Kent County, New Brunswick, did not catch any significant number but a light spawning did occur in these areas that is presumed to be from disease-resistant oysters planted in the spring of 1958.

Oyster Leasing Programme

As of March 31, 1959 there were a total of 1,308 leases in effect in the three Maritime Provinces, which included a total of 3,268 acres under cultivation. A breakdown of these figures by provinces is shown in the following table:

Oyster Leases in Effect As Of March 31, 1959

Province	Leases	Acreage	Revenue from Lease Rentals
P.E.I.	673	1,971.05	$1,966.77
Nova Scotia	144	295.81	305.05
New Brunswick	491	1,001.03	846.91
Totals	1,308	3,267.89	$3,118.73

In July 1958 the Province of New Brunswick entered into an agreement with the federal Government whereby the latter was given jurisdiction of the oyster producing waters of Northumberland County. Under this agreement 90 oyster leases issued by the provincial Government in the Miramichi Bay area were transferred to federal leases.

Leasing activity continued throughout the Maritimes at a high level despite the effects of the epidemic oyster disease in mainland waters, and it is interesting to note that during 1958 a total of 74 applications were received for new oyster leases in Miramichi Bay, where only the year before the disease had completely devastated that area.

As of March 31, a total of 340 applications for oyster leases were awaiting examination and survey in the following areas:

P.E.I.—Bedeque Bay, 1; Boughton Bay, 8; Cascumpeque Bay, 3; Covehead-Brackley, 2; Conway Narrows, 8; Darnley Basin, 2; Enmore-Percival, 18; Flat River, 1; Foxley River, 4; Hillsborough River, 11; Murray Harbour, 4; New London Bay, 5; Pinette, 5; Pownal Bay, 3; Savage Harbour, 2; St. Peters Lake, 2; St. Mary's Bay, 2; Tracadie Bay, 1; Tryon-Victoria, 1; Vernon-Orwell, 16; Wolfe Inlet, 1; Malpeque Bay, 17.

Nova Scotia—Mainland, 13; Brad d'Or Lakes, 21.

New Brunswick—Gloucester Co., 25; Northumberland, 164.

The marked increase in the number of applications received by the Department for oyster leases in P.E.I. in 1958 can be attributed to the sudden heavy market demand and the high prices being paid for P.E.I. oysters as a result of the depletion of Nova Scotia and New Brunswick oyster populations.

Every effort will be made during 1959 to examine and survey these new applications. It is anticipated that with the increase in staff of this establishment to be provided in 1959 these new applications can all be dealt with.

The heaviest concentration of applications for oyster leases is in Northumberland County in New Brunswick where federal jurisdiction was obtained in July 1958. Of the 164 applications in that area, 90 are former provincial leases which will have to be resurveyed.

Oyster Lease Surveys

During the year ending March 31, 1959, a total of 182 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 P.E.I., New Brunswick and Nova Scotia. In addition surveys were made in connection with the establishment of contaminated area boundaries.

Other Surveys

(a) The boundaries of the contaminated area in Cheticamp Harbour in Nova Scotia as established by the Interdepartmental Shellfish Committee were located and marked.

(b) The new boundaries of the contaminated area in Conway Narrows in P.E.I. as established by the Interdepartmental Shellfish Committee were located and marked.

(c) The area in Conway Narrows to be reserved for the Department's seed farming programme was established and marked.

Lease Plans and Records

A new standard system of recording and plotting all oyster lease surveys at a scale 300 ft.-to-one-inch was established since past record systems proved to be no longer adequate for the large number of leases now involved.

This new system was brought into effect in September 1958 and during the period from that date to March 31, 1959, a new set of records and 300 ft.-to-one-inch plans were completed for P.E.I. and New Brunswick leases.

The Maritime Oyster Industry

The effects of the oyster disease on Maritimes oyster production were most evident in 1958 when Maritimes production dropped to its lowest level since 1920, with a total landing of 14,280 barrels.

It is interesting to note the effect and reactions of this situation on the P.E.I. oyster fishery, which is not affected by the disease. Of the total Maritimes landings of 14,280 barrels, 11,790 barrels came from P.E.I. It can therefore be realized that as far as the market was concerned the P.E.I. oyster fishery was never in a better position. Oyster farmers and fishermen received as high as $40 per barrel for ungraded oysters. The result of this situation was a marked increase in fishing activity, and it can be considered that the marketable oyster population in P.E.I. was pretty well fished out in 1958. A drop in the island production could therefore be anticipated for 1959. This situation will continue until the rehabilitation of the mainland oyster producing areas has been accomplished.

Protection

Pacific Area

As was the case in 1957, extraordinary restrictive measures were again generally required in British Columbia to assist in securing essential spawning escapement of Pacific salmon, a matter of prime concern to the Department and to the fishing industry. The trend of recent years towards greater fishing efficiency and mobility of fishing fleets continued in 1958, placing an additional workload on fishery officers who, with their knowledge of local conditions, are required to recommend special closures, extended weekly closed times and other conservation methods to protect and conserve the salmon stocks.

It was found necessary in 1958 to introduce a new type of progressive closure, identified as the "four-ten" system, which provides for four days of fishing followed by ten days of closure, in the Johnstone Strait, Gulf of Georgia and Fraser River areas during the fall fishing season. This was imposed in an endeavour to provide for progressive escapement of chum salmon for reproduction purposes. In fact, in the case of the Fraser, only two-day fishing periods were permitted during the 40-day period October 22 to November 30.

A number of developments or trends of special interest were associated with the 1958 salmon migration and salmon escapement.

There was a major variation in the normal oceanographic phases of the North Pacific adjacent to the B.C. coast. Higher water temperatures and changes in the flow pattern of principal ocean currents apparently were mainly responsible for some unusual features in the inshore migration of salmon runs. In the case of the important Adams River sockeye run, a large segment approached the Fraser River by way of the north end of Vancouver Island and Johnstone Strait, and the arrival of the segment which returned through Juan de Fuca Strait was some 10 days later than expected.

The return from the 1954 Adams River sockeye spawning was unusually high and this, coupled with the successful catch from the unexpected segment returning through Johnstone Strait, and the take from other points made for the greatest British Columbia sockeye catch in over half a century. The sockeye pack of 1,074,305 cases was only 6,368 cases less than that of 1905, which was the highest previous pack.

With minor exceptions, the volume of sockeye escapement for reproduction was satisfactory to the Nass, Skeena, Rivers Inlet, Nimpkish, Somass and Fraser.

The return to Bella Coola River was light, and that to Smith Inlet disappointing. The late arrival of the large spawning run at Adams River, based on past experience, may result in a lesser yield than otherwise might be expected.

Pink salmon runs, in the aggregate, occur in lesser volume in the even-numbered years, and on this basis the runs of pink were reasonably satisfactory. The run to the Skeena was of unexpected length and improved spawning escapement was secured. Excellent runs of pinks occurred to streams along the east coast of Vancouver Island from the Comox area westward and to mainland areas of the Alert Bay sub-district, again re-affirming the importance of the coastal streams of this section as pink producers.

Commercial catch and escapement figures relating to the coho and spring salmon runs would indicate that these varieties are holding up at a good level. Both varieties benefit from rigorous restrictions imposed for the protection of sockeye, pinks and chums.

After three years of light chum salmon runs, there was a general improvement all along the coast in chum stocks in 1958. In most sub-districts spawning escapements equalled or exceeded those of the brood year 1954, which were generally satisfactory. Outstanding exceptions were the Fraser system where, save for the late runs to the Chehalis and Harrison Rivers, the escapement was estimated to be only 10 per cent of that required for adequate spawnings, and the west coast of the Queen Charlotte Islands where, with minor exceptions and despite the absence of any substantial fishing effort, the number of spawners again was far from sufficient to provide satisfactory seeding.

The fishery officers assigned to protection issued 20,015 commercial fishing licenses and 1,994 Indian food fishing permits. In addition, 1,179 angling permits were issued for sports fishing in tidal areas where such permits are required by regulation, namely Rivers Inlet, Phillips Arm and Muchalat Arm. The sports fishing effort rose sharply during the year and a record catch of 408,900 salmon from tidal waters was recorded. As a result of major development of the sports fishery in recent years departmental officers are giving far more attention to this phase of their duties than in the past and will be required to give even more in the future.

During the year there were 297 prosecutions for violations of the Fisheries Act and Regulations, with revenue amounting to $13,795 from fines and $8,120 from the sale of confiscated gear and fish. Other duties of fishery officers include predator control, stream clearance work and fry salvage. They destroyed 295 sea lions and 346 hair seals during the year. Prolonged hot, dry weather during the summer and resultant low water flows, particularly along the east coast of Vancouver Island, necessitated a greater amount of salmon fry salvage work than usual and 748,975 salmon fry were saved, the greatest number since 1951.

The number of vessels on patrol duty in the Pacific Area was maintained at 40 during 1958. Construction of one 45-foot patrol boat to replace *F.P.L. Swantail II*, which had seen long service on the Fraser River, was undertaken. The new vessel has a top speed of 11 to 12 knots.

The policy of equipping fishery officers in certain areas with fast, seaworthy speedboats was continued. Seven new boats were provided for officers in various subdistricts and in addition, one was placed on *F.P.C. Howay* to supplement her services. These speedboats are in addition to the regular patrol fleet, which is made up of larger craft.

Steps were again taken to increase the efficiency of radio-telephone and other electronic equipment on departmental vessels, and in addition, four portable small radio transmitters were installed in guardians' cabins, providing communication with vessels of the fleet. Nine departmental vessels are now equipped with radar.

The number of motor vehicles operated by the Protection Branch remained at 25, and the number of office-residences at 16.

Newfoundland Area

The enforcement of conservation measures in both the commercial and sports fisheries in Newfoundland resulted in 170 prosecutions during the year. In the commercial salmon fishery 30 fishermen were convicted of breaches of the regulations during 1958, twice as many as during 1957. In the majority of cases, prosecutions were for the use of nets with undersized meshes. There were 87 prosecutions in the sports fishery for breaches of the salmon and trout regulations. In the majority of these cases, infractions were of a minor nature and fines ranging from $5 to $30 were levied. There were, however, some serious offenses which resulted in fines of up to $150. There were 53 prosecutions in the lobster fishery, most of them in one district. Elsewhere in the province Protection Officers received the usual co-operation from lobster fishermen, especially in the matter of returning berried and undersized lobsters to the water.

Throughout the year, a Protection Officer was assigned to fulltime duty inspecting fishing gear affected by regulations of the International Commission for the Northwest Atlantic Fisheries, which specify minimum mesh sizes. In addition, other officers carried out frequent checks on nets at plants where the trawlers land their catches.

Seventeen trawlers, six draggers and eight Danish seiners were licensed to operate from Newfoundland ports. In addition a Danish seiner licensed in Nova Scotia landed her catch in this province. Two licensed fishing vessels were lost during the year. On October 3, 1958, the dragger *Pennyson I* went down with no loss of life. On February 9, 1959, the trawler *Blue Wave* went down with all hands on the Banks, the result of heavy icing during severe weather.

Nine coastal patrol boats were operated in various areas of the province and three smaller craft were assigned to river protection duties. Included in special assignments were patrols in areas where foreign fishing vessels operate, and winter patrols with the local fleet along the western part of the southwest coast. During the winter, which was severe, the Department's *M. V. Eastern Explorer* was frequently called upon to keep harbours open to permit boats to fish and to bring in food supplies. Several fishing boats which developed engine trouble at sea were towed to port.

As has happened in other years, patrol boats occasionally carried seriously ill patients to hospital from isolated communities along the coast.

In its effort to alleviate the depredations of harbour or bay seals, the Department continued to pay bounties of $10 for each adult seal killed and $5 for each young one. During 1958 a total of 293 adult seals and 1,447 young were killed for payments amounting to $10,165. Since this bounty was inaugurated in 1952, more than $54,000 has been paid to claimants.

A representative of the Department made three flights over the harp seal hunting area of the northeast coast to assure that the opening dates for killing, March 5 for the Gulf of St. Lawrence and March 10 for the "front", or Atlantic area, were observed.

The sports fishery in 1958 was the most successful on record. A total of 22,283 salmon were taken, an increase of 200 over 1957. The average weight of the fish taken was 4.88 pounds. The largest salmon for the season weighed 34 pounds and was landed on the Lower Humber. With the early spring of 1958, salmon entered the rivers early and the run continued to be heavy until it reached its peak in mid-July. It slackened off gradually after that except in the case of a few rivers in the western part of the island where the run was fairly heavy to the end of the season. Water levels remained normal or high throughout the season, permitting salmon to reach spawning areas with comparative ease.

Maritimes Area

Officers of the Protection Branch in the Maritimes Area, in addition to maintaining the law with regard to the fisheries, are also responsible for the collection of statistical data for the Economics Service and also are important sources of information for other services of the Department.

During 1958-59, the protection of groundfish was the cause of little concern, although it has been noted that the waste of immature fish taken in nets may become a serious problem in the future. Regulations of the International Commission for the Northwest Atlantic Fisheries are enforced by fishery officers insofar as they affect Canadian fishermen. Officers stationed at centres where large quantities of groundfish are landed by otter trawlers measure net meshes to make sure that the ICNAF regulations are being observed. They also educate fishermen whenever possible in connection with the need for conservation measures.

Along portions of the coastline of the Maritimes Area concentrations of cod are found at certain seasons of the year close to shore, and at such times territorial waters to the three-mile limit have to be protected from foreign fishermen.

During 1958, the officers inspected 143 vessels and measured 226 otter trawl nets. Two large trawlers and eight small draggers were prosecuted, convicted and penalized for using illegal gear, and 25 other vessels received warnings. Licenses were issued to 308 otter trawlers and 262 small draggers.

A total of 35,644 licenses of all kinds were issued in the Maritimes Area, including those for angling.

There were 744 prosecutions which resulted in 706 convictions, nine of which carried jail sentences and the rest bringing fines totalling $14,880. Illegal lobster fishing was the cause of 488 of the prosecutions and accounted for five of the jail terms and $10,785 of the fines. In the enforcement of the lobster regulations, 17,993 traps and 171,615 lobsters were confiscated.

Lobsters account for approximately 40 per cent of the total landed value of all species of fish in the Maritimes, and because of a strong demand and high prices, more difficulty is encountered in maintaining the lobster regulations than those affecting other fisheries. The Maritimes Area is divided into 10 lobster fishing districts, each with a special season and a special size limit. Fishermen are not permitted to take lobsters in more than one district in any one year. Further, fishing gear used in one district is not permitted to be used in any other district in the same year. Due to improved transportation facilities and changing markets, few lobsters are now canned and more are sold in the fresh state than in former years.

Poaching, that is, taking lobsters during closed seasons, is hard to control because lobsters taken from a closed district need only be transported across an imaginary dividing line into an open district and, provided that they are of legal size, they can be intermixed with the legal catch. Also, when lobsters are taken ashore from a closed district, it is very hard to prove that they did not come from an open district in another part of the country. The various minimum size limits in separate districts also cause trouble because small lobsters may be sold inland provided that they are over the smallest minimum size limit.

There is a ready market for illegally-caught undersized lobsters and fishermen are able to land them at many places along the 5,000 miles of coastline in the Maritimes. Usually lobsters are culled at sea. Often the undersized ones are held in sunken crates attached to the legal trap lines. Smuggling is carried on at night, and the lobsters are often canned in the fishermen's homes and in the woods. Sometimes the lobsters are boiled and shucked and the meat sold to licensed canneries. Canned lobster sold within a province is not subject to inspection at the present time. Unscrupulous dealers buying lobsters caught illegally usually pay less per pound than legal purchasers.

There is an increasing demand for crab meat, and some fishermen would like to trap crabs during the closed season for lobsters. However, it is practically impossible to trap crabs without trapping lobsters at the same time.

Tuna did not appear in the usual numbers during 1958. However, swordfish were quite plentiful but were taken well offshore. Mackerel appeared to have changed their inshore migration routes and were scarce. Herring, the most important species of pelagic fishes in the Area, were in good supply, especially in the Bay of Fundy.

Of the anadromous fishes, salmon were more plentiful in 1958 than they had been for a number of years. Smelts, which are taken during the cold months of the year, were not as plentiful as formerly. Natural smelt spawning grounds in many streams have been changed due to lumbering and farming methods, and new highway construction, with modern concrete bridges and culverts, has been another factor in limiting spawning areas. Alewives also are an important commercial species. Formerly most of the catch was salted for the West Indies trade, but in recent years a large proportion of the annual crop has been used for pet food, and early-run fish are often sold at high prices for lobster bait. Because of increasing markets and higher prices for alewives, the fishing effort has increased and, since most of the catch is taken during spawning runs, management and control of this fishery is

very important. Alewives sometimes travel long distances in fresh water to reach suitable spawning grounds in lakes and still waters, and natural and artificial obstructions to their migrations have to be cleared. They are the most valuable commercial species in the Saint John River, N.B., at the present time, and with the co-operation of the Fisheries Research Board, a special investigation of the natural history of the fish was started there during 1958. Shad, found in some of the larger rivers of the Maritimes, are mostly taken at times when salmon also are present, and as the same gear is used for both species, similar laws governing seasons and methods of capture are necessary.

The scallop now supports the most valuable shellfish fishery (lobsters are not a shellfish) in the Maritimes Area. This is so because scallops have been found in offshore fishing grounds in large quantities, and a steady supply maintains a strong market. Inshore fishing for scallops is not as intensive as formerly. Minimum size limits for scallops were rescinded a few years ago in favour of "savings gear".

The oyster fishery is confined mainly to warm water sections of the Gulf of St. Lawrence. As has already been reported in the Fish Culture section of this Service oyster disease has practically wiped out parent stocks in northern Nova Scotia and eastern New Brunswick. Disease-resistant stock from Prince Edward Island has been planted in depleted areas, and results from this operation are encouraging. Because of the disease, total landings of oysters were down considerably in 1958, but high prices paid for good quality oysters resulted in a total landed value almost equal to that of 1957.

The downward trend in the catch of soft-shelled clams continued in 1958, possibly due in part to silting of clam beds and to attacks from natural predators such as green crabs and boring snails. New methods of harvesting soft-shelled clams by dredging instead of by the use of hand tools could possibly result in the saving of immature clams. Because of the scarcity of the soft-shelled variety, there was an increasing interest in bar clams, razor clams and quahaugs, which are found in deeper water. New methods of harvesting them are being developed.

Salmon, trout and bass are classified as "sport fish." Striped bass are included in this category. This species, a natural predator of young salmon and sea-run trout, spends most of its time in salt water, but it is permissible for anglers to fish for striped bass in fresh water during closed seasons for salmon and trout. In some cases, this increases the difficulty of maintaining closed seasons.

Angling for salmon and trout appears to be increasing in importance. Salmon angling, especially, attracts visitors and fishing pressure is increasing each year. New highways are being built and many waterways are becoming accessible to the motoring public for the first time. More small boats and outboard motors are being used, and this and other factors increase the need for care of the natural environment of game fishes.

Central Area

Aircraft were used for the first time to any considerable extent in the Central Area during 1958-59, with a plane being at the disposal of the protection staff during both summer and winter seasons. The staff, consisting of one senior inspector,

three inspectors and two guardians, also used two motor vessels, the *Marila* and the *Mareca*, for summer patrol on Great Slave Lake, and three bombardier snowmobiles during the winter. With the aircraft, vessels, bombardiers and the district headquarters at Hay River, N.W.T., all equipped with radio-telephone, the efficiency of the patrol service was considerably improved, both for enforcement purposes and as an aid to fishermen in search and rescue service.

The main duties of the patrol were to make sure that closed areas were not commercially fished, that fishing vessels carried sufficient ice, that the 30-hour time limit for nets in the water was observed and that craft were properly licensed and were not using more than the regulation lengths of nets. Searches for lost fishermen were also made, and the aircraft were used to control fishing in Nonacho, Tathlina and Kakisa lakes, which were fished in addition to the main fishing areas on Great Slave Lake.

During the 1958 summer season five companies, with a total of 55 boats and six skiffs carried out operations, and 258 licenses were issued to fishermen. Five companies, with between 193 and 213 men fishing, operated during the winter.

Fourteen treaty Indian fishermen were assisted by the Government to fish on Great Slave Lake. Seven cabooses were provided and the fishermen made average catches of 5,070 pounds per man. With no system of permits for domestic fishermen, no accurate calculation can be made of fish taken by Indians for food purposes.

During the year 1957-58 there were 23 prosecutions but, because of the ambiguity of the wording of certain regulations, there were only eight convictions. However, during 1958-59, important new regulations went into effect governing the size of mesh and hanging of web. There was the same number of prosecutions as in the previous year, and convictions resulted in every case.

Because of the availability of varied employment at Churchill, Manitoba, the effort of beluga hunters at that point was greatly reduced in 1958. Out of 370 belugas taken, two brothers killed 164; the other 19 hunters only operated in the fishery in their spare time. The reduced kills of recent years do not reflect the abundance of belugas in that region. The most recent survey indicated that the beluga population of the southwest coast of Hudson Bay was between 6,000 and 10,000, and there is no known reason for any depletion since it was made.

Protection Fleet, 1958-1959

The Department's protection fleet of 79 vessels maintains constant patrol of commercial fishing areas off both the Atlantic and Pacific coasts and on certain inland waters. The offshore fleet, the largest vessel of which has a length of 155 feet and a tonnage of 581, operates in support of both Canadian and international regulations. The smaller vessels patrol inshore waters and rivers to prevent illegal activities in the lobster, salmon and other fisheries.

Rescue operations and emergency services, including frequent "mercy trips", are undertaken in remote areas, and the vessels are also used when called upon to aid in the work of other Services of the Department. The vessels of the fleet, as divided by areas, are listed in the next section of this report.

DEPARTMENTAL VESSELS

IN ADDITION to its fleet of 79 patrol vessels, the Department maintains a floating bait depot, the *Arctica*, for the Newfoundland Bait Service, a floating laboratory, the *Belle Bay*, in the Inspection Service, Newfoundland, and another vessel, the *Ostrea*, in oyster culture work. The Fisheries Research Board of Canada has a fleet of 17 craft of varying sizes.

At the end of the fiscal year 1958-59, a 153-foot steel vessel was under construction for the Protection Service in the Atlantic, to be named *Cygnus*. The large vessel bearing that name which has been in service for some years has been re-named *Lamna*.

Following is the makeup of the fleet:

Protection Service

Name	Registered Tonnage	Length	Crew
Maritimes Area—			
Acartia	7.16	37′	2
Alosa	52	62.5′	5
Cardita	15	45′	3
Cratena	56	65′	5
Cumella	65	65′	6
Diala	16	42′	3
Fabia	12	32′	2
Gull Light	3.08	39.4′	2
Hyperia	11.39	40′	2
Ilea	10	40′	2
Lacuna	61	64.5′	5
Lamna	581	155.4′	32
Limanda	61	64.5′	5
Macoma	13	34′	3
Marcia	15	45′	3
Modiolus II	13	34′	2
Mya II	13	34′	2
Obelia	8	36′	2
Osmerus	25	40′	3
Paphia	15	45′	3
Prim Light	3.11	39.5′	3
Rossia	12	38′	2
Sabella	58.28	65′	5
Serpula	13	42′	2
Tegula	15	45′	3
11A-1957 (not registered)	—	26′	1

Name	Registered Tonnage	Length	Crew
Newfoundland Area—			
Aurelia	29	48′	3
Badger Bay	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
Nebalia	29	48′	3
Pecten	13	34′	2
Point May	31	53′	3
Porella	29	48′	3
Sabinea	15	40′	2
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 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. 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
North Rock	19.67	45′	1
Nicola Post	48	63′	5
Onerka II	25	46.5′	3
Pholis	16	37.3′	1
Pursepa	21	47′	3

Name	Registered Tonnage	Length	Crew
Pacific Area—Concluded			
Rissa	10	36′	1
Sarda	8	31.9′	1
Sooke Post	52	55.7′	4
Star Rock	18	39.9′	2
Statistic	10	30′	2
Sterna	10	36′	2
Stuart Post	44	54.6′	4
Swantail II	19	40.3′	3
Bait Service			
Newfoundland Area—			
Arctica	313	135.6′	15
Inspection Service			
Newfoundland Area—			
Belle Bay (laboratory vessel)	38.96	63.5′	4
Fish Culture Service			
Maritimes Area—			
Ostrea	7.67	35′ (when required)	2
Fisheries Research Board			
St. John's, Nfld.—			
A. T. Cameron	330	167.5′	25
Investigator II	52	78.4′	9
Marinus	35	58.5′	6
Parr	18	44.9′	2
St. Andrews, N.B.—			
Harengus	48	77.6′	9
J. J. Cowie	22	56.3′	5
Mallotus	13	53.8′	4
Pandalus II	20	46.3′	3
Clupea H	11	30.2′	1
Cyprina	10	34.8′	2
Montreal, P.Q. (Arctic Unit)—			
Calanus	5	47′	5
London, Ont.			
Cottus (Great Lakes)	10	41.9′	2
Stenodus (Great Slave Lake)	10	42.8′	2
Nanaimo, B.C.—			
A. P. Knight	78	72.5′	6
Investigator I	36	54.3′	4
Alta	13	38.9′	2
Noctiluca	8	30.1′	1

INSPECTION AND CONSUMER SERVICE

IN THE LATTER part of 1958, agreement was reached between government and industry in the adoption of fresh and frozen fish processing standards to be issued by the Canadian Government Specifications Board. Commencing in April 1960, the Department will make available to industry, on a voluntary basis, an inspection service on rigid standards for both the product and the processing plants, which will permit the use of quality designations on the finished product.

Discussions took place during the year between the federal Government and provincial authorities of the Province of Quebec with respect to the proposed transfer of the Quebec inspection service to federal administration. The transfer of this inspection service to the Department would complete the establishment to bring about uniform inspection on a national basis.

Some difficulty was experienced in applying the expanded inspection programme in British Columbia, due to a shortage of inspection staff. Difficulty was also encountered in recruiting qualified bacteriologists for the Department's inspection laboratories in all areas.

There were no serious complaints from industry and few difficulties were encountered in administering the regulatory controls for the inspection of canned, smoked, salted, and other types of fish.

The year was highlighted by large-scale improvements and additions to existing processing facilities by the fishing industry, in an effort to meet the standards proposed by the Department for the new inspection programme.

The following is a summary of inspections for 1958 by areas of smoked, dried, canned and other types of fish.

Area	Canned Fish		Fresh and Frozen Fish		Salted, Pickled, Smoked and Other Types of Fish
	Domestic	Imported	Domestic	Imported	
	No. Cases	No. cases	No. lbs.	No. lbs.	Pounds
Pacific	1,900,226	520,556	—	820,000	736,000
Central	—	—	25,603,000	6,580,000	—
Maritimes	11,760	616,873	184,000,000*	—	80,460,297
Newfoundland	—	—	55,000,000*	—	45,531,426
Total	1,911,986	1,137,429	264,749,000	7,400,000	126,727,723

*Estimated.

Maritimes Area

Inspection personnel of the field service in the Maritimes Area carried out a total of 14,206 separate inspections for quality and grade of salted, dried, smoked and pickled fish under the Fish Inspection Act and Regulations, involving 80,460,297 pounds including fresh and frozen lobster meat and Irish moss. This is an increase of approximately 10 percent in the number of inspections when compared with last year. The quantity inspected decreased by 5,465,000 pounds.

During the year the following quantities of fish, totalling 80,460,297 pounds, were inspected: dry and semi-dry, 43,253,103 pounds; green salted, 1,281,589 pounds; boneless, 5,603,864 pounds; semi-boneless, 583,975 pounds; fibred, 358,010 pounds; bits and trimmings, 2,731,968 pounds; smoked, pickled and other types of fish, 26,647,788 pounds.

The quantities of salted, dried and boneless cod inspected this year are about the same as those inspected in 1957. There was a slight decrease in the quantity of dried hake and cusk offered for inspection in 1958. The production of dried pollock increased substantially this year, when compared with last year's figure. Increases occurred in the amounts of smelts, lobster meat, salmon, shad and pickled alewives offered for inspection this year when compared with last year. However, marked decreases were noted in the quantities of bloaters, oysters, pickled herring and mackerel when compared with 1957. The decrease in oyster production was due to the severe reductions in oyster stock, caused by severe natural mortality in New Brunswick and Nova Scotia.

During the year under review, a total of 355,479 containers were inspected. Bloater boxes accounted for the largest proportion of the total. The total number of containers inspected dropped some 170,000 when compared with last year.

The quantities of various kinds of fish reinspected under the Fish Inspection Act during 1958 amounted to 1,965,460 pounds. This is an increase over last year. Reinspections made on salted cod, boneless cod, bloaters, pollock and alewives were mainly responsible for the increase. Some 270,000 pounds of fish were condemned as unfit under the Fish Inspection Act. This represents a slight increase over the figure for last year. The examination of shipments of fish purchased by government agencies under standards set up by the Canadian Government Specifications Board was carried out by the inspection staff of the Maritimes Area. A total of 169,143 pounds of fish were inspected at the request of the Department of National Defence. This was an increase in inspections of about 25,000 pounds over last year.

During 1958, a total of 3,021,000 pounds of lobster meat was inspected. This was an increase of about 1,500,000 pounds when compared with last year.

During the year under review the Fish Inspection Laboratory graded a total of 1,750 cases of canned fish and inspected 10,010 cases. This compared with a total of 8,140 cases graded and 5,889 cases inspected last year. A total of 896 cartons of canned fish were condemned and destroyed as unfit for human consumption. These included lobster, chicken haddie and clams. This figure compares with 1,042 cartons condemned and destroyed in 1957 and 3,254 cartons destroyed in 1956.

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The quantities of imported canned fish subjected to inspection continue to increase. All samples of imported canned fish from Sault Ste. Marie, Ontario, east to the Atlantic Coast are withdrawn from shipments by departmental inspectors and are forwarded to the Fish Inspection Laboratories at Halifax, N.S., and St. Andrews, N.B., for examination. A total of 2,237 lots of imported canned fish were inspected by the two laboratories. This represents an increase of a little over 300 parcels of canned fish when compared with last year. These products came from 24 different countries, as compared with 22 in 1957. The samples from these lots amounted to some 25,000 tins. The total number of cases of canned fish represented by these samples was 473,227 cases of 48 cans each; exclusive of sardines which amounted to an additional 143,646 cases of 50 cans each.

A total of 85 lots of imported canned fish and shellfish were found on inspection to be unsound and were refused entry. This figure is more than twice the number of parcels rejected in 1957. A total of 178 lots were detained pending label amendment to comply with the requirements of the Meat and Canned Foods Act.

During 1958, the proposals for maintaining quality in fresh and frozen fish plants were continued 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 establishments in the Maritimes. A monthly report is prepared for each plant and the recommendations included in these reports are discussed by the local officer with plant management. The plant operators are encouraged to make all the necessary improvements recommended. The response by industry to the voluntary programme has been extremely gratifying and major improvements have been made to many plants in the past year.

This is the sixth year that a senior supervising inspector has been in the field as a training officer, to instruct the inspection staff in the techniques of inspection and grading cured fish products. As a direct result of this action, great strides have been made in standardizing the grading of fish products. Industry has indicated its appreciation of the accomplishments in this field.

The voluntary programme of inspection of fresh and frozen fish which commenced in 1957 continued this year. The overall objective of this programme is the production of first quality fish through improved methods of handling fish at sea and in the processing plants. Considerable work was carried out in the development of standards for groundfish and other species such as catfish, rosefish and flounders. Tentative standards for these fish have been established but further research work is continuing towards the setting up of more final standards.

During the year under review, a total of 184,000,000 pounds of fresh and frozen cod, haddock, pollock, redfish, flounder and catfish were inspected and graded.

Fish and shellfish plants and canneries are inspected and graded under the authority of the Meat and Canned Foods Act and the Fish Inspection Act. During 1958, the inspection staff and members of the Fish Inspection Laboratory made a total of 12,801 checks of all types of fish establishments for compliance with sanitary requirements.

The programme of training inspectors of fresh and frozen fish continued. This training included a considerable degree of theory on the spoilage of fish under

commercial conditions, the handling of fish at sea and ashore, freezing and transportation of fish products, sanitation, plant construction, plant inspection and objective and subjective methods of estimating fish spoilage. The practical side consisted of the extensive grading of fish on an organoleptic basis with obtained results compared with trimethylamine values. Trimethylamine is one of the objective tests used to measure the quality of fish. During the year, a short course in the techniques of oyster grading was carried out.

Bacteriological and organoleptic examinations of samples of lobster meat collected daily from each operating plant were made. The results of these analyses are used for sanitary control purposes to meet requirements of the Massachusetts and the City of New York health authorities. The bacteriological results are a good index of the relative effectiveness of plant sanitation programmes and can be used to track down the cause of high bacterial counts in the pack. A total of 2,563 analyses for bacteriological counts were made. Total counts of bacteria and determination of coliforms were made on each sample. In addition analyses were made for staphylococci and enterococci bacteria.

A great deal of day to day educational work is carried on by the inspectors in the field and the staff of the fish inspection laboratory among fishermen and members of the fishing industry. Instruction was given fishermen and plant operators in the approved methods of handling, curing and preparing the varied and diverse types of fish products which are put up in the Maritime Provinces. Technical assistance was given with respect to plant processing equipment, plant construction and operating methods. The inspectors and laboratory staff spend considerable time in interpreting the requirements of the various acts and regulations to members of the trade and fishermen.

Circulars dealing with the methods of preparation of different kinds of fish products were prepared and distributed. Numerous requests were received from the trade for staff personnel to demonstrate and to train plant help in the various operations involving canning, salting, filleting, drying, smoking and the manufacture of boneless and marinated fish products. A considerable number of requests were received for information of various kinds from provincial governments, foreign countries and trade associations.

Work in connection with the issuance of export permits to shellfish shucking plants continued. Routine plant inspections were made by both the local inspectors and field officers to insure that sanitary practices required by international agreement between Canada and the United States were effectively maintained at all times. Bacteriological surveys of polluted areas were carried out in a number of areas. Over 800 separate inspection visits were made to shellfish plants during the year under review. This compares with 905 in 1957.

The Fish Inspection Laboratory operates an analytical service covering fish products and raw materials used in the industry. During the year, analyses were made on samples of fish meals, fishery salts, etc. In addition to this, a number of analyses were carried out at the request of fishery inspectors. These numbered 254 separate laboratory analyses as compared with 195 in 1957.

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A total of 20,040 chemical analyses were carried out in determinations concerning the quality of both domestic and imported fish, including tests for determination of preservatives in fishery products. This represents a threefold increase in the number of chemical analyses carried out this year as compared with the previous year. The majority of these chemical analyses were trimethylamine determinations.

Investigation of the keeping time and quality of frozen lobster meat at varying levels of storage temperature and vacuum, which commenced in 1957, continued this year. As a result of the data collected on this project, it has been established that prime quality lobster meat can be packed, frozen and stored at −10°F. for periods extending from one to six months in various containers before detailed inspection, by the laboratory, would be necessary for issuance of a Certificate of Quality. For push cover containers the period of storage would be limited to one month. In the case of lobster meat packed in hermetically sealed containers (no vacuum) the storage time would extend to two months and for hermetically sealed containers with a vacuum of 16″ or more, the period of storage would extend to six months.

Pacific Area

During 1958 the Fish Inspection Laboratory at Vancouver inspected 2,603 parcels of British Columbia canned salmon, totalling the equivalent of 1,900,226 48-pound cases. This represents an increase of 329 shipments and 549,730 cases inspected over the previous year. A decrease occurred in inspections of canned herring with 22 lots being examined as compared with 27 last year.

The laboratory during 1958 inspected 1,691 parcels of imported canned fish and shellfish totalling 520,556 cases imported into Canada through ports of entry west of the Great Lakes. This represents an increase of approximately 50,000 cases over last year. Twenty-one parcels of canned fish and shellfish, totalling 2,047 cases were found on inspection to be unsound and were refused entry. One hundred and twenty-six parcels amounting to 7,748 cases were detained pending amendment of labelling to comply with provisions of the Meat and Canned Foods Act.

For the inspection of canned salmon and canned herring the Department charges the canners a nominal fee of one-half cent per 48-pound case which resulted in collections of $10,000. This is an increase of approximately $2,000 over last year.

For the year under review all shipments of frozen or canned Japanese tuna entering Canada through ports west of the Great Lakes were inspected for radioactivity.

Approximately 368 tons (1,839 boxes) of British Columbia dry salt herring were produced and shipped to the Orient and each shipment was inspected and certificates were issued. There was a marked decrease in the number of shipments and boxes of dry salt herring when compared to last year.

A total of approximately 820,000 pounds of imported fresh, frozen and cured fish entered through ports in the Greater Vancouver Area and were inspected in 1958. This figure is made up of 68 shipments totalling 130,000 pounds of fresh

fish, 254 shipments amounting to about 640,000 pounds of frozen fish and 30 shipments totalling 50,000 pounds of cured or precooked fish.

Considerable work was done in the development of the Department's programme of plant and product inspection for fresh, frozen and prepared fish under Canadian Government Specifications Board specification. Meetings were held with industry to discuss the draft specification. Surveys of plants were made with regard to compliance with the physical standards of the draft specification. Inspection officers also observed halibut landings and processings whenever possible to gain experience in the grading of halibut in anticipation of the Canadian Government Specifications Board inspection of this product.

Work was completed on a method for forming rapid estimates of bacterial population in cooked crab and shrimp meat. During the year frequent bacteriological surveys were made of filleting plants to assess sanitary conditions for plants in Steveston, Victoria and Prince Rupert.

Work with an industry committee on possible standards for a Fancy Grade canned sockeye salmon was continued. In the latter part of the year, much work was done in attempting to produce reference colour standards for use in grading canned salmon. Permanent standards of the exact colours required have been difficult to produce, but several of the required standards have been produced in porcelain baked on steel.

Three inspection officers were added to the field staff, and one bacteriologist and one chemist to the laboratory staff.

