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

50373-0—1

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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 year 1960, and the financial statements of the Department for the fiscal year 1960-1961.

Respectfully submitted,

Minister of Fisheries.

50373-0—1½

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 year 1960, and the financial statements of the Department for the fiscal year 1960-1961.

I have the honour to be, Sir,

Your obedient servant,

Deputy Minister.

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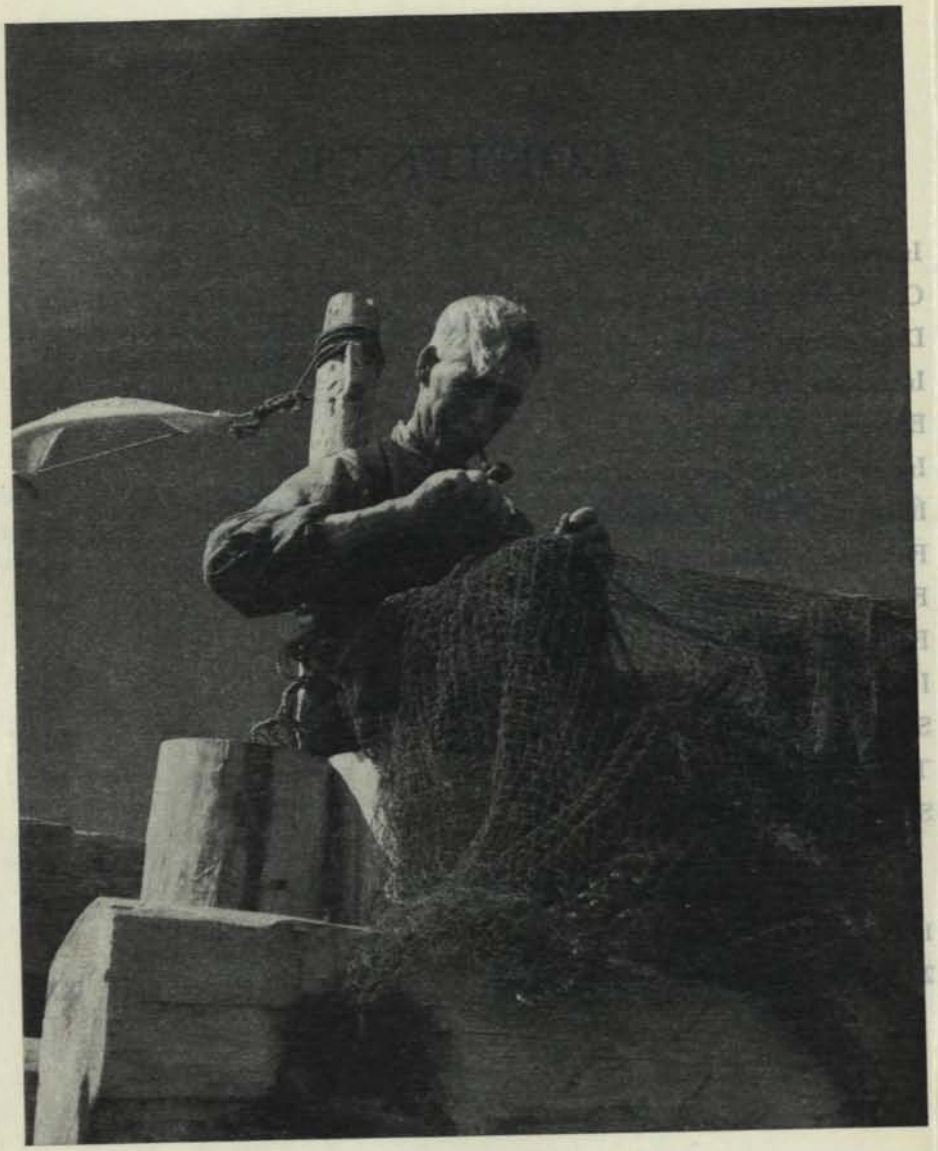

A veteran Gulf of St. Lawrence fisherman mends his nets.

INTRODUCTION

WASHED by seas containing some of the richest fisheries of the world, and encompassing fertile inland lakes and rivers which comprise half the freshwater area of the earth, Canada is a major fishing nation and a leading exporter of fish and fishery products.