Newfoundland Area

In the Newfoundland Area the main responsibilities of the Inspection Service are the inspection, prior to export, of salt codfish and pickled fish, including herring and turbot, and continual supervision over the operations of filleting and freezing plants. In addition, encouragement is given to both fishermen and the trade to produce high quality fishery products. Approximately 60 field officers are employed to carry out these duties and technical assistance is supplied by the Fish Inspection Laboratory located at St. John's, and the floating laboratory *M.V. Belle Bay*. There are other tasks with which the Inspection and Consumer Service is concerned in the area, including the collection of statistical information, enforcement of conservation laws and ICNAF regulations, etc.

In the period under review, a total of 4,457 inspections, for which certificates were issued, were carried out. These included inspections on light and heavy salted codfish, pickled herring and pickled turbot. Many additional inspections were carried out in filleting and freezing plants, for which no certificates were issued. In addition, 493 inspections were carried out on canneries, herring packing factories, salted codfish export premises, cooperages, etc., prior to licensing. These premises were inspected periodically throughout the year.

During the year 45,531,426 lbs. of salted and pickled fish were inspected in the following quantities: light salted cod, 27,509,664 lbs., heavy salted cod, 14,718,592 lbs., pickled herring, 2,363,970 lbs., pickled turbot 939,200 lbs.

Due to the number of complaints received from the markets regarding the quality of the 1957 production of salted codfish, an effort was made to encourage the production of better quality fish in 1958 and also to maintain a more rigid inspection programme. Arrangements were made early in 1958 by the Inspection Branch to carry out an educational programme among fishermen. As a result, more attention was given to curing methods, particularly washing and salting, which are of prime importance. Difficult drying conditions, however, caused a quantity of sunburned fish. This condition was difficult to detect when packing and presented a tedious inspection problem.

To supplement the educational programme among fishermen, greater co-operation was requested from licensed exporters.

As a result of a united effort by fishermen, the industry and the Department, the quality of salted fish in 1958 was maintained at a fairly high level and few complaints were received from the markets. It is interesting to note, in fact, that fewer complaints were received on the 1958 production than for any previous year.

Inspection was carried out on the pickled herring production, which has fallen off considerably in recent years. The production of pickled turbot was up in 1958-59 and fishery officers engaged in the inspection of this product report that the quality was quite satisfactory. A total of 246 herring packing licenses were issued, compared with 359 in 1957. Turbot packing licenses totalled 180, compared with 162 in 1957.

Training courses were conducted for all inspection personnel during the year.

Methods of producing a quality product were discussed with fishermen at the scene of operations. Illustrated booklets on fish handling were distributed to fishermen all over the province. Films were also used to good advantage, particularly in the processing plants.

The Inspection Service of the Department of Fisheries is assisted in a scientific way by the Fish Inspection Laboratory. This involves providing technical advice to the Department and to industry, assisting in controlling conditions in fish processing operations, examining and analysing samples of a chemical and a bacteriological nature, providing technical instruction to training classes and the compilation of technical information gathered during routine work.

During 1958-59, a total of 5,651 samples were handled by the laboratory staff. This number shows a decrease over the previous year as there was no grading programme for fishery officers attached to fresh and frozen fish inspection, and the research work on antibiotic-treated fillets was completed in 1957-58. However, members of the laboratory staff were occupied full time in the examination of processing plant fillet samples, which were greater in number and involved more detailed bacteriological work than previously.

Bacteriological examination in the laboratory of daily samples of frozen fish from all processing plants was conducted throughout the year. These samples were secured by officers at each plant.

Up to December, 1958, the *M.V. Belle Bay* completed two surveys of all filleting plants on the south coast and one survey of plants on the north-east coast. In the first three months of 1959, three plants on the south coast were visited. At

each plant, two members of the laboratory staff, assisted by a fishery officer, checked the finished products and fillets from different areas in the processing lines for total bacterial counts and most probable numbers of coliform bacteria. Areas in the plants, such as fish washing machines, filleting, skinning and trimming boards, conveyor belts and workers' hands, were also checked for contamination. The number of samples examined in this category was 2,461.

Considerable bacteriological work was done for a commercial firm on fish glue and advice offered in an attempt at standardization of the finished product.

Chemical analyses were carried out on samples from different sources, the four main ones being the federal Department of Fisheries, commercial firms, provincial government, and the Department of National Health and Welfare. A total of 2,670 samples were tested for such constituents as Vitamin A and free fatty acids in fish oils; protein, fat, salt, and ash in fish meals and fish solubles, and the weight and condition of contents in canned fish products. Imported salt cargoes were checked to ensure high quality of fishery salts.

Daily fillet samples from processing plants were checked for trimethylamine content as an indication of quality, while fillet samples graded organoleptically during training courses were similarly tested.

The revenue derived from the analytical work performed on commercial samples amounted to $2,948.

During the year the technical members of the staff of the laboratory assisted in training courses for district officers and fishery officers in both salt and fresh and frozen fish. Lectures that were given covered such subjects as salt, methods of preservation, plant sanitation and chlorination, by-products of the fishing industry, and the grading of fresh fish, round, dressed and filleted. Throughout the year assistance was given in drafting the new proposed Canadian Government Specifications Board specifications for fresh, frozen and prepared fish.

In an effort to establish tolerances for "Good Commercial Practice" in relation to defects under the present C.G.S.B. requirements for fresh, frozen and prepared fish, samples from all processors in this area who either had stocks or were processing were critically examined and reported. The number of samples examined was 520.

Papers were prepared and presented in November at the third annual conference of the Inspection and Consumer Service held at Ottawa on the following: (a) progress report on laboratory vessel *Belle Bay*; (b) abnormally coloured groundfish fillets; (c) observations on bacterial counts and landed fish quality in Newfoundland processing plants.

Data covering results obtained on the physical and chemical grading of haddock and American plaice by members of the Inspection Service were presented in the form of a detailed paper entitled "Physical and Chemical Grading of Haddock and American Plaice".

Central Area

During the year under review, a total of 17,755 individual shipments of whitefish, amounting to 19,603,000 pounds were inspected, prior to export, by officers of the Department's Central Area, as required by the Whitefish Export Inspection

Regulations. This is an increase of approximately 3,700 shipments when compared with last year. The total number of pounds of whitefish inspected decreased slightly.

The voluntary inspection of other varieties of fish, at the request of industry, resulted in a total of 4,222 separate inspections of pike, pickerel, lake trout, tullibee, etc., amounting to approximately 6,000,000 pounds. This represents an increase of 667 inspections of these species of fish over 1957. The number of pounds inspected was up slightly.

The floating laboratory Belle Bay at launching. She is used in the Inspection Service in Newfoundland.

The quantities of imported canned fish subjected to inspection continued to increase during 1958. A total of 4,714 parcels were inspected as compared with 3,415 parcels last year. The shipments inspected this year represent a total of 664,000 cases. This is an increase of nearly 165,000 cases when compared with last year. Shipments of various kinds of fish were received from 24 different countries. The bulk of the importations, however, were canned shrimp from the United States, sardines from Norway, anchovies from Sweden, sardines and sprats from Denmark, tuna, clams and oysters from Japan and herring in various sauces from Germany.

Since the Department inaugurated its programme of inspection of imported canned fish and shellfish in 1954, the total number of cases inspected has increased fivefold this year. The following table shows the total number of parcels inspected, together with the total number of cases imported during the past five years.

	No. of Parcels	No. of Cases
1954-55	574	130,000
1955-56	1,700	378,000
1956-57	2,911	499,000
1957-58	3,415	480,000
1958-59	4,714	664,000

A total of 1,989 separate label checks were made during the year under review, on shipments of imported fresh, frozen and processed fish involving 6,580,000 pounds. This compares with 1,800 inspections representing 6,290,000 pounds last year. It may seem anomalous that a great fish producing country like Canada should be importing fish. However, most of the imports consisted of shrimp, rock lobster tails, squid, crab legs and a variety of other fish which are not produced here.

The inspection staff of the Central Area examined 930 shipments of fish purchased by government agencies under standards set up by the Canadian Government Specifications Board. This is a slight decrease in the number of shipments inspected when compared with last year's figure.

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. Much more work of this nature is required. It has been found that the main reason for poor quality fish is a lack of knowledge on the part of the producer of the factors contributing to spoilage and how preventative steps may be taken.

Members of the Fish Inspection Laboratories in Toronto and Winnipeg did considerable work in the development of the Department's programme of plant and product inspection for fresh, frozen and prepared fish under C.G.S.B. specification. Meetings were held with industry to discuss the draft specifications. Surveys of plants were made in regard to compliance with the physical standards. A total of 21 processing plants in Ontario and the Prairie Provinces were surveyed by inspectors and staff members of the Fisheries Inspection Laboratories. Reports were prepared for each plant and the recommendations contained in these reports were discussed with plant management.

In an effort to establish tolerances for the presence of bones, blemishes, etc. in frozen packaged fish fillets, samples of each brand of fish from processing plants in the Central Area were examined by the Inspection Laboratories. The results of this survey revealed that the workmanship of the majority of the products inspected was poor. It is considered that most of the defects encountered were the result of careless handling.

Samples of fish from the Food and Drug Directorate of the federal Department of National Health and Welfare and the Manitoba Department of Food Control were submitted to the laboratory in Winnipeg for analysis and comment.

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Members of the Fish Inspection Laboratories attended the Inspection and Consumer Conference held in Ottawa in November, as well as a meeting on spoilage problems of freshwater species of fish, at the Fisheries Research Board station at London, Ontario.

Consumer Branch

During the past year, the Consumer Branch added a regional test kitchen at Edmonton, Alberta. The branch now has four home economists at Ottawa and six regional home economists. The latter are stationed at Vancouver, Edmonton, Winnipeg, Toronto, Montreal and Halifax.

The testing and developing of recipes, both for consumers and institutional use, were continued at the test kitchen in Ottawa. In addition an experimental programme on basic fish cookery was begun. In a co-operative experiment with the Food and Drug Laboratory to determine the biological value of fish flour, a series of baking tests was carried out using fish flour to fortify yeast bread. Fish flour for this project was supplied by the Halifax Technological Station of the Fisheries Research Board of Canada, the Department's scientific arm.

In co-operation with the Information and Educational Service, recipes and food photographs were supplied for use in that Service's regular press, radio and television releases, and a new filmstrip, "How to Buy Fish", was completed. In addition two new cookbooks, "Let's Serve Shellfish", and "Let's Serve Canned Salmon", were prepared for the Department's continuing programme to promote the greater use of fishery products in Canada. A new large "quantity" cookbook, "Quality Fish for Quantity Service", was produced for the restaurant and hotel trade. Special small cookbooks were produced for special occasions such as "The Salute to the Sockeye" festival in British Columbia and "The Look to the Sea" programme at the Canadian Home Economics Association Convention. Work started on a new general fish cookbook.

Seven special seafood luncheons were given in the Ottawa test kitchen to varied groups such as commentators on the C.B.C. Farm and Fisheries Broadcasts and the House of Commons Standing Committee on Marine and Fisheries.

School demonstrations were given by all the regional home economists in addition to the work outlined below. These demonstrations include those given to university classes, high schools, and trade and vocational schools. More than 350 demonstrations were given and the home economists appeared on television 22 times and radio programmes 37 times. In several cases over 1,000 requests for material offered were received from each show. Television and radio provide extremely wide coverage; school demonstrations are worthwhile because they are given before future homemakers; demonstrations given to teachers and cooks and restaurant personnel are especially valuable, and it is hoped to expand this particular aspect of the work in the future.

Well over 100,000 cookbooks were distributed and 24 illustrated talks were given during the year, and filmstrips were circulated through schools.

The Pacific Area home economist reported an increase in co-operative work with the fishing industry and greater contact with retail outlets for fish products.

Work with the fishing industry included recipe development, food preparation for pictures and recipes for product labels. There was also a series of store demonstrations at retail stores. Fishery officers located throughout British Columbia gave assistance in consumer work by organizing tours of duty for the home economist, and they also contacted the local press and radio.

Cooking shows were given at the "Salute to the Sockeye" in B.C. In this event the Edmonton home economist assisted.

The Edmonton office was opened in the fall after the Lakehead Exhibition and National Fish Week promotion throughout the prairies. During National Fish Week, radio and television were used extensively. The Edmonton home economist held two film nights for the fishing industry, wholesale and retail trade, provincial fisheries and radio and television personnel. She also participated in a Hospital Cooks' Course sponsored by the province of British Columbia. With the help of the Winnipeg home economist, promotional fish cookery demonstrations were given in two retail stores at Edmonton. The two home economists collaborated on a series of public demonstrations during Lent.

The Toronto home economist participated in five conventions and exhibitions, including the Nova Scotia Fisheries Exhibition and Fishermen's Reunion. She also was heard regularly on a C.B.C. radio show directed towards consumers. The Montreal home economist also attended five conventions and exhibitions. In addition she gave fish cooking demonstrations to a group of nuns in charge of cooking in their communities, and to cooks of lumber camps in the New Brunswick area. A television show in Quebec City was notable because of the response from the audience.

The Halifax home economist carried out work in New Brunswick, Prince Edward Island and Newfoundland as well as Nova Scotia, and gave special shows at the Atlantic Provinces Economic Council Food Show, the Canadian Home Economics Convention and the Nova Scotia Fisheries Exhibition. She also made three one-minute films for television to be used during National Fish Week. These films were used in Halifax, Sydney and Moncton. A fish buffet was arranged for National Fish Week. The guests included press, radio and television representatives as well as members of the fishing industry, home economists and dietitians, and armed forces personnel.

The home economists initiated and maintained contacts by taking part in the following conventions and exhibitions: Hotel and Restaurant Suppliers, Montreal, P.Q.; Canadian Restaurant Association Convention, Toronto, Ont.; Canadian Dietetic Association Convention, Niagara Falls, Ont.; Canadian Home Economics Association Convention, St. Andrews, N.B.; International Home Economics Congress, Washington, D.C., and the annual meeting of the Canadian Association of Consumers, Montreal, P.Q. Demonstrations were given at the following exhibitions: Salute to the Sockeye Festival, Salmon Arm, B.C.; Newfoundland Agricultural and Handcrafts Exhibition, St. John's, Newfoundland; Nova Scotia Fisheries Exhibition and Fishermen's Reunion, Lunenburg, Nova Scotia; Atlantic Provinces Food Show, Amherst, Nova Scotia, and Canadian Home Economics Association Convention, St. Andrews, N.B.

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ECONOMICS SERVICE

THE ACTIVITIES of the Economics Service in the field of research during 1958-59 were restricted mainly to the completion of projects started the previous year or earlier. This resulted from a temporary reduction in the Service's manpower; the assistant director and a senior economist had been seconded to the Royal Commission on Price Spreads of Food Products, where they remained throughout the year, and the chiefs of the research branch and of the Newfoundland Area unit at St. John's resigned during the year.

The study of costs and earnings in assisted long-lining and dragging enterprises in the Atlantic provinces was continued with slightly reduced coverage in Newfoundland and somewhat more extensive coverage elsewhere. A progress report, "Operations of Modern Longliners and Draggers, Atlantic Seaboard, 1952-1957", was published late in 1958. The study of the weir herring fishery in the Bay of Fundy, undertaken the previous year for the International Passamaquoddy Fisheries Board, was extended to include the purse-seining fishery and other ancillary operations in the district affected by the tidal power scheme. On the Pacific coast, with a view to perfecting a statistical service for the salmon sports fishery in tidal waters, an investigation was made of the investment, geographical distribution and seasonal pattern in this phase of the recreational industry in British Columbia. The findings were published in a supplement to the annual report on the statistics of the fishery. On the Pacific coast also, the Service undertook a study of the salmon and halibut fisheries to determine the feasibility of regulations to control entry to these fisheries. The "reconnaissance" phase of this study was completed in 1958-59.

The study of the problems of management in mechanized fish-curing operations, with particular reference to production costs, which was described in last year's annual report, was completed in 1958-59 and a comprehensive report on findings was prepared for publication. Supplementary investigations of (a) the conditions facilitating or retarding the shift from home-curing to the sale of the catch as landed or in the salt-bulk form and (b) the effect of such a shift on the income position of the crews in the traditional small-boat fisheries of Newfoundland, were also completed.

Among the projects being planned for the future is a study of the economy of the lobster fishery on the Atlantic coast. Preparatory to this study, and as a basis for sampling the fishing industry generally, a registry of fishing enterprises in the Atlantic provinces is being established—the preliminary work was carried out in the winter of 1958-59 and a similar programme was instituted at the same time in British Columbia. The registry will also serve a useful purpose in the field of economic intelligence: for example, much more accurate information on investment and employment in the primary fishing industry will be made available.

Other developments in the intelligence field in 1958-59 included (a) the completion, in co-operation with the Dominion Bureau of Statistics, of the programme for improving statistical services for the fisheries of the Maritimes Area—culminating in a decision to install I.B.M. equipment for data processing at the Halifax office—and (b) the design of a "purchase-slip" system for the collection of landings statistics in the fisheries of Great Slave Lake—the latter project being carried out jointly by the Service's staffs at headquarters and Vancouver.

In addition to the various duties of liaison with other departments of the federal government, with the provincial fishery administrations and with the industry which have been referred to in earlier reports, officers of the Service are engaged in a considerable range of miscellaneous activities related to their fields of work. During 1958-59, papers were prepared for an international conference, organized by FAO, on the costs and earnings of primary fishing enterprises and for a symposium on the economic and biological aspects of fishery management (conservation). Members of the staff represented the Department at these meetings and also at international gatherings convened under the aegis of GATT and OEEC.

INFORMATION AND EDUCATIONAL SERVICE

THE DEPARTMENT'S responsibilities and activities in administering the fisheries and the specialized operations of its various services and agencies are relayed to fishermen, the fishing industry, and the general public by the Information and Educational Service. In addition to a headquarters unit at Ottawa, the Service has Information Officers stationed at Vancouver, B.C., Halifax, N.S., and St. John's, Newfoundland.

The long-range goals of the Department's information work, in which all appropriate media of communications are utilized, are to make Canadians aware of the importance of the fisheries to the Canadian economy and of the nutritional value of fish products. The achievements of fisheries scientists and those concerned with fisheries management in perpetuating fish stocks and in improving the efficiency of fishing operations have created an accelerated demand for information not only from the public generally, but more specifically from those interested in education and from the fishing industry itself.

To meet this demand, the Service maintains a steady flow of material on a wide range of fishery topics of national and local interest. This takes the form of informational sheets, pamphlets, booklets, films and filmstrips, as well as items especially prepared for newspapers, various trade and other magazines, radio, and television. A home economist on the staff works closely with the Inspection and Consumer Service in the preparation of consumer items for the press, radio and television. These illustrate attractive and economical ways in which fishery products may be prepared and served. A monthly press release along these lines is prepared and distributed in English and French to food editors who have requested such a service. Photographs of fish dishes in glossy print or mat form accompany the release to editors who have asked for illustrative material. This release is sent regularly to 65 daily newspapers and to 231 weekly newspapers. Fish recipes having to do with a particular theme, food photographs and feature articles are also supplied to newspaper and magazine food editors who make special requests. For radio commentators a series of short scripts of consumer interest are prepared in English and French. These are distributed, on request, to 122 radio stations.

A large proportion of the people concerned with fisheries, i.e., fishermen, industry officials, news outlets, and federal and provincial fisheries personnel receive monthly issues of the Department's publication, "Trade News." This magazine is also circulated abroad, and is widely recognized as an authoritative and comprehensive vehicle for informative articles on the Canadian fishing industry, as well as for outlines of departmental operations and policy. Other fisheries magazines both in Canada and other countries frequently reprint articles or excerpts from its pages.

A second publication for which the Service is directly responsible is "The Canadian Fish Culturist," issued periodically. Canadian scientists in the fish culture and related fields submit papers for inclusion in this magazine, which is circulated to persons and organizations with a direct interest in the development of fish culture.

The close working relationship between the Information and Educational Service and the Canadian Broadcasting Corporation's "Fishermen's Broadcasts", aired over stations in the Pacific, Maritimes and Newfoundland Areas, continued during the year, during which the vacant position of Information Officer to carry out the radio and television work of the Service was filled. This allowed a more effective approach to be made in providing more fisheries news to fishermen and the general public through broadcasting. The CBC and many independent radio and television stations in Canada were provided with special taped interviews covering various fisheries subjects. As did other sections of the Service, the radio branch worked closely with the home economics section of the Department's Inspection and Consumer Service, and television appearances and demonstrations were arranged featuring home economists from both headquarters and the Areas.

The activities of the Information and Educational Service include the distribution of pamphlets on the fisheries, the screening of films and filmstrips, and the designing of displays for fisheries exhibitions. "Fisheries Fact Sheets" are the most widely distributed of the informational material, providing background information on fish and fishing, and many other related topics. They are primarily intended for use in schools and adult study groups, and are distributed without charge. There was a particularly heavy demand for these fact sheets in the Pacific Area during 1958 because of the keen interest in the subject aroused by the British Columbia Centennial celebrations. This, of course, was natural as the fisheries of British Columbia are important in the economic development of that province, as they are in the Atlantic coastal provinces.

The Service plans and arranges for the showing of departmental displays at various fishery and consumer exhibitions and conventions. At the 1958 Nova Scotia Fisheries Exhibition and Fishermen's Reunion, held in Lunenburg, N.S., the exhibit stressed the Department's responsibility in safeguarding the fisheries, demonstrably a national heritage. It included fish product displays in which nearly every fish processor in the Maritime Provinces was represented, a cooking school, with home economists demonstrating various ways to cook fish, a display of boning and culling fish, and a fish tank. In the past, live species of fish were shown in the tank, but for the 1958 exhibit it was decided to feature live lobsters being caught in lobster traps, as great interest had been aroused in the underwater investigations of these crustaceans. The major portion of this resources exhibit was also shown for three months at the National Museum of Canada in Ottawa. It includes life-like models of some of the main commercial fish found in Canadian waters, and also symbolically stressed the importance of the fisheries as a self-perpetuating food resource.

During the summer, the Department co-operated with the Vancouver Public Aquarium in the preparation of a Centennial Celebration exhibit featuring the three main fisheries of British Columbia. The herring fishery was displayed in July, halibut in August, and salmon in September.

The importance of visual aids as an effective way of educating the public on fisheries matters was again demonstrated in the Service's educational programme. During the year, all the Department's films were given numerous screenings from Newfoundland to British Columbia. It is noteworthy that the film "Salmon's Struggle for Survival" had 45 separate screenings in British Columbia. This film and others were also shown on television. Two filmstrips were added to the Department's library of this medium during 1958-59. They are "How to Buy Fish" and "The Biology of Pacific Salmon."

As in previous years, the Information and Educational Service did liaison work for the Fisheries Research Board of Canada and for annual meetings in Canada of various national and international fishery commissions. Examples of this were the information functions undertaken during the Board's annual meeting and the "Open House" programmes conducted at the various biological and technological stations for the benefit of the fishing industry, and the press and broadcasting arrangements for meetings held in Canada of such organizations as the International North Pacific Fisheries Commission and the International Commission for the Northwest Atlantic Fisheries.

The position of Pacific Area Information Officer, vacated on September 1, 1958, was filled at the end of that year. The former officer served on the "Salute to the Sockeye" committee in conjunction with the British Columbia Centennial before his retirement from the Department. His successor, as had been done in previous years, arranged for departmental personnel to act as instructors at the Youth Training Programme sponsored by the Extension Department of the University of British Columbia. Also, for the fifth year in succession, the officer acted as the Department's representative and as one of its instructors at the short course for fishermen conducted by the university. The Maritimes Area Information Officer carried out similar activities, and his counterpart in Newfoundland continued to represent the Department on a committee organized by officials of the provincial Department of Education to guide the 4-H Clubs of the province in special projects dealing with the catching and processing of cod and lobsters.

INDUSTRIAL DEVELOPMENT SERVICE

THE INDUSTRIAL Development Service has as its primary objective modernization of the Canadian fishing industry through the application of improved technology in all phases of operations from the primary catching or harvesting function through the processing, transportation, storage and distributive phases. To achieve these ends the Service encourages the fishing industry and others to suggest and recommend areas of study and investigation and to participate as far as possible in the developmental projects undertaken. To give effective implementation to practical industrial operations, the Service keeps in close touch with results of fisheries technological research originating with government and industry at home and abroad.

In the year under review, the Service continued to engage in a variety of developmental projects which in a broad area are classified as "Technical Services to Fishermen and the Fishing Industry". Projects in the group included exploratory fishing for new scallop and shrimp beds; experimental work with an electrical fish catching device and the demonstration of mid-water trawl gear; the development of new types of metal lobster traps and techniques for shellfish harvesting; study of transportation problems including the air shipment of live lobsters, boat unloading equipment and the holding of fish in refrigerated sea water; improved plant processing methods and better facilities for processing fish by fishermen; the development of new products and new methods of packaging.

The applied research function reflected in the work described suggests that the planning and implementation of the Service's programme involves both long term and short term projects. Accordingly, while a number of new projects were initiated during the year, some of the work engaged in was a continuation of programmes begun in the previous years.

The Service continued to operate the Department's Fish Processing Experimental Plant at Valleyfield, Newfoundland. Among other activities, noteworthy progress was made in the development of an improved brining process for saltfish and in the designing of better packaging. In addition to the activities at Valleyfield, the Service continued its studies of the mechanical saltfish drying operation which has been developed in co-operation with a commercial firm at Catalina, Newfoundland.

An important trend reflected in the work of the Service is the increasing co-operation of the federal and provincial governments and industry through joint participation in projects and fisheries development generally. A forward step in this direction, and one which should facilitate the work of the Service, was the formation of a vessel and gear sub-committee of the Federal-Provincial Atlantic

The old and the new methods of harvesting clams. Fisherman at Clam Harbour, N.S., gathers a "mess" of clams while in the background the crew of a mechanized clam digger prepares for the day's work. The machine was built by the Department's Industrial Development Service and the Fisheries Research Board.

Fisheries Committee with responsibilities in the technological development of fishing vessels and fish catching gear and related devices.

The Service continued to administer departmental assistance programmes in connection with the construction of fishing vessels of the dragger or long-liner types and the provision of bait storages.

During the year, grants were paid to provincial loan boards or equivalent agencies in the Atlantic region toward the construction of 48 vessels thus bringing the total number of boats assisted under the programme since its inception in 1947-48 to 297.

In addition to the administration of these programmes the Service dealt with a variety of administrative matters, chiefly the co-ordination of marine works having specific implications for the fisheries.

FISHERMEN'S INDEMNITY PLAN

THE FISHERMEN'S Indemnity Plan is a measure administered by the Department under regulations established by Order in Council to assist fishermen in the event of loss of or serious damage to their fishing vessels. To secure protection under the Plan, fishermen must have their vessels appraised and must pay a nominal premium of one per cent of the appraised value per annum. The Plan was put into operation in July, 1953, and is available to all coastal fishermen owning and operating fishing vessels at from $250 to $10,000. The upper limit was increased from $7,500 to $10,000 in April 1947, to take into account the increased cost of vessel construction.

When initiated the Plan provided for an indemnity of 60 per cent of the appraised value in the event of total loss and payment of 85 per cent of the cost of repairs in excess of 30 per cent of the appraised value following serious damage. The much better than average loss and damage experience of the British Columbia area permitted subsequent increase in the rate of indemnity for total loss to 70 per cent in that area as well as payment of 85 per cent of the cost of repairs in excess of 15 per cent of the appraised value. A further amendment provides for payment of 100 per cent of the cost of repairs in all areas in excess of the 30 and 15 per cent figures referred to above.

The Plan has continued to prove increasingly popular with fishermen. In Newfoundland the number availing themselves of its protection increased from 930 to 1,068, in the Maritimes from 1,559 to 1,748, in Quebec from 372 to 386 and in British Columbia from 1,485 to 1,929. In all, 5,131 vessels were insured at March 31, 1959 as compared with 4,346 a year earlier. The total appraised value of vessels covered under the Plan reached $14,625,885 at the end of the year under review compared to $11,281,529 at March 31, 1958. Losses paid during the fiscal year 1958-59 numbered 147 and were settled for an amount slightly less than the net premiums collected during the same period.

The lobster trap protection feature of the Indemnity Plan has also grown in popularity, particularly following isolated severe storm damage to this type of fishing equipment. However, since losses of gear of this kind are more readily replaced with the resources of the fishermen than the loss of a fishing vessel, fishermen have not proven too responsive to the opportunity to protect themselves. The tendency has been for those fishermen in the most vulnerable areas to take advantage of the Plan to a greater extent than in other areas, hence the financial statement indicates a fairly substantial excess of indemnities over premiums over the entire period of operation of the Plan.

TABLE—FISHERMEN'S INDEMNITY PLAN NET PREMIUMS COLLECTED AND INDEMNITIES PAID FROM INCEPTION OF PLAN (JULY 1953) TO MARCH 31, 1959

Province	Vessels		Lobster Traps	
	Net Prem.	Indemnity	Net Prem.	Indemnity
Newfoundland	$ 63,839	$118,222	$ 9,978	$ 36,391
Nova Scotia	78,677	92,767	66,822	218,490
New Brunswick	21,219	16,902	625	1,000
Prince Edward Island	9,204	5,277	10,448	32,662
Maritimes	109,100	114,946	77,895	252,152
Quebec	16,512	47,975	9,291	15,105
Atlantic Coast	189,451	281,143	97,164	303,648
British Columbia	287,168	227,040	—	—
TOTAL	$476,619	$508,183	$97,164	$303,648

FISHERIES PRICES SUPPORT BOARD

HIGHER average prices for several of the principal species, together with a high level of total landings, resulted in an overall increase of 25 per cent in returns to fishermen in 1958 as compared to 1957. While this very significant increase was not equally enjoyed by all fishermen in all areas the overall position was such that no direct support action by the Fisheries Prices Support Board was necessary

Department of Fisheries bait depot at Bonavista, Newfoundland.

during the fiscal year. One region where large numbers of fishermen suffered a sharp decline in income was in Newfoundland, where a failure of the cod catch over a wide area of the inshore fishery occurred. In order to provide a measure of assistance the Support Board recommended a local construction programme as an alternative to price support, which under the circumstances was unsuited to meet the need.

The Board met in Ottawa in July 1958 to consider price movements generally and since the major problems appeared on the Atlantic coast the Board met again early in September in Halifax and St. John's in order to consider these problems in detail and to meet with representatives of fishermen and processors concerned. As indicated the Board was unable to find a solution under the terms of the Prices Support Act and recommended alternative action to relieve the situation.

Fish markets generally, both domestic and export, showed continuous strength throughout the year, particularly for the fresh and frozen forms, and the generally higher production moved into consumption without difficulty. The markets for

"Community Stage" at Crow Head, Newfoundland. One of 20 such processing sheds built by the Government in local construction programmes.

salted fish continued to give some difficulty particularly in so far as price was concerned, with some of the major markets retaining price ceilings below economic levels. However, the reduced production of these items was disposed of and by year-end the stock position was at a low level. The tendency towards greater production of the fresh and frozen forms and less of the salted forms continued.

The staff of the Board continued to administer the Fisheries Salt Assistance Programme and the headquarters activities of the Fishermen's Indemnity Plan. Under the salt assistance programme, initiated in 1954, producers of salted fish products receive a 50 per cent rebate on their laid down cost of salt. The payments are made to individual fishermen and processors against documents covering their

use of salt. During the fiscal year 5,963 payments were made to fishermen totalling $347,643.71. During the same period 600 claims from processors were paid amounting to $387,894.59.

The operations of the Fishermen's Indemnity Plan are discussed in the preceding chapter of this report.

The staff of the Board also is reponsible for the headquarters administration of the Pacific Dogfish Destruction Programme, the Newfoundland Bait Service and other related programmes designed to aid fishermen. The Board also co-operates with the Economics Service of the Department of Fisheries in the collection and compilation of costs of fishing operations in several provinces.

Officers and members of the Board are: Chairman, I. S. McArthur, Ottawa; Vice-Chairman, W. S. Lee, Halifax, N.S.; Members: C. E. Desourdy, Montreal, P.Q.; K. F. Harding, Prince Rupert, B.C.; H. I. Mifflin, Catalina, Nfld.; Francois Millerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.

FISHERIES RESEARCH BOARD OF CANADA

THE FISHERIES Research Board is an advisory, consultative and administrative body provided for by Act of Parliament. It operates under the control of the Minister of Fisheries and has charge of most of the Canadian Government research on fishes and other aquatic animals, their behaviour, the biology of their stocks, equipment needed for capturing them, methods and equipment for processing them, methods for their preservation and control of quality, and development of by-products from waste material obtained in processing.

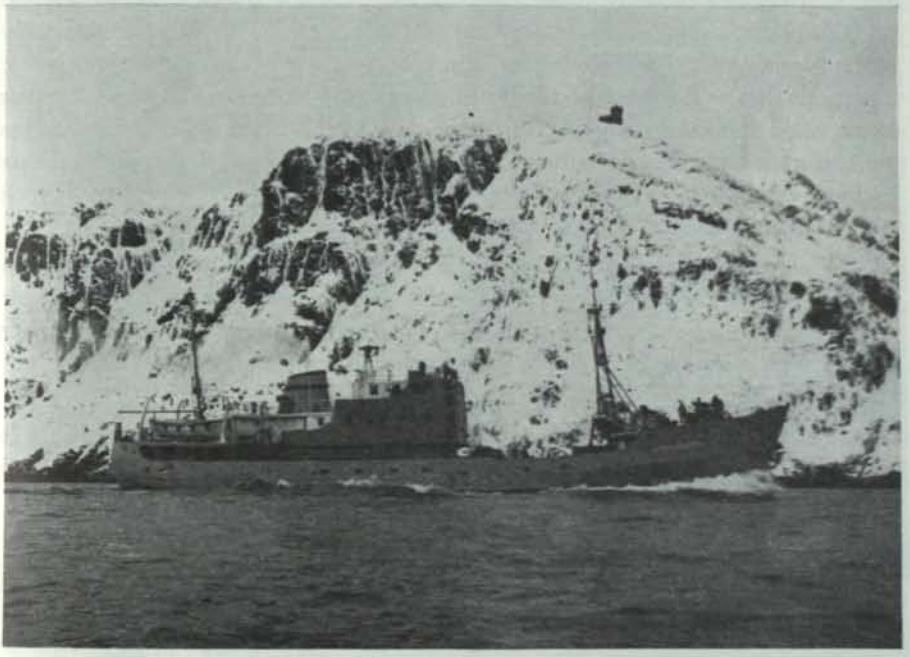
The Fisheries Research Board Act provides for "a chairman and not more than 18 other members", the majority of whom must be scientists. In addition to the full-time chairman, in 1958 this Board consisted of 10 scientists, experts in disciplines related to its work, six business leaders with an intimate knowledge of the fishing industry and one representative of the Department of Fisheries.

Early in January each year, the Board as a whole meets at Ottawa with directors and project leaders of investigations to review general research programmes carried out at various locations across Canada and to consider reports from its different committees. Among the latter are the Executive Committee which met three times during the year to deal with personnel and financial matters and the four Regional Advisory Committees (Atlantic, Arctic, Central and Pacific), which each met twice during the year, once at one or another of the Board's stations and once in Ottawa at the time of the annual meeting, to review investigational work in detail, to obtain progress reports, to formulate recommendations for programme improvement, and to consider the suitability of physical facilities and the quality and adequacy of staff. Continuity of administration and supervision of the Board's work as a whole is provided by the chairman, who is also the Board's chief executive, and his associates in the office of the chairman in Ottawa.

During 1958, satisfactory research progress was made in fishery biology, oceanography and fishery technology, the three main branches of scientific interest of the Board. To help meet expanding needs, caused by more demanding requests for fisheries information and increased complexity of research problems, this Board's staff and facilities have been extended but new demands still seem to outstrip available staff, laboratory space and equipment. In the period covered by this report, the Board's new 177-foot research vessel C.G.S. *A. T. Cameron* was placed into service on the Atlantic coast; biological laboratory facilities in St. Andrews, N.B. were increased; a new building for the technological station at Vancouver, B.C., was all but completed; a rented business block in London, Ont., was modified to serve as laboratory headquarters for research on freshwater fisheries; and expanded residence and field laboratory space was provided in the Great Slave Lake area of the Northwest Territories

Some of the research programmes have been adjusted and reoriented to meet new needs and changing conditions; a new fishing gear research unit was established; studies on the effects of pollution and other man-made environmental conditions on fish stocks have been intensified; the study of oceanography has been expanded and technological investigations have been extended to chemical and physiological changes which occur in live fish in addition to the usual work on preservation, processing and better utilization of fishery products.

As in previous years, the Board has co-operated with and participated in the work of several international fisheries commissions: the International Passamaquoddy



Research vessel A. T. Cameron leaving harbour, St. John's, Newfoundland.

Fisheries Board, the International Commission for the Northwest Atlantic Fisheries, the Great Lakes Fishery Commission, the International Whaling Commission and the North Pacific Fur Seal Commission. Close liaison was continued and co-operative oceanographic programmes were carried out with the Royal Canadian Navy, the Department of Transport, the Department of Mines and Technical Surveys, and the Institute of Oceanography of the University of British Columbia. Much assistance has again been received from a number of Canadian universities and several programmes have been carried out successfully in co-operation with provincial governments. Biochemical studies of migrating salmon were continued together with the International Pacific Salmon Fisheries Commission. With the administrative assistance of the National Research Council the Board has continued to support a number of post-graduate scholarships in fields related to its work.

A detailed review of the Board's work during the period covered by this report will be found in its separate "Annual Report 1958-59", which also contains lists of its scientific staff and various publications. Therefore only a summary of some important and typical results will be given here.

Biological Investigations

Newfoundland and Maritimes Areas

The Board's biological work on Atlantic fisheries is centered at the stations in St. John's, Nfld., and St. Andrews, N.B.

Cod remains the most abundant large fish off our Atlantic coast. Canadian landings of cod decreased by 18 per cent in 1958. The decline was almost wholly in the Newfoundland inshore fishery, apparently caused by unusual oceanographic conditions there. Emphasis of the Board's work is on collecting accurate statistics of the catch and, when possible, the catch per unit of fishing effort. Experiments with different trawl meshes continue, in order to find the one which permits maximum landings with the least possible sorting and wastage at sea. The present $4\frac{1}{2}$ inch mesh has saved many thousands of tons of young fish.

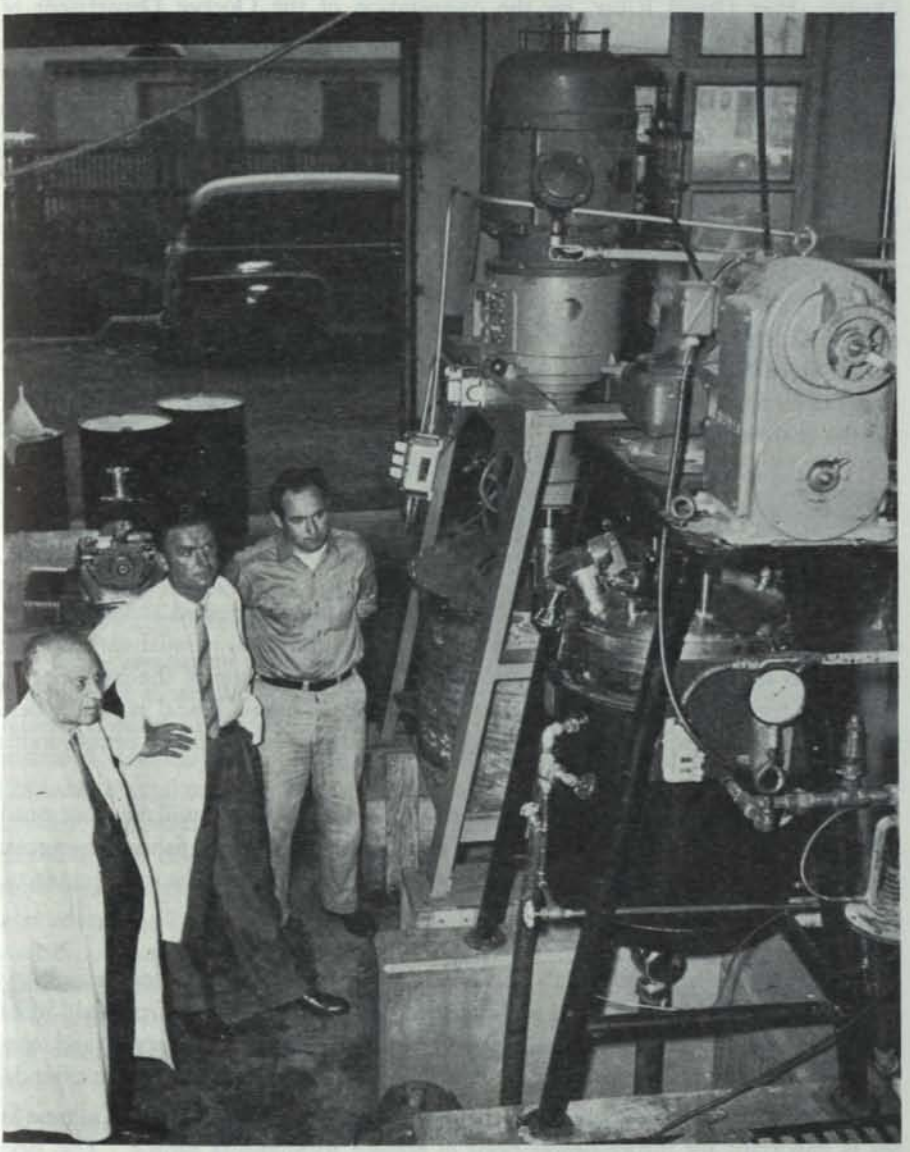
While an especially good year-class of young cod (the 1957 hatch) appeared in southern Newfoundland harbours in 1958 and since the cod fishery is less dependent than the haddock fishery on the vagaries of natural reproduction, indications are that the year-class will be available to the fishery in years ahead.

The Board's Grand Bank *haddock* survey indicated that the 1949, 1952 and 1953 year-classes made up the bulk of the 1958 catch. A good 1955 year-class is expected to contribute to future years' fishing, from 1959 onward. However no new large year-class has appeared on St. Pierre Bank to replace the big one in 1949. Off Nova Scotia the 1952 brood is strong, and other broods are also represented in the more stable fishery of that region.

Exploration for fishable stocks of *herring* in the Newfoundland area continued during 1958, from the Strait of Belle Isle to St. Mary's Bay. Water in 1958 was less stratified due to temperature effects than in 1957, permitting greater vertical dispersion of the stock. Fishable concentrations were located only in winter and spring.

The *sardine herring* of the Bay of Fundy area were marked again in 1958. Of 100,000 sardines tagged, about 2,700 were returned, almost all from weir-caught fish. There was a concentration of sardines toward the head of Passamaquoddy Bay in early spring and summer, and general dispersal afterward. The adult herring fishery in southwestern Nova Scotia continues to expand. It is apparently from this region that sardines for Passamaquoddy Bay and the Grand Manan shallows are recruited. The study of the Passamaquoddy Bay tidal power development involves knowledge of herring swimming ability and resistance to temperature and pressure stresses. It was found that their maximum sustained swimming speed is two knots. A change in temperature from 58° to 68°F proved fatal to herring, but rapid changes in pressure, from one to four atmospheres and back again, did not have any apparent ill effects.

Large and valuable *lobster* populations continue to flourish in the Gulf of St. Lawrence, in spite of occasional failure of effective reproduction due to ocean conditions. Such a failure occurred in 1958, but it will not affect the lobster fishery until 1962, and it will scarcely be noticeable then unless followed by one or more



Section of pilot plant used by Fisheries Research Board in fish protein studies. Equipment includes basket centrifuge and reaction kettle.

similar failures. Effects of management practices on lobster survival and growth are being tested by a tagging and marking study at Gabarus, N.S., and other places. Elsewhere larger or more valuable stocks are being made available by increasing

the minimum size to let the smaller lobsters grow a little—but the illegal landing of "shorts" has always proved troublesome.

Assessment of *Atlantic salmon* production continues at stations in Newfoundland (Little Codroy River), New Brunswick (Miramichi and Pollett Rivers) and Quebec (Port Daniel River, by the co-operation of the Quebec Department of Fisheries). The Miramichi in 1958 produced about $2\frac{1}{2}$ million smolts. This figure reflects the benefits of merganser control on the river for several years, and was achieved in spite of substantial losses in some tributaries by DDT spraying. An unusual effect of DDT on the Northwest Miramichi was the production of a large class of smolts at age two in 1957—a year younger than usual—and their return as grilse in 1958. Thus the 1958 angling was better than predicted.

The *oyster* epidemic which recently spread to New Brunswick is being counteracted by introductions of disease-resistant stock from Prince Edward Island. Some of these have now survived a year, spawned once, and spatted, so that rapid reseeding of the affected areas seems assured. Meantime the disease spread toward northeastern New Brunswick, where growers were encouraged to harvest available susceptible oysters before it struck. Additional introductions of resistant stock will be made to these areas.

An improved hydraulic digger-escalator for harvesting *clams* has been developed with the assistance of Industrial Development Service funds. Destruction of young soft-shell clams is only four to eight per cent, as compared with 50 per cent for hand digging.

The value of *rainbow trout* in Maritime lakes is being tested at Crecy Lake, near St. Andrews, N.B. The plantings and procedure used parallel earlier work there with *speckled trout*, and will provide a direct comparison of the two species. Rainbow trout have already been tested in Prince Edward Island ponds, where they can supplement natural production of speckled trout without unfavourable competition.

During 1958 a *pollution investigation* was begun, which will be concerned with all changes in the environment of fresh water and shore fishery resources. A "base-line" survey of Saint John River conditions was one of the initial projects.

Pacific Area

The Board's biological work on Canada's west coast is carried out mainly by the staff of its Biological Station at Nanaimo, B.C., and sometimes from field units maintained at appropriate places, necessitated for reasons of economy and convenience, covering the wide areas over which the work of this establishment extends.

A more complete knowledge of the distribution of British Columbia salmon at sea is important for future negotiations in respect to high-seas fishing. The 1958 gill netting was hampered by bad weather, but two Canadian vessels caught 2,101 salmon in 37 sets made west to 155° West Longitude. All species of salmon were found sparsely over the broad expanse of the ocean, north of the warm water zone. *Sockeye salmon* were more abundant at sea than in the two previous years, preceding their general abundance in the various British Columbia fisheries later on, particularly the Fraser River.

Four kinds of parasites have proved to be one key to the identification of the area of origin of sockeye salmon taken on the high seas. Two are acquired by the salmon from the waters of Asia, and two from American waters; all are tiny and of no importance otherwise. Serological tests and body characters have been used by United States investigators for the same purpose. Identified in this way, it appears there is a broad area of intermixture of Alaskan and Kamchatkan sockeye north and south of the Aleutian Islands. There is as yet no evidence that British Columbia sockeye go as far west as the present Japanese ocean fishing area, but Fraser sockeye have been tentatively identified, from scale pattern, in catches taken as far west as 155° West Longitude.

The study of Babine Lake—main nursery of Skeena River sockeye—indicated an above-average production of smolts in 1958. Study of the dispersion of the young sockeye in the lake showed again that the large main body of the lake was under-utilized and could produce many more smolts than at present. Regulation of the Skeena fishery in 1958 provided a good escapement to Babine—812,000 fish—of which a considerable fraction went to streams tributary to the main lake.

Two years ago Canada and the United States agreed to abolish net fishing on the high seas, because it made regulation of escapement of salmon to specific rivers almost impossible. At that time the limit for net fishing at the mouth of the Strait of Juan de Fuca was left subject to negotiation, to be based on the results of two years of study by Canada and the State of Washington. This study is now complete; it shows that both the provisional Bonilla-Tatoosh line, and one farther east proposed by the United States, would limit the net *coho salmon* catch almost exclusively to fish bound for spawning areas inside the strait.

Better assessment of stream production of *pink* and *chum salmon* and prediction of catches of these two species will be the result of systematic record-keeping and improvement of surveys along the whole coast, as well as special studies in the Skeena watershed. Spawning in 1957 suffered from low water in southern British Columbia coastal streams, and from heavy floods a little later. Such vagaries of the weather, combined with variable survival and variable growth rate in the sea, have played a large role in making production variable from year to year. In spite of these vicissitudes, an adequate spawning stock is absolutely essential in order to take advantage of favourable rearing conditions when they do occur. Estimates available at present suggest that, on the whole, British Columbia pink and chum salmon escapements are about one-quarter as great as are needed to provide stocks for maximum catches from existing spawning areas. Pink salmon reaching the Skeena area exceeded average expectation, with about 600,000 escapement and 800,000 catch.

The exceptionally large 1956 year-class of *herring* produced unusually large catches in southern British Columbia during the 1958-59 fishing season; there was also a larger-than-normal carry-over from the previous year, when fishing was light. Most northern areas had no strong year-class and availability was down, so the total catch for the province was slightly less than the record.

One function of a continuing research programme on *fur seals* is to balance the value of the fish the seals eat against the value of the seals themselves. In 1958

the Board took 500 seals pelagically, determined their food, age, maturity and other biological data. This information is being added to and compared with that obtained by the United States, Japan and the U.S.S.R.

Fisheries Research Board observers were present on the occasion of the demolition of Ripple Rock in Seymour Narrows. Popular fears of extensive damage to fisheries proved unfounded. Caged *lingcod* and other fish, anchored at various distances from the site, were unharmed unless within half a mile of the actual detonation. Only a few hundred *rockfish* were observed dead after the explosion.

Central Area

Canada's inland fisheries have become an important study project of the Board in recent years. In the year just past, investigations have been continued vigorously through the Biological Station at London, Ont., and associated field units.

Operating under an agreement with the Great Lakes Fishery Commission, the Board maintained electrical barriers to exclude lampreys from 22 Canadian rivers, tributaries of Lake Superior, in 1958. On the Chippewa River, where a barrier has now operated for four years, an intensive survey showed no young lampreys, in contrast to their abundance four years ago. Thus a substantial reduction of lampreys in the lake now seems assured by 1960 or 1961, provided the barriers are maintained each year.

The Board also conducted experiments on barriers of different design and electrical current characteristics, in order to improve performance and reduce costs. Reactions of lampreys to electric currents, and to water currents, were also studied in detail.

In addition, a new weapon in the lamprey war had its first Canadian trials during 1958. United States investigators had discovered an organic substance which kills young lampreys without killing fish—provided the concentration is just right for the prevailing temperature. Two trials in 1958 showed that the chemical works well in the brown-water streams of the Lake Superior north shore.

In the Great Slave Lake fishery, a decrease in number of fishermen by 27 per cent resulted in a 17 per cent decrease in landings in the summer of 1958. The size of *whitefish* and *trout* caught by $5\frac{1}{2}$-inch mesh gill nets is now almost stabilized in the more accessible parts of the lake—marking the close of the long period of "fishing-up of accumulated stock" that began when the lake was first fished commercially in 1945. However, it will be some years yet before the recruitment of young fish comes into equilibrium with the reduced stock of large fish. The catch quotas in effect since 1945 have assured a continuing supply of fish at a high level of availability for the Indian fishery.

Observations in 1958 confirmed that effective *pike* control has been achieved on Heming Lake: the surviving pike population consists almost exclusively of year-old fish. More important, the incidence of the *Triaenophorus* parasite of whitefish in the lake has been drastically reduced, pike being the only host of the mature parasite.

Arctic Unit

Studies on arctic fisheries were carried out by the Board's Arctic Unit with headquarters at Montreal, Que.

The Arctic is becoming ever more popular and more populated. Its fish resources are considerable, but poorly known. They are under-utilized in some areas; in fact, it has been difficult to convince some of the caribou-hunting tribes that fish is a good alternative food to the meat to which they have been accustomed. Elsewhere native populations have long harvested fishes for their own use and for dog food. Near modern air bases sport fishing has developed rapidly.

The Board's studies in 1958 extended from Banks Island on the west to Baffin Island on the east, and from Ellesmere Island south to the lower Thelon River west of Hudson Bay. Hazen Lake on Ellesmere Island, the most northerly large lake in the world, was found to support a substantial population of *arctic char*. At Frobisher Bay, a number of lakes and rivers close to the air field are now being intensively fished, and their potential yield is being determined. Western arctic fishes and fisheries include the large whitefish-like *inconnu*, and at Tuktoyaktuk on the Mackenzie delta collections of marine *herring* (*Clupea*) were made. On Banks Island a stock of *lake trout* (*Cristivomer namaycush*) was rediscovered, far north of its principal mainland range.

Age determinations of the *harp seal* stock off Labrador showed a very poor survival of the 1956 year-class of pups, associated with an unusually heavy kill that year by the international fishery—Canadian and Norwegian. This and other indications of overexploitation have been checked by a new aerial survey of the stock made early in 1959. *Ringed seals*, a staple of life in the far north, are much less heavily used in most areas. A synopsis of their stocks and yield potential in the southern arctic region has been prepared.

The life history of eastern arctic *walruses* is now known in detail. An illustrated booklet has been prepared, designed especially for Eskimo hunters, which outlines desirable conservation practices. Walrus and other studies were conducted in 1958 from the Belcher Islands in Hudson Bay. Good supplies of seals, Greenland cod and capelin were observed.

Oceanographic Investigations

The Board's biological stations regularly collect oceanographic information during the course of biological investigations, but most of this work is carried out by the Board's Atlantic Oceanographic Group operating from St. Andrews, N.B., and its Pacific Oceanographic Group based at Nanaimo, B.C. Investigations by both groups were intensified during 1958 through participation in oceanographic programmes associated with the International Geophysical Year.

A special cruise for the IGY involved deep-sea observations from Greenland to Davis Strait, and cross-sections of the West Greenland Current, the Labrador Current, and the Gulf Stream. Numerous seasonal cruises in the Grand Banks, Scotian Shelf and Bay of Fundy areas, and observations from coastal stations confirmed the recent trend toward lower average water temperatures. Special attention

was given to detailed analysis of transports of water masses in the region of the Gulf of St. Lawrence and Cabot Strait. Existing data were worked up to provide a picture of water conditions north of 40° N. for each month of the year.

A field programme has been completed for the International Passamaquoddy Fisheries Board in the lower Bay of Fundy and adjacent areas. It included current measurements from an anchored ship, drift-bottle releases, temperature and salinity observations, transport measurements by electromagnetic methods, and drift-pole tracking. A current measurement programme is continuing, leading to preparation of hourly tidal current charts.

Arctic oceanographic information was obtained by a staff member who assisted with the United States Air Force Research Group's programme on Ice Island T-3, floating in the Polar Basin.

The tempo and intensity of oceanographic observations on the Pacific Coast doubled during the past year. Through one or another expedition, representatives from the Pacific Oceanographic Group were at sea almost continuously during the 12-month period starting in March 1958. Their work included surveys of the Aleutian, mid-Pacific and coastal regions, special studies of productivity, oceanographic support for exploratory fishing and naval research projects, and extensive drift-bottle observations. Data are now on hand to define the predominant features of the water masses, the properties of the water, structure, and the currents in the upper 1,200 fathoms of the eastern sub-arctic Pacific.

Through 1957 and 1958 there was a progressive intrusion of warm water northward between ocean station "P" in the Gulf of Alaska and the Canadian coast. It appears that this tongue of warm water deflected the migration route of the large Adams River sockeye run and other 1958 runs of salmon to the north. It was also associated with a plenitude of fin-back whales and scarcity of sperm whales off Vancouver Island. Oceanographic conditions north of latitude 40° N. and east of longitude 170° W. are affected by intrusion of sub-arctic water from the west and sub-tropic water from the south. Means of identifying the extent of each of these have been devised, and attempts at forecasting them are being made. Assessment of ocean productivity has been initiated in a sea cruise and at ocean station "P", where a six-week patrol was completed in March 1959.

At the Nanaimo Station a large outdoor model of the Hecate Strait region was completed. It simulates the tidal and other water movements in the area on a compressed scale and is now being used to analyse these phenomena.

Technological Investigations

Maritimes Area

On the Atlantic coast, the technological station at Halifax continued emphasis on investigations of factors that give rise to quality deterioration in fresh unfrozen fish.

Observations on the occurrence of the well known "sea-weedy" or "iodine-like" odour in fillets from some iced and gutted cod and haddock, particularly when caught in summer, indicated that this odour is a symptom of an early stage of quality deterioration, occurring immediately under the skin soon after the fish are caught.

Much attention was paid to means of maintaining the quality of unfrozen fillets. Fillets from good quality fish, treated by a brief dip in a solution of the antibiotic chlortetracycline (CTC) were shown to have a shelf life of 12 to 21 days at 32° F. An important practical result of these studies has been that certain local plants are now producing the CTC-treated fillets vacuum-packed in plastic containers, dated, and with an added statement that the fillets have a shelf life of 10 days from the date marked if the fillets are kept chilled. A survey of trade practice in using a sodium nitrite dip as a preservative for fillets disclosed the care that must be taken to ensure that the fillets take up enough nitrite to be effective, but not more than the allowable amount of 200 parts per million([1]).

Studies concerning the deleterious effect of temporary rise in cold storage temperature on the quality of frozen fish were continued. It can now be stated that although frozen Atlantic cod fillets can be expected to store satisfactorily for nine months at −10° F. or for five months at 0° F., if their temperature happens to rise to +10° or +15° F. for as little as a week as may occur during transportation, the subsequent satisfactory storage life when the original storage temperature is resumed will be reduced to about half of what it would have been had the warming not occurred.

During some experiments on keeping quality of frozen cod fillets stored at −10°F., several packs were unexpectedly found to be as good after storage for over a year as when they were first frozen. Finding the reason for the superior keeping ability made an interesting addition to the station's long-term continuing study of the physical and chemical characteristics of proteins in frozen fish in relation to the lipids (fats and fat derivatives) and other flesh constituents. The presence of seven main components in the lipids of unfrozen and stored frozen cod flesh was demonstrated. An almost pure, crystalline protein resembling rabbit-muscle tropomyosin was prepared from cod muscle. By another procedure larger quantities of fairly pure cod-muscle tropomyosin were made as starting material for work on its amino acid structure by means of enzymic breakdown into smaller molecular units that can be more readily separated and studied.

Chemical analyses of *Porrocaecum* (a fish parasite) revealed the presence of a type of constituent that may be of interest in connection with some animal feeding tests conducted under a contract between the Board and McGill University.

The oils from fish, also most oils from marine mammals such as whales and seals, consist chiefly of complex mixtures of individual fats—chemical combinations of glycerine with various fatty acids. The nature of these oils and their constituent fatty acids is often fairly characteristic of the animal, and sometimes allows the oils, their fatty acids or derivatives to be particularly suited to industrial, dietary and other special uses. The study of the fatty-acid make-up of herring oil and the chemical structure of its fatty acids was continued.

In the field of engineering, the storage of cod in refrigerated sea water was compared with control cod stored in crushed ice. Tests with boards of various sizes

([1])The provision of the Canada Food and Drug Regulation B.16.006 for the use of sodium nitrite in fresh fish and preserved fish in an amount not exceeding 200 parts per million of the finished product was rescinded by Order in Council of July 16, 1959, thus prohibiting the use of sodium nitrite in these items.

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and shapes from different kinds of wood were instituted to determine the durability of coatings for fish holds and pen boards. Assistance was given in design of aluminum-alloy lobster traps and trap buoys, and in design of an aluminum-alloy fish hold.

Further experiments with "fish flour" indicated that an off-white colour experienced in some earlier batches is not attributable to the processing but rather to seasonal biological changes in the fish muscle from which the flour is made. The greatest divergence from white was experienced with flour from fish caught in late November; by the middle of December the fish again yielded a practically white flour.

The technological station at Grande-Rivière on the Gaspé coast conducts investigations relating mainly to salt cod. By means of improved techniques worked out at this station, it has been possible to expedite the study of the amino acid composition of complete cod flesh proteins, of certain fractions therefrom, of the proteins that leach out of the flesh into the brine during salting of cod, and of the free amino acids in such brines. Further details were uncovered concerning the substances responsible for the visible yellow colour of cod pickle and the blue fluorescence it exhibits under ultraviolet light. The effects of temperature and salt concentration on the chemical changes that occur in cod muscle proteins during salting also received considerable attention; appreciable differences were shown to exist for the inhibiting effect of salt on the various deteriorative actions.

Work continued on the nature and properties of the free fatty acids liberated from the fats of cod flesh during preparation of light-salted and heavy-salted cod. Particular study of the liberation of volatile free fatty acids in the process of light salting, showed that 80 to 90 per cent of those liberated is acetic acid. Little or none of these volatile acids is formed during heavy salting. They alone do not appear to be responsible for the characteristic flavour of light-salted cod; the greater part of the flavour and odour was shown to be attributable to another type of volatile substance formed during processing.

The continuing study of the halophilic red bacteria that thrive even in presence of strong salt solutions and sometimes cause red discolorations on salt cod was centred on obtaining a clearer picture of their nutrition requirements. It had previously been difficult to formulate a suitable nutrient medium for laboratory growth of these bacteria, but a chance contamination of some test cultures by tobacco ash was noticed to result in decided stimulation of growth and multiplication. The cause was traced to manganese compounds in the ash, an observation that assisted in development of improved types of culture media and culturing techniques that allow more rapid growth of these halophilic bacteria for research on finding ways to avoid their intrusion during fish salting. Other bacteriological studies were concerned with means of retarding the development of general bacterial populations during light-salt curing.

An occasional contamination of salt fish by a mold was traced to persistence of the mold on the wire screen of fish-drying racks. An effective treatment of screens to control the mold without corroding the wire was worked out and published.

Storage experiments with semi-dried ("green") light-salted cod continued. Even with the addition of allowable preservatives, prolonged storage is risky, but under controlled humidity conditions storage at 55°F. for two months was found to be feasible. A series of brine-salting experiments undertaken to find the best way to obtain a uniformly good-quality product included investigation of a continuous brining procedure and the importance of each of the variables involved. Also investigated were the functions of the time-honoured practices of piling ("water horsing") salted or brined cod before drying is commenced, and press-piling between the drying periods. It is expected these investigations may promote the mechanization of salt fish processing.

Further experiments were made on development of "salt fish slabs", an edible product from shredded cod flesh compressed after incorporation of salt. Centrifuging the minced muscle prior to admixture of the salt, and addition of CTC preservative, considerably improved the keeping quality.

Pacific Area

At the Vancouver Station, the most thorough bio-chemical and chemical study made on Pacific Coast sockeye and coho salmon during their spawning migration was continued into its third year. Because salmon cease feeding shortly before they leave the sea to ascend the river system leading to their parental spawning ground, and continue their fast until they die after spawning, they must rely on conversion of certain of their body constituents into energy for the long and arduous journey. On the way, they must also complete other conversions for elaboration of the special tissues and products associated with spawning. Contributions to knowledge about the qualitative and quantitative nature of the body reserves, and their conversions, add to a better understanding of the salmon's life history including assessment of the extent of their ability to cope with possible delays in passing natural obstructions or dams and reservoirs, and still reach their natural spawning grounds to spawn successfully.

The past year's work under this programme consisted mainly of biochemical and chemical examination of tissues, organs and blood from salmon secured in 1957. Body compositions of coho salmon which had been confined to an aquarium tank were compared with those of some of their kin which had been undertaking their natural spawning migration; changes in the confined fish were in general less pronounced. Analyses for proportions of body fat, moisture and protein in the 216 sockeye salmon taken from the 1957 Fraser River spawning migration were completed. A detailed examination of the changes in the percentages of various minor but biologically very significant tissue and blood constituents present at different stages during the 715-mile migration in the river revealed new information about the part these constituents play in developing sexual maturity ending in death shortly after spawning.

During further investigation of the sterols (complex solid alcohols) in various marine invertebrates a new kind of sterol was isolated from starfish.

The holding of fish catches in sea water refrigerated to between 32° and 30°F., extensively investigated at the Vancouver Station and widely adopted commercially,

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particularly on the Pacific coast, has its eventual limitations if the time is too extended. It had been found previously that during holding of fish in refrigerated sea water the natural balance between sodium and potassium compounds in the flesh reverses, and that while the water content of larger fish such as salmon and halibut does not alter much, some smaller kinds of fish, particularly small flatfish may take up undesirable percentages of water. A chemically modified sea water was developed that minimizes these changes. Construction of two steel commercial fishing vessels during the year offered opportunities to study the problem of fish-holding tank construction in such vessels, and a commercial installation of shore tanks at a cannery provided a successful practical demonstration of the suitability of refrigerated sea water for short-term holding of large quantities of salmon before canning.

Work on avoidance of oxidative rancidity during 0°F. storage of frozen salmon continued through testing of various synthetic-film wrapping materials with or without application of an antioxidant to the fish. The close cling of the film to the product as achieved by vacuum packing gave more protection than a non-vacuum package.

Laboratory-scale experiments were initiated in a new programme for studying the possibility of preparing fish solubles by either or both acid and enzymic digestion of whole fish. The choice of enzyme is important since speed of digestion is essential for successful commercial application. Work on the troublesome variations in viscosity encountered in commercial production of herring solubles continued.

The further study of stabilization of herring meal by antioxidants with the help of chick nutrition tests showed that treated meals had no better keeping qualities than untreated similar meals, though chemical and sensory tests indicated less deterioration in antioxidant-treated meals. Protein nutritive value and accessory food factors appeared to be well conserved.

In conjunction with a government programme to assist in reduction of numbers of predatory dogfish in fishing waters, it was shown that if dogfish carcasses are carefully eviscerated and cleaned and quickly placed in ice or in refrigerated sea water (with or without added CTC) the flesh is just as resistant to deterioration as is the flesh of most varieties of food fish.

Testing of various fishing gear materials for research purposes and as a service to the industry continued until the gear research work was transferred to the Biological Station at Nanaimo, B.C., toward the end of the year.

Newfoundland Area

The work of the Technological Unit at St. John's, Nfld., has largely been concerned with design, construction and consulting services for fisheries installations in Newfoundland. Substantial assistance was given in the establishment of the Department's Fish Processing Experimental Plant at Valleyfield and its associated laboratory. The operation of the laboratory was taken over from the Board in 1958 by the Department's Industrial Development Service. Plans and specifications for a bait depot at Bonavista were finalized. A continuous salt fish dryer was installed for the federal Department and its early operation was supervised in the Mifflin Fisheries Ltd. plant at Catalina. Commercial interest in shore installations

of tanks of refrigerated sea water for short-term holding of fish prior to processing was encouraged and assisted.

Central Area

The Technological Unit at London, Ont., has been in operation only since 1957. Its principal function is to conduct research in freshwater fisheries technology. This includes study of the bacterial and other factors that may cause loss of prime quality in freshwater fishery products, the development of new products from commercially important species and the less-used coarse fishes, as well as the supplying of technological information and limited engineering services to the industry.

Bacteriological work commenced with the isolation from Lake Erie yellow perch of thirty different species of bacteria. These are being identified for their action on fish tissues.

As part of the project to explore present and potential uses for different species of freshwater fishes, the proportions of major and some of the minor nutritive constituents are being determined. So far, Lake Erie smelt, white bass, alewife, gizzard shad, sucker and yellow perch have been analysed. Due attention is paid to certain constituents, especially thiaminase, in relation to the use of whole coarse fish processing wastes in animal foods, particularly mink food. Experiments indicated that the discoloration to which thawed yellow perch are prone starts during frozen storage; the longer the storage period, the more evident is the discoloration on thawing. Means for preventing this discoloration were explored.

Engineering services included demonstration of construction, insulation and use of tanks of refrigerated water for holding fish catches, experiments on canning of smelts and rock sturgeon, and design of fish pumps.

Further details of the above and other investigations by the Board's various establishments are given in the separate annual report of the Board.

INTERNATIONAL COMMISSIONS

THE ESTABLISHMENT of international commissions to conserve the resources of the oceans, lakes and rivers of the world has been a noteworthy development of recent years. Canada has taken a leading part in the organization and activities of such commissions, the main function of which is to study and recommend management procedures in waters where the fishery and other resources are shared by two or more countries. Of the seven conventions to which Canada is signatory, three are bilateral agreements with the United States dealing with Pacific salmon and halibut and the fisheries of the Great Lakes. The other four cover most areas of the Atlantic and Pacific Oceans, as well as the Arctic and Antarctic. In these Canada and the United States work closely with the governments of interested countries in both Europe and Asia.

Following are accounts of the work of the seven commissions.

International Pacific Salmon Fisheries Commission

The International Pacific Salmon Fisheries Commission was appointed in 1937 following a Convention established between the United States and Canada for the preservation, protection and extension of the sockeye salmon fisheries of the Fraser River. The Convention was amended in 1957 to include pink salmon of the Fraser River. The responsibility of the Commission in regulating the fishery in Convention waters is to produce maximum yields with a minimum of escapement and to insure equality of catches by Canadian and United States fishermen. Practices designed to restore the former great upriver runs are increasingly successful. On the other hand the current rapid rate of industrialization throughout the Fraser River watershed is posing increasing and most complex problems. To cope with the problems associated with industrial use of water, appropriate new biological concepts and research approaches are currently being developed and formulated.

The total 1958 sockeye run to the Fraser of 19,000,000 fish was the largest since 1913 and the largest ever recorded on this cycle year. The Canadian catch in Convention waters of 5,241,617 fish was 49.93 per cent of the total in Convention waters. It is estimated that an additional 4,280,000 sockeye of Fraser River origin were caught in non-Convention waters by Canadian fishermen. Total escapement to the Fraser was 20.08 per cent of the season's run and was, numerically, 13 per cent greater than in 1954, the previous cycle year.

The outstanding feature of the season was the very large size of the Adams River population which contributed about five-sixths of the total run. The remarkable success of this population in 1958 was in part due to careful management of the escapement in 1954, but also to a rare combination of fortuitous natural circumstances throughout the life-span of this generation. An undesired escapement

of some 1,500,000 fish occurred as a result of a disagreement within the industry regarding quality and prices of late-running fish but serious overcrowding of the spawning grounds was largely averted by the installation of an electric barrier at the mouth of Adams River.

Difficult regulatory problems were encountered during 1958 because of an abnormal ten-day delay in the landward migration of all Fraser River sockeye populations. The problems were intensified by the diversion of an unprecedented proportion of each run through Johnstone Strait, the northern approach to the Fraser. Comparison of troll and net catches along the coast in 1958 with those of previous years suggests that the entire run approached the coast from a more northerly direction than usual. Studies of the northeastern Pacific by the Pacific Oceanographic Group of the Fisheries Research Board of Canada indicate that an anomalous and extensive intrusion of warm oceanic water occurred in 1958 as far north as the Queen Charlotte Islands, and it is probable that this caused a diversion of migrating sockeye to the north and also resulted in the delayed arrival of the runs in the fishery. Since routes of migration and times of arrival must be anticipated in designing regulatory controls, advance information on oceanographic conditions in the northeast Pacific will be of considerable value in the future management of Fraser River sockeye and pink salmon.

Pink salmon runs are non-existant in the Fraser in the even years but field studies were conducted on the seaward migrating progeny of the 1957 run and methods were developed for establishing indices of freshwater survival on several major populations.

Some pink salmon populations which contribute to catches in Convention waters originate in streams other than the Fraser in the State of Washington and British Columbia. Since management in Convention waters must take cognizance of these non-Fraser stocks and since insufficient information was available on their movements and numerical size, provision was made in the Pink Salmon Protocol to the Convention for "a co-ordinated investigation of pink salmon stocks which enter Convention waters for the purpose of determining the migratory movements of these stocks". To provide a means of accomplishing the necessary co-ordinated programme a committee was formed in 1957 consisting of members of the Department of Fisheries of Canada, the Washington State Department of Fisheries and the International Pacific Salmon Fisheries Commission. During 1958 this committee functioned effectively and prepared a report entitled "A Preliminary Review of Pertinent Past Tagging Investigations on Pink Salmon and Proposals for a Co-ordinated Research Programme for 1959". The programme of joint investigations planned for 1959 includes extensive marine tagging and enumeration of escapements in areas within and adjacent to Convention waters and is designed to provide a detailed and accurate basis for the rational exploitation of all pink salmon stocks migrating through Convention waters.

Research on sockeye during 1958 included a continuing study of the racial composition of catches and escapements, an assessment of marine tagging programmes, an evaluation of the effects of water diversion into a sockeye producing lake, an examination of annual variations in age, sex ratios and size, and, in co-operation with

the Fisheries Research Board, the measurement of energy expenditure during spawning migration. A study was also initiated on the effects on sockeye of pressure changes at high dams.

Research on pink salmon included a study of the character of the upstream migration and an evaluation of methods of enumeration; an examination of some freshwater and marine factors affecting survival of pink salmon; and evaluation of methods for the measurement of freshwater survival.

A continuing expenditure of effort was required in devising protective facilities or modifications in industrial structures or processes involving use of water inhabited by sockeye or pink salmon.

Continuing effort to rehabilitate barren areas in 1958 included transfers of 850,000 eyed eggs from Taseko Lake to Upper Adams River, 480,000 eyed eggs from Seymour River to Upper Adams River, 580,000 eyed eggs from Raft River to Barriere River, 270,000 eyed eggs from Seymour River to Eagle River, 280,000 eyed eggs from Seymour River to Salmon River, and 3,430,000 from Stellako River to the Quesnel Field Station for release in Horsefly Lake.

A total of 11 Commission meetings were held during 1958, in Bellingham, New Westminster and Seattle. The Canadian Government was represented on the Commission by Senator Thomas Reid (Chairman of the Commission during 1958), Mr. A. J. Whitmore, Pacific Area Director, Department of Fisheries and Mr. F. D. Mathers.

International North Pacific Fisheries Commission

The International North Pacific Fisheries Commission was established under a treaty between Canada, Japan and the United States, which came into force on June 12, 1953. The Commission has no authority to make fisheries regulations, but can make recommendations to the contracting parties for the conservation of stocks of fish of joint interest on the high seas of the North Pacific Ocean.

The Commission has been carrying out research concerning two principal problems since 1955. The first of the two problems is assigned to the Commission by the Protocol to the Convention. In the Convention, Japan agrees to abstain from fishing salmon in the waters east of a line located at approximately 175°W. longitude. This line is provisional. The Protocol to the Convention instructs the Commission 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 intermingle with salmon originating in the rivers of Asia. If such areas are found, the Commission is to conduct suitable studies to determine a line or lines which will best divide salmon of Asiatic origin from salmon of Canadian and United States origin. The second problem is to study 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 and on the fisheries research organizations of the three countries for execution of the programmes. Co-ordination of the

research activities of the three countries is accomplished through the Committee on Biology and Research and the Commission's staff. At the 1954 annual meeting, the Committee on Biology and Research outlined a basic programme of research on the two problems mentioned above. This basic programme has been further developed and modified and has been carried out with increasing intensity since that time.

An ad hoc committee, which is now called the Ad Hoc Committee on the Protocol, was established at the 1957 annual meeting. The work of this ad hoc committee is to consider application of the results of research to adjustment of the provisional line in accordance with the terms of the protocol.

There is another important phase of the Commission's work. In the Convention, Japan agrees to abstain from fishing the stocks of salmon in the waters east of the abovementioned provisional line and the stocks of halibut and herring along the coast of North America. Canada agrees to abstain from fishing the stocks of salmon in the waters of the Bering Sea east of the provisional line. Beginning in 1958, the Commission is to review annually the qualifications for continued abstention of these stocks. In order to remain under abstention, the stocks must continue to be under full utilization, sufficient conservation regulations and extensive scientific study. The Commission has been making preparations for dealing with these questions since 1955. The United States and Canada each submitted to the Commission reports concerning the stocks under abstention. An ad hoc committee, which is now called the Ad Hoc Committee on Abstention, was established at the 1956 annual meeting to study these reports.