The Department of Fisheries, responsible for the continued existence and, where possible, the expansion of the fish resources, must follow sound, scientifically based conservation principles, and at the same time allow maximum exploitation for the benefit of nearly 80,000 fishermen and many others in the fishing industry. This calls for the drafting of regulations, their enforcement when they become law, the propagation of fish stocks, and special consideration, among other things, of pollution problems, multiple water use, poaching, fishing skills, processing and marketing methods, and the fact that the consumer, at home and abroad, must be assured of a quality product.

The annual Canadian catch of all species of fish and shellfish is usually in the neighbourhood of a million tons, but in 1960 landings were down somewhat, to about 892,000 tons. The landed value, $101 million, was also a little below average. The drop was due mainly to a lower catch in Pacific waters; the Atlantic coast fisheries had a record year and the inland fisheries were only slightly below average. Fishery exports, valued in 1960 at $138.1 million, were down seven per cent from the previous year. The United States, best customer for Canadian fishery products, bought as much as usual; the drop in exports was in those to Europe, the second biggest market. Purchases by Caribbean countries, which take most of the balance of Canadian exports, were about the same as in 1959.

In the field of industrial development the focus of attention is being increasingly directed towards the efficient exploitation of commercial stocks of fish by the development and introduction of modern fishing gear and fishing techniques.

A further increase took place during 1960 in the number of fishermen taking advantage of the Fishermen's Indemnity Plan. At the end of the year a total of 5560 fishing vessels were insured in the Plan for a total appraised value of $17,545,505. This total included an increase of 282 vessels over the number covered a year previously. During 1960 claims amounting to $166,180 were paid in 151 cases of damage.

The year 1960 was one of generally stable prices to fishermen and no action was considered necessary under the Fisheries Prices Support Act. One of the major problems requiring consideration was the impact of the general collapse of world prices of fish meal. This situation had a direct bearing on the market for herring used for reduction into meal on the Pacific Coast and also an indirect effect on those Atlantic Coast species where the by-products are marketed as meal. Since the

problem was worldwide in scope it was necessary for the Department to collaborate with all other producing and consuming countries in encouraging an increase in demand for fish meal consistent with the expansion in world production.

One section of this report deals with the activities of the Fisheries Research Board of Canada, which functions under the authority of the Minister of Fisheries and is thus the Department's scientific arm. A more detailed account of the Board's biological, technological and oceanographic work is published in a separate annual report.

Fishermen aboard a British Columbia purse seiner complete a "set".

Conservation, in these days, calls for co-operation with other fishing nations in connection with fishing grounds where the productivity is shared. This applies not only to the high seas but to other international waters, including the Great Lakes. The Department is deeply involved in the work of international fisheries commissions, which are the subject of a section of this report.

Considerable interest was manifested in 1960 in the development of salt water angling. This form of sport is increasing tremendously in popularity on both the Atlantic and Pacific coasts and can be of much greater value to Canada. During the

summer months particularly, sport fishermen are finding that on salt water they are not hampered, as fresh water anglers sometimes are, by low water levels, by restricted travel during fire hazard conditions in forested country, and by flies, mosquitoes, etc. Salt water angling should thus take some of the pressure off the already heavily fished anadromous and fresh water stocks in certain areas, in addition to providing recreation for many who have never before enjoyed fishing as a leisure-time pursuit.

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CONSERVATION AND DEVELOPMENT SERVICE

CONTINUING industrial expansion, further efficiencies in fishing gear and operations, and the persistence of certain minorities in the flaunting of fisheries laws served to increase the efforts of the Conservation and Development Service in carrying out the responsibility for expanding and maintaining the fisheries resource.

The disappointing salmon catch in British Columbia resulted in another fishery taking top place in value of catch. In 1960 the lobster fishery of the Atlantic coast proved to have a higher dollar value to the fishermen than that of any other species.

The need for control and prevention, where possible, of pollution in coastal and inland waters to allay adverse effects on marine and aquatic life is more than ever evident. Numerous problems associated with pollution, as well as multiple use of waters were dealt with, although in certain areas there is a shortage of the trained personnel necessary to approach these matters in an orderly manner and on a proper priority basis.