The fifth annual meeting of the Commission was held in Tokyo, Japan, November 4 to 10, 1958. Various committees of the Commission met prior to and during the annual meeting. The chairman of the meeting was Mr. Iwao Fujita of Japan. The Canadian national section of the Commission included Commissioners George R. Clark, John M. Buchanan, James C. Cameron and Roger T. Hager. The Commissioners were accompanied by a number of advisors, including Dr. A. W. H Needler, Dr. W. M. Sprules, and Dr. F. Neave.

At the opening public session on November 4, the chairman, Mr. Fujita, summarized the major problems facing the Commission at this annual meeting. Mr. Clark, speaking for the Canadian national section, stressed the Commission's accomplishments in research and noted that the primary objective of the Convention is to promote conservation measures for the purpose of securing the maximum sustained productivity of fisheries of joint interest. Mr. Clark also pointed out that perpetuation of the North Pacific salmon resources required restrictions on fishing activities and some waiver of the right of free fishing. Mr. Milton E. Brooding, Chairman of the United States national section, spoke of the substantial progress made by the Commission in the first five years and summarized the obligations laid on the Commission by the Convention. He stressed the need for careful consideration of the conservation requirements of salmon stocks in the area of intermingling on the high seas and the hazard to preservation of some sockeye runs of North American origin if provision was not made for conservation action. Mr. Kyuhei Suzuki, speaking for the Japanese national section, stressed the view that

conservation measures for fisheries resources should be based on scientific findings and should be equitably applied to all those concerned.

After meeting a number of times prior to and during the annual meeting, the Committee on Biology and Research submitted to the Commission a report on the progress of research on the problems raised by the Protocol. The report points out that much progress has been made in all fields of study and that progress has not only greatly increased knowledge of salmon distribution pertinent to the protocol problem, but also has produced much which will be of more general value. The major contents of the report may be summarized as follows:

The Committee on Biology and Research reported to the Commission at its 1957 annual meeting that sockeye, pink and chum salmon of Asiatic and North American origin intermingle in a broad area in the North Pacific and the Bering Sea. The first question in the protocol has thus been answered, but the large area of intermingling makes it very difficult to obtain a description of the high seas distribution of salmon of various origins. There is evidence that each stock may vary from year to year in distribution as well as in size. Furthermore, the research programme, despite its size, still leaves many gaps. For such reasons as these, it is not yet possible to describe the high seas distribution of all important races of salmon quantitatively or even, in some cases, qualitatively. The research should continue on at least its present scale.

It is nevertheless possible to draw some conclusions of great interest to the Commission from the work already done. A very brief summary of agreed conclusions reached in the discussion of the committee and its technical sub-committees is given below.

1. *Distribution of sockeye salmon.* Fishing by research vessels and the Japanese commercial fishery have shown sockeye to be widely distributed in the northern North Pacific and the Bering Sea. Recoveries of sockeye salmon tagged along the Aleutian Islands and in the southern Bering Sea indicate the predominance of sockeye salmon of Alaskan origin in the central part of Aleutian and Bering waters during May to August in 1956 and 1957. The presence of Bristol Bay sockeye salmon as far west as 171°E. is shown by parasitological studies. On the other hand, there are some indications that sockeye salmon of Asiatic origin are also present as far east as 170°W. Some evidence has been found of differences between the east-west distribution of Asiatic and North American sockeye salmon in 1956 and 1957, suggesting some year to year variation.

2. *Distribution of pink salmon.* From the tagging work, it was shown that the Asiatic pink salmon were distributed as far east as 163°W. in 1957 and that the North American pink salmon occurred as far west as 177°E. in 1958. Large year to year fluctuations in the distribution of pink salmon in mid-ocean areas are noted.

3. *Distribution of chum salmon.* Evidence available from tagging and scale analysis indicates that in 1956 and 1957 there existed an area of intermingling of North American and Asiatic chum salmon at least between 167°W. and 177°W. both north and south of the Aleutians. However, the exact range of intermingling and the precise proportion of North American and Asiatic fish in this area could not be determined.

4. *Oceanography.* Great progress has been made in describing the physical oceanography of the region occupied by salmon. Year to year differences in the distribution of properties and in water movements have been found which may well influence the distribution of salmon. Some instances of relation between the limits of distribution of salmon stocks and the boundaries of water masses appear to be emerging.

The Commission referred the report of the Committee on Biology and Research to the Ad Hoc Committee on the Protocol. The ad hoc committee studied the report for the purpose of making recommendations to the Commission as to the application of scientific findings to adjustment of the provisional lines in accordance with the terms of the Protocol. The committee's report to the Commission was dealt with and adopted on an *in camera* basis and only certain portions of the report of the committee were read into the record of the plenary sessions of the Commission. The statement for the record indicates that no conclusions were reached by the Ad Hoc Committee on the Protocol as to the application of the research findings to adjustment of the provisional lines.

At the final plenary session of the 1958 annual meeting, the chairman of the commission read into the record the following resolution, which had been unanimously adopted by the Ad Hoc Committee on the Protocol and by the Commission:

> "In view of the results of scientific investigations to date as contained in the reports of the Committee on Biology and Research and in accordance with the objective of conservation of fishery resources of the North Pacific Ocean, as expressed in the International Convention for the High Seas Fisheries of the North Pacific Ocean, the Ad Hoc Committee on the Protocol recommends that the International North Pacific Fisheries Commission respectfully recommend to the Governments of the Contracting Parties that full consideration be given to the conservation needs of these fisheries resources in the area of common concern when preparing fishing regulations for future operations."

In the second report to the Commission, the Committee on Biology and Research reviewed the results of research on king crab to date and agreed that excellent progress was being made toward the solution of the problem assigned by the Commission. The report, however, states that the king crab studies of the Commission have not yet reached the stage where specific recommendations for conservation measures with respect to the existing fishery can be made. As a result of the above view expressed by the Committee on Biology and Research, the Commission agreed that it would not be necessary at this time to take any action on the king crab question.

The question of determining whether the stocks of fish specified in the annex continued to qualify for abstention had been referred to the Ad Hoc Committee on Abstention. The committee met on several occasions prior to and during the 1958 annual meeting. The chairman of the Commission made a report regarding activities of the Ad Hoc Committee on Abstention at a plenary session of the annual meeting.

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The chairman stated that studies had been made of the reports submitted by Canada and the United States and consideration had been given to the comments on these reports made by the Japanese scientists and further comments made by the Canadian and United States national sections. However, no agreement had been reached at this time, with respect to conclusions on the studies, as to whether such stocks continued to qualify for abstention. The Commission, therefore, did not make a determination that the stocks specified in the annex no longer met the conditions for abstention. A scientific sub-committee of the Ad Hoc Committee on Abstention was established to study and clarify the technical and scientific aspects of the reports under review.

It is not possible to describe details of the research progress during 1958 and reference is made to the research summaries by the three countries given in the annual report of the International North Pacific Fisheries Commission for the year 1958, copies of which are available from the Commission's headquarters in Vancouver, B.C.

The sixth annual meeting of the Commission will be held in Seattle, beginning on November 2, 1959, under the chairmanship of Mr. Edward W. Allen of the United States. During the preceding two weeks, the various committees of the Commission will hold their meetings. The members of the Commission and its secretariat at the end of 1958 were as follows: Canada—George R. Clark, John M. Buchanan, James C. Cameron, Roger T. Hager; United States—Milton E. Brooding, Edward W. Allen, John H. Clawson, Arnie J. Suomela; Japan—Iwao Fujita, Haruki Mori, Kenjiro Nishimura, Kyuhei Suzuki; secretariat—Roy I. Jackson, Executive Director, and Hiroshi Kasahara, Assistant Director.

International Pacific Halibut Commission

The International Pacific Halibut Commission was established as an investigational organization under a treaty signed by Canada and the United States in 1923. It was continued with regulatory powers under treaties signed in 1930, 1937 and 1953. Through its regulations, effective each year since 1932 after approval by the two countries, the stocks of halibut and the sustainable annual catches have been rebuilt from low and declining levels to high levels and the fishery has been restored from an unprofitable condition to a highly profitable one.

Under the terms of the present treaty, the Commission is responsible for developing the stocks of Pacific halibut to levels which will permit the maximum sustained yield and for maintaining the stocks at those levels. It is required to justify its regulatory actions by scientific investigations.

Halibut fishing in Pacific waters in 1958 was conducted under regulations adopted by the Commission on January 30 after review of the findings of its scientific staff and consultation with representatives of the interested fishermen's, vessel owners' and wholesale dealers' organizations. These regulations became effective on March 29 upon approval by the Governor General of Canada and the President of the United States. The halibut regulations in 1958 continued the five regulatory areas of the three previous years: Areas 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 the Shumagin Islands, Alaska; and Area 3B, all convention waters west of Area 3A, including Bering Sea.

Regulation of fishing in Areas 1A, 1B and 3A was not significantly different from 1957. However, changes were made in Areas 2 and 3B on the basis of scientific findings, to improve the seasonal and geographic distribution of fishing upon the stocks of halibut in them.

Area 3B was opened to fishing on April 1, one month earlier than in 1957. All other areas were opened on May 4. Area 3B and Area 1A, each with single fishing season and no catch limit, were closed to fishing on October 16.

In Area 3A, the single fishing season with a catch limit of 30 million pounds was continued.

Two fishing seasons were again provided for Area 2, the first season with a catch limit of 26.5 million pounds, the second without a catch limit but with a time limit of seven days commencing on August 31. The Cape Scott and Goose Island grounds off the north end of Vancouver Island were excluded from the second opening because of indications of increased fishing upon their stocks. Fishing seasons identical to those in Area 2 and without catch limits were continued in Area 1B.

The Masset and Timbered Islet grounds in Area 2, which were closed to halibut fishing in 1932 on account of a preponderance of small, young individuals in their stocks, were opened to fishing in 1958 to utilize accumulations of large, old halibut revealed by recent investigations.

The first fishing seasons in Area 2 and Area 1B were terminated on July 2 and the single fishing season in Area 3A on August 31 when the Commission deemed the applicable catch limits would be attained. The dates of closure were announced approximately nine and 19 days respectively in advance of closure.

Halibut production by the combined Canadian and United States fleets in 1958 exceeded 65 million pounds, nearly three million pounds more than in 1957 and very close to pre-season expectations. The Canadian fleet increased its share of the total catch to 45 per cent.

Landings from Areas 1A and 1B combined, all by United States vessels, amounted to only 321,000 pounds. They were 20 per cent lower than in 1957 by reason of a reduction in the already small Area 1 fleet.

The total catch from Area 2 was 30.5 million pounds, a decrease of 800,000 pounds from 1957. Landings from the first season amounted to 26.5 million pounds, an increase of 400,000 pounds. In the second season the catch was 3.4 million pounds, a decrease of 1.0 million pounds from 1957. Incidental and other landings declined from 800,000 to 400,000 pounds. The latter reductions resulted from a decrease in the size and number of vessels fishing and the closure of some grounds during the second season and from a decrease in post-season fishing for associated species.

Catches from the grounds west of Cape Spencer, Areas 3A and 3B combined, totaled 34.3 million pounds, the largest amount ever taken from them in one year, The Area 3A catch was 29.8 million pounds, about 500,000 pounds more than in 1957 but 200,000 pounds below the catch limit.

Area 3B landings were 4.6 million pounds compared to 1.4 million in 1957. The catch in Bering Sea was 2.2 million pounds, seven times more than had been taken there in any previous year. Approximately 1.7 million pounds of the Area 3B catch in 1958 were taken in April before the opening of the other areas. This early catch was about equally divided between the grounds in Bering Sea and those south of the Alaskan Peninsula.

The general density of the halibut stock in Area 2, as indicated by the number of pounds caught per skate set, was about the same in 1958 as in 1957 although some sections of the area showed increases and others decreases. In the Cape Scott-Goose Island region, the downward trend of the previous four years ceased. The catch per skate increased throughout Hecate Strait region. On the grounds inside southeastern Alaska, the sharp downward trend of the preceding three years was continued. The catch per skate set also declined on the outside grounds of southeastern Alaska.

On the Masset and Timbered Islet grounds, closed to fishing from 1932 to 1957 inclusive, the catch per skate compared favorably to that of upper Hecate Strait.

In Area 3A the density of the stock at the beginning of the season was about the same as in 1957 but did not decline as much during the season. An apparent increase in the catch per skate for the year resulted. A noticeable exception was the Shelikof Strait region where the fishery was heavy in 1957.

In the Pacific section of Area 3B the catch per skate continued at the level of recent years. In the Bering Sea section of the area it declined as the season progressed in keeping with the relatively heavy fishery there.

Sampling of the commercial landings was continued at Prince Rupert and at Seattle, Washington, to obtain materials for study of changes in the composition, growth, mortality and recruitment of the halibut stocks upon important banks. It was also conducted for the first time at Petersburg, Alaska, to obtain materials from grounds not represented in the landings at the other two ports.

Studies of size and age composition from Hecate Strait in Area 2 showed a continuation of the reduction in the number of older fish and an increasing dependence on younger fish, particularly during the second season. On the Goose Island grounds the decline in older fish, observed since 1954, appeared to have ceased and sustained heavy catches of younger fish gave good promise for the future.

Catches from the Masset grounds, closed from 1952 to 1957 inclusive, contained 26 per cent chickens, 64 per cent mediums and 10 per cent large. Samples showed an age composition similar to that in heavily fished northern Hecate Strait. Catches from the previously closed Timbered Islet grounds also contained a high proportion of larger, older fish.

Samples from the channels of Southeastern Alaska, obtained for the first time at Petersburg, consisted mainly of fish less than 11 years old, though older age groups also made a heavy weight contribution. There was no change in age composition as the season progressed.

Samples from Portlock and Albatross Banks in Area 3A showed little change in the general levels of abundance of the various age classes. Throughout the season

as in other very recent years there was a progressive decline in numbers of fish over 11 years of age, which contribute most to the weight of the catch.

On the Shumagin Island grounds the availability of older fish increased to mid-season and thereafter declined, as in 1957, suggesting a seasonal immigration and emigration of matures. Although there was much variability within the region most age groups were more available in 1958 than in 1957.

Samples from the Bering Sea Edge showed an increasing catch of older fish from April through June, but by July the number of fish in all age groups showed a sharp reduction. The accumulation of old fish found in 1956 appeared to have been substantially reduced by the subsequent fishery.

Studies of growth, based upon measurements of the widths of the annual growth zones in the earstones, were continued and permitted reconstruction of the patterns of growth for several grounds, one series extending back 60 years and another almost 40 years. The former series, for Portlock Bank in Area 3A, showed a great increase in growth from the earliest to the most recent years. The latter series, for the Goose Island grounds in long-fished Area 2, demonstrated little change. During the past 25 years, there appeared to have been a slight decline in average size at each age on Goose Island but a large increase in Portlock Bank.

Tagging experiments were begun in the Frederick Sound section of southeastern Alaska, where tagging had not been done previously, to study the relationship of that stock to those in neighboring regions. The halibut vessel *Arlice* was chartered for 45 days in March and April for the purpose. A total of 1,530 halibut, weighing approximately 33,000 pounds, were tagged and released.

Studies of the mortality of tagged halibut were begun with a view to improving the quantitative value of tag-recovery data. A research vessel, the *Commando*, was chartered for a period of 57 days during May and June and operated out of a sheltered harbor near Kodiak, Alaska, in Area 3A. Tagged halibut were held in floating live boxes within the bay for periods up to two weeks.

Tag recoveries in 1958 totaled 1,199, considerably above expectations. A marked intensification of fishing in Bering Sea was reflected in a great increase of recoveries from experiments initiated there during 1956. Opening the Masset grounds to fishing markedly increased recoveries from a 1955 experiment on these grounds. Returns from the Frederick Sound tagging in March and April were also much higher than expected and suggested a high rate of utilization of the halibut in that region.

The distribution of tag recoveries in 1958 was generally along expected lines. Recoveries within Areas 3A and 2 from the 1956 experiments in Bering Sea were more numerous than in 1957, as was predicted a year earlier on the basis of small experiments in Bering Sea in 1930 and 1947. They indicated an increase in the migration of Bering Sea halibut into the fishery south and east of the Alaskan Peninsula with increase in age.

The tagged halibut held in live boxes showed no mortalities prior to the sixth day. Thereafter, mortalities increased to the end of the holding period. Observations and examinations of the fish suggested that the halibut were not critically injured

by the tagging operation. Decision as to whether the deaths after the first week were the result of tagging or caused by the unnatural conditions under which the fish were held must await more detailed studies under more natural conditions.

A detailed study of tag losses was also initiated. One phase, based upon the results of experiments in which halibut have been marked with two tags, was concerned with the loss of tags from the fish. Another phase consisted of tagging fish in the holds of vessels about to unload their fish to determine the proportion that subsequently were overlooked or lost. Preliminary results indicate that tags were being lost in both ways, but that the proportion lost was not high.

Investigations of the life of the halibut during their earliest years, prior to recruitment into the fishery, were carried forward. Experimental fishing was conducted with fine meshed nets in shallow fishable waters between the north end of Vancouver Island and the Shumagin Islands off Western Alaska. The research vessel *Commando* was chartered from mid-July to mid-September for the purpose.

A total of 4,663 young halibut were caught, ranging from two to 25 inches long and from one to seven years old. Of these, 623 were less than one year old, 3,356 were one year old, 393 were two years old, and 160 were three years old.

In Area 2, young halibut were caught in small numbers, as in the previous years. At only one place, near Sitka, Alaska, where concentrations of them were found in 1957, were they taken in significant numbers.

In Area 3A, fishable grounds off Yakutat and in Prince William Sound yielded a small catch of young halibut. Heavy concentrations were encountered in the Cook Inlet and Kodiak regions, as in 1957. The numbers taken in individual net hauls in the latter locations were sufficiently large, in both years, to justify the belief that quantitative estimates of year-to-year changes in the production of young may be feasible in these parts of Area 3A several years before those young are recruited into the fishery.

Through the courtesy of the United States Fish and Wildlife Service, the Commission also secured 718 halibut of sub-commercial size, taken during king crab investigations on Bering Sea. These halibut ranged from seven to 25 inches in length and from two to seven years of age.

One general report upon the regulation of the fishery and investigations during 1957 was published during the year. A technical report and a number of memoranda upon special subjects were also prepared for the information and use of the Governments of Canada and the United States.

Members of the Commission for Canada during the year were: Dr. William M. Sprules, Ottawa, elected vice-chairman; Mr. Harold S. Helland, Prince Rupert; and Mr. Richard Nelson, Vancouver. United States members during the year were: Mr. Seton H. Thompson, Washington, D.C., elected Chairman; Mr. William A. Bates, Ketchikan, Alaska; and Mr. Mattias Madsen, Seattle, Washington.

The annual meeting of the Commission was held at its headquarters in Seattle, Washington, from January 26 to 29 inclusive. The results of investigations and regulations in the year 1958 were reviewed in conferences with representatives of

the halibut fishermen's, vessel owners' and wholesale dealers' organizations, and proposals regarding regulation in 1959 were discussed. Thereafter, the Commission approved a research programme and adopted regulations for the 1959 fishing season.

At the close of the annual meeting Dr. Sprules and Mr. Thompson were elected chairman and vice-chairman respectively for the ensuing year.

International Commission for the Northwest Atlantic Fisheries

The eighth annual meeting of the Commission was held in June 1958. At this meeting, for the first time, the U.S.S.R. participated as a member. The Commission now has 12 member countries, namely Canada, Denmark, France, Germany, Iceland, Italy, Norway, Portugal, Spain, U.S.S.R., United Kingdom and United States. All these countries were represented at the 1958 annual meeting, at which plans for researches and for the activities of the Commission in the coming fiscal year were elaborated.

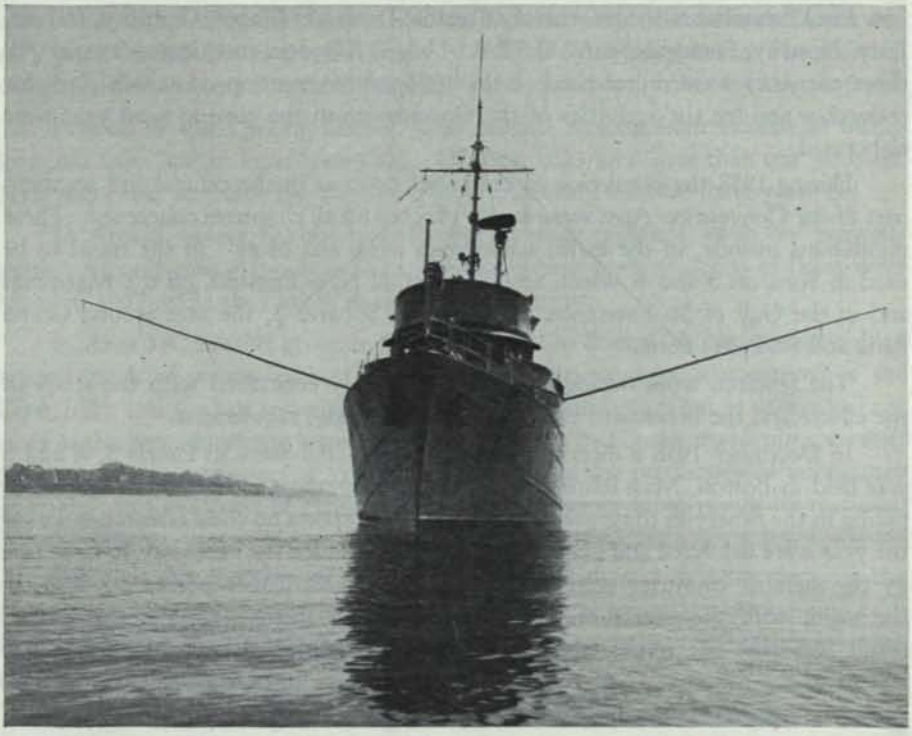
During 1958 the regulation of the trawl fisheries in the central and southern part of the Convention Area were finally effected by all countries concerned. These regulations include, in the main, a minimum mesh size of $4\frac{1}{2}''$ in the trawl to be used in Subareas 5 and 4, which are the areas off New England, off the Maritimes and in the Gulf of St. Lawrence, and of $4''$ in Subarea 3, the area around Grand Bank and St. Pierre Bank.

The research work during the year was mainly concerned with the study of the effects and the benefits to the fishery of these trawl regulations.

In December 1958 a meeting of the Group of Advisers to Panels 5, 4 and 3 was held in Boston, Massachusetts. Scientists from most of the countries participating in the fishery in these areas were present. Reports on their researches during the year were delivered and plans for future work and for the necessary co-operation by the member countries were elaborated. The researches reported on dealt, in the main, with the effects of the trawl regulations introduced, and the general result was that the initial effects of these regulations had been of considerable benefit to the fishery. The researches, however, have to be continued in order to assess the more long-term benefits of these regulations.

During December-January, the research programmes for the year 1959 by the various countries were reported to the Commission and circulated among all countries. From these programmes, it appears that the researches are undergoing a considerable extension. In this connection, it can first be mentioned that Canada, during the year, has added the new and modern vessel, the *A. T. Cameron*, to her fleet of research vessels. This addition means an intensification of the Canadian researches in the Convention Area. Other member countries have also increased, or are increasing, their research activity. Denmark has now one large and several smaller research vessels working in the Greenland waters, and Norway is, in its programme, considering sending two modern research vessels to the Greenland area in the summer of 1959. The new member of the Commission, U.S.S.R., has several research trawlers scouting through the Convention Area, especially from the

Grand Banks to West Greenland, searching for new fishing grounds and investigating the biology of the main commercial species in that area, namely the cod and the redfish. Further, it can be mentioned that Portugal has reported on extensive research work on cod in the Gulf of St. Lawrence, as well as in the areas off Newfoundland, Labrador and West Greenland. Spain also is extending its research work and is now reporting results of researches from the West Greenland waters as well as from the Grand Bank area. Still another addition to the research work in the Convention Area in recent years is the investigations carried out by Germany, which has a research vessel working in the West Greenland area and carries out researches from commercial fishing vessels in the Grand Bank and the Labrador area.



Units of the Department's fleet, in addition to maintaining constant patrol of commercial fishing areas, frequently perform other duties, such as rescue operations and "mercy trips" during emergencies, and occasionally carry out experimental fishing operations for the benefit of fishermen and fishing companies. Here the Fishery Protection Cruiser Howay, troller-rigged for albacore tuna, is shown off the coast of British Columbia, where tuna occur from time to time, on such an exploratory assignment.

It is obvious from the research programmes—as well as from the landings—that the redfish is becoming more and more important to the fisheries. This is especially so since scouting from commercial trawlers of various countries has shown the occurrence of large populations of redfish in the area from the northern part of the Grand Bank and off the Hamilton Inlet Bank, as well as on the southern banks of West Greenland. It was already known, from the researches carried out by the Fisheries Research Board of Canada, that large concentrations of redfish were found

off the northern and eastern coasts of Newfoundland and off Hamilton Inlet Bank. During autumn of 1958 a considerable redfish fishery was carried out in these areas, mainly by trawlers from Iceland, Russia and Germany.

In conformity with the growing importance of the redfish, the researches of this species have been intensified during recent years, and at its 1958 annual meeting the Commission planned a special symposium to be held on the biology and the fishery of the redfish through the whole of the Convention Area. Further, the Commission decided that the symposium should also consider results from other areas in order that a proper and full picture of the biology of the redfish could be formed. This being so, the Commission decided to invite the International Council for the Exploration of the Sea, the sister commission working in the Northeast Atlantic, to join in the redfish meeting. This institution (ICES) accepted the invitation, and a joint symposium on redfish by the two commissions was arranged for October, 1959, in Copenhagen. About 40 scientists working especially with redfish, not only the North Atlantic species but also species from the Pacific, were to attend this meeting. It is hoped that the scientists are able to compile and evaluate the data previously collected, and to plan the collection of further data necessary to advance as far as possible our knowledge of this important fish.

In June 1959, the ninth annual meeting of the Commission was held in Montreal. About 70 participants from the member countries were present. Also present were observers from the Food and Agriculture Organization of the United Nations, the Great Lakes Fishery Commission, the International Council for the Exploration of the Sea, the International Fisheries Convention 1946, the International North Pacific Fisheries Commission, and from Poland. The annual meeting considered a number of questions related to the implementation of the trawl regulations in the Convention Area. Data had been collected from the member countries as to the ways in which the trawl regulations had been implemented and as to the results of inspections of fisheries carried out in order to ensure the proper implementation of the regulations. After full consideration of the reports received, the Commission found that the implementation and the inspections carried out were satisfactory. It was agreed that similar data should be collected every year and considered by the Commission at its annual meetings. The Commission also considered the results of the already-introduced trawl regulations and the benefits accruing from them to the fishery. Further, the Commission considered the possibility of an extension of the trawl regulations: firstly, the question of the introduction of a minimum mesh size in the remaining subareas, i.e., the subareas covering the regions of the sea off Labrador and West Greenland; secondly, the possibility of introducing a uniform minimum mesh size for the whole of the Convention Area; and thirdly, the possibility of the introduction of a uniform mesh size for trawls to be used in the whole of the North Atlantic. During the annual meeting these three problems were studied by the Commission's Standing Committee on Research and Statistics. This committee planned a series of investigations to be carried out in order to answer the questions raised. It was decided that during the coming year a number of additional data on research results and on fisheries should be collected and evaluated by a small committee of specialists. This committee of specialists should meet in the beginning of

1960 for consideration of the material collected up until then and for the preparation of a report to be considered at the 1960 annual meeting of the Commission.

Another important item of research was the question of environmental studies. The Research Committee considered the need for a development of these environmental studies in the Convention Area, i.e., researches on oceanography and plankton and on the effects of hydrographic conditions and plankton on the fisheries in the Convention Area. The Research Committee studied the various ways in which more comprehensive investigation of these problems could be initiated by the various countries working in the Convention Area. It was agreed to intensify the researches and to exchange programmes of research vessels' investigations and to adjust these programmes to one another. It was further agreed that each country should appoint a scientist working in environmental research to co-operate with the subcommittee established on environmental research and with its chairman, Dr. L. A. Walford, U.S.A. It was finally agreed that a preliminary research vessel planning meeting should be held in October in Copenhagen under the chairmanship of the chairman of the Research Committee, Dr. M. Ruivo, Portugal.

At the preceding annual meeting, the Commission had established a programme for the exchange of cod otoliths in order to ensure that the age-reading of the otoliths by scientists from the various countries was in conformity with one another. This exchange of otoliths among scientists had been carried out during the year. A report was delivered and an analysis of the results showed a high degree of comparability among estimates by the various scientists. Where differences occurred they were related to differences in interpretation of structural details in the otoliths. It was agreed that it would be of value if the scientists concerned with age readings could have more opportunities for meeting and comparing their readings, and it was further agreed that more attention should be paid to the use of the spawning zones in the otoliths as indications of various biological aspects of the fish concerned.

At the annual meeting the Commission reviewed the methods for collecting data of a statistical character—data on landings and effort as well as on sizes of fish caught and on amounts of undersized fish discarded. The annual meeting further reviewed the panel memberships of the Commission in the light of the extent of the fisheries of the various countries in the various subareas. Finally the Commission agreed to accept an invitation by Norway to hold the tenth annual meeting in Bergen in early June 1960, and another invitation by the United States to hold the eleventh annual meeting in Washington in June 1961.

The following chairmen were elected at the meeting: Chairman for the two ensuing years, Commissioner A. J. Suomela, U.S.A.; Vice-Chairman for the same period, Deputy Minister of Fisheries George R. Clark, Canada; and for the same period, the following chairmen for the five panels were elected: Panel 1—Dr. Jón Jónsson, Iceland; Panel 2—Dr. J. J. Marti, U.S.S.R.; Panel 3—Captain Tavares de Almeida, Portugal; Panel 4—Captain L. J. Audigou, France; Panel 5—Mr. T. A. Fulham, U.S.A. Dr. Mario Ruivo, Portugal, was re-elected Chairman of the Standing Committee on Research and Statistics, and Mr. J. Howard MacKichan, Canada, was elected Chairman of the Standing Committee on Finance and Administration.

The Commissioners for Canada at the annual meeting were the following: Mr. George R. Clark, Deputy Minister of Fisheries; Mr. J. Howard MacKichan, General Manager, United Maritime Fishermen; and Mr. S. W. Moores.

Commission's Publications

The "Annual Proceedings" Vol. 8 for the year 1957/58 was published and circulated in December 1958.

The "Sampling Yearbook" Vol. 2 for 1957 was published and circulated in June 1959.

The "Statistical Bulletin" Vol. 7 for 1957 is in print and will be published and circulated shortly.

A "Redbook" Vol. 1, including the proceedings (with appendices) of the meetings of the Standing Committee on Research and Statistics during the 1958 annual meeting and certain other papers relative to the researches, was prepared in the secretariat and given a restricted distribution in December, 1958.

During the year four newsletters were issued by the secretariat, giving information on the activities of the Commission and including news relative to the fisheries in the Convention Area.

The Great Lakes Fishery Commission

The Great Lakes Fishery Commission was established by the Convention on Great Lakes Fisheries, between Canada and the United States, which was ratified on October 11, 1955. The Commission has two main responsibilities: (1) to develop co-ordinated programmes of research on the Great Lakes and, on the basis of their findings, recommend such action as will ensure the maximum sustained productivity of any fish of common concern, and (2) to formulate and implement a programme to eradicate or effectively control sea lamprey populations in the Great Lakes.

The Commission was organized in April 1956, and began its activities on July 1, 1956. It is composed of three members from the United States and three from Canada. Canadian Commissioners are Dr. A. L. Pritchard, Ottawa; Dr. W. J. K. Harkness, Toronto; and Dr. A. O. Blackhurst, Port Dover. It is assisted in its programme planning by a Scientific Advisory Committee of four scientists, two from each country, under the chairmanship of the executive secretary. Committees representing the fishing industry, sportsmen, government agencies, and the public at large have also been established to advise each national section.

The commercial production of lake trout in the upper Great Lakes, which has dropped from about 16 million pounds annually to only slightly over 1.5 million pounds in 1957, exemplifies the devastating effect the invasion of the sea lamprey has had on the fishery. The virtual elimination of lake trout in Lake Huron and Lake Michigan and the continuing decline in production from the last remaining trout populations in Lake Superior has made rapid progress in lamprey control imperative. In Lake Superior the 1957 production of 1.5 million pounds represents a 68 per cent drop from the 1950 production and a 36 per cent decrease from the 1956 catch. Fewer mature fish are appearing in the catch and the danger that

reproduction will soon be seriously reduced, if the decline is not reversed, is becoming very real. Accordingly the Commission's major concern has been to establish lamprey control in order to prevent the elimination of the trout fishery in Lake Superior and to restore this species to its former abundance in the Great Lakes. There is also some evidence that, since the reduction of the lake trout, other species, such as whitefish, herring and yellow pickerel (walleye), are also affected by the lamprey.

The lamprey control programme is supported by both countries, whose contributions are based on their historic economic interest in the Great Lakes fisheries. The United States provides 69 per cent of the programme cost and Canada 31 per cent. By treaty agreement, the Commission works through existing agencies as far as possible, and has contracted with the Fisheries Research Board of Canada and the Bureau of Commercial Fisheries, United States Fish and Wildlife Service, to carry out the control programme in the two countries. Two methods are now being used to minimize sea lamprey populations. Electrical barriers are being used to prevent adult lamprey from spawning and selectively toxic chemical is applied to destroy the young lamprey in streams.

Electrical Barriers

Each spring mature sea lamprey ascend certain tributaries of the Great Lakes to spawn on a limited number of suitable gravel areas. Electrical barriers are placed, in the relatively few streams in which successful spawning appears possible, to prevent the lamprey from reproducing. In 1958, all the Lake Superior streams known to produce sea lamprey in significant numbers were blocked and approximately two-thirds of the network in Lake Michigan was completed. During 1958, the Fisheries Research Board operated electrical barriers in 22 streams tributary to Lake Superior and the Bureau of Commercial Fisheries in 45.

In general, the results from the 1958 operation of the electrical control network showed marked changes in the sea lamprey populations of both Lake Superior and Lake Michigan. Although the kill of approximately 67,000 mature sea lamprey from Lake Superior streams on the United States side exceeded last year's total of 57,800 individuals, the kill declined approximately 30 per cent in eastern Lake Superior, where the majority of the barriers have been operated since 1954. The total kill of 3,044 lampreys on the Canadian side in 1958 was slightly lower than the kill in 1957. The decrease was again largely in the eastern section. The barriers in Lake Michigan were increased to 65 in 1958, or 28 more than in 1957. Despite these additions, only 36,600 lampreys were killed as compared to about 65,000 from 37 barriers in 1957.

The reduction in the numbers of sea lamprey in the eastern section of Lake Superior is most encouraging, but it would be unjustifiably optimistic to interpret the decrease as the result of electrical barrier operation in previous years. It is much more likely that the sea lamprey population has expanded to a level of stability in the eastern part of the lake and that the decline represents only a fluctuation in natural abundance. This explanation seems reasonable in view of the decline this

year in the catch from Lake Michigan streams, where barriers have not been operated long enough for lamprey runs to be affected.

In addition to the construction and operation of the electrical barriers, the Commission's agents examined streams, with and without barriers, to assess the efficiency of the network in preventing lamprey spawning. They continued to receive considerable assistance in stream surveys and barrier operation from provincial and state agencies. Several of these agencies conduct research on problems related to sea lamprey control and restoration of lake trout.

Both agents continued research to improve existing control techniques and develop new ones. The studies of the behavior and habits of the sea lamprey were continued. The strength and pattern of electrical fields required to block the lamprey spawning migrations and associated problems concerned with guiding lamprey and fish into traps were investigated. The development of more efficient trapping facilities and the installation of direct current guiding devices in certain streams has been responsible for a significant reduction in game fish mortalities.

No attempt has yet been made to control lamprey in Lake Huron, as the Commission decided earlier to concentrate its efforts in Lake Superior. However, preparations by the Fisheries Research Board for eventual lamprey control has proceeded. To date, almost every tributary of Lake Huron has been explored sufficiently to reach a decision that a total of 42 definitely produce sea lamprey. The possibility of using chemicals for lamprey control has made it necessary to know not only whether lamprey larvae are present in a given stream but also their distribution in each stream. Surveys of this nature are still far from complete.

Chemical Control

Life history studies demonstrated that during the first five to seven years of their life sea lamprey live in burrows in the bottom of the streams in which they are hatched. Realizing that a rapid reduction in sea lamprey might be achieved by destroying the young before they migrated to the lake and became parasitic, the Bureau of Commercial Fisheries in 1951 began a search for a chemical that would destroy these generations in the streams. The chemical required was one which would at low concentrations destroy the young sea lamprey or ammocetes but be harmless to other fish, fish foods, wildlife and livestock. After several years of testing some 6,000 chemicals, a group of related compounds appeared to meet most of the requirements and were selected for further study and two of these, 3-4-6 trichloro-2-nitrophenol and 3-trifluormethyl-4-nitrophenol showed promise. Laboratory studies indicated the chlorinated nitrophenol, formulated as a sodium salt, to be lethal to lamprey at 13 ppm and not harmful to other fish until it exceeded 23 ppm. The fluorinated nitrophenol was lethal to lamprey at 2 ppm and did not harm fish until concentrations of 7 ppm were exceeded. By mid-summer of 1958 field tests in two tributaries of Lake Huron and two of Lake Superior were completed, demonstrating that the chemical was extremely successful in killing the lamprey ammocetes in the streams and harmless to most other forms of aquatic life. The discovery and application of the chemical have proven to be the most remarkable advance in the programme thus far.

During the fall of 1958 the chemical method reached the stage of practical field use. A total of nine Lake Superior streams, the majority with large sea lamprey spawning runs, were treated with formulations of the sodium salt of 3-trifluormethyl-4-nitrophenol in September and October. The nine river systems in the chronological order of treatment were: 1. Pancake River (Ontario); 2. Huron River (Michigan); 3. Iron River (Michigan); 4. Middle River (Wisconsin); 5. Poplar River (Wisconsin); 6. Amnicon River (Wisconsin); 7. Sucker River (Michigan); 8. Rock River (Michigan); 9. Chocolay River (Michigan). The treatment of the streams followed a standard procedure of three major steps: pre-treatment examination of the stream to learn distribution of ammocetes; application of the chemical; and post-treatment surveys to assess completeness of kill. The results of the applications were most encouraging as destruction of ammocetes was nearly total and damage to fish was not significant.

Approximately 22 Lake Superior streams remain to be treated on the United States shore and approximately 14 on the Canadian shore. The number cannot be given precisely as surveys in 1959 may show that ammocete populations no longer exist in some as a result of barrier operation. In view of the early success of the chemical method the Commission now proposes treating all lamprey-producing streams in Lake Superior, with the exception of the Michipicoten River in Canada, by the end of June, 1960, provided aggregate flows do not exceed 5,000 cfs.

The effectiveness of these selective toxicants, or lampricides, in various Great Lakes drainages at different seasons will have to be known in order to properly plan and execute chemical treatments. Both agents co-operatively are devoting considerable study to the identification of factors affecting the biological activity of the larvicide. Theoretically, investigations of this nature could lead to the addition of certain chemicals with the larvicide to enhance the effect of the latter. The larvicides now in use have various analogs or isomers which may contain to a greater or lesser degree the desired properties and may prove to be less costly.

Lake Trout Restoration

The restoration of lake trout may be as difficult as the control of the sea lamprey. The Commission has, therefore, given considerable attention to the development of a lake trout restoration programme. It has established a Special Committee on Lake Trout Rehabilitation with representatives from federal, state, and provincial agencies in the upper Great Lakes Area and has assigned to a member of its secretariat the task of developing and co-ordinating the programme with the assistance of this committee. The need to stock Lake Superior remains to be determined and investigations of this sort have commenced by the federal governments of both countries. It is obvious that spawning populations in Lakes Huron and Michigan can only be established by introducing hatchery produced fish. At the present time, hatchery facilities in the upper Great Lakes area can produce for the Great Lakes programme approximately 3.5 million lake trout yearlings annually. Production is presently limited by the number of lake trout eggs available. In past years eggs had been obtained from Lake Superior, but now, with the scarcity of mature fish, other sources must be found. In order to insure a future supply of eggs, brood stocks are being

developed in the hatcheries and collections from various inland lake sources have been started by federal, state, and provincial agencies. Through the combined efforts of these agencies a total of 987,000 yearling lake trout were stocked in Lake Superior during the 1958 season.

General Research

Programmes of research in the Great Lakes not related to sea lamprey control have developed only recently and are accordingly concerned largely with methods of obtaining representative samples of fish populations in order to follow and understand fluctuations in abundance. Associated with these investigations are studies of migrations, feeding habits, and hydrographic conditions. The Commission, recognizing the importance to the fishery of economic, marketing, technology, and gear development studies, has recommended that the two governments begin work in these fields. Remarkable co-ordination has been developed by research agencies through informal committees. Although the programme of general research on the Great Lakes is still far below the level desirable, the work underway and the problems selected for initial study by the research groups are of prime importance and present a sound approach to an understanding of the fishery.

Great Lakes Fisheries Bibliography

A bibliography of Great Lakes fisheries literature was begun in 1957-58 by the Commission under contract with the University of Toronto in order to further encourage the research programme. To date, approximately 2,200 references have been prepared on index cards by subject, author and locality. Copies of the bibliography are provided groups carrying out fisheries research on the Great Lakes for ready reference to results of past research.

North Pacific Fur Seal Commission

The North Pacific Fur Seal Commission was established in January 1958, in accordance with the provisions of the Interim Convention on Conservation of North Pacific Fur Seals. The Convention was signed at Washington, D.C., on February 9, 1957, on behalf of Canada, Japan, the U.S.S.R., and the U.S.A., and came into force on October 14, 1957.

The Convention provides, among other things, for: 1) the establishment of a North Pacific Fur Seal Commission of four members, one from each of the four signatory parties; 2) a six-year co-operative research programme to determine the measures which will make possible the maximum sustainable yield from the fur seal resources, with due regard for their relation to the productivity of other living marine resources of the North Pacific Ocean; 3) the prohibition of seal hunting at sea except to a specified extent for research purposes; 4) boarding and search of vessels at sea in suspicious circumstances and arrest of vessels and crews upon reasonable belief of seal hunting, with trial of the suspected offenders in the country of the flag of the vessel; 5) the enactment and enforcement by the party governments of such legislation and the application of such measures as may be necessary to

guarantee the observance of the convention; and 6) a sharing arrangement which assures that Canada and Japan each will receive annually 15 per cent of the fur sealskins taken by the U.S.S.R. on Robben Island and the Commander Islands and by the U.S.A. on the Pribilof Islands.

The first annual meeting of the Commission was held in Washington, D.C., from January 13 to 17, 1958, the commissioners being Deputy Minister of Fisheries George R. Clark for Canada, with Dr. W. M. Sprules as alternate commissioner; Mr. Kenjiro Nishimura for Japan; Mr. Arnie J. Suomela for the United States; and Mr. Alexander A. Iskov for the U.S.S.R.

The January 1958 meeting was primarily an organizational one at which rules of procedure, financial regulations, and budgets were adopted. Mr. Suomela, commissioner for the United States, was elected to serve as chairman of the Commission through the next meeting and Mr. Clark, commissioner for Canada, was elected vice-chairman for a like period. A standing scientific committee, with representatives from each party government, was also established by the Commission and given responsibility for examining proposed programmes for research, both pelagic and on land, and including the sex, age, and size composition of the commercial kill on land. The commission was also requested to consider the means for standardizing techniques on methods in reporting scientific data and to consider other specified matters arising under the Interim Convention upon which recommendations from scientists would be helpful to the Commission. A final significant action of the first annual meeting was the approval of the land and pelagic research programmes proposed by each party government for 1958.

The second annual meeting of the Commission was held from December 8 to 13, 1958, again in Washington, D.C., the four party governments again being represented by the commissioners who were present at the first meeting. The Canadian commissioner, Mr. Clark, was elected chairman of the Commission, to serve through the next annual meeting, and Mr. Nishimura, the Japanese commissioner, was elected vice-chairman. The Commission agreed to hold its third annual meeting in Moscow, U.S.S.R., beginning January 25, 1960.

During its second annual meeting the Commission reviewed the results of the 1958 fur seal programmes of the four party governments and approved a co-ordinated plan for continued research during the 1959 season.

While the Commission reached no conclusions at its second annual meeting with regard to migration patterns and food habits of fur seals in the North Pacific (both being important aspects of the research being conducted under the Interim Convention), it is noteworthy that for the first time a Soviet-tagged fur seal from the Commander Islands was recovered on the Pribilof Islands off Alaska during 1958. For their part, Soviet scientists reported the recovery on the Commander Islands of 12 seals tagged by the United States on the Pribilof Islands. The Soviet scientists also recovered on Robben Island (in the Sea of Okhotsk) two seals tagged by the United States on the Pribilof Islands.

Six thousand, one hundred and six fur seal specimens were taken at sea in 1958 in the course of research projects carried out by the four party governments. By far the greater portion of animals taken at sea off the Asian coast were young

fur seals, two to five years of age, which are of greatest value from a commercial standpoint. On the other hand, seals taken off the North American coast during research operations by Canada and the United States were predominantly adult females, having skins of relatively small value.

Off the coasts of California and Oregon, fish of little or no economic importance were found to have constituted 70 to 80 per cent of the fur seal diet. From Washington State to southeastern Alaska, herring was the dominant item in the diet of fur seals, and in western Alaska sand lance and other species of no commercial value comprised the bulk of the diet. Data collected during the 1958 season indicated that off the Asian coast about 30 per cent of the fur seal diet included large squid, anchovy, and other species of commercial value, while 70 per cent of the diet was made up of lantern fish and small squids of no commercial value.

International Whaling Commission

The International Whaling Commission recommends catch quotas and methods of taking whales to the 17 contracting governments which are signatory to the Convention for the Regulation of Whaling, of which Canada is one. The tenth annual meeting was held at The Hague from June 23 to 27, 1958.

At this meeting the Commission accepted its Scientific Committee's view that the stock of whales is declining and that the level of catching is too high. The catch limit stands at 15,000 blue whale units, but this was reduced to 14,500 in 1957-58, and a motion to retain the 14,500 limit for another year (1958-59) was passed.

The Commission elected R. G. R. Wall, of the United Kingdom, as chairman, and G. R. Clark, Deputy Minister of Fisheries of Canada, as vice chairman for the ensuing three years.

Member countries represented at the meeting were Australia, Canada, Denmark, France, Iceland, Japan, the Netherlands, New Zealand, Norway, Sweden, Union of South Africa, U.S.S.R., the United Kingdom and the United States of America. Brazil, Mexico and Panama, the remaining member countries, were not represented. Observers were present from Italy and Portugal and from the Food and Agriculture Organization of the United Nations, the Association of Whaling Companies and the International Council for the Exploration of the Sea. It was decided to hold the eleventh annual meeting in London, where the Commission has its headquarters.

SPECIAL COMMITTEES

Federal-Provincial Atlantic Fisheries Committee

AT THE March, 1958, meeting of the Federal-Provincial Co-ordinating Committee on Atlantic Salmon, the structure of the committee was reviewed and it was felt that, because there are many fisheries matters of mutual concern to the federal Government and the governments of the Atlantic provinces, a committee broader in scope should be formed. It was decided to establish a main committee made up of federal and provincial Deputy Ministers, with a number of sub-committees composed of senior officials. The main committee was termed the Federal-Provincial Atlantic Fisheries Committee, and the former Federal-Provincial Co-ordinating Committee on Atlantic Salmon became known as the Atlantic Salmon and Trout Research and Management Committee. Also established were an Oyster Industry Sub-Committee and a Sub-Committee on Fishing Vessels and Gear.

At a meeting of the Atlantic Salmon and Trout Research and Management Sub-Committee held in March, 1959, recommendations of a regulations sub-committee, which had studied every salmon fishing regulation in great detail, were submitted, and provincial representatives were asked to consider them and forward comments to the federal Department of Fisheries by mid-August, 1959. The regulations would then be studied again and if possible changes would be implemented in 1960.

The Oyster Industry Sub-Committee outlined the federal Department's programme for rehabilitating the New Brunswick oyster industry by transplanting disease resistant Malpeque oyster spat from Prince Edward Island, stating that the oysters transplanted during 1957 and 1958 had shown resistance, so far, to the disease. It was also reported that as a result of scientific work being done by the Fisheries Research Board of Canada at its Ellerslie, P.E.I., station, there appeared to be a reasonably good prospect that remedies might be available before too long to counteract the epidemic attacks on oyster stocks.

The Sub-Committee on Fishing Vessels and Gear reported on the federal Government's industrial development programmes and projects for the fiscal year 1959-60. These include exploration for commercial stocks of fish, development and demonstration of fish catching methods and devices, fish processing equipment and fish transportation and handling equipment, and the development of new products and packaging methods.

It was decided that with regard to provincial participation with the federal Department of Fisheries in various aspects of fisheries industrial development, the federal Department would continue to work with the provinces, singly or collectively, depending on the nature and degree of application of the undertaking.

The annual meeting of the main committee, to be held in Ottawa, was arranged for May 12-15, 1959.

THE FISHING INDUSTRY

IN 1958 THERE were approximately 80,000 men engaged in commercial fishing in Canada. This number was slightly above that of 1957, due principally to conditions in Newfoundland and British Columbia. In the former province a continuing contraction of alternative employment opportunities turned men towards the traditional small-boat fishery, and in the latter the expectation of large salmon runs was the stimulus for greater fishing activity. Using boats and gear valued at roughly $122 million, commercial fishermen landed almost two billion pounds of fish and shellfish, a little below the average of the past five years. The value of these landings, however, reached $116 million, which represented one of the best years on record and was due almost entirely to the successful season in the British Columbia salmon fishery.

Exports of fishery products totalled $155 million, with $103 million going to the United States, $32 million to the United Kingdom and continental Europe and the remainder to the Caribbean area and miscellaneous markets. The value of exports last year was $23 million greater than in 1957, with most of the increase attributable to sales of canned salmon. Cold-storage stocks of fishery products at the end of 1958 were only slightly higher than they were twelve months earlier and supplies of cured fish, with a few exceptions, were substantially lower than at the same date in 1957.

Pacific Area

Last year, in contrast with the disappointing results of the 1957 fishery, brought good returns to almost all British Columbia fishermen. In terms of value it was the best season ever experienced by the primary industry on the Pacific Coast. The outstanding feature was the sockeye salmon catch, the largest in fifty years, which was taken mainly from the run to the Adams River. The catch of pink salmon was rather disappointing but chums were relatively abundant. The marketed value of salmon products rose in 1958 to $76 million, compared with $45 million in 1957, despite a minor decline in the average price per case for canned sockeye, pinks and chums. Market returns for fresh and frozen dressed salmon improved noticeably.

Herring fishermen, after the prolonged strike which ended in June, engaged in a successful summer operation. Winter season catches up to Christmas established a record for the period, and total herring landings for the year amounted to 405 million pounds, compared with a full year's output of 491 million pounds in 1956 Halibut fishermen had one of their better seasons, landing 23.7 million pounds in Canadian ports, an increase of more than one million pounds over the previous year. The average landed price of halibut increased substantially to 20.7 cents per pound.

The catch of shrimps again increased in British Columbia in 1958, and crab production recovered to the average level of the past five years. The total yield of the two species was six million pounds with a marketed value of $1.3 million. The landings of soles declined and the fisheries for the various cod species produced mixed results. The small whaling fleet which operated out of Coal Harbour captured a total of 764 whales, compared with 635 during the 1957 season.

The total landings of all fish and shellfish by commercial fishermen in British Columbia in 1958 amounted to 654 million pounds. Included in this figure are five million pounds of halibut landed by Canadian fishermen in ports of Alaska and the State of Washington. The total marketed value reached a record $98 million, not including the value of halibut landed in American ports nor that of tuna canned from raw imports of Japanese origin.

The 1958 fishing season opened in an atmosphere of optimism. Inventories of frozen and canned fish were at moderate levels, a heavy run of sockeye salmon was expected to the tributaries of the Fraser and a settlement of contractual differences in the herring industry was achieved at mid-June. The results of the season's fishing, nevertheless, surpassed all expectations. The number of holders of commercial licenses reached a record high of 14,266. Ninety-three fishing vessels were completed during 1958, and the year-end inventory value of the fleet rose slightly to $45.3 million. Forty-three vessels were under construction at the end of the year, compared with 25 a year earlier. Fishing gear used by the industry increased in value by about $200,000 during the year, to reach a total of $8.2 million.

The fishing industry in 1958 was prepared to handle a heavy run of salmon, notably that expected from the peak year of the Adams River sockeye cycle. Price negotiations between the fishermen's union and the packers were prolonged but ended in agreement at the middle of August. The returning Adams River sockeye reached coastal waters somewhat later than usual and large numbers of the salmon passed through the straits inside Vancouver Island. Canadian seine and gillnet fishermen obtained very heavy catches in Johnstone Strait during the two weeks which preceded the August 23rd closure. Good results were shared with the Americans in the Strait of Juan de Fuca and approaches to the mouth of the Fraser, when the rest of the Adams River run reached Commission waters. Canned salmon production from all areas totalled 1.9 million cases, 1.1 million cases of which represented the sockeye pack. The United Kingdom Government placed canned salmon under Open General License in September and importers in that traditional market for sockeye quickly contracted for all that part of the pack which was available for export: six to seven hundred thousand cases.

Maritime Provinces and Quebec

The abnormally mild winter in the Atlantic region in 1958 was followed by an ice-free spring but rough seas delayed the setting of lobster traps and, for a time, limited groundfish operations largely to the trawler fleet. The fishing industry enjoyed moderate success over the year, despite a scarcity of cod, haddock and small flatfishes for filleting. Lobstering improved during the summer and fall and total landings for the year were close to 1957 levels. North American markets for

a good many fishery products were surprisingly strong, considering general economic conditions, and fishermen in the Atlantic area derived some benefit in the form of higher prices. Commercial fishermen in the four mainland provinces took 772 million pounds of fish and shellfish in 1958, a little below the level of the previous year, of which inshore vessels caught close to sixty per cent.

Returns to the fishermen improved by seven per cent to reach $39.6 million, with the high-priced lobster leading the way. Market prices reacted readily to changes in the supplies of live lobsters which were affected by the late opening of the spring season and frequent rough weather in the fall of 1958. A consistently strong demand in the United States for live lobsters and fresh lobster meat resulted in unprecedented prices for "markets" in certain regions. The proportion of the total catch which was marketed in the live form and as meat rose accordingly, and there was a decline in the output of canned lobster. The lobster fishery as usual was of much greater importance to fishermen than the landing statistics would indicate: lobster catches in the Maritime Provinces and Quebec made up only five per cent of the total for all species, but accounted for thirty-nine per cent of the landed value. Each of the provinces recorded a decline in quantities but showed an increase in value.

Landings of cod, haddock and flounders were adversely affected by two factors: the relative scarcity of fish on the grounds and a reduction in fishing effort on account of adverse weather conditions. The catches of redfish and certain other groundfish species remained at about 1957 levels and pollock bulked large in the total, especially the production by small-boat fishermen along the outer coast of Nova Scotia and in the Bay of Fundy. Filleting plants processed all available supplies and their total output for the year compared favourably with that of 1957. The salting industry's production fell off, principally as a result of the decline of 67,000 quintals in purchases of saltbulk fish from Newfoundland.

Total herring landings for the region differed little from those of previous years, although there were variations in provincial landings. Catches in Nova Scotia waters showed a marked increase but there were decreases of equal proportions in New Brunswick and Quebec. The production of pickled herring and of smoked bloaters dropped sharply. Sardine canneries on the New Brunswick side of the Bay of Fundy received adequate supplies and their output rose by about 17 per cent from the previous year.

The export markets for most fishery products of the Maritime Provinces and Quebec were strong in 1958. This was especially true of the fresh and frozen items. Cold storages held moderate stocks at the beginning of the summer season and filleting plants were hard pressed to supply the strengthening United States market during the second half of the year. Inventories of salted cod were light also, particularly towards the end of the year, but supplies of "scale" fish were ample. The export prices for salt fish and other cured products were somewhat disappointing although sales generally compared favourably with those in the previous year.

Commercial fishermen numbered about 32,000 in the Maritime Provinces and Quebec in 1958. The inventory value of fishing craft and gear amounted to approximately $28 million and $15 million, respectively.

Newfoundland

The traditional cod fishery proved to be a failure in most of Newfoundland's bays and inlets last year, and this outweighed increased returns from some other sectors of the industry.

The year began with a successful herring fishery in the Bay of Islands. As a result of the unusually moderate winter, the inshore waters were almost free of ice when lobstering and trap fishing began in the spring of 1958. Lobster fishermen were able to begin operations promptly when the season opened on April 20th and good catches during the first month or so resulted in a profitable season. Cod catches also were good up until June but optimism faded when the trap fishery came to a premature end.

Commercial fishermen in Newfoundland took a total of 464 million pounds of fish and shellfish, valued at $11.3 million, in 1958. The decline from 1957 levels amounted to 19 per cent in quantity and 17 per cent in value. In addition to the decline of 101 million pounds in the cod fishery, haddock and squid catches were also considerably reduced. Landings of lobster, herring, redfish, plaice, greysole and turbot, however, showed marked improvement and the results of the salmon fishery were especially encouraging because, for the second successive year, landings increased following a period of steady decline. Of the lesser species, mackerel produced the poorest results.

The favourable weather conditions which aided the lobster and salmon fishermen also encouraged an early start in the inshore cod fishery. Trap fishermen in a number of areas suffered some loss of gear from gales during the second week of June, but activity increased rapidly thereafter with the appearance of capelin inshore and an abundant run of codfish. Cod soon became very scarce along the coastline, however, and the trap fishery was virtually at an end by the beginning of August. Line fishing was severely curtailed throughout the season by an acute shortage of squid for bait, although some supplies of bait were obtained from outside the province. The offshore dragger fleet also found cod and haddock scarce but redfish and the smaller flatfishes were quite plentiful.

The drop in cod landings mainly affected the production of cured fish. The output of light-salted codfish in 1958 was only 208,000 quintals, a decline of 43 per cent from 1957. Heavy-salted production made up a greater proportion of the total than in the previous year, but dropped by 27 per cent to 375,000 quintals. All areas except Trinity and St. Mary's Bays had disappointing results. Drying plants in Newfoundland again processed an increased proportion of the saltbulk production, and competition from plants in the mainland provinces for the reduced supplies served to hold prices at about the same level as those of the previous season. Total exports of light and heavy-salted codfish for the year were a little lower than in 1957. Although there was normal demand in the traditional saltfish markets and a shortage of supplies in Canada and in Europe, the prices received for dried codfish failed to improve.

The production of frozen groundfish fillets, blocks and other forms increased in 1958 from 53 million to 54 million pounds, in spite of the sharp overall decline in landings. This was accomplished largely through the diversion of cod from

salting to filleting. Generally speaking the east coast plants, dependent chiefly on cod supplies, showed substantial decreases in production while south coast plants fared considerably better. Newfoundland fillet exporters were shipping to a firm United States market in 1958 and slightly higher prices were obtained.

The lobster fishery was considerably better last year than in 1957. Total landings for the season reached 4.7 million pounds, valued at $1.3 million which amounted to 11 per cent of the return from all species. The fishery on the east and south coasts was more productive than in 1957 but landings declined on the west coast. Most of the lobsters were sold in live form to the United States at favourable prices, and the output of canned lobster again declined.

Fillet packaging machine in modern fish plant.

A radical change occurred in the seal fishery, as only one vessel prosecuted the hunt from St. John's in the traditional way and that one with limited success. Landsmen were much more successful.

The numbers of fishermen who engaged in the 1958 inshore fishery increased by 7.4 per cent to a total of 17,578. This was mainly the result of the continuing lack of other employment in certain areas of the province. The offshore fishing fleet of draggers and longliners employed a relatively small number of men, 632 in 1958 and 623 in 1957. The total value of fishing craft employed in the province remained relatively unchanged at about $9.5 million, although there was a significant increase in the number of inshore motor boats resulting in most instances from the

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use of older craft which had not been employed in the fishery in 1957. The inventory value of gear used by Newfoundland fishermen was approximately $4.8 million.

Freshwater Fisheries

The commercial catches taken from the lakes and rivers across Canada were estimated to be about 120 million pounds in 1958, practically unchanged from the previous year. The total landed value of freshwater species probably declined slightly, however, because of a further drop in catches of some of the more valuable species and the increasing prevalence of lower-priced "coarse" fish in the total catch. Fishermen received approximately $13 million for their 1958 production. Great Slave Lake, where the fishery is regulated by the Department, produced smaller quantities of whitefish last year but there was some increase in catches of lake trout. An encouraging increase in landings of the latter species occurred also in Ontario, a reversal of the trend in recent years. Total exports of freshwater fish in 1958 had a value of $21.5 million compared with $20.7 million in the previous year, reflecting somewhat improved prices. Cold storage holdings of whole or dressed and filleted freshwater species were normal at the end of 1958, although slightly higher than they were twelve months earlier.

STATISTICS OF THE FISHERIES

Fish and Shellfish—Landings and Landed Value, 1958 (Principal Species)

	Landings	Landed Value
	'000 lb.	$'000
Pacific Coast		
Salmon	181,321	37,079
Herring	405,123	6,712
Halibut	28,852	6,060
Soles and Flounders	7,783	429
Ling Cod	4,296	382
Sablefish	576	74
Grey Cod	7,666	377
Crabs	4,209	384
Maritimes and Quebec		
Lobster	38,070	14,017
Cod	226,812	6,740
Herring(1)	197,933	2,565
Haddock	72,416	3,361
Mackerel	15,402	801
Halibut	6,274	1,691
Small flatfishes	59,909	1,987
Salmon	1,291	651
Redfish	35,496	940
Newfoundland		
Cod	300,086	6,360
Lobster	4,696	1,273
Haddock	30,760	713
Flounder and Greysole	26,915	750
Salmon	2,153	557
Redfish	25,470	521
Herring	28,738	237

(1) Including sardines.

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Fish and Shellfish—Landings and Value by Provinces and Areas, 1958

	Landings[1]	Landed[2] Value
	'000 lb.	$'000
SEA FISHERIES—TOTAL	1,871,857	103,164
Atlantic Coast—TOTAL	1,217,974[3]	50,866[3]
Nova Scotia	466,692[3]	24,956[3]
Newfoundland	446,139[3]	11,272[3]
New Brunswick	157,255[3]	7,353[3]
Quebec	108,866[3]	3,531[3]
Prince Edward Island	39,022[3]	3,754[3]
Pacific Coast—TOTAL	653,883	52,298
FRESHWATER FISHERIES[4]—TOTAL	120,000	13,000
Ontario	55,000	7,000
Manitoba	32,000	3,000
Saskatchewan	11,000	800
Alberta	11,000	800
Northwest Territories	5,700	700
Quebec	2,000	500
New Brunswick	3,300	200
GRAND TOTAL	1,991,857	116,164

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

Fish and Shellfish — Exports by Types of Products — 1958

	Quantity	Value
	lb.	$
Fresh and Frozen Fish, whole or dressed	155,822,000	35,734,000
Fresh and Frozen Fillets	140,080,000	35,163,000
Smoked Fish	9,591,000	1,575,000
Pickled Fish	24,921,000	2,969,000
Salted and Dried Fish	110,529,000	18,156,000
Canned Fish	76,961,000	33,705,000
Molluscs and Crustaceans (fresh and canned)	27,423,000	19,220,000
Fish Oils (gallons)	1,650,000	1,318,000
Miscellaneous	—	7,176,000
Total	—	155,016,000

Number of Fishermen in Canada, by Areas, 1957

SEA FISHERIES	
British Columbia	12,999
Maritimes and Quebec	31,656
Newfoundland	16,347
FRESHWATER FISHERIES	17,928
Total	78,930

Value of Fishing Craft and Gear in Canada, by Areas, 1957

SEA FISHERIES	$
British Columbia	51,815,000
Maritimes and Quebec	42,291,000
Newfoundland	14,452,000
FRESHWATER FISHERIES	12,000,000
Total	120,558,000

APPENDIX 1

FINANCIAL STATEMENTS 1958-59

COMPARATIVE SUMMARY OF EXPENDITURES

Appropriation	1958-59	1957-58	Increase or Decrease—
	$	$	$
Minister's Salary and Motor Car Allowance	17,000.00	17,000.00	
GENERAL SERVICES			
Departmental Administration	356,025.65	330,539.96	25,485.69
Information and Educational Service	176,408.45	159,753.76	16,654.69
Economics Service	296,028.96	280,806.40	15,222.56
Industrial Development Service	512,662.91	786,709.61	—274,046.70
Fishing Bounty	159,821.10	159,683.00	138.10
FIELD SERVICES			
Field Services Administration	879,014.30	793,833.49	85,180.81
Protection Branch—			
Operation and Maintenance	3,770,150.10	3,507,728.87	262,421.23
Land, Buildings and Equipment	400,688.48	227,830.38	172,858.10
Inspection Branch—			
Operation and Maintenance	1,344,012.02	1,220,132.94	123,879.08
Land, Buildings and Equipment	75,204.49	204,509.38	—129,304.89
Fish Culture and Development Branch—			
Operation and Maintenance	1,178,989.91	1,024,603.36	154,386.55
Land, Buildings and Equipment	251,412.34	149,451.98	101,960.36
Consumer Branch	69,589.56	61,893.13	7,696.43
Fishermen's Indemnity Plan—			
Administrative Expenses	203,057.13	184,110.33	18,946.80
Destruction of Harbour and Gray Seals	34,891.08	36,645.01	—1,753.93
SPECIAL			
Canadian Share of Expenses of the Commissions	787,491.52	786,082.62	1,408.90
Newfoundland Bait Service—			
Operating Expenses	632,249.34	284,964.16	347,285.18
Educational Work Among Fishermen	86,966.40	89,970.06	—3,003.66
Fisheries Prices Support Act—			
Administrative Expenses	61,777.72	58,082.55	3,695.17
Assistance to Producers of Salted Fish	735,538.30	594,996.90	140,541.40
Assistance in Construction of Vessels of the Dragger or Long Liner Type	349,633.35	331,998.15	17,635.20
Assistance in Construction of Bait Freezing and Storage Facilities	.....	.....	.....
Contributions toward building for Fisheries Exhibition, Lunenburg, N.S.	19,480.19	55,519.81	—36,039.62
Destruction of Dogfish and other Predators	67,372.04	.....	67,372.04
Recoup Lobster Trap Indemnity Account— as of March 31, 1958	.....	50,614.84	—50,614.84
FISHERIES RESEARCH BOARD			
Headquarters Administration	175,385.81	156,627.68	18,758.13
Operation and Maintenance	3,430,173.13	2,985,537.69	444,635.44
Land, Buildings and Equipment	1,435,450.78	1,855,466.36	—420,015.58
Totals	17,506,475.06	16,395,092.42	1,111,382.64

COMPARATIVE SUMMARY OF REVENUES

	1958-59	1957-58	Increase or Decrease—
	$	$	$
Return on Investments	391,910.47	481,634.31	—89,723.84
Privileges, Licenses and Permits	109,582.60	102,656.61	6,925.99
Proceeds from Sales	85,317.20	59,383.05	25,934.15
Service and Service Fees	33,780.39	20,169.14	13,611.25
Refund of Previous Years' Expenditure	118,675.16	33,184.92	85,490.24
Miscellaneous	53,073.43	51,173.02	1,900.41
Totals	792,339.25	748,201.05	44,138.20

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	274,482.78	4,020.00	45,812.45	324,315.23
Protection Officers	30,172.50	.....	9,986.56	40,159.06
Wardens	62,570.00	18,310.00	34,873.50	115,753.50
Guardians	.....	88,236.00	8,039.12	96,275.12
Departmental Boats—				
Badger Bay	5,546.36	2,280.00	8,545.13	16,371.49
Fecten	.....	.....	749.61	749.61
Crago	.....	.....	798.02	798.02
Sabinea	.....	.....	1,133.89	1,133.89
Cinderella	5,410.40	2,280.00	5,071.18	12,761.58
Louise Ruth	2,880.00	2,280.00	5,441.60	10,601.60
Eastern Explorer	12,720.00	6,562.98	16,423.07	35,706.05
Point May	7,920.00	.....	4,715.78	12,635.78
Porella	5,640.00	2,029.32	4,962.69	12,632.01
Nebalia	5,640.00	2,280.00	6,328.99	14,248.99
Aurelia	5,640.00	2,280.00	5,611.59	13,531.59
Boltenia	5,640.00	2,170.73	5,933.94	13,744.67
Little Bay Islands—Office—Residence	.....	.....	144.80	144.80
St. Anthony—Office—Residence	.....	.....	1,893.52	1,893.52
Bonavista—Office—Residence	.....	.....	1,701.45	1,701.45
Fish Inspection Laboratory	45,129.78	.....	7,812.07	52,941.85
Fisheries Area Office	16,987.50	.....	2,738.95	19,726.45
M.V. "Belle Bay" (Floating Laboratory)	7,420.00	1,442.98	8,810.13	17,673.11
Miscellaneous	.....	.....	19,511.78	19,511.78
Totals	493,799.32	134,172.01	207,039.82	835,011.15

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Maritimes Area

	Officers		Wardens			Guardians		Miscellaneous			Total
	Permanent Salaries	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$	$	$	$
NOVA SCOTIA—											
Inspection Branch—District No. 1	97,074.32	17,729.40								2,707.78	117,511.50
District No. 2	76,605.63	20,037.04								2,612.78	99,255.45
Protection Branch—District No. 1	46,674.60	14,385.53	6,480.00	16,932.31	6,536.30	6,766.37	113.45			2,945.52	100,834.08
District No. 2	84,258.49	26,968.96	2,160.00	32,621.52	11,498.28	19,088.13	184.02			6,818.67	183,598.07
District No. 3	36,502.43	11,705.02	10,800.00	17,192.58	7,214.43	18,386.48	586.08			5,073.21	107,460.23
District No. 4	41,445.00	14,638.54	2,693.46	7,580.37	4,503.92	12,356.42	204.06			6,495.02	89,916.79
Fish Inspection Laboratory—Halifax								79,725.80	2,373.16	24,832.72	106,931.68
Miscellaneous								11,145.00		1,451.88	12,596.88
PRINCE EDWARD ISLAND—											
Inspection Branch—District No. 4B	51,810.71	6,788.44									58,599.15
Protection Branch—District No. 9	50,075.87	16,941.13	3,906.60	10,276.88	3,410.74	666.73	522.53				85,800.48
Fish Inspection Laboratory—											
Charlottetown								7,955.61	513.10	8,705.20	17,173.91
Miscellaneous										12,258.68	12,258.68
NEW BRUNSWICK—											
Inspection Branch—District No. 3	29,910.00	4,543.53								864.70	35,318.23
District No. 4A	41,182.50	17,721.68							670.30	3,576.16	63,150.64
Protection Branch—District No. 5	24,288.75	7,391.60		11,629.89	2,137.48	5,316.09	58.46			1,468.72	52,290.99
District No. 6	37,642.50	10,874.11	610.00	36,180.12	5,318.14	19,622.78	901.49			5,773.31	116,922.45
District No. 7	61,806.50	17,924.26	6,570.00	43,353.24	8,131.50	11,668.40	311.76			8,104.52	157,870.18
District No. 8	32,795.00	10,008.23	1,933.20	15,509.45	5,109.49	4,638.53	52.62			5,894.58	75,941.10
Fish Inspection Laboratory—Shediac								13,432.99	1,407.54	7,031.60	21,872.13
Fish Inspection Laboratory—											
St. Andrews								28,115.00		2,255.98	30,370.98
Miscellaneous										313.20	313.20
EAST—											
Fisheries Area Office								27,337.50		47,000.55	74,338.05
Miscellaneous										15,778.25	15,778.25
	712,072.30	197,657.47	35,153.26	191,276.36	53,860.28	98,509.93	2,934.47	167,711.90	4,964.10	171,963.03	1,636,103.10

Maritimes—Patrol

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NOVA SCOTIA—				
Cratena	8,612.01	6,484.00	8,656.75	23,752.76
Marcia	8,553.05	2,557.78	9,926.73	21,037.56
Limanda	12,467.49	2,566.16	14,001.23	29,034.88
Lacuna	7,513.31	7,482.16	14,342.15	29,337.62
Sabella	3,831.45	7,577.28	17,718.01	29,126.74
Mya II	.....	4,574.00	2,989.28	7,563.28
Modiolus II	6,861.00	.....	4,663.03	11,524.03
Serpula	6,858.08	.....	4,481.73	11,339.81
Chartered Boats	.....	1,517.56	776.85	2,294.41
PRINCE EDWARD ISLAND—				
Obelia	522.43	4,769.15	3,659.52	8,951.10
Macoma	.....	176.27	41.47	217.74
Diala	201.45	4,605.08	3,510.60	8,317.13
Yorke Point	.....	2,215.41	1,117.11	3,332.52
Fabia	.....	4,664.20	3,837.63	8,501.83
Acartia	.....	4,756.64	2,766.65	7,523.29
Prim Light	.....	6,656.55	6,667.95	13,324.50
Chartered Boats	.....	12,856.62	8,592.61	21,449.23
NEW BRUNSWICK—				
Rossia	.....	4,895.69	3,487.40	8,383.09
Ilea	1,288.65	3,619.06	3,495.72	8,403.43
Tegula	1,577.69	5,047.97	5,108.92	11,734.58
Alosa	7,508.96	7,606.53	12,278.29	27,393.78
Osmerus	5,305.22	1,873.04	5,798.41	12,976.67
Cardita	1,321.18	5,302.00	4,295.09	10,918.27
Paphia	.....	6,608.44	4,877.95	11,486.39
Alvania	.....	.....	76.33	76.33
Cumella	13,502.65	5,042.10	15,977.93	34,522.68
Hyperia	.....	4,919.75	3,216.15	8,135.90
Gull Light	5,827.16	251.82	7,147.65	13,226.63
EAST—				
Lamna	35,769.90	60,130.82	75,944.30	171,845.02
Cygnus	.....	.....	219,950.94	219,950.94
Totals	127,521.68	178,756.08	469,404.38	775,682.14

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Central Area

—	Officers		Guardians		General			Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$
Quebec	16,332.50	368.00					4,611.88	21,312.38
Ontario	68,115.00	4,255.37					12,669.04	85,039.41
Fish Inspection Laboratory—Toronto					7,725.00		2,325.27	10,050.27
Manitoba	38,880.00	3,783.19					5,941.66	48,604.85
Fish Inspection Laboratory—Winnipeg					8,612.04		5,939.64	14,551.68
Saskatchewan	14,021.80	5,167.14					7,264.92	26,453.86
Alberta	12,990.00	812.64					1,515.61	15,318.25
Yukon Territory	1,904.62	3,921.67					183.80	6,010.09
Northwest Territories	35,363.52	13,979.27	8,221.72	2,286.24			19,415.83	79,266.58
Office Building							985.72	985.72
Staff House						2,250.00	7,713.88	9,963.88
Supervisor's Residence							4,074.69	4,074.69
Garage						3,993.60	4,512.06	8,505.66
Housing Units							58,526.05	58,526.05
Patrol Boat "Marila"							1,136.92	1,136.92
Patrol Boat "Mareca"							1,590.06	1,590.06
Miscellaneous							3,162.87	3,162.87
Totals	187,607.44	32,287.28	8,221.72	2,286.24	16,337.04	6,243.60	141,569.90	394,553.22