FISH CULTURE BRANCH

(See also Appendix 2)

MARITIMES AREA

The Fish Culture Branch in the Maritimes Area is divided into four services—biological, engineering, hatchery and shellfish culture. Each of these, with the exception of shellfish culture, is supervised by a senior officer stationed at area headquarters. The field work is carried on by a staff of trained officers and technicians working from headquarters or stationed at various centres throughout the Maritimes.

In 1960, the four services were confronted with the usual diversified problems that normally present themselves in fish culture work. The year's work program progressed favorably and most of the major projects were completed or advanced as scheduled. The shortage of staff in the engineering and biological services seriously curtailed the number of projects that could be undertaken. The continuation of the Atlantic salmon program, as in former years, was given top priority. The investigation and research work in connection with this program is carried on by the biological service, while the hatchery service is concerned primarily with the production of fingerlings and smolts for distribution.

The excellent co-operation that has been so evident in the past between members of the Fisheries Research Board, the Protection Branch, and the Fish Culture Branch was continued throughout the year. Valuable assistance has also been received from members of the Canadian Wildlife Service, provincial government agencies and several fish and game associations.

Hatchery and Pond Operations

The Department's 15 hatcheries, four salmon retaining ponds and four pond rearing establishments functioned with the usual degree of efficiency during 1960. In addition to the collection of eggs at the four salmon retaining ponds, river collections were undertaken on the Restigouche River in New Brunswick and the Margaree River in Nova Scotia. The annual land-locked salmon egg collection at Chamcook Lakes, New Brunswick, was carried out. An additional collection of land-locked salmon eggs was completed at Palfrey Lake. Speckled, brown and rainbow trout egg collections from pond stocks were above average both in quantity and quality. The total collection of eggs from all species for the area amounted to approximately 65,000,000 while the total distributions of fish of all stages and species for the year amounted to well over 33,000,000.

The growth rate and survival of hatchery stock was maintained at a normal level in spite of adverse water conditions which prevailed in most areas throughout the Maritime Provinces during the summer and fall months. Through the ingenuity and increased efforts of hatchery personnel, water problems were overcome by introducing auxiliary supplies by various means. In spite of the difficulties, fish stocks were carried through the season without serious losses or setbacks.

Through the extended dry period of 1960 it was necessary to reduce distributions to a minimum as many of the rivers and streams lacked sufficient water to maintain normal fish stocks. In several instances it was necessary to make small distributions in lakes at the headwaters of streams that were to have been stocked. Distributions of fish were deferred in the area of New Brunswick being sprayed for budworm control until late in the season, when it was hoped that adverse effects from the spray would be reduced to a minimum.

Experimental rearing was continued at the Coldbrook fish culture station where 80,000 Atlantic salmon fingerlings were retained through the winter. This rearing program takes advantage of a spring-fed water supply which has been found in the past to accelerate growth and development. The products of the 1959 fall experiment were liberated in the spring of 1960 and it was found that well over 50 per cent of the yearlings had reached the smolt stage.

A series of feeding experiments was carried out at the Coldbrook Station under the supervision of one of the Fish Culture Branch biologists. Several groups of speckled trout fingerlings were fed diets containing cod liver meal and cod liver meal pellets. It was concluded from these tests that the cod liver products used were not suitable in their present form as fish food. Further feeding experiments will be undertaken in the future.

OYSTER CULTURE

The Department of Fisheries and the Fisheries Research Board continued co-operative investigations during 1960 to improve the position of the oyster industry in the Maritime Provinces. The Department's efforts were under the supervision of the Area Director, Maritimes Area, and the Fisheries Research Board's efforts were under the supervision of the Director of the Board's Biological Station at St. Andrews, N.B.

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Mortalities in the New Brunswick and Nova Scotia Oyster Populations

The epidemic oyster disease, which since 1955 has ravaged the oyster populations of New Brunswick and Nova Scotia, appears for the present to have confined itself to that area of the mainland Atlantic coast from Caraquet Bay in New Brunswick on the north to Cape George in Nova Scotia on the south. Within that stretch of coast a few small unaffected spots still exist but since the disease appears to have many forms of transmission it is anticipated that these presently unaffected spots will be devastated, as is now the case in Miscou Harbour. It should also be noted that during 1960 unusual mortalities continued to occur in the Bras d'Or Lakes area in Nova Scotia. However, since to date these Bras d'Or Lakes mortalities are not following the usual epidemic disease mortality pattern, there is not sufficient evidence at this time to say definitely that the epidemic oyster disease has spread to the Bras d'Or Lakes area, although it is entirely possible that such may be the case.

Rehabilitation of Disease Stricken Areas

The final phase of the rehabilitation transplant by the Department of 10,000 barrels of disease resistant breeding stock oysters from P.E.I. to the disease devastated areas of New Brunswick and Nova Scotia was completed in 1960, with the final transplant of 804 barrels which was carried out from May 9 to May 20. The tabulation of the distribution of these plantings is as follows:

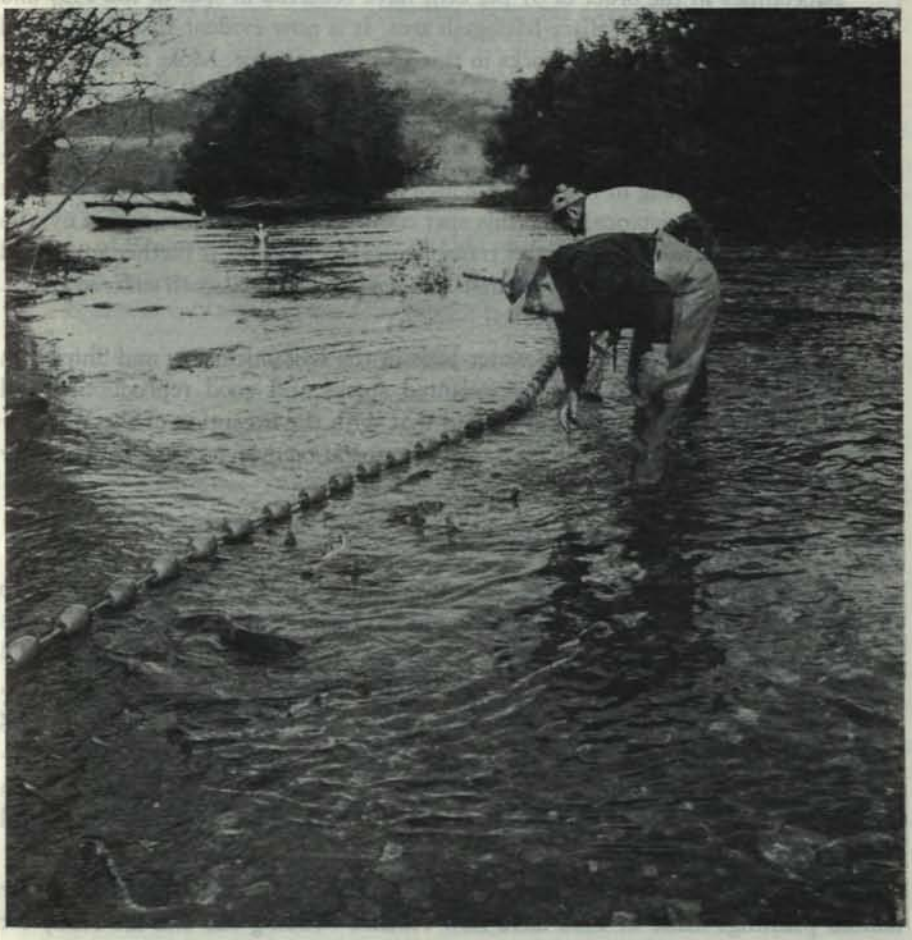
DISTRIBUTION OF TRANSPLANTED OYSTERS

Area	1957	1958	1959	1960	Total
New Brunswick	bbls.	bbls.	bbls.	bbls.	bbls.
Shippegan Area	1,000	100			1,100
Caraquet Bay			1,075	525	1,600
Lameque Bay			300		300
Miramichi Bay		2,800	200		3,000
Kent County Areas		1,500	300		1,800
Shediac Bay				9	9
Tracadie Bay				200	200
					8,009
Nova Scotia					
Wallace-Malagash	500				500
Caribou Harbour		55	380		435
Pictou Harbour		45			45
Amet Sound			1,000		1,000
Merigonish Harbour				140	140
					2,120
					10,129

Results

During the summer of 1960 examinations were made of stocks in all transplanted areas. It is now evident that in all areas, with the exception of the Wallace-Malagash area in Nova Scotia, transplant stocks have survived well and have reproduced.