—	Officers		Guardians		Miscellaneous			Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$
British Columbia—								
District No. 1	61,237.28	25,235.50	9,964.50	3,974.95	.....	.....	37,882.72	138,294.95
District No. 2	81,878.33	31,180.14	43,507.20	13,725.61	.....	.....	6,248.89	176,540.17
Queen Charlotte City—Office—Residence	.....	.....	.....	.....	.....	.....	805.26	805.26
Bella Bella—Office—Residence	.....	.....	.....	.....	.....	.....	455.93	455.93
Bella Coola—Office—Residence	.....	.....	.....	.....	.....	.....	2,836.28	2,836.28
Massett—Office—Residence	.....	.....	.....	.....	.....	.....	687.17	687.17
Ocean Falls—Office—Residence	.....	.....	.....	.....	.....	.....	87.44	87.44
Rivers Inlet—Office—Residence	.....	.....	.....	.....	.....	.....	3,984.07	3,984.07
Sandspit—Office—Residence	.....	.....	.....	.....	.....	.....	547.59	547.59
District No. 3	99,355.76	32,118.73	12,682.05	1,859.31	.....	.....	10,074.03	156,089.88
Quatsino—Office—Residence	.....	.....	.....	.....	.....	.....	2,237.68	2,237.68
Campbell River—Office—Residence	.....	.....	.....	.....	.....	.....	818.06	818.06
Alert Bay—Office—Residence	.....	.....	.....	.....	.....	.....	2,200.58	2,200.58
Pender Harbour—Office—Residence	.....	.....	.....	.....	.....	.....	1,395.02	1,395.02
Kuyquot—Office—Residence	.....	.....	.....	.....	.....	.....	242.20	242.20
Tofino—Office—Residence	.....	.....	.....	.....	.....	.....	1,268.42	1,268.42
Westview—Office—Residence	.....	.....	.....	.....	.....	.....	787.17	787.17
Fisheries Area Office	.....	.....	.....	.....	15,474.29	.....	748.12	16,222.41
Fisheries Station—Prince Rupert	.....	.....	.....	.....	10,709.72	4,643.60	4,370.98	19,724.30
Fisheries Station—New Westminster	.....	.....	.....	.....	43,326.96	8,334.80	19,409.65	71,071.41
Fish Inspection Laboratory—Vancouver	.....	.....	.....	.....	67,676.29	.....	24,997.49	92,673.78
Miscellaneous	.....	.....	.....	.....	.....	.....	40,720.43	40,720.43
Totals	242,471.37	88,534.37	66,153.75	19,559.87	137,187.26	12,978.40	162,805.18	729,690.20

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
BRITISH COLUMBIA—				
General				
Howay	29,328.95	25,934.26	78,612.86	133,876.07
Kitimat	27,077.81	10,673.08	31,729.16	69,480.05
Laurier	32,145.52	24,267.39	127,672.08	184,084.99
DISTRICT No. 1—				
Gavia	9,023.89	.....	2,558.46	11,582.35
Chilco Post	17,134.50	2,703.93	17,148.47	36,986.90
Diaphus	8,221.14	.....	3,475.38	11,696.52
Swantail II	10,132.16	.....	1,279.21	11,411.37
Rissa	6,507.56	2,450.00	2,971.45	11,929.01
Ardea	473.00	1,217.56	1,782.82	3,473.38
Star Rock	8,297.25	1,259.00	3,129.40	12,685.65
DISTRICT No. 2—				
Arrow Post	13,416.33	3,203.50	10,506.22	27,126.05
Babine I	.....	1,359.64	468.37	1,828.01
Babine Post	12,695.63	3,574.09	13,471.31	29,741.03
Beldis	8,582.45	1,732.18	6,176.63	16,491.26
Bonila Rock II	10,146.13	1,450.58	7,498.97	19,095.68
Clupea	7,536.00	3,856.68	389.40	11,782.08
Egret Plume II	8,227.33	2,050.00	8,871.18	19,148.51
F.D. 202	8,008.73	.....	2,978.56	10,987.29
Nicola Post	16,556.79	3,338.82	14,754.21	34,649.82
Onerka II	8,717.93	2,359.00	7,273.01	18,349.94
Sooke Post	13,368.00	3,475.49	13,247.85	30,091.34
Skeena	.....	.....	103.18	103.18
Agonus	6,963.62	.....	6,928.71	13,892.33
Clavella	13,725.10	3,041.14	7,027.40	23,793.64
Branta	2,296.00	.....	1,266.85	3,562.85
Sterna	3,414.18	2,126.09	4,163.92	9,704.19
North Rock	4,382.00	.....	5,190.34	9,572.34
Chartered Boats	.....	28,787.28	61,746.49	90,533.77
DISTRICT No. 3—				
Atlin Post	19,100.30	3,104.69	14,830.59	37,035.58
Black Raven II	9,676.65	3,440.55	6,537.30	19,654.50
Comox Post	14,539.06	2,633.62	17,872.81	35,045.49
F.D. 102	5,576.00	.....	2,528.18	8,104.18
F.D. 201	5,576.00	.....	2,835.87	8,411.87
Daphnia	5,108.99	.....	3,593.26	8,702.25
Pholus	2,429.00	.....	2,900.42	5,329.42
Pursepa	8,274.09	3,141.22	5,842.98	17,258.29
Stuart Post	13,063.26	2,990.00	10,650.73	26,703.99
Atolla	3,936.00	.....	2,330.46	6,266.46
Ciona	3,748.00	.....	1,840.57	5,588.57
Sarda	3,936.00	.....	1,381.49	5,317.49
Statistic	5,248.00	.....	3,075.67	8,323.67
Brama	4,592.00	.....	5,804.30	10,396.30
Chartered Boats	4,376.00	51,550.37	43,816.75	99,743.12
AIR SERVICES—				
District No. 1	.....	.....	1,689.53	1,689.53
District No. 2	.....	.....	30,542.10	30,542.10
District No. 3	.....	.....	27,242.87	27,242.87
Totals	395,557.35	195,720.16	627,737.77	1,219,015.28

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	690,095.87														690,095.87
Newfoundland —Patrol	144,915.28														144,915.28
Maritimes Area		90,116.30	818,104.68	173,832.22	554,049.90										1,636,103.10
Maritimes— Patrol		391,795.96	165,011.09	71,617.34	147,257.75										775,682.14
Central Area						21,312.38	95,089.68	3,162.87	63,156.53	26,453.86	15,318.25		161,322.58	6,010.09	391,826.24
Central— Patrol													2,726.98		2,726.98
Pacific Area												729,690.20			729,690.20
Pacific— Patrol												1,219,015.28			1,219,015.28
Totals	835,011.15	481,912.26	983,115.77	245,449.56	701,307.65	21,312.38	95,089.68	3,162.87	63,156.53	26,453.86	15,318.25	1,948,705.48	164,049.56	6,010.09	5,590,055.09

FISH CULTURE DEVELOPMENT

Expenditure by Provinces and Establishments

Establishment	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NEWFOUNDLAND—				
General	24,402.02	5,144.00	32,065.40	61,611.42
NOVA SCOTIA—				
Fish Culture Stations—				
Antigonish	19,716.57	4,014.00	28,427.36	52,157.93
Bedford	7,432.50	7,030.85	7,372.81	21,836.16
Cobequid	14,562.50	6,426.40	6,161.00	27,149.90
Coldbrook Rearing Station	4,020.00	3,225.27	5,624.79	12,870.06
Kejimkujik Rearing Station	9,817.50	1,926.00	7,537.14	19,280.64
Lindloff	12,418.80	7,895.27	11,821.00	32,135.07
Margaree	10,170.00	1,798.20	18,170.80	30,139.00
Margaree Retaining Ponds	.....	1,059.00	3,833.97	4,892.97
Middleton	11,038.24	2,125.00	3,668.10	16,831.34
River Philip Retaining Pond	.....	369.75	77.15	446.90
Sackville Retaining Pond	.....	526.30	217.99	744.29
Yarmouth	12,495.24	3,312.40	6,402.32	22,209.96
Grand Lake Rearing Station	9,544.42	3,136.79	4,717.77	17,398.98
Mersey River Rearing Station	6,195.00	1,432.80	7,683.53	15,311.33
Shellfish Culture	3,795.00	.....	711.77	4,506.77
General	.....	.....	2.60	2.60
Total	121,205.77	44,278.03	112,430.10	277,913.90
PRINCE EDWARD ISLAND—				
Fish Culture Stations—				
Kelly's Pond (Southport)	.....	2,463.54	2,747.80	5,211.34
Cardigan Retaining Pond	3,645.00	4,674.70	4,102.23	12,421.93
Shellfish Culture	15,277.50	.....	13,964.57	29,242.07
General	.....	.....	99.47	99.47
Total	18,922.50	7,138.24	20,914.07	46,974.81
NEW BRUNSWICK—				
Fish Culture Stations—				
Florenceville	13,507.50	6,411.74	17,139.21	37,058.45
Grand Falls	7,845.00	6,778.26	12,120.63	26,743.89
Miramichi	17,672.31	4,453.60	13,235.82	35,361.73
Miramichi Retaining Pond	.....	2,993.75	2,119.78	5,113.53
New Mills Retaining Pond	4,020.00	4,433.87	7,975.74	16,429.61
Saint John	15,701.06	13,745.53	25,271.04	54,717.63
Charlo	8,876.35	9,021.40	14,493.68	32,391.43
Haley Brook Rearing Pond	3,645.00	3,185.53	7,121.21	13,951.74
Shellfish Culture	4,020.00	.....	2,168.92	6,188.92
General	.....	.....	200.65	200.65
Total	75,287.22	51,023.68	101,846.68	228,157.58
EAST—				
Shellfish Culture	7,440.00	27,700.27	29,612.41	64,752.68
Atlantic Salmon General	.....	17,689.13	22,677.52	40,366.65
General	99,373.77	16,106.41	43,346.07	158,826.25
Total	106,813.77	61,495.81	95,636.00	263,945.58
BRITISH COLUMBIA—				
District No. 1	.....	5,489.93	9,652.32	15,142.25
District No. 2	16,431.70	4,957.67	57,727.47	79,116.84
District No. 3	26,401.17	13,153.19	101,875.91	141,430.27
General	152,649.19	9,598.61	153,861.80	316,109.60
Total	195,482.06	33,199.40	323,117.50	551,798.96
Grand Total	542,113.34	202,279.16	686,009.75	1,430,402.25

FISHERIES RESEARCH BOARD OF CANADA

(Operation and Maintenance)

Expenditure 1958-59

Particulars	Gross Expenditure	Revenue and *Recoverable	Net Expenditure
	$	$	$
Administration—General	185,806.59	10,420.78	175,385.81
Biological Stations:			
St. John's, Nfld.	214,571.22	.....	214,571.22
St. Andrews, N.B. (General Research)	528,400.83	.....	528,400.83
*St. Andrews, N.B. (International Passamaquoddy Fisheries Board)	105,934.94	105,934.94	.....
Montreal, Que. (Arctic)	143,936.43	.....	143,936.43
London, Ont. (General Research)	162,736.70	.....	162,736.70
**London, Ont. (Lamprey Control)	358,726.36	358,726.36	.....
Nanaimo, B.C.	903,854.63	.....	903,854.63
Technological Stations:			
St. John's, Nfld. (Unit)	30,184.50	.....	30,184.50
Halifax, N.S.	308,792.50	.....	308,792.50
Grand River, Que.	98,320.20	.....	98,320.20
London, Ont. (Unit)	35,423.37	.....	35,423.37
Vancouver, B.C.	255,300.75	.....	255,300.75
Oceanographic Groups:			
St. Andrews, N.B.	69,969.96	.....	69,969.96
Nanaimo, B.C.	178,953.09	.....	178,953.09
Contracts for Research:	17,900.00	.....	17,900.00
Scholarships:	24,840.00	.....	24,840.00
Vessels:			
St. John's, Nfld.: "*A. T. Cameron*"	86,396.40	.....	86,396.40
"*Investigator II*"	59,513.17	.....	59,513.17
"*Marinus*"	34,281.83	.....	34,281.83
"*Parr*"	278.59	.....	278.59
St. Andrews, N.B.: "*J. J. Cowie*"	25,957.47	.....	25,957.47
"*Harengus*"	54,730.05	.....	54,730.05
"*Mallotus*"	6,451.26	.....	6,451.26
"*Pandalus II*"	12,410.82	.....	12,410.82
London, Ont. (General Research) "*Stenodus*"	873.18	.....	873.18
**London, Ont. (Lamprey Control) "*Cottus*"	17,658.19	17,658.19	.....
Arctic: "*Calanus*"	3,617.32	.....	3,617.32
Nanaimo, B.C.: "*Alta*"	10,819.11	.....	10,819.11
"*Investigator I*"	36,533.43	.....	36,533.43
"*Noctiluca*"	1,788.91	.....	1,788.91
"*A. P. Knight*"	28,333.87	.....	28,333.87
Chartered:			
"*Cape Blanco*"	11,079.41	.....	11,079.41
"*Fort Ross*"	40,703.48	.....	40,703.48
"*Key West II*"	43,220.65	.....	42,220.65
Total	4,098,299.21	492,740.27	3,605,558.94

*Recovered from International Joint Commission for Research Passamoquoddy Bay Area.

**Recovered from the Great Lakes Fishery Commission.

BAIT SERVICE—NEWFOUNDLAND

Receipts and Payments—1958-59

RECEIPTS:		
Sales of Bait		49,510.11
Storage and Other Service Charges		4,763.12
Total Receipts		54,273.23
PAYMENTS:		
Operating Expenses:		
Purchase of Bait	100,841.13	
Salaries and Wages	127,727.22	
Overtime	6,808.27	
Professional and Special Services	82.00	
Travelling and Removal Expenses	3,356.42	
Freight, Express and Cartage	2,448.69	
Postage	250.00	
Telephones and Telegrams	2,013.54	
Office Stationery, Supplies and Equipment	872.07	
Materials and Supplies	31,468.70	
Repairs and Upkeep of Buildings, etc.	21,227.36	
Rental of Buildings	3,480.00	
Repairs and Upkeep of Equipment	7,539.53	
Rentals of Equipment	1,139.25	
Light, Heat and Power	5,170.48	
Unemployment Insurance	1,036.70	
Sundries	397.10	
		315,858.46
		261,585.23
CAPITAL EXPENDITURES:		
Acquisition and Construction of Buildings	294,147.95	
Acquisition of Equipment	22,242.93	
		316,390.88
Excess of payments over Receipts		577,976.11

Province and County	Boats	Men	Amount	Vessels	Tons	Men	Amount	Total Amount
			$				$	$
NOVA SCOTIA—								
Annapolis	71	102	1,029.80	11	195	31	486.40	1,516.20
Antigonish	62	92	926.80	1	18	1	27.40	954.20
Cape Breton	138	213	2,140.20	65	2,064	310	4,978.00	7,118.20
Cumberland	5	11	108.40	1	13	3	41.20	149.60
Digby	139	215	2,160.00	65	894	148	2,285.20	4,445.20
Guysboro	339	486	4,907.40	39	1,496	210	3,470.00	8,377.40
Halifax	431	639	6,438.50	43	1,947	358	5,312.20	11,750.70
Inverness	81	138	1,378.20	18	470	86	1,278.40	2,656.60
Kings	20	28	283.20	2	38	5	85.00	368.20
Lunenburg	346	388	3,994.10	40	2,290	529	7,262.60	11,256.70
Pictou	22	39	388.60	.....	.....	.....	.....	388.60
Queens	111	173	1,737.20	22	437	67	1,066.80	2,804.00
Richmond	184	308	3,080.10	27	469	88	1,296.20	4,376.30
Shelburne	363	590	5,909.00	230	3,952	653	10,090.20	15,999.20
Victoria	121	176	1,775.40	10	172	23	388.20	2,163.60
Yarmouth	73	141	1,399.30	68	1,297	237	3,524.80	4,924.10
Total	2,506	3,739	37,656.20	642	15,752	2,749	41,592.60	79,248.80
PRINCE EDWARD ISLAND—								
Kings	250	343	3,474.20	11	365	57	900.80	4,375.00
Prince	418	710	7,092.90	5	72	14	203.60	7,296.50
Queens	143	265	2,634.90	1	32	6	88.40	2,723.30
Total	811	1,318	13,202.00	17	469	77	1,192.80	14,394.80
NEW BRUNSWICK—								
Charlotte	82	135	1,351.00	84	1,516	229	3,668.60	5,019.60
Gloucester	476	888	8,824.10	82	2,264	316	5,234.40	14,058.50
Kent	139	232	2,319.80	68	778	142	2,112.80	4,432.60
Northumberland	41	74	736.60	35	423	76	1,137.40	1,874.00
Restigouche	8	15	149.00	.....	.....	.....	.....	149.00
Saint John	5	11	108.40	.....	.....	.....	.....	108.40
Westmorland	68	123	1,224.20	.....	.....	.....	.....	1,224.20
Total	819	1,478	14,713.10	269	4,981	763	12,153.20	26,866.30
QUEBEC—								
Bonaventure	160	276	2,754.40	21	376	80	1,128.00	3,882.40
Gaspe	589	901	9,058.40	80	1,551	301	4,380.40	13,438.80
Magdalen Islands	494	1,117	10,993.80	33	623	113	1,685.20	12,679.00
Matane	54	75	759.00	.....	.....	.....	.....	759.00
Saguenay	568	842	8,482.80	1	41	3	69.20	8,552.00
Total	1,865	3,211	32,048.40	135	2,591	497	7,262.80	39,311.20
Grand Total	6,001	9,746	97,619.70	1,063	23,793	4,086	62,201.40	159,821.10

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	356,025.65					
Information and Educational Service	145,873.69	6,924.27	3,977.26	9,125.52		
Economics Service	134,875.69	41,126.98	66,862.80			
Industrial Development Service	96,620.73	392,140.18	18,001.29	1,644.71		
Fishing Bounty				79,248.80	14,394.80	26,866.30
Field Services Administration	136,134.10	389,690.94	112,200.25	14,372.79	8,674.76	21,442.34
Protection Branch		427,343.59	446,695.25	658,855.60	168,134.70	550,388.97
Inspection Branch		407,667.56	35,217.01	324,260.17	77,314.86	150,918.68
Fish Culture and Development Branch		61,611.42	263,945.58	277,913.90	46,974.81	228,157.58
Consumer Branch	29,473.54	134.52	5,450.79	117.94		3.40
Fishermen's Indemnity and Loan Plan—Administrative Expenses	11,536.84	64,219.68	23,928.48	24,088.41	5,284.09	6,234.33
Destruction of Harbour and Gray Seals		10,165.00		3,005.00	385.00	2,635.00
International Commissions	460,696.28					
Newfoundland Bait Service		632,249.34				
Educational Work Among Fishermen			2,172.20	34,026.00	3,764.09	11,737.71
Fisheries Prices Support Act—Administrative Expenses	60,374.08	319.54	2.90	850.38	24.90	205.92
Assistance in Construction of Vessels		1,135.20		174,919.80	11,403.15	53,064.00
Assistance in Construction of Bait Freezing and Storage Facilities						
Assistance to Producers of Salted Fish		339,378.68		206,511.41	28,293.86	83,656.89
Contributions toward a building for Fisheries Exhibition, Lunenburg, N.S.				19,480.19		
Destruction of Dogfish and other Predators						
Fisheries Research Board	218,134.78	995,564.43	56,553.13	341,023.49	37,745.34	708,254.26
	1,666,745.38	3,769,671.33	1,035,006.94	2,169,444.11	402,394.36	1,843,565.38

DISTRIBUTION OF REVENUE

—	General	Newfoundland	East General	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$	$
Return on Investments	391,637.03	50.00		223.44		
Privileges, Licences and Permits		9,561.27		23,808.27	3,714.74	12,316.35
Proceeds from Sales	3.60	73,189.90			62.10	3,061.60
Service and Service Fees		9,311.96		138.50	30.00	
Refund of Previous Years' Expenditure	118,675.16					
Miscellaneous	809.12	3,578.25	.12	14,310.84	4,546.42	4,798.27
	511,124.91	95,691.38	.12	38,481.05	8,353.26	20,176.22

BY PROVINCES 1958-59

Quebec	Ontario	Central General	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	17,000.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	356,025.65
.....	.....	.....	.....	.....	.....	10,507.71	.....	.....	176,408.45
.....	.....	.....	.....	.....	.....	53,163.49	.....	.....	296,028.96
.....	.....	.....	.....	.....	.....	4,256.00	.....	.....	512,662.91
39,311.20	.....	.....	.....	.....	.....	.....	.....	.....	159,821.10
3,979.55	6,180.00	32,792.34	3,060.00	.....	.....	145,717.96	.....	4,769.27	879,014.30
1,322.47	84.02	718.44	.....	.....	.....	1,854,672.80	6,010.09	56,612.65	4,170,838.58
19,989.91	95,007.23	2,444.43	63,154.96	26,453.86	15,318.25	94,032.68	.....	107,436.91	1,419,216.51
.....	.....	.....	.....	.....	.....	551,798.96	.....	.....	1,430,402.25
7,607.85	5,713.63	83.07	6,364.59	9.64	7,480.99	7,149.60	.....	.....	69,589.56
30,179.54	.....	.....	.....	.....	.....	37,585.76	.....	.....	203,057.13
.....	.....	.....	.....	.....	.....	18,701.08	.....	.....	34,891.08
.....	.....	.....	.....	.....	.....	326,795.24	.....	.....	787,491.52
.....	.....	.....	.....	.....	.....	.....	.....	.....	632,249.34
27,099.84	.....	.....	.....	.....	.....	8,166.56	.....	.....	86,966.40
.....	.....	.....	.....	.....	.....	.....	.....	.....	61,777.72
109,111.20	.....	.....	.....	.....	.....	.....	.....	.....	349,633.35
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
77,697.46	.....	.....	.....	.....	.....	.....	.....	.....	735,538.30
.....	.....	.....	.....	.....	.....	.....	.....	.....	19,480.19
.....	.....	.....	.....	.....	.....	67,372.04	.....	.....	67,372.04
252,810.32	203,018.91	.....	32,573.67	.....	.....	2,074,535.88	.....	120,795.51	5,041,009.72
569,109.34	310,003.79	36,038.28	105,153.22	26,463.50	22,799.24	5,254,455.76	6,010.09	289,614.34	17,506,475.06

BY PROVINCES 1958-59

Quebec	Ontario	Central General	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	391,910.47
235.00	.....	.....	26.00	.....	.....	41,034.27	7,099.00	11,787.70	109,582.60
.....	.....	.....	.....	.....	.....	9,000.00	.....	.....	85,317.20
.....	14,479.98	.....	.....	.....	.....	9,819.95	.....	.....	33,780.39
.....	.....	.....	.....	.....	.....	.....	.....	.....	118,675.16
.....	963.00	.....	.37	.....	.....	22,826.63	14.75	1,225.66	53,073.43
235.00	15,442.98	.....	26.37	.....	.....	82,680.85	7,113.75	13,013.36	792,339.25

APPENDIX 2

FISH CULTURE DEVELOPMENT STATEMENTS, 1958

FISH DISTRIBUTED BY SPECIES 1958

Species	Fry	Advanced fry	Fingerlings	Yearlings and Older	Total Distributions
Salmo salar—Atlantic salmon	239,044	990,000	6,048,958	692,500	7,970,502
Salmo trutta—Brown trout	.....	.....	1,454,862	3,176	1,458,038
Salmo gairdnori—Rainbow trout	.....	.....	48,442	5,454	53,896
Salmo salar sebago—Sebago salmon	.....	.....	106,209	1,326	107,535
Salvelinus alpinus—Arctic char	.....	.....	5,214	.....	5,214
Salvelinus fontinalis—Speckled trout	153,500	203,000	12,893,574	189,159	13,439,233
Salvelinus namaycush—Lake trout	.....	.....	274,104	.....	274,104
	392,544	1,193,000	20,831,363	891,615	23,308,522

DISTRIBUTIONS BY PROVINCES 1958

Fry, Fingerlings, Yearlings and Older Fish

Province	Fry	Advanced Fry	Fingerlings					Yearlings and Older	Totals
			No. 1	No. 2	No. 3	No. 4	No. 5		
NOVA SCOTIA—									
Atlantic salmon	239,044	.....	.....	1,144,100	307,250	559,300	103,000	322,927	2,675,621
Brown trout	.....	.....	.....	433,120	417,110	154,035	174,220	3,176	1,181,661
Lake trout	.....	.....	.....	120,000	25,354	.....	.....	.....	145,354
Rainbow trout	.....	.....	.....	.....	3,342	.....	.....	485	3,827
Sebago salmon	.....	.....	.....	.....	.....	.....	.....	1,326	1,326
Speckled trout	50,500	169,000	3,357,800	710,455	978,600	906,485	570,500	143,788	6,887,128
	289,544	169,000	3,357,800	2,407,675	1,731,656	1,619,820	847,720	471,702	10,894,917
NEW BRUNSWICK—									
Arctic char	.....	.....	.....	5,214	.....	.....	.....	.....	5,214
Atlantic salmon	.....	990,000	1,917,800	438,600	1,047,645	205,400	81,343	369,573	5,050,361
Brown trout	.....	.....	140,000	136,377	.....	.....	.....	.....	276,377
Lake trout	.....	.....	80,000	.....	.....	48,750	.....	.....	128,750
Rainbow trout	.....	.....	.....	.....	19,900	.....	.....	4,969	24,869
Sebago salmon	.....	.....	106,209	.....	.....	.....	.....	.....	106,209
Speckled trout	103,000	4,000	2,452,700	760,550	656,925	514,200	1,010,870	45,371	5,547,616
	103,000	994,000	4,696,709	1,340,741	1,724,470	768,350	1,092,213	419,913	11,139,396
PRINCE EDWARD ISLAND—									
Atlantic salmon	.....	.....	82,000	15,520	147,000	.....	.....	.....	244,520
Rainbow trout	.....	.....	.....	.....	.....	25,200	.....	.....	25,200
Speckled trout	.....	30,000	317,000	106,100	187,389	304,000	60,000	.....	1,004,489
	.....	30,000	399,000	121,620	334,389	329,200	60,000	.....	1,274,209
TOTALS	392,544	1,193,000	8,453,509	3,870,036	3,790,515	2,717,370	1,999,933	891,615	23,308,522

CO-OPERATIVE TRANSFERS AND STOCK SUPPLIED FOR SCIENTIFIC INVESTIGATIONS, 1958

Species	From	To	Number	Development	Date
Atlantic salmon	Grand Lake Fish Culture Station	Nova Scotia Dept. of Trade & Industry, Charleston Ponds, Medway River	50,000	Fingerlings	Aug. 6-8
	Haley Brook Fish Culture Station	Fisheries Research Board, St. Andrews, N.B.	100	Yearlings	Oct. 28
	Haley Brook Fish Culture Station	Academy of Natural Sciences, Philadelphia, Pa.	800	Yearlings	Sept. 15
	Margaree Fish Culture Station	Memorial University of Newfoundland	375	Fingerlings	Oct. 6
	Miramichi Fish Culture Station	Govt. of Greenland, Godthab, Greenland	100,000	Eyed eggs	Apr. 7
	Miramichi Fish Culture Station	St. Johnsbury, Vermont	200,000	Eyed eggs	Mar. 4.
	Miramichi Fish Culture Station	State Fish Hatchery, Fort Edward, N.Y.	300,000	Eyed eggs	Mar. 4
	Miramichi Fish Culture Station	U.S. Fish Culture Station, Bucksport, Maine	500,000	Eyed eggs	Mar. 5
	St. John Fish Culture Station	Fisheries Research Board, Nanaimo, B.C.	500	Eyed eggs	Mar. 19
Brown trout	Fish & Wildlife Service, Lamar, Pennsylvania.	Kejimkujik Fish Culture Station	250,976	Eyed eggs	Nov. 24
	Fish & Wildlife Service, Lamar, Pennsylvania.	Middleton Fish Culture Station	253,000	Eyed eggs	Nov. 24
Lake trout	New York State Conservation Dept., Bath, N.Y.	Grand Falls Fish Culture Station	192,432	Eyed eggs	Nov. 13
	Whiteshell Park, Dept. of Mines & Natural Resources, Rennie, Man.	Grand Falls Fish Culture Station	141,487	Eyed eggs	Nov. 13
Rainbow trout	New York Conservation Dept., Crown Point, N.Y.	Antigonish Fish Culture Station	207,306	Eyed eggs	Jan. 8
	New York Conservation Dept., Crown Point, N.Y.	Middleton Fish Culture Station	100,000	Eyed eggs	Dec. 5
Speckled trout	Antigonish	Dalhousie University, Halifax	100	2 years	Nov. 5
	Florenceville	Banff National Park, Banff, Alta.	250,000	Eyed eggs	Jan. 31
	Florenceville	Waterton Lakes National Park, Waterton Park, Alta.	100,000	Eyed eggs	Jan. 31
	Lindloff	Jasper National Park, Jasper, Alta.	250,000	Eyed eggs	Jan. 17
	Lindloff	Whiteshell Park, Dept. of Mines & Natural Resources, Rennie, Man.	100,000	Eyed eggs	Jan. 17

COLLECTION AND DISPOSAL OF EGGS BY SPECIES 1958

Species	Collection Area	Egg Collecting Period	Number Collected	Egg Disposal— To Fish Culture Stations at:	Number	Total by Species
Atlantic salmon	Margaree Stn. & Salmon Pond, N.S.	Nov. 2–26	1,033,600	Margaree	1,033,600	
	Nictaux River, N.S.	Oct. 27	21,350	Middleton	21,350	
	River Philip, N.S.	Nov. 10–21	2,532,320	Cobequid	1,136,800	
				Grand Lake	501,760	
				Kejimkujik	893,760	
	Sackville Pond, N.S.	Oct. 31–Nov. 12	246,940	Bedford	246,940	
	Miramichi Pond, N.B.	Oct. 22–Nov. 10	11,735,770	Bedford	1,000,000	
				Florenceville	1,500,000	
				Grand Falls	1,500,000	
				Miramichi	7,235,770	
				Kelly's	500,000	
	New Mills Pond, N.B.	Oct. 23–Nov. 10	2,957,610	Charlo	2,957,610	
	Restigouche River, N.B.	Oct. 28–Nov. 7	572,000	Charlo	572,000	
	Rocky Brook, N.B.	Oct. 14–21	167,195	Miramichi	167,195	
	Saint John Ponds, N.B.	Oct. 30–Nov. 11	434,450	Saint John	434,450	19,701,235
Brown trout	Antigonish Ponds, N.S.	Nov. 4–13	502,656	Antigonish	502,656	
	Cobequid Ponds, N.S.	Nov. 17–24	136,180	Cobequid	136,180	
	Lindloff Ponds, N.S.	Oct. 29–Dec. 4	474,536	Lindloff	474,536	
	Yarmouth Ponds, N.S.	Oct. 20–Nov. 24	1,419,445	Yarmouth	1,419,445	
	Saint John Ponds, N.B.	Oct. 27–Nov. 3	555,548	Saint John	555,548	3,088,365
Rainbow trout	Lindloff Ponds, N.S.	Apr. 16	40,737	Lindloff	40,737	40,737
Sebago salmon	Grand Lake Ponds, N.S.	Nov. 10–25	37,640	Grand Lake	37,640	
	Chamcook Lake, N.B.	Nov. 15–28	68,400	Saint John	68,400	
	Clinch Brook, N.B.	Oct. 30–Nov. 21	10,000	Florenceville	10,000	116,040
Speckled trout	Antigonish Ponds, N.S.	Oct. 30–Nov. 17	12,119,876	Antigonish	4,566,003	
				Bedford	2,014,530	
				Middleton	2,018,264	
				Yarmouth	2,019,483	
				Kelly's	1,501,596	
	Cobequid Ponds, N.S.	Oct. 28–Nov. 14	3,139,200	Cobequid	3,139,200	
	Lindloff Ponds, N.S.	Nov. 3–25	6,285,345	Lindloff	6,285,345	
	Margaree Ponds, N.S.	Oct. 30–Nov. 26	6,186,335	Margaree	6,186,335	
	Charlo Ponds, N.B.	Oct. 25–Nov. 3	1,164,300	Charlo	1,164,300	
	Florenceville Ponds, N.B.	Oct. 16–Nov. 12	2,739,100	Florenceville	2,739,100	
	Grand Falls Ponds, N.B.	Oct. 21–Nov. 17	1,906,150	Grand Falls	1,906,150	
	Saint John Ponds, N.B.	Oct. 28–Nov. 26	10,115,164	Saint John	10,115,164	43,655,470
						66,601,847

NOTE: With the exception of rainbow trout, main production from eggs collected in 1958 will be shown in the Annual Report of 1959-60.

DISTRIBUTIONS

Key to Abbreviations

Species

- A Atlantic salmon
- B Brown trout
- C Arctic char
- G Lake trout
- L Landlocked or Sebago salmon
- R Rainbow trout
- S Speckled trout

Stages of Development

- a Green eggs
- b Eyed eggs
- c Fry
- d Advanced fry
- 1 No. 1 fingerlings
- 2 No. 2 fingerlings
- 3 No. 3 fingerlings
- 4 No. 4 fingerlings
- 5 No. 5 fingerlings
- f Yearlings
- g Two years
- h Three years
- k Older fish

Classifications

Advanced Fry: Fish for a period of two weeks following complete absorption of the yolk sac.

Fingerlings:

- No. 1 From two to eight weeks after complete absorption of the yolk sac.
- No. 2 From eight to fourteen weeks after complete absorption of the yolk sac.
- No. 3 From fourteen to twenty weeks after complete absorption of the yolk sac.
- No. 4 From twenty to twenty-six weeks after complete absorption of the yolk sac.
- No. 5 From twenty-six weeks to one year from date of hatch.

NOVA SCOTIA

Antigonish F. C. Station

Antigonish County—
- Black River—7,000 S3.
- Delhanty's Lake—3,500 S3.
- Dunns Lake—900 Sg.
- Linwood Lake—7,000 S3.
- Lochaber Lake—44,000 G2, 25,354 G3.
  - Copper Lake—1,300 S5.
  - MacMillan Lake—5,000 S2.
  - Middleton Lake—5,000 S2.
- Maryvale Brook—3,500 S3, 653 Sg.
- St. George Bay—
  - North Lake—7,000 S3, 900 Sg.
  - North River—3,500 S3.
- South River—29,044 Ac, 1,300 S5.
  - MacDonald Lake—5,000 S2, 900 Sg.
  - Pinevale Lake—5,000 S2, 900 Sg.
  - South River Lake—600 Sf.
- West River—40,000 Ac.
  - Beaver Meadow River—5,000 S2.
  - Brierly Brook—7,000 S3.
  - Gaspereaux Lake—12,905 S2.
  - James River—40,000 Ac.
  - St. Joseph Lake—5,000 S2.

Guysborough County—
- Black Lake—3,500 S3.
- Canter Lake—650 Sh.
- Cole Harbour—
  - Cooee Coffre Lake—3,000 S3.
  - Dobson Lake—3,000 S3.
- Country Harbour River—40,000 Ac, 3,000 Af, 700 S5.
  - Eight Island Lake—5,000 S2.
  - Goshen Lake—5,000 S2.
  - Horahan Lake—500 S5.
  - Hurley Lake—600 Sf.
  - Jones Lake—2,000 S2, 600 Sf.
  - McMullin Lake—600 Sf.
  - Mills Lake—500 S5.
  - Murry Lake—600 Sf.
  - Polson Lake—500 S5.
  - Pringle Lake—5,000 S2, 1,200 S5, 362 Sf.
  - Tailors Lake—800 S5.
  - Tate Lake—500 Sf.
  - Timber Lake—7,500 S3.
  - Trout Lake—7,500 S3, 600 Sf.
- Dover Bay—
  - Hazel Hill Lake—3,000 S3.
  - Three Mile Lake—3,000 S3.
  - Watkins Lake—3,000 S3.
  - Whistle Lake—3,000 S3.
- Ecum Secum River—
  - Ash Lake—3,000 S3, 600 Sf.
  - Spider Lake—3,000 S3.
- Gegoggin Lake—7,600 S2, 322 Sg.
- Guysboro River—50,000 B2, 10,560 B3.
  - Guysboro Lake—12,500 B2.
  - Hart Lake—5,000 S2.
  - Meaghers Lake—3,000 S2.
  - Nickerson Lake—5,000 S2.
  - Rocky Lake—5,000 S2.
  - Roman Valley River—4,600 B4.
  - Salmon Lake—12,500 B2.
  - Salmon River—25,000 B2, 4,600 B4.
    - Beaver Dam Lake—600 Sf.
    - Giants Lake—600 Sf.
    - Lawlor Lake—2,000 S2.
    - Long Lake—5,000 S2, 600 Sf.
    - Narrow Lake—5,000 S2.
  - Wells Lake—5,000 S2.
- Harbour Boucher River—
  - Jellows Lake—7,500 S2, 6,000 S3, 750 Sg.
  - Morrison Lake—7,500 S2, 900 Sg.
- Indian Harbour Lake—46,620 B2, 6,000 B3 19,031 B4.
- Isaacs Harbour River—3,000 Af.
- Leonard Lake—200 Sg.
- Liscomb River—
  - Bear Lake—8,200 S2.
  - Hawbolt Lake—600 Sf.
- MacPherson Lake—3 000 S2, 650 Sh. 600 Sf.
- Manassette Lake—3,000 S2, 180 Sg, 425 Sh.
- Mattie Lake—6,000 S3.
- New Harbour River—2,500 Af.
- St. Mary's River—
  - East River St. Marys—45,000 Ac, 1,000 A5, 5,000 Af.
    - Cumminger Lake—3,500 S2, 600 Sh.
    - MacKeen Lake—2,000 S2.
    - Melrose Lake—2,000 S2, 600 Sg, 600 Sh.
    - Taylor Lake—5,000 S2.
    - Two Mile Lake—5,000 S2.
  - Sherbrooke Lake—7,500 S2, 600 Sf.
  - West River St. Marys—45,000 Ac, 1,000 A5, 6,528 Af.
    - Cargill Lake—3,000 S3.
    - MacCarthy Lake—2 000 S2.
    - MacDonald Lake—3,000 S3.
    - MacIntosh Lake—200 Sg.
- Seal Harbour—
  - Goldbrook Lake—2,000 S2.
  - Seal Harbour Lake—2,000 S2.
- South River Lake—
  - Giants Lake—5,000 S2.
  - Kennedy Lake—5,000 S2
  - MacInnis Lake—5,000 S2.
- Summers Lake—6,000 S3.