In the Wallace-Malagash area, it is now evident that disease resistant stocks transplanted to that area in 1957 have suffered a mortality of from 20 to 30 per cent, whereas in all other transplanted areas mortalities of transplanted stocks are in the order from five to eight per cent. It is considered that this high mortality in the stocks transplanted to this area can be attributed to "transplant shock". These were the oysters which had been held out of water for a considerable period at Summerside when, due to unforeseen ice conditions, their transportation to this area by water could not be provided and eventually they were transported by truck.



Employees of the Fish Culture Branch remove salmon from a drag seine. The fish are to be stripped of their eggs to supply a hatchery on the Nanika River, B.C.

In all other transplanted areas and in particular in Caraquet Bay, St. Simon Inlet and the Miramichi Bay area in New Brunswick, there is every indication of a good reproduction and survival of both transplanted breeding stocks and young oysters presumably produced from the transplanted breeding stocks. Examination of the intertidal zones in these areas showed spat of three year classes in considerable quantity and growing well. Although there was evidence of some mortality in this

spat, there was no indication that it was other than what would normally be expected from winter kill on an intertidal zone. It is of interest to note that this spat was in sufficient quantity along the Neguac shore of Miramichi Bay and along the shores of the Shippegan and Caraquet areas to make it possible to open these areas to picking by local oyster lease holders. This action enabled them to obtain this spat for seed stock for their leases and at the same time salvage it from winter kill on intertidal zones. It was not formerly anticipated that this stage of rehabilitation would be reached before 1963.

Mortalities in the order of 87 per cent have occurred in spat of the 1957 and 1958 year classes in the Wallace-Malagash area. It is now evident that the original estimate of mortality in native stocks in this area was in error. More native oysters were surviving in 1957 and 1958 than was originally calculated. It is, therefore, reasonable to assume that in view of the mortalities in stocks transplanted to this area for the reason above suggested, and the fact that in 1957 and 1958 there were native oysters spawning in the area, the high mortality of spat in this area was due principally to non-resistance, since this spat could be produced from native oysters or from a cross between natives and transplanted stocks. This is further supported by the fact that 1958 disease resistant P.E.I. spat held at Malagash suffered only a 13 per cent mortality, which is normal.

Drag samples taken on deep water beds in the Miramichi Bay and Shippegan areas showed good survival of transplanted stocks and good reproduction and survival of spat. To sum up it can be said that with the exception of the Wallace-Malagash area, the Department's transplant operation has to date been highly successful.

Oyster Seed Stock and Seed Farming

Oyster farmers in Prince Edward Island continued in 1960 to look principally to the picking of "wild" oysters as their main source of seed. However, for the first time in many years, a considerable number of oyster farmers in Prince Edward Island put out spat collection material and were able in many cases to obtain a good catch. A total of 70,000 collectors were set out in Prince Edward Island waters during the summer of 1960 to collect spat for the Department's seed farming operation.

Although by comparison with 1959, which was phenomenal, the total catch obtained by these 70,000 collectors was small, it was still a good set by normal standards.

A total of 951 barrels of spat have been planted on the seed farm to date. The limited plantings made in 1958 have now reached bedding size and are ready for distribution in the spring of 1961. A policy for the distribution and disposal of this bedding stock to the industry will have to be formulated prior to the spring of 1961.

Experience has shown that an annual operation involving 70,000 collectors is the maximum that can be handled by present methods and with present facilities.

The search for a more suitable collector material from the standpoint of econmics and simplicity in handling was continued during 1960 with several new materials being tried, principal among which were alumi-foil pie plates and plywood veneer. Although the alumi-foil pie plates caught well, the separation of spat from them is

considered to be too arduous to be economical. The plywood veneer, cut in strips and dipped in a concrete solution, obtained an excellent catch of spat and it was found that the separation of the spat from this material was comparatively simple. It