Pictou County—
- Caribou Harbour—
  - Big Caribou River—100 Sf.
  - Little Caribou River—3,000 S3, 200 Sf.
  - Toney River—300 Sf.
- East River—10,000 S2.
  - Calder Lake—10,000 S2, 900 Sg.
  - Grant Lake—5,000 S2.

Antigonish F. C. Station—*Conc.*

Pictou County—Conc.
East River—*Conc.*
McLellan Brook—5,000 S2.
McPherson Lake—5,000 S2.
Sutherland Lake—3,000 S3.
West Branch Lake—5,000 S2.
Lansdowne Brook—3,000 S1.
Merrigomish Harbour—
Barney River—92,500 B2, 5,000 B3, 3,730 B4.
Brora Lake—10,000 S2.
French River—5,000 B3, 1,740 B4.
Robertson Lake—5,000 S2.
Sutherland River—8,000 B3, 3,730 B4.
MacKays Dam—6,000 S3.
West River—
Bezanson Lake—3,000 S3.
Roger Hill Brook—3,000 S3.

Queens County—
Tait Lake—3,342 R3.

Atlantic Salmon	261,072
Brown Trout	311,111
Lake Trout	69,354
Rainbow Trout	3,342
Speckled Trout	385,997
Total	1,030,876

Bedford F. C. Station

Colchester County—
Grahams Lake—9,000 S1.

Halifax County—
Anti Dam—8,000 S1.
Barretts Lake—3,600 S1.
Beaver Dam—6,300 S1.
Beaverbank Lake—4,800 S1.
Big Kearney Lake—6,000 Sl.
Big Lake—9,000 S1.
Black Duck Lake—3,500 S1, 5,000 S2.
Black Point Lake—12,500 Sc.
Burke Lake—5,400 S1.
Butlers Lake—1,800 S1.
Charlotte Lake—8,000 S2.
Chezzetcook River—
Conrod Lake—6,000 S1.
Lac aux Pattes—5,000 S2.
Thompson Lake—8,000 S1.
College Lake—9,000 S1.
Cooks Lake—7,000 S1.
Cousins Lake—9,000 S1.
Drain Lake—4,000 S4.
Elbow Lake—4,500 S1.
Frog Lake—10,000 Sc.
Goose Lake—5,000 S1.
Grand Lake—10,000 S1.
Grassy Lake—4,500 S1.
Halfway Brook—4,000 Sl.
Harrigan Long Pond—4,500 S1.
Hatchet Lake—2,500 S2.
Ingram River—40,000 A2, 5,000 A4.
Kinsac Lake—4,800 S1.
Lily Lake—3,000 S1.
Lily Pond Lake—4,500 S1.
Little Connors Lake—2,400 S2.
Little River Lake—6,000 S1.
Long Lake—7,000 S1.
Long Still—11,250 S1.
McGrath Lake—2,500 S2.
Melville Lake—5,000 S2.
Mitchell Lake—6,000 S1.
Moose Cove Lake—5,000 S1.
Moser River—
Bear Lake—2,000 S2.
Kindervater Lake—2,800 S2.
Round Lake—3,200 S2.
Newcombe Brook—32,800 A4.
Newcombe Lake—6,930 S1.
Newman's Pond—5,670 S1.
Nine Mile River—66,050 A2, 6,000 A4.
Fraser Lake—12,500 Sc.
Oak Lake—5,000 S1, 2,500 S2.
Pockwock Lake—10,000 S1, 3,000 S2.
Quillan Lake—4,000 S1.
Rosley Lake—9,000 S1.
Run Lake—15,000 Sc, 2,500 S2.
Sackville River—38,000 A2, 19,500 A3, 13,400 A4.
Salmon River—37,000 A2, 21,250 A3, 8,000 A4.
Salmon River Lake—8,000 S1.
Scott Lake—9,900 S1.
Seloam Lake—11,250 S1.
Springfield Lake—6,000 S1, 3,750 S2.
Stillwater Lake—8,000 S1.
Taylor Bay Grand—6,000 S2.
Taylor Lake—6,000 S1.
Trout Lake—3,500 S1.
Upper Trout Lake—5,000 S2.
Webber's Pond—1,000 S1.
Welsh Lake—8,100 S1.
West Lake—12,000 S1.
West River—8,000 A 4.
Williams Lake—11,00 S2.

Hants County—
Avon River—
Herbert River—9,000 S1, 4,800 S2.
Lily Lake—8,000 S1.
Pigott Lake—8,000 S1.
Cameron Lake—8,000 S1.
Coxcomb Lake—6,000 S1, 3,000 S2.
Lacey Lake—4,000 S1.
Mason Lake—3,200 S2.
Shubenacadie River—
Burton Lake—5,625 S1.
Maitland Mill Pond—5,625 S1.
Rynes Creek—5,625 S1.
Withrow Lake—5,625 S1.
St. Croix River—2,000 S5.
Ponhook Lake—10,000 S1, 6,500 S2.
West Lake—3,000 S2.

Bedford F. C. Station—*Conc.*

Lunenburg County—
Clarke Lake—7,875 S1.
East River—45,050 A2, 40,000 A3, 26,300 A4.
Collander Lake—9,000 S1.
Little Whitford Lake—6,750 S1.
Mill Lake—9,000 S1.
Otto Lake—4,500 S1.
Timber Lake—4,500 S1.
Fox Point Lake—6,750 S1.
Gold River—54,000 A2, 10,000 A3, 50,400 A4.
Hollahan Lake—5,000 S4.
Martins River—8,000 A4.
Spondo Lake—12,500 Sd.
Middle River—
Hutt's Lake—10,000 Sd.
Rocky Lake—4,500 S1.
Mushamush Lake—15,000 Sd.
Nevertell Lake—5,000 S2.
Simms Lake—6,750 S1.
Spectacle Lake—7,875 S1.
Vaughans Lake—12,500 Sd.

Atlantic Salmon	528,750
Speckled Trout	642,450
Total	1,171,200

Cobequid F. C. Station

Colchester County—
Bass River of Five Islands—19,000 S2, 5,000 S3.
Beaver Brook at Five Islands—10,000 S2, 10,000 S3.
Chiganois River—35,000 S1, 7,500 S2, 7,500 S3.
Galloping Brook—7,500 S1, 2,500 S3.
Guyons Lake—4,500 S2.
McKinley Lake—4,500 S2.
Economy River—36,000 A3.
Economy Lake—10,000 S2, 30,000 S3.
Newton Lake—20,000 S1, 10,000 S2, 10,000 S3.
Simpson Lake—30,000 S1, 15,000 S2, 12,500 S3, 400 Sf.
Folly River—35,000 A2, 10,000 A3.
Folly Lake—20,000 S1, 8,000 S2, 8,100 S3, 500 Sf.
French River—25,000 S1, 9,000 S2, 8,100 S3.
Long Lake—4,000 S2.
Hart Lake—30,000 S1, 8,000 S2, 7,000 S3.
Irwin Lake—500 Sf.
North River—34,500 A3.
North River, South Branch—1,000 Sf.
Portapique River—25,000 A2, 30,000 S1, 8,000 S2, 3,250 S4.
Salmon River—30,000 A2, 15,000 A3.
Silica Lake—9,000 S1, 6,000 S3.
Stewiacke River—
Little River—15,000 S1, 9,000 S2.
Moose Lake—12,000 S1.
Waughs River—10,000 B2, 33,000 B3, 27,460 B4, 159 Bg.
Earltown Lake—8,000 S2.
West Lake—7,500 S2.

Cumberland County—
Apple River—25,000 A2, 12,000 A3.
Dewar Lake—400 Sh.
Fox River—24,000 S1, 10,000 S3.
LaPlanche River—
Long Lake—500 Sf.
McLellans Pond—500 Sf.
Sand Lake—500 Sf.
Maccan River—61,000 A2, 5,000 A3, 6,000 S4, 1,450 Sf.
Cleveland Lake—235 Sh.
Fordyce Brook—12,000 S1, 5,000 S3.
Harrison Lake—10,000 B2, 12,600 B3.
Lawrence Brook—15,000 S1, 6,000 S2, 5,000 S3.
South Brook—8,000 S1, 3,000 S3.
Mattatall Lake—200 Sh.
Parrsboro River—
Leaks Lake—750 Sf, 300 Sh.
McAloney Lake—9,000 S1.
Parrsboro Aboiteau—500 Sg.
Portapique River—
Fountain Lake—10,000 S1, 8,000 S2, 5,000 S3.
Isaac Lake—12,000 S1, 7,000 S2, 4,800 S3, 3,250 S4, 250 Sf.
Newfound Lake—12,000 S1, 7,000 S2, 4,800 S3, 250 Sf.
Little Lake—3,000 S1, 1,000 S2.
Otter Lake—3,500 S2.
Sutherland Lake—25,000 S1, 7,000 S2, 13,500 S3, 6,500 S4, 1,900 Sf.
Webb Lake—3,500 S2.
Pugwash River—12,000 S1, 6,000 S2, 5,000 S3, 850 Sf.
Doherty Brook—6,500 S1.
Ramshead River—18,000 S1, 11,000 S2, 7,000 S3.
River Hebert—20,000 S1, 5,000 S2, 7,700 S3, 4,500 S4.
Gilbert Lake—9,000 S1, 750 Sf.
River Philip—50,000 A2, 37,000 A3, 25,125 Af.
Black River—16,000 Sd, 6,000 S2, 12,700 S3.
Fitzsimmons Brook—12,000 S1.
Mountain Brook—8,000 Sd, 3,000 S2, 2,700 S3.
Polly Brook—10,000 S1, 3,000 S3.
Sugarloaf Brook—15,000 Sd, 5,000 S2, 5,700 S3.
Tillies Creek—22,500 S1.
Vickery Lake—9,000 S2.
West Branch—15,000 S1, 12,000 S2, 5,000 S3.
Poison Lake—150 Sh.

Cobequid F. C. Station—*Conc.*

Cumberland County—Conc.
Shinimicas River—10,000 A3, 30,000 S1, 3,300 S4.
Tidnish River—30,000 S1, 7,000 S2.
Wallace River—35,000 A2, 12,500 A3, 40,000 Sd, 40,000 S1, 28,000 S2, 20,000 S3, 10,000 S4, 2,358 Sf.
Barbour Lake—3,000 S1.
West Branch—40,000 Sd, 10,000 S1, 20,000 S2, 17,000 S3.

Westmorland County—
Big Lake—1,000 Sf.
Carters Brook—6,000 S2, 3,000 S3.
Silver Lake—20,000 S1, 11,000 S2, 12,500 S3, 400 Sh.
Tantramar River—
Jenks Brook—6,000 S2, 10,500 S3.
North Brook—4,000 S2, 2,000 S3.
Robinson Brook—20,000 S1, 10,000 S3, 5,000 S4.

Atlantic Salmon	458,125
Brown Trout	93,219
Speckled Trout	1,423,543
Total	1,974,887

Colbrook F. C. Station

Hants County—
Avon River—
Armstrong Lake—3,000 S5.
Otter Lake—5,000 S5.
Palmer Lake—5,000 S5.
Ponhook Lake—16,200 S5.
Valley Lake—6,000 S4.

Kings County—
Aylesford Lake—8,000 S4.
Lake George—17,500 S4.
Loon Lake—15,000 S4.
Bass Creek—2,000 S4.
Blue Mountain Lake—1,500 S4.
Canard River—5,000 S3.
Cornwallis River—
Brandywine River—13,950 B3.
Farm Brook—4,000 S4.
McGee Lake—8,000 S4.
Mill Brook—6,000 S4.
Palmeter's Pond—2,000 S5.
Port Williams Reservoir—1,500 S4.
Silver Lake—5,000 S4, 4,000 S5.
Tupper Lake—10,000 S4.
Tupper Lake Brook—3,000 S5.
Woods Pond—2,000 S5.
Eaton's Farm Pond—500 Sc.
Gaspereau River—
Murphy Lake—10,000 S4.
North River—10,000 S4.
Habitant River—10,000 S3.
LaHave River—
Hardwood Lake—12,000 S4.
Lake Paul Stream—10,000 S4.
Mill Creek—3,000 S4.
Pereau Creek—6,000 S4.
Woolaver's Pond—1,500 S4.

Lunenburg County—
Avon River—
Card Lake—15,000 S4, 5,000 S5.
North Canoe Lake—12,000 S4.
East River—
Bezanson Lake—7,000 S4.
Rocky Lake—1,000 S4.
Connaught Lake—5,000 S4.
Mill Lake—6,000 S4.
Timber Lake—5,000 S5.
Gold River—
Duck Lake—4,000 S5.
Harris Lake—8,000 S4.
Horseshoe Lake—7,000 S4.
Round Lake—6,000 S4.
Indian Lake—6,000 S4.
Lake Ramsey—7,000 S5.
Lewis Lake—8,000 S4.
Loon Lake—3,000 S5.
Nevertell Lake—5,000 S5.
Seffern Lake—5,000 S4, 4,000 S5.
Steves Lake—4,000 S5.
Wallaback Lake—9,000 S4.
Whelan Lake—3,000 S5
Gull Lake—4,000 S5.
Middle River—
Cress Lake—8,000 S4.
Millet Lake—7,000 S4.
Nine Mile Lake—6,000 S4.
Whitney Lake—8,000 S4.
Sherbrooke Lake—76,000 G2.

Brown Trout	13,950
Lake Trout	76,000
Speckled Trout	360,700
Total	450,650

Grand Lake F. C. Station

Colchester County—
Stewiacke River—15,000 A4, 12,000 Af.

Halifax County—
Burnt Lake—1,000 Sf.
Eagle Lake—1,000 Sf.
Hatchett Lake—1,000 Sf.
Hosier River—
Cranberry Lake—1,000 Sf.
Hubley Lake—1,000 Sf.
Long Lake—1,000 Sf.
Sheldrake Lake—1,000 Sf.
Little Salmon River—15,000 A4.
McGrath Lake—1,000 Sf.

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Grand Lake F. C. Station—*Conc.*

Halifax County—Conc.
Mill Lake—1,000 Sf.
Mushaboom Lake—1,000 Sf.
Musquodoboit River—15,000 A4, 12,280 Af.
Grand Lake—1,000 Sf.
Lay Lake—1,000 Sf.
Lindsay Lake—1,000 Sf.
McCaffrey Long Lake—1,000 Sf.
Turtle Lake—1,000 Sf.
Nine Mile River—
Big Five Bridge Lake—1,000 Sf.
Fraser Lake—1,350 Sf.
Governor Lake—1,000 Sf.
Pace Lake—1,000 Sf.
Salmon River—15,000 A4.
Sandy Lake—1,000 Sf.
Ship Harbour River—15,000 A4, 12,000 Af.
Shubenacadie River—
Grand Lake—904 Lg, 422 Lh.
Rawdon River—24,000 A4.
Tangier River—15,000 A4, 12,000 Af.
Phillip's Lake—2,000 Sf.
River Lake—1,000 Sf.
West River—15,000 A4, 12,000 Af.
Williams Lake—1,000 Sf.

Hants County—
Cameron Lake—1,000 Sf.
Coxcomb Lake—1,000 Sf.
Kennetcook River—15,000 A4.

Lunenburg County—
St. Margaret's Bay—
Bayswater Lake—500 Sf.
East River—6,000 Af.
Square Lake—1,000 Sf.
Long Lake—500 Sf.
Mill Lake—1,000 Sf.
Mill Cove Lake—500 Sf.
Riley Lake—500 Sf.
Walkers Lake—1,000 Sf.

Atlantic Salmon	210,280
Sebago Salmon	1,326
Speckled Trout	31,350
Total	242,956

Kejimkujik F. C. Station

Annapolis County—
Annapolis River—36,000 A2, 6,200 Af.
Round Hill River—24,000 A2, 24,000 A4.
LaHave River—10,000 A2, 19,000 A4, 3,600 Af.
Lequille River—23,000 A2, 12,000 A4.

Kings County—
Annapolis River—72,000 A2, 18,000 A4, 6,600 Af.
LaHave River—18,000 A3, 9,500 A4, 3,600 Af.

Lunenburg County—
LaHave River—11,000 A2, 36,000 A3, 36,400 A4, 43,655 Af.
Ohio River—12,000 A4, 10,800 Af.

Queens County—
Kejimkujik Lake—7,000 B3, 40,364 B5, 8 Bk.

Atlantic Salmon	435,355
Brown Trout	47,372
Total	482,727

Lindloff F. C. Station

Cape Breton County—
East Bay—
Gillies Lake—10,000 S3.
MacAdam Lake—10,000 S3.
Gabarus Lake—18,000 S4.
Grand Lake—24,000 S3.
Hardys Lake—8,000 S4.
Jackson Lake—10,000 S4.
Kilkenny Lake—25,000 B3, 200 Bg
MacIntyre Lake—10,000 S3.
MacMillan Lake—5,000 S3, 12,000 S4.
Mill Pond—4,000 S5.
Mira Bay—
Catalogne Lake—20,000 S3.
Cochran Lake—15,000 S3.
Gaspereaux River—25,000 B3, 5,345 B5.
McCormick Lake—12,000 S4.
Salmon River—63,144 B4, 312 Bg.
Northwest Brook—25,000 B3.
Pottles Lake—18,000 S4.
Quarry Ponds—8,000 S5.
Scotch Lake—4,000 S5.
Stewart Lake—6,000 S5.
Sydney River—
Blackett Lake—15,000 S1, 10,000 S3.
Meadow Brook—60,000 S1.

Richmond County—
Beaver Lake—5,000 S4.
Bell Lake—7,000 S4.
Black River—100,000 S1.
Buchanan Lake—10,000 S1.
Bras D'Or Lake—933 Sg, 963 Sh.
Indian Lake—15,000 S1.
MacDonald Lake—4,000 S3.
MacKenzie Lake—15,000 S1.
MacNab Lake—5,000 S4.
Mary Ann's Lake—5,000 S3.
Pringle Lake—5,000 S3.
River Tom—40,000 S1.
Scott Brook—20,000 S1.
Breens Lake—20,000 S1.
Ferguson Brook—15,000 S1.
Ferguson Lake—18,000 S3.
Five Island Lake—12,000 S3.

Lindloff F. C. Station—*Conc.*

Richmond County—Conc.
- Grand River—10,458 Af.
  - Barren Hill Lake—12,000 S3.
  - Loch Lomond Lake—27,000 S3, 1,600 Sg.
- Isle Madame—
  - Deep Lake—7,000 S4.
  - Forrest Lake—10,000 S3.
  - Grand Lake—30,000 S3.
  - Latimer Lake—10,000 S4.
  - Mannette Lake—3,000 S4.
  - Potties Lake—10,000 S3.
  - Shaw Lake—15,000 S3.
- Landry's Lake—5,000 S4.
- McDonald Lake—
  - MacLeod Brook—20,000 S1.
  - Straughton Brook—15,000 S1.
- Richard Pond—400 Sg.
- River Inhabitants—5,000 Af.
- River Tillard—130,000 S1.
- Lindloff Lake—485 Rg.
- Mill Lake—20,000 S1, 6,000 S3.
- Thompson Lake—10,000 S3.
- Rockdale Lake—10,000 S1.
- St. Esprit Lake—30,000 S1.
- Sterling Lake—12,000 S3.

Victoria County—
- Clyburn Brook—3,800 Sf.
- Fresh Water Lake—4,400 Sf.

Atlantic Salmon	15,458
Brown Trout	144,001
Rainbow Trout	485
Speckled Trout	969,096
Total	1,129,040

Margaree F. C. Station

Inverness County—
- Bras D'Or Lake—
  - Little Narrows Pond—5,000 S4, 1,750 Sf, 500 Sg.
  - MacKenzie Brook—25,000 S1, 4,000 S3, 5,000 S4.
  - Skye Brook—58,000 S1, 4,000 S3.
    - Brigend Brook—25,000 S1, 5,000 S3, 1,000 Sf.
- Cheticamp River—18,765 Af.
  - Cheticamp Lake—2,000 Sf.
  - Cheticamp Mountain Lake—3,000 S4.
- French Mountain Lake—2,000 S4, 2,000 Sf.
- Grand Etang Brook—33,000 S1, 15,000 S3, 15,000 S5.
- Horton Lake—3,000 S3.
- Lac Du Rosseau—33,000 S1, 15,000 S3, 1,000 Sf, 500 Sg.
- Lewis Brook—5,000 S4.
- Little Judique River—400 Sf.
- Little River—400 Sf.
- MacDonnell Lake—25,000 S1, 500 Sf.
- Margaree River—
  - Gallant Brook—10,000 S5.
  - Northeast Margaree River—15,684 Af.
    - Big Brook—33,000 S1, 5,000 S3.
    - Black Rock Pool—75,000 A2.
    - Carroll's Pond—1,500 S4, 500 Sf, 200 Sg.
    - Coady Brook—10,000 S5.
    - Cranton Bridge—75,000 A2.
    - Egypt Brook—34,000 S1, 15,000 S3, 1,000 Sf, 500 Sg.
    - Forest Glen Brook—75,000 A2, 25,000 S1, 3,000 S4, 325 Sg.
    - Hatchery Pool—50,000 A2.
    - Ingraham Brook—100,000 S1, 15,000 S3, 9,000 S5, 1,000 Sf, 500 Sg.
    - Lake O'Law Brook—33,000 S1, 15,000 S3.
    - Lake O'Law Lake—34,000 S1, 1,525 Sf, 500 Sg.
    - Lake O'Law Lake (Lower)—33,000 S1, 15,000 S3, 8,000 S5.
    - Lake O'Law Lake (Upper)—33,000 S1, 8,000 S5.
    - Levis Brook—33,000 S1, 5,000 S3.
    - MacDonald Brook—20,000 S1, 7,500 S4.
    - MacLeod Brook—25,000 S1, 3,000 S4.
    - Mancini Pond—265 Sg.
    - Marsh Brook—33,000 S1, 5,000 S3.
    - Murray Brook—25,000 S1, 3,000 S4.
    - Rock Pool—75,000 A2.
    - Ross Bridge Pool—50,000 A2.
    - Salt Brook—34,000 S1, 5,000 S3.
    - Stewart Brook—100 Sg.
    - Watson Brook—33,000 S1, 1,500 S4.
  - Scotch Hill Brook—392 Sh.
  - Southwest Margaree River—
    - Captain Allan's Brook—18,000 S1, 3,500 S4.
    - Collins Brook—16,000 S1, 1,500 S4.
    - MacDonnell Brook—25,000 S1, 3,500 S4.
    - MacLellan Pond—400 Sf.
  - McGinnis Brook—5,000 S4.
  - Pembroke Lake—7,000 S4, 2,000 Sf.
  - Plateau Brook—34,000 S1, 15,000 S3, 500 Sg.
  - Port Hood Island Pond—5,000 S1, 500 Sf.
  - Presqu'ile Lake—1,000 Sf.
  - Red River Lake—2,000 S4.
  - River Denys—10,000 S5.
    - Big Brook—40,000 S1, 4,000 S3.
    - Glen Brook—50,000 S1, 4,000 S3, 5,000 S4.
  - River Inhabitants—
    - McColl Brook—33,000 S1, 4,000 S3.
    - McPherson Brook—33,000 S1, 4,000 S3.
    - Rough Brook—34,000 S1, 4,000 S3.
  - Strathlorne Brook—33,000 S1, 5,000 S3, 15,000 S5, 2,400 Sf.

Victoria County—
- Aspy River—15,545 Af.
- Barrasois River—3,500 S4, 1,000 Sf.
- Bras D'Or Lake—
  - Baddeck River—170,000 S1, 6,000 S4, 10,000 S5.
    - Farquhar Angus Brook—30,000 S1, 5,000 S4.
    - Gillis Brook—35,000 S1, 5,000 S4.

78047-8—9½

Margaree F. C. Station—*Conc.*

Victoria County—Conc.
Bras d'Or Lake—*Conc.*
Washabuck River—80,000 S1, 5,000 S4, 1,000 Sf.
Brinton Cove Pond—400 Sf.
Burton Lake—400 Sf.
Church Brook—75,000 S1, 3,000 S4.
Tarbot Lake—25,000 S1, 3,000 S4.
Dingwall Lake—500 Sf.
Fresh Water Lake—750 Sh.
Giffin Lake—5,000 S4, 2,550 Sf.
Jigging Cove Lake—5,000 Sf.
MacDonald Lake—400 Sf.
Mary Ann Brook—2,000 Sf.
Middle River—
Beaver Brook—33,000 S1, 4,000 S3, 12,500 S5.
Black Brook—33,000 S1, 12,500 S5.
Cold Brook—35,000 S1, 4,000 S3, 3,500 S5, 500 Sf.
Indian Brook—67,000 S1, 6,000 S3, 12,500 S5.
MacLeod Brook—34,000 S1, 750 Sf.
Morrison Lake—50,000 S1, 5,000 S4, 800 Sf, 100 Sh.
White Point Pond—400 Sf.

Atlantic Salmon	449,994
Speckled Trout	2,178,707
Total	2,628,701

Mersey F. C. Station

Lunenburg County—
Beck Lake—3,000 S5.
Blue Rocks Pond—2,000 S5.
Crouse Lake—3,000 S5.
Huey Lake—3,000 S5.
King's Bay—
Hirtles Pond—1,800 S5.
Romkey Pond—1,800 S5.
Mason Pond—1,500 S5.
Mike's Pond—500 S5.
Mushamush River—12,700 A5.
Petite River—7,500 A4, 7,500 A5.
Branch Lake—4,000 S4, 3,300 S5.
Fitch Lake—8,400 S5.
Wallace Lake—4,000 S4.
Randall Lake—4,000 S4.

Queens County—
Calf Pen Brook—1,600 S5.
Christophor Lake—5,000 S4, 4,000 S5.
Five Rivers—3,000 S4, 2,900 S5.
Halfway Brook—3,000 S4.
Hebb Pond—500 S1.
Herring Cove Lake—4,000 S4, 2,500 S5.
Louis Lake—3,000 S5.
McAlpine Brook—2,000 S4, 3,200 S5.
Medway River—14,500 A4.
Bangs Falls—9,000 A2, 15,000 A4, 20,400 A5.
Dean Brook—2,000 S1.
Fifteen Mile Brook—2,000 S4.
Greenfield—9,000 A2, 14,000 A5.
Ponhook Lake—9,000 A2, 27,600 A5.
Salter's Brook—2,000 S1, 3,000 S5.
Wentworth Brook—2,000 S4.
Mersey River—
Bar Pond—2,000 S4, 1,600 S5.
Deep Brook, Head Pond—10,000 S1, 2,800 S5.
Great Brook, Lower—8,000 B5, 4,000 S1, 3,500 S4.
Great Brook, Lower, Head Pond—12,000 B2, 4,000 B4, 32,500 B5.
Mitchells Brook—3,500 S4.
Mersey River below Cowie—18,800 A5.
No. 3 Head Pond, Mersey River—6,000 B2, 4,000 B4, 24,100 B5.
Ten Mile Lake—4,000 S4, 3,300 S5.
Russel Lake—4,000 S5.

Shelburne County—
East Brook—5,000 S5.
Four Mile Brook—4,000 S5.
Misery Lake Brook—3,400 S5.
Ogden's Brook—3,500 S5.
Tom Tigney Brook—8,000 S1, 3,200 S5.
Wall Lake—5,000 S4.
Wall Lake Brook—3,500 S5.

Atlantic Salmon	165,000
Brown Trout	90,600
Speckled Trout	160,300
Total	415,900

Middleton F. C. Station

Annapolis County—
Annapolis River—5,000 S3, 13,500 S4, 19,000 S5.
Bloody Creek—5,715 S4.
Comeau's Pond—3,000 S2.
Eel Weir Lake—4,500 S3.
Cranberry Lake—2,100 S4.
Evans Brook—5,000 S5.
Katy or Cady Lake—6,500 S4.
Little River—6,000 S4, 6,500 S5.
Morton Brook—2,500 S3.
Nictaux River—5,000 S3, 6,500 S5.
Benjamin or East Lake—5,000 S5.
Connell Lake—5,100 S5.
Curl Hole Flowage—6,000 S4.
McGill Lake—5,000 S3, 7,500 S4.
Private Brook—1,715 S4.
Quilty Lake—4,000 S4.
Scrag Lake—5,715 S4.
Shannon River—5,700 S4.

Middleton F. C. Station—*Conc.*

Annapolis County—Conc.
- Annapolis River—*Conc.*
  - Nictaux River—*Conc.*
    - Stoddard Brook—5,715 S4.
    - Trout Brook—5,000 S3.
    - Trout Lake—5,715 S4.
    - Wamboldt Lake—400 S5.
    - Waterloo Lake—5,000 S3.
  - Paradise Brook—5,715 S4.
    - Paradise Lake—30,000 S5.
  - Parker Brook—6,500 S5.
  - Wright Lake—5,500 S5.
- Bakers Pond—500 S2.
- Bear River—
  - Baillie Lake—7,000 S4.
  - Beeler Lake—5,715 S4.
  - Lake Mulgrave—6,500 S5.
  - Nigger Line Brook—3,715 S4.
  - Power Lot Brook—2,000 S4.
  - Sundown Lake—5,715 S4.
- Bustin Lake—2,000 S4.
- LaHave River—6,000 S5.
  - Lake Pleasant—7,500 S4.
  - Springfield Lake—6,000 S4.
- LeQuille River—
  - Gibson Lake—5,715 S4.
  - Grand Lake—10,500 S4.
  - Lake LaRose—5,715 S4.
  - Lamb Lake—5,715 S4.
  - Matthew's Lake—6,000 S5.
  - Mickey Hill Brook—3,000 S4.
  - Ten Mile River—6,000 S5.
- Medway River—
  - Lake Alma—10,500 S5.
  - Spectacle Lake—5,715 S4.
  - Wildcat Brook—2,400 S4.
- Mersey River—
  - *Boot* Lake—5,700 S4.
  - Eleven Mile Brook—2,000 S4.
  - Fisher's Lake—4,000 S4.
  - McLellan Lake—1,000 S4.
  - Munroe Lake—2,000 S4.
  - Pike Lake—1,000 S4.
  - Twin Lakes—1,000 S4.
- Milbury Lake—7,500 S4.
- Reagh Brook—200 S4.
- Young Lake—6,000 S4.

Kings County—
- Annapolis River—6,500 S5.
  - Fales Stream—6,000 S5.
    - Mud Lake—2,000 S4.
  - Randall Lake Stream—3,715 S4.
  - South River—5,000 S3, 10,500 S4.
  - Walker Brook—5,500 S5.
  - Wiswal Brook—5,000 S5.
  - Zeke Brook—3,000 S4.
- LaHave River—
  - Armstrong Lake—6,000 S5.
    - Chain Lakes—5,715 S4.
  - Mack Lake—5,715 S4.
  - Upper Sixty Lake—5,715 S4.
    - Twin Lakes—6,000 S5.
- Lake Paul—10,500 S5.
- Lake Torment—5,715 S4.

Lunenburg County—
- Helbert Lake—2,000 S4.
- LaHave River—13,215 S4.
  - Grant Lake—2,000 S4.
  - Indian Lake—3,000 S4.
    - Lake William—3,000 S4.
  - North River—6,000 S4.
  - Rhyno Lake—5,000 S4.
  - Rocky Lake—3,000 S4.
- Mathew Lake—5,000 S4.
- Naas Lake—5,000 S4.
- Trails End Ranch—20,000 S2.
- Whetstone Lake—2,000 S4.

Queens County—
- Collins Lake—2,000 S4.
- Kejimkujik River—4,000 S4.
- Medway River—
  - Christopher Lake—10,000 S4.
  - Harmony Lake—1,000 S4.
- Mersey River—
  - Grafton Lake—2,000 S4.
    - Minard's Brook—3,000 S4.
  - Kejimkujik Lake—5,000 S4.

Speckled Trout..... 539,185

Yarmouth F. C. Station

Digby County—
- Bonaventure Lake—2,000 S5.
- Brier Lake—2,000 Sf.
  - Bear's Back Lake—2,000 Sf.
- Grosse Coques River—700 S5.
  - Bartlett's Lake Brook—700 S5.
  - Mill Brook—700 S5.
- Meadow Brook—2,000 S2.
- Metegan River—600 S5.
  - Bear Lake Brook—800 S5.
  - Blackador's Brook—2,000 S2.
    - Irishman's Brook—2,500 S2.
  - Danver's Lake—500 S5.
  - Eel Lake—3,000 S5.
  - Gatien Thibeault Brook—1,000 S2.
  - Lewis Lake—700 S5.
  - Metegan Lake—2,000 S5.
  - Victor's Mill Brook—2,000 S2.
- Mistake Lake—1,500 S4.
- Payson's Meadow Brook—2,000 S2.
- St. Mary's Bay—
  - Belliveau River—700 S5.
  - Budd's or Handspiker Brook—700 S5.
  - Church Point Brook—1,000 S2.
  - Flag or Wagner Lake—1,000 S4
  - Gaudet's Mill Pond—1,500 S2.
  - Long Island Brook—7,000 S2.
  - Margo River—700 S5.
  - Salmon River—40,000 A4, 923 Af.
    - Clearwater Lake—2,000 S5.
    - Dean's Brook—2,000 S2.
    - English Lake—14,741 Af.

Yarmouth F. C. Station—*Conc.*

Digby County——Conc.
- St. Mary's Bay—*Conc.*
  - Salmon River—*Conc.*
    - Farish Lake—2,000 Sf.
    - Lake Doucett—3,000 S5.
    - Salmon Lake—7,000 Af.
    - Salmon River Lake—8,000 Af.
  - Sissiboo Rover—
    - Amirault Lake—1,000 S4.
    - Andrews Lake—1,000 S4.
    - Dunbar Brook—1,000 S4.
    - Everett Lake—1,000 S4.
    - Mallett's Lake—1,000 S4.
    - Provost Lake—600 S5.
  - Snarl Lake—20,000 B2, 25,000 B3.
  - Tusket River—
    - Carrying Road Lake—2,000 S5.
    - Lucky Lake—3,000 S3.
  - Wentworth Lake—
    - Toad Brook—400 S5.
    - Wentworth or Klondyke Brook—2,000 S2.

Shelburne County—
- Barrington River—8,000 S3, 2,000 S5.
- Beaver Dam Brook—2,000 S5.
- Birchtown Brook—600 S5.
- Black's Brook—1,000 S5.
- Churchover Lake Brook—300 S5.
- Clyde River—40,000 A4, 30,923 Af.
  - Barn Brook—2,000 S3.
  - Big Goose Creek—500 S5.
  - Birch Hill Brook—3,000 S3.
  - Bloody Creek—1,000 S5.
  - George A. Brook—500 S5.
  - Hamilton Brook—2,000 S3.
  - Harper Lake—1,000 S5.
  - Hemlock Creek—2,000 S5.
  - Little Goose Creek—300 S5.
  - McDonald Creek—2,000 S3.
  - Potters Run—2,000 S3.
  - Purdy Hill Brook—300 S5.
  - Salmon Creek—500 S5.
  - Spring Creek—3,000 S3.
  - Thurston Creek—2,000 S3.
- Dexter's Lake Brook—300 S5.
- Doane's Brook—300 S5.
- Downeys Brook—2,000 S3.
- Fresh Brook—1,000 S5.
- Long Bridge Brook—300 S5.
- Purney's Brook—1,000 S5.
- Roseway River—
  - Beaver Creek—2,000 S5.
  - Big Beech Hill Brook—500 S5.
  - Clam Lake—20,000 B3, 8,500 B4, 13,500 B5.
  - Courtenay Lake—2,000 S5.
  - Horseshoe Lake—36,000 B2, 36,000 B3, 5,000 B4.
  - Lake Deception—2,000 S5.
  - Little Beech Hill Brook—500 S5.
  - Mark's Brook—500 S5.
  - McKay Lakes—2,000 S5.
  - Mill Creek—3,000 S1.
  - Pug Lake—45,000 B3, 4,500 B4, 13,500 B5.
- Sandy Point Brook—500 S5.
- Shag Harbour Brook—1,000 S5.

Yarmouth County—
- Annis River—
  - Big Brazil Lake—20,000 B2, 20,000 B3, 6,000 B5, 263 Bk.
  - Brazil Lake Brook—6,000 B2, 1,574 B5.
  - Crosby's Brook—5,000 B2.
  - Dave Saunder's Mill Pond—14,000 B2, 3,000 B5.
  - Gardener's Mill Pond—10,000 B2, 25,000 B3, 12,000 B5.
  - Hawley Road Brook—5,000 B2.
  - Hooper Lake—20,000 B3, 6,000 B5.
  - Lake Annis—15,000 B3, 2,000 B5, 885 Bk.
  - Lake Edward—20,000 B3, 974 Bf.
  - Lake Jessie—15 000 B3, 6,337 B5.
  - Little Brazil Lake—20,000 B2, 200 Bg, 175 Bk.
  - Norwood Brook—10,000 B2.
  - Pleasant Valley Brook—10,000 B2.
- Argyle River—
  - Frost Pond—3,000 S3.
  - Moses Lake—3,000 S3.
  - Randall's Brook—3,000 S3.
  - Sand Pond Brook—2,000 S3.
- Canee Lake—2,000 S5.
- Coldstream River—
  - James Lake—3,000 S3.
  - Kegeshook Lake—3,000 S3.
  - Louis Lake—3,000 S3.
- Corning Lake—1,000 S5.
- Marcel Delaporte's Pond—100 S2.
- Rose's Pond—500 S2.
- Tedford Lake—3,000 S5.
- Tusket River—10,000 Af.
  - Back Lake Brook—3,000 S3.
  - Big Meadow Brook—3,000 S2.
  - Burrell's Brook—3,000 S3.
  - Carleton River—2,000 S5.
    - Fanning Lake—3,000 S5.
    - Hamilton Lake—6,000 Sf.
    - Ryersons Brook—1,000 S2.
    - Sloan's Lake—3,000 Sf.
  - Clearwater Lake—2,000 Sf.
  - Grey's Brook—1,000 S2.
  - Harris Lake—2,000 Sf.
  - Littl Meadow Brook—1,000 S2.
  - Rushy Lake—2,000 S5.
  - Schoolhouse Brook—1,000 S2.
  - Solomon's Lake—3,000 Sf.
  - Sunday Lake—2,000 Sf.
- Welchard Brook—4,000 S3.
- Wellington Lake—3,000 S5.
- Wilson Brook—3,000 S3.
- Winter's Lake—3,000 S5.

Atlantic Salmon.....	151,587
Brown Trout.....	481,408
Speckled Trout.....	195,800
Total.....	828,795

NEW BRUNSWICK

Charlo F. C. Station

Gloucester County—
- Elmtree River—5,000 S3.
- Middle River—40,000 S1.
- Miller Brook—5,000 S3.
- Millstream River—16,000 S2, 5,000 S3.
- Nigadoo River—20,000 S1, 5,000 S3.
- Nipisiguit River—60,000 Ad, 30,000 A1.
  - Bass River—20,000 S1, 5,000 S3.
  - Forty-four Mile Brook—6,000 S2.
  - Gordon Brook—20,000 A3.
  - Papineau River—20,000 A3.
  - Portage Brook—7,000 S2.
  - Portage Lake No. 1—7,000 S2.
  - Portage Lake No. 2—1,500 Sf.
- North Caraquet River—8,000 S2.
- Pokemouche River—16,000 S2.
- South Caraquet River—8,000 S2.
- Teagues Brook—5,000 S3.
- Teagues Lake—20,000 S1.
- Tetagouche River—70,000 A1, 20,000 A3.
- Tracadie River—70,000 A1, 20,000 A3, 14,000 S3.

Restigouche County—
- Chaleur Bay—
  - Christopher Brook—15,000 S1, 6,000 S3.
    - Black Brook—15,000 S1, 6,000 S3.
    - Loch Lomond Lake—2,000 S2.
  - Eel River—20,000 S1, 12,000 S3.
    - Robinson Lake—900 Sf.
  - Jacquet River—120,000 Ad, 40,000 A3.
    - Black Lake—8 000 S2.
    - Jacquet River Lake—4,000 S2, 12,000 S3.
  - Louson River—20,000 S1, 7,000 S3.
  - Nash Creek—20,000 S1, 7,000 S3.
  - North Branch Charlo River—12,000 S2, 12,000 S3.
    - Charlo Dam—7,000 S4.
  - Restigouche River—80,000 A1, 40,000 A3, 7,165 Af.
    - Five Finger Brook—4,000 S2.
    - Kedgwick River—140,000 A1, 25,000 A2, 40,000 A3, 8,600 Af.
      - Eight Mile Lake—12,000 S2.
      - South Branch Kedgwick River—20,000 A3, 4,000 Af.
      - S. W. Kedgwick River—30,000 A1.
    - Little Main Restigouche River—20,000 A3, 4,000 Af.
      - Gunamitz River—80,000 A1, 20,000 A3.
    - Upsalquitch River—70,000 A1, 20,000 A3.
      - Murray Lake—12,000 S2.
      - North West Upsalquitch River—39,645 A3, 7,600 Af.
      - South East Upsalquitch River—105,000 A1, 45,000 A3.
        - Island Lake—300 Sh.
      - Meadow Brook Lake No. 1—10,000 S2.
      - Meadow Brook Lake No. 2—10,000 S2.
      - Tongue Lake—772 Sf, 342 Sh.
      - Upsalquitch Lake—7,000 S4.
  - Walker Brook—20,000 S1, 12,000 S3.
  - Fourteen Mile Lake—2,200 S4.
  - Tetagouche Lake—14,000 S4.

Atlantic Salmon	1,276,010
Speckled Trout	504,014
Total	1,780,024

Florenceville F. C. Station

Carleton County—
- Eel River—
  - Asphalt Lake—1,000 Sf.
  - Bull Creek—16,000 S3.
- Feeney Brook Pool—200 S2.
- McLeary Brook—16,000 S3.
- Morgans Pool—200 S2.
- Saint John River—
  - Acker Brook—8,000 S3.
  - Becaguimac River—90,900 A1, 18,000 Af, 15,000 S5.
    - Beaver Brook—5,000 S1.
    - Birmingham Brook—25,000 S1.
    - Burnt Land Brook—24,000 S1.
    - Coldstream Brook—16,000 S3, 15,000 S5.
      - Hamilton Brook—12,000 S1.
      - Hartley Brook—10,000 S1.
      - Hayden Brook—10,000 S1.
    - Day Brook—12,000 S1.
    - Gin Brook—10,000 S1.
    - Howard Brook—15,000 S5.
    - Indian Brook—6,000 S1.
    - Markie Brook—10,000 S1.
  - Bulls Creek—8,000 S3, 15,000 S5.
    - Rosemond Lake—2,000 Sf.
  - Gibsons Stream—27,000 S1.
  - Guisiguit River—15,000 S5.
    - Big Guisiguit River—15,000 S1.
    - Hamilton Brook—5,000 S1.
    - Little Guisiguit River—8,000 S1.
  - Johnsville Pond—1,000 Sf, 840 Sg, 377 Sh.
  - Meduxnekeag River—
    - Gartley Brook—20,000 S1.

Florenceville F. C. Station—*Conc.*

Carleton County—Conc.
- Saint John River—*Conc.*
  - Meduxnekeag River—*Conc.*
    - Hagerman Brook—12,000 S1.
    - Rose Pond—1,000 S2.
  - Miramichi River—
    - Argyle Pond—1,000 Sf.
    - Big Tague River—15,000 S5.
    - Lampeda Lake—300 Sh.
    - North Branch Miramichi River—25,000 A2, 45,000 A3, 6,000 Af.
    - South Branch Miramichi River—25,000 A2, 20,000 A4, 6,000 Af, 15,000 S5.
      - Argyle Pond—840 Sg.
      - Clearwater Brook—16,000 S3, 15,000 S5.
      - Juniper Brook—9,000 S1.
      - Schoolhouse Brook—9,000 S1.
    - South West Miramichi River—25,000 A2, 20,000 A4, 3,000 Af.
      - Elliot Brook—27,000 S5.
  - Monquart River—16,000 S4, 15,000 S5.
    - Trout Brook—15,000 S5.
  - Nashwaak River—20,000 A4.
  - Presquile River—76,900 A1.
    - Big Presquile River—15,000 S5.
      - Dingee Brook—10,000 S1.
      - Harold Brook—12,000 S1.
    - Gowan Lake—1,000 Sf.
    - Howard Brook—7,500 S5.
    - Ketch Lake—20,000 S4.
    - Little Presquile River—20,000 S4, 15,000 S5.
      - Burpee Creek—8,000 S3.
      - Gallivans Brook—6,000 S1.
    - McLarey Brook—7,500 S5.
    - Williamstone Lake—15,000 S5, 420 Sg, 1,200 Sh.
  - Priest's Pond—15,000 S5.
  - River de Chute—16,000 S3.
  - Shiktahawk River—100,000 A1, 20,000 A4, 15,000 S5.
  - Stickney Brook—16,000 S3.
  - White Marsh Brook—900 Sf.

York County—
- Charles Lake—2,000 Sf.
- Eel River—
  - Dead Creek—15,000 S5.
  - Fish Creek—8,000 S1.
  - Four Mile Brook—10,000 S1.
  - Mistake Brook—9,000 S4.
- Fish Lake—5,000 S4.
- Little River—
  - Bear Brook—5,000 S4.
  - Forks Stream—5,000 S4.
- Magaguadavic River—
  - Clinch Brook—8,000 L1.
  - Cranberry Brook—7,500 S5.
    - McAdam Brook—7,500 S5.
  - Harvey Lake—1,000 Sf.
  - Lily Lake—4,000 S1.
  - N.E. Magaguadavic River—15,000 S5.
- Mill Brook—6,000 S4.
- Palfrey Lake—
  - Grassy Lake—15,000 S5.
  - Palfrey Brook—20,000 S4.
  - Skiff Lake—7,000 L1, 16,000 S4, 12,000 S5, 1,000 Sf, 420 Sg.
- Poplar Brook—6,000 S4.
- Saint John River—
  - Kilarney Lake—12,000 S5.
  - Nashwaak River—12,000 Af.
    - Cross Creek—10,000 S4.
    - East Branch Nashwaaksis River—28,000 S4.
  - Lime Kiln River—8,000 S4.
  - Manzer Mill Stream—10,000 S4.
  - McBanes Brook—5,000 S4.
  - McCallums Brook—5,000 S4.
  - McLean Brook—5,000 S4.
  - Penniac Stream—5,000 S4.
  - Ryan Brook—5,000 S4.
  - Tay River—16,000 S4.
    - Kingsmere Lake—500 S1.
    - North Branch Tay River—8,000 S4.
    - South Branch Tay River—8,000 S4.
  - Pokiok River—16,000 S4.
    - Davinson Lake—1,260 Sg.
    - George Lake—2,000 Sf, 420 Sg.
- Sam Foster Mill Stream—6,000 S4.
- Sixth Lake—1,000 Sf.
- Spednik Lake—
  - Boulton Lake—12,000 S5, 1,000 Sf, 336 Sg.
  - Lacoute Brook—9,000 S4.
    - Lacoute Lake—1,000 Sf.
  - Mosquito Brook—9,000 S4.
  - Musquash Lake—12,000 S5.
  - Pirate Brook—9,000 S4.
- Third Lake—
  - Dead Brook—15,000 S5.

Atlantic Salmon	512,800
Sebago Salmon	15,000
Speckled Trout	1,103,213
Total	1,631,013

Grand Falls F. C. Station

Madawaska County—
- Caron's Pond—20,000 Sc.
- Deadwater Brook—15,000 S1.
- Fournier Pond—3,000 Sc.
- Glazier Lake—20,000 G1, 10,000 G4.
- L'Emilie Pond—5,000 Sc.
- Marcel Cyr's Pond—2,000 S2.
- St. John River—
  - Baker Brook—5,000 S3.
  - Baker Lake—40,000 G1, 28,750 G4, 10,000 S3, 400 Sg.
  - Ben's Pond—15,000 Sc.
  - Reed Brook—9,000 S2.
  - Sisson Brook—5,000 S1, 2,500 S3.
- Caron Lake—10,000 S3, 50 Sg.
- Cyr's Brook—5,000 S1.
- Daigle Brook—15,000 S1.
- Grand River—16,000 S3.

Grand Falls F. C. Station—*Conc.*

Madawaska County—Conc.
St. John River—*Conc.*
Green River—29,000 S3, 900 Sg.
Belone Brook—15,000 S2.
Big Brook—5,000 S3.
Martin Brook—7,000 S2.
Thibodeau Brook—8,000 S2.
Third Green Lake—20,000 G1, 10,000 G4.
Iroquois River—15,000 S2, 12,000 S3.
Belanger Brook—11,000 S1.
Blanchette Brook—11,000 S1.
Iroquois River (Upper)—25,000 Sc.
Laforge Pond—3,000 Sc.
Michaud Brook—10,000 S1.
Millstream—20,000 S1, 10,000 S2.
Millstream Pond—5,000 Sc.
Notre Dam Pond—1,000 S2.
Pelletier Brook—9,000 S2.
Caron Brook—6,000 S2.
Quisibis River—12,000 S3.
Burgess Brook—10,000 S1.
Hunter Brook—10,000 S1.
Little Forks Brook—10,000 S1.
Spring Valley Brook—20,000 S1.
Siegas River—20,000 S1, 4,700 S4.
Clark Brook—10,000 S1.
Three Mile Brook—3,000 Sc, 10,000 S1.
Thompson Lake—5,000 S2, 2,500 S3.
Trout River—12,000 S3.
Cache Brook—6,000 S2.
South Trout River—5,000 S1, 5,000 S2.
Unique Lake—17,500 S3.

Restigouche County—
Big Cedar Brook—2,000 S4.
Headwaters Green River—5,500 S4.

Victoria County—
Downey Brook—32,400 S1.
Trout Brook—10,000 S3.
Golden Acre—1,000 S2.
Grand River—
Big Forks Brook—15,000 S1.
Black Brook—25,000 S1.
Violette Brook—15,000 S1.
Jardine Brook—2,000 S4.
Nary Brook Lake—1,000 S2.
Portage Lake—1,000 S2.
St. John River & Tributaries—60,000 A3, 4,000 Af, 806 Sg.
Bishop Brook—3,000 S2.
Brown's Brook—3,000 S2.
Brown's Pond—3,000 Sc.
Cold Brook—4,000 S1.
Curry Brook—3,000 S2.
Huds Brook—3,000 S2.
Jamer Brook—3,000 S2.
Lennon Brook—2,000 S2.
Little River & Tributaries—35,000 A3, 1,000 Af, 3,000 Sc, 500 S1, 15,000 S2, 19,200 S3, 500 Sg.
Bakerhouse Brook—12,000 S1.
Basley Brook—6,000 S1.
Beaverdam Brook—30,000 S1.
Lake Edward—10,000 Sc.
McCluskey Brook—12,000 S1.
Perkins Brook—9,000 S1.
Ryan Brook—20,000 S1, 3,000 S3.
Ten Mile Brook—12,000 S1.
Marcel Cyr's Pond—2,000 S2.
McCarthy Brook—2,000 S2.
Mill Brook—2,000 S2.
Miller Brook—3,000 S2.
Morrell Brook—2,000 S2.
Muniac River—25,600 A3, 10,000 S3.
Rapide de Femme Brook—4,000 S3.
Salmon River & Tributaries—150,000 A1, 54,400 A2, 189,600 A3, 6,959 Af, 10,000 S3, 500 Sg.
Barney Brook—10,000 S1.
Bogan Brook—10,000 S3.
Cedar Brook—900 S4.
Foley Brook—10,000 S3.
Little Salmon River—60,000 A1, 28,000 A3, 1,000 Af.
Mooney Brook—10,000 S1.
Mooney Pond—8,000 Sc.
Otterslide Brook—10,000 S1.
Outlet Brook—20,000 S2.
Sutherland Brook—10,000 S1.
Scott Brook—3,000 S2.
Tibbitts Brook—3,000 S2.
Tobique River—21,000 S2, 900 Sg.
Belzele Pond—1,500 S2.
Big Flat Brook—3,000 S2, 2,000 S4.
Caldwell Brook East—1,000 S4.
Caldwell Brook West—1,000 S4.
Hudson Brook—3,000 S2.
Indian Brook—3,000 S2.
Odell River—8,000 S4.
Odellach River—8,000 S4.
Pokiok Brook—8,000 S4.
Quaker Brook—5,000 S4.
Trout River—8,000 S4.
Wark Brook—2,000 S2.

Atlantic Salmon	615,559
Lake Trout	128,750
Speckled Trout	994,256
Total	1,738,565

Haley Brook F. C. Station

Carleton County—
Saint John River—97,975 Af.

Northumberland County—
Serpentine River—17,400 A2, 7,000 A5.

Restigouche County—
Little Tobique River—16,800 A3.

Victoria County—
Tobique River—1,800 Af.
Main Tobique River—1,700 Af.
Mamozekel River—17,400 A2, 7,000 A3, 7,000 A5.
Odell River—1,500 Af.

Atlantic Salmon	175,575
Total	175,575

Miramichi F. C. Station

Kent County—
Maillet Pond—10,000 S1.
Miramichi River—
Bass River—9,000 S4.
Buctouche River—22,500 S1, 4,500 S4.
Girouards Pond—2,000 Sd.
Cocagne River—22,500 S1, 4,500 S4.
Grand Alduane River—22,500 S1.
Kouchibouguac River—28,800 S1, 6,000 S4.
Kouchibouguassis River—9,000 S3, 12,600 S4.
Richibucto River—22,500 S1, 6,400 S4.
Salmon River—75,000 A1, 54,000 A3.

Northumberland County—
Miramichi River—
Bartibog River—24,750 S1, 4,500 S4.
Eskedelloc Brook—24,750 S1.
Green Brook—9,000 S4.
Bay Du Vin River—14,000 S2.
Black River—26,400 S1, 7,000 S2.
Little Black River—6,400 S4.
Burnt Church River—11,900 S2, 4,800 S4.
Eel River—9,000 S4.
Horton's Creek—9,000 S4.
Little Bartibog—3,600 S4.
Lower S.W. Miramichi River—180,000 Ad, 99,000 A2, 70,500 A3, 15,200 A4.
Catamaran River—3,000 S3, 3,000 S4.
Devils Brook—3,000 S3, 3,000 S4.
Libby Brook—3,000 S3.
Nappan River—23,100 S1, 5,000 S4.
Northwest Miramichi River—360,000 Ad, 33,000 A2, 97,500 A3, 17,000 A4.
Buckley Pond—4,000 S4.
Castor Brook—4,500 S3, 3,000 S4.
Little River—9,000 S4.
Millstream—90,000 Ad.
Mullin Stream—4,500 S3, 3,000 S4.
Sevogle River—60,000 A1, 33,000 A2.
Stewart Brook—6,000 S4.
Trout Brook—4,000 S4.
Wildcat Brook—2,000 S4.
River DeCashe—9,100 S2.
Southwest Miramichi River—165,000 A1, 20,000 A4, 3,200 Af.
Barnaby River—90,000 A1, 15,400 A2, 2,500 Af.
Bartholmew River—60,000 A1.
Burnt Land Brook—16,200 S3.
Cains River—90,000 Ad, 90,000 A1, 20,000 A4, 8,200 Af.
Mill Brook—4,500 S3, 3,300 S4.
Moores Brook—4,500 S3, 3,300 S4.
Renous River—90,000 Ad, 75,000 A1, 20,000 A4, 8,200 Af.
Dungarvon River—75,000 A1, 8,200 Af.
Tabusintac River—33,000 A2, 54,000 A3, 15,200 A4.

York County—
S. W. Miramichi River—
Clearwater Brook—10,200 Af.
Rocky Brook—22,800 Af.
Taxes River—75,000 A1, 18,000 A4, 3,200 Af.

Atlantic Salmon	2,256,300
Speckled Trout	461,900
Total	2,718,200

St. John F. C. Station

Albert County—
Crooked Creek—3,500 Rf.
North River—869 Rf.
West River—600 Rf.
McFadden Lake—4,000 S2.
Petitcodiac River—
Fords Pond—150 S2.
Pollett River—13,500 Af.
Babcock Pond—2,000 S1.
Wolf River—
Bennett Lake—4,250 Sf.
Wolf Lake—1,000 Sf.

Annapolis County (Nova Scotia)
Nictaux River—10,412 Ag.

Carleton County—
St. John River—15,900 Af.

Charlotte County—
Bonaparte Lake—10,200 S1.
Brandfords Cove Pond—454 S5.
Canoose River—
Goat Brook 675 Sf.
Goat Brook (Big)—8,000 S5.
Goat Brook (Little)—5,000 S2, 4,000 S5.
Green Brown Brook—10,200 S1.
Kirk Brook—5,000 S2.
Pat Fairy Brook—5,000 S2.
Sandy Brook—10,000 S2.
Carr Lake—3,400 S1.
Chamcook Lake—91,209 L1, 7,024 Af.
Clear Lake—9,343 A5, 1,000 Af.
Crecy Lake—13,500 R3.
Digdeguash River—90,000 B1, 136,377 B2, 18,000 S5, 875 Sf.
Anderson Brook—5,100 S1.
Black Brook—14,000 S1.
Bog Brook—21,000 S1.
Clarence Stream—21,000 S1.
Craig Brook—14,000 S1.
Craig Lake—225 Sf, 225 Sg.
Falls Brook—14,000 S1.
North West Branch—10,000 S2.
South Brook—14,000 S1.
Wellington Brook—14,000 S1.
Wyman Brook—14,000 S1.
Dwellys Pond—1,130 S5.
Experimental Station, Tower Hill—1,025 S3.
Gallop Stream—18,000 S3.
Haggarty's Cove Brook—3,400 S1.
Kerr Lake—5,000 R3.

Charlotte County—Conc.
- Lake Southern—3,000 S5.
- Leonard Lake—700 S5.
- Lepreau River—2,000 Af.
- Long Pond—908 S5.
- Magaguadavic River—6,000 Af, 1,103 Ag.
  - Cox Brook—1,700 S1.
  - Parks Brook—14,000 S1.
- Meadow Brook—9,000 S5.
- Meadow Pond—500 S5.
- Mohannas Creek—18,000 S5.
  - Annis Brook—3,400 S1.
  - Ash Brook—1,700 S1.
  - Soap Brook—3,400 S1, 6,000 S5.
- New River—18,000 A2, 2,000 Af, 55,000 S1, 3,000 S5.
- Ohio Pond—908 S5.
- Otter Lake—1,000 S2.
- Pocologan River—18,000 A2, 4,000 Af, 15,000 S1.
  - Pocologan River (Little)—1,500 S5.
- Red Rock Lake—50,000 S1, 4,500 S5.
  - Sparks Lake—50,000 S1, 6,000 S5.
- St. Croix River—
  - Denny Stream—10,000 S2, 18,000 S3, 18,000 S5, 250 Sf.
    - Billy Weston Stream—3,400 S1, 9,000 S5.
    - Bush Brook—3,400 S1, 5,000 S2.
  - King Brook—6,800 S1.
  - Satchel Brook—3,400 S1.
  - Trout Brook—10,000 S2.
  - Waweig River—5,000 S5.
    - Berry Brook—5,000 S5.
    - Gowdy Brook—6,000 S5.
    - McCarlies Brook—9,000 S5.
    - McGuire Brook—4,000 S5.
    - Twin Lakes—375 Sf, 375 Sg.
- St. Patrick Lake—3,400 S1.
- Spears Brook—30,000 S1.
- Stein Brook—5,100 S1.

Kings County—
- Belyea Pond—500 S2.
- Brittian Lake—20,000 S1.
- Canaan River—
  - Prince Brook—10,000 S3.
  - Thornes Brook—15,000 S3.
- Parlee Brook—20,000 S1, 2,000 S5.
- St. John River—
  - Kennebecasis River—20,000 A5, 4,000 Af.
    - Crawford Lake—4,000 S5.
    - Drury Cove Brook—30,000 S1.
    - Knapp Lake—3,000 S5.
    - Millstream—35,000 S1, 34,000 S5, 400 Sf, 800 Sg.
    - Passekeag Brook—15,000 S1.
    - Peckett Lake—3,000 S5.
    - Pikwaket Brook—15,000 S1, 3,000 S5.
    - Smith Creek—4,000 Af, 28,000 S5.
      - Chestnut Brook—20,000 S1.
      - Kinz Brook—20,000 S1.
      - McGregor Brook—25,000 S1.
      - Sally Brook—20,000 S1.
      - Trout Creek—4,000 S5.
        - Wards Creek—2,000 S5.
  - Little Harvey Lake—500 S2.
  - Truan's Pond—2,000 Sd.
  - Saunder's Pond—500 S1.
  - Thompson Pond—500 S1.
  - Walton Lake—5,214 C2.

Northumberland County—
- N.W. Miramichi River—9,778 Af.

Queens County—
- Appleby Farm Pond—1,000 S1.
- Armstrong Pond—1,000 S2.
- Cranberry Lake—1,200 S5.
- Cumberland Bay Stream—21,600 S2.
- Gagetown Military Camp—75,000 S2.
- Grand Lake—
  - Newcastle Creek—30,000 S3, 3,500 S5.
  - Young Cove Stream—7,200 S2.
- Henderson Brook Pond—2,000 S1.
- McDonald Pond—500 S1.
- Salmon River—
  - Big Forks—14,400 S2.
  - Castaway Stream—14,400 S2.
  - Gaspereaux River—28,800 S2, 10,000 S5, 540 Sf.
  - Little River—15,000 S3, 3,500 S5.
  - Salmon Creek—15,000 S3, 3,500 S5.

St. John County—
- Big Salmon River—20,000 A5, 5,000 Af, 15,057 Ag, 986 Sf.
  - Donnelly Lake—5,960 S5.
  - Four Mile Lake—13,640 S5.
  - Pats Lake—3,000 S5.
  - Rody Lake—6,000 S5.
  - Walker Lake—6,660 S5.
- Black River—9,000 A5, 2,000 Af, 20,000 S1.
  - Black River East—20,000 S1.
  - Grassy Lake—2,670 S5.
  - Taylor Lake—25,000 S1.
- Blindman Lake—2,000 S5.
- Clear Lake—10,000 S2.
- Dark Lake—2,000 S5.
- Hammond River—
  - Browley Lake—800 S5.
  - Germaine Brook—30,000 S1, 3,000 S5.
  - Hanford Brook—30,000 S1, 3,000 S5.
- Hanson Brook—2,500 S5.
- Henry Lake—25,000 S1, 3,000 S5.
- Kennebecasis River—
  - Cherry Lake—3,000 S1.
  - Dolan Lake—15,000 S1, 13,000 S5.
    - Adams Lake—8,000 S5.
      - McCormac Lake—20,000 S1, 11,000 S5.
  - Ritchie Lake—4,000 S5.
- Lillis Lake—1,000 S2.
- Little River—1,400 R3, 2,000 S5.
  - Blackall Lake—2,000 S5.
  - Boaz Lake—3,000 S1.
  - Douglas Lake—50,000 B1.
  - Elderly Brook—15,000 S1, 8,000 S5.
  - Graham Lake—4,670 S5.
  - Treadwell Lake—40,000 S1, 12,000 S5.
- Marsh Creek—
  - Ashburn Lake—10,000 S2.
  - Lilly Lake—2,000 S5.
  - Mud Lake—2,000 S2.

St. John F. C. Station—*Conc.*

St. John County—Conc.
- Mispec River—6,000 A5, 2,000 Af, 20,000 S1, 1,335 S5.
  - Balls Lake—3,000 S1.
  - Beaver Lake—5,000 S1.
  - Brandy Brook—1,335 S5.
  - Loch Lomond Lake—18,000 S5, 600 Sf, 600 Sg.
    - Dead Brook—15,000 S1.
    - McCracken Lake—20,000 S1, 16,000 S5.
    - Second Lake—45,000 S1, 1,200 Sf.
    - Terrio Lake—30,000 S1.
    - Wilmot Stream—3,000 S5.
- Musquash River—
  - Anderson's Lake—10,000 S2.
  - Little John Lake—7,000 S1.
  - Musquash River East—4,200 S5.
  - Musquash River West—20,000 S2.
  - Robin Hood Lake—6,000 S5.
  - Seven Mile Lake—10,000 S1.
- Pyng's Pond—2,000 S2.
- Round Lake—30,000 S5.
- Tufts Lake—6,660 S5.
- Tynemouth Creek—3,000 A5, 1,000 Af.

Sunbury County—
- Oromocto River—5,000 Af.
  - Alter Brook—20,000 S1.
  - Boone Brook—10,000 S1, 750 S5.
  - Hardwood Creek—20,000 S1.
  - Lyons Stream—3,000 S5.
  - Morance Brook (Big)—20,000 S1, 1,500 S5.
  - Morance Brook (Little)—10,000 S1, 750 S5.
  - Porcupine Brook—10,000 S1, 750 S5.
  - Scribner Brook—750 S5.
  - Three Tree Creek—40,000 S1, 1,500 S5.
  - Yoho Brook—30,000 S1, 3,000 S5.
- Peltoma Lake—44,000 S5, 612 Sf.
  - Peltoma Stream—40,000 S1.

Westmorland County—
- Aboushagan River—25,600 S1.
- Dykeman's Pond—200 S2.
- North River—10,000 S3.
  - Bennet Brook—10,000 S3.
  - Colpitts Brook—5,000 S3.
  - Eagles (John) Brook—5,000 S3.
  - Fawcett Brook—5,000 S3.
- Shediac River—19,200 S1.
  - Scoudouc River—28,800 S1.
  - Weisner Brook—6,400 S1.

York County—
- Gardener Creek—3,000 S5.
- Lake George—640 S5.
- Magaguadavic River—350 Sf, 700 Sg.
  - Beaver Brook—17,800 S2, 8,750 S5.
  - Davis Brook—28,800 S2, 8,750 S5.
  - Deadwater Brook (Lower)—8 750 S5.
  - Deadwater Brook (Upper)—8,750 S5.
  - Kedron Lake—27,000 S5.
  - Kedron Lake (Big)—27,000 S5.
  - Stoney Brook—5,100 S2.
  - Trout Brook (Lower)—8,750 S5.
  - Trout Brook (Upper)—8,750 S5.
  - Trout Creek—24,600 S2.
- McAdam Station Pond—50 Sf, 100 Sg.
- Sears Brook—13,600 S2.

Arctic Char	5,214
Atlantic Salmon	214,117
Brown Trout	276,377
Rainbow Trout	24,869
Sebago Salmon	91,209
Speckled Trout	2,484,233
	3,096,019

Cardigan F. C. Station

Kings County—
- Bear River—4,000 S3.
- Belle River—4,000 S4.
- Black Pond—6,000 S4.
- Boughton River—3,000 S3, 4,000 S5.
  - Graystone Creek—3,000 S3.
  - Ross' Pond—4,000 S3, 3,000 S5.
  - Whitlocks Pond—4,000 S3.
- Cardigan River—10,000 S3, 3,000 S5.
- Condons Pond—3,000 S3.
- East Lake—6,000 S4.
  - McDonald Brook—3,000 S4.
- Finlaysons Pond—10,000 S4.
- Fitzpatricks Pond—7,000 S3, 4,000 S5.
- Fortune River—
  - Big Brook—4,000 S4.
  - Dingwells Stream—3,000 S4.
- Fox River—3,000 S3.
- Grahams Pond—3,000 S3.
- Greek River—4,000 S3.
- Hay River—7,000 S4.
- McCarnies Pond—3,000 S3.
- McClures Pond—4,000 S3, 6,000 S5.
- Mellish's Pond—4,000 S3, 4,000 S5.
- Midgell River—25,000 A3, 5,000 S3.
  - McKinnons Stream—15,000 A3, 4,000 S4.
- Mitchell River—4,000 S3.
- Montague River—4,000 S3.
  - Browns Creek—4,000 S3.
  - Knox's Pond—4,000 S3, 4,000 S5.
  - McDonald's Pond—2,000 S4.
  - McRae's Pond—8,000 S4.
  - Valleyfield Stream—9,000 S4.
- Morell River—47,000 A3, 5,000 S3, 3,000 S5.
  - Baldwins Road Brook—4,000 S3.
  - Cranes' Pond—4,000 S3.
  - Cranes' Stream—4,000 S3.
  - Leard's Pond—5,000 S3.
  - MacAulay's Stream—2,000 S3, 4,000 S5.
  - Mooneys Pond—4,000 S3, 3,000 S5.
- Naufrage River—20,000 A3, 6,000 S3.
  - Larkins Pond—4,000 S3.
- North Lake—6,000 S4.
- Pine Brook—3,000 S4.
- Priests Pond—4,000 S4.
- Quigleys Pond—5,000 S3.
- Schooner Pond—3,000 S3.
- Stricklands Pond—7,000 S3, 5,000 S4.

Cardigan F. C. Station—*Conc.*

Kings County—Conc.
- Sturgeon River—4,000 S3.
  - Moore's Pond—10,000 S4.
  - Whim Road Stream—3,000 S3.
- Town's Pond—6,000 S4.
- Websters Pond—4,000 S4.
- Whalens Stream—5,000 S4.

Prince County—
- Bains Stream—6,000 S4.
- Barbara Weit Stream—6,000 S4.
- Barlows Pond—6,000 S4.
- Dunk River—20,000 A3, 2,000 R4, 7,000 S4.
  - Scales Pond—3,000 R4, 5,000 S4.
  - Wrights Pond—6,000 S4.
- Egmont Bay—
  - Brae River—4,000 S4.
  - Enmore River—6,000 S4.
  - Pierre Jacques River—5,000 S4.
    - McWilliams Pond—3,000 S4.
  - Sheep River—6,000 S4.
- Gordons Pond—4,000 S4.
- Greens Stream—4,000 S4.
- Mill River—
  - Cains Stream—5,000 S4.
  - Gards Stream—4,000 S4.
- Tignish River—10,000 A3, 6,000 S4.
  - Arsenaults Pond—6,000 S4.
  - Harpers Stream—6,000 S4.
  - Little Tignish River—6,000 S4.
  - Myricks Pond—6,000 S4.
- Trout River—10,000 A3, 6,000 S4.
  - Leards Pond—6,000 S4.
- Tyron River—
  - Ives Pond—4,000 S4.
  - Lords Pond—6,000 S4.
- Waddels Pond—6,000 S4.
- Warrens Stream—6,000 S4.

Queens County—
- Clyde River—
  - Beers Pond—3,000 S5.
  - Parsons Pond—6,000 S4.
  - Scotts Pond—3,000 S5.
- Comptons Pond—4,000 S3, 4,000 S4.
- Cooks Pond—4,000 S3.
- Dalvey Lake—5,000 R4.
- East River—4,000 S4.
- Flat River—
  - Beatons Pond—3,000 S3, 3,000 S5.
  - McPhersons Pond—5,000 S3, 3,000 S5.
- Glenfinnan Lake—9,200 R4.
- Gurneys Stream—4,000 S4.
- Hope River—7,000 S4.
  - Simpsons Pond—1,000 R4.
- Hunter River—
  - Bagnalls Pond (Hazel Grove)—3,000 S4.
  - Bagnalls Pond (Rae)—7,000 S5.
- Lanes Brook—3,000 S3.
- Long Pond—5,000 R4.
- Mathesons Pond—3,000 S3, 3,000 S5.
- McLeans Pond—3,000 S3.
- McPhersons Pond—4,000 S3.
- Stanley River—
  - Coles Pond—4,000 S4.
  - Founds Pond—5,000 S4.
  - Howetts Pond—3,000 S4.
- Tracadie Bay—
  - Blooming Point Pond—5,000 S4.
  - MacAulays Stream—5,000 S4.
  - Winter River—4,000 S4.

Atlantic Salmon	147,000
Rainbow Trout	25,200
Speckled Trout	533,000
Total	705,200

Kelly's Pond F. C. Station

Kings County—
- Big Pond—10,000 S2.
- Boughton River—
  - Graystone Creek—4,000 S1.
  - Narrow Creek—4,000 S1.
  - Ross' Pond—8,000 S1.
- East River—8,000 S1.
- Finlayson's Pond—6,000 S1.
- Fortune River—
  - Big Brook—6,000 S1.
  - St. Charles Pond—20,000 Sd.
- MacLeod's Pond—8,000 S1, 4,700 S2.
- Midgell River—40,000 A1.
- Montague Electric Pond—14,000 S1.
- Morell River—21,000 A1, 15,520 A2.
  - Crane's Pond—6,000 S1.
  - Leard's Pond—10,000 S1.
- Naufrage River—6,000 S1.
  - Larkin's Pond—10,000 S1.
- Woodville Mills—8,000 S1.

Prince County—
- Barlow Pond—5,000 S2.
- Black Pond—5,000 S2.
- Brae River—4,000 S1.
- Conroy's Pond—4,000 S1.
- Dunk River—21,000 A1, 20,000 S1.
  - Calbeck's Pond—7,000 S1.
  - Scales' Pond—10,000 S2.
  - Wright Leard's Pond—7,000 S1.
- Enmore River—5,000 S1.
- Gordon's Pond—6,000 S1.
- Hunter's Pond—8,000 S1.
- Ira Bank's Pond—5,000 S1.
- Ives' Pond—5,000 S1.
- Kelly's Pond—6,000 S1.
- McNally's Stream—5,000 S2.
- Mill River—
  - Bell's Stream—5,000 S2.
  - MacAusland's Pond—6,000 S1.
- Morrison's Pond—2,000 S1.
- Myer's Stream—6,000 S1.
- Nail Pond (Little)—3,200 S2.
- Round Pond—4,000 S1.
- Seacow Pond—3,200 S2.
- Trout River—
  - Getson's Pond—4,000 S1.
  - Leard's Pond—8,000 S1.
- Wilmot River Pond—20,000 S1.

Queens County—
Black River—4,000 S1.
Brander's Pond—4,000 S2.
Buell's Pond—2,000 S1.
Cousin's Pond—4,000 S2.
Crapaud River—
Leard's Pond—8,000 S1, 3,000 S3.
Stordy's Pond—8,000 S1.
DeSable River—
Dixon's Stream—12,000 S1.
Holmes' Pond—4,000 S1.
East River—
Boswall's Pond—1,000 S2.
Clark's Stream—8,000 S1.
Glenfinnan River—8,000 S1, 3,000 S3.
Essery's Pond—5,000 Sd.
Gates Pond—3,000 S2.
Hillsboro River—
Ing's Pond—800 S3.
Jenkin's Pond—1,500 S3.
Hunter River—
Bagnall's Pond—8,000 S1.
Campbell's Pond—8,000 S2.
Judson's Pond—4,000 S3.
Kinloch Creek—5,000 Sd.
Orwell River—5,000 S1.
Rattenburg River—
Howatt's Pond—3,000 S1.
Taylor's Pond—5,000 S1.
Ross' or MacLean's Pond—9,000 S1, 4,000 S3.
West River—6,000 S2.
Brookvale Stream—8,000 S2.
Wheatley River—
Crooked Creek—4,000 S2.
Rackham's Pond—8,000 S1.
Winter River—10,000 S2.
Thompson's Pond—5,000 S2.
Wisener's Pond—2,000 S2.
Worth's Pond—2,089 S3.

Atlantic Salmon.....	97,520
Speckled Trout.....	471,489
Total.....	569,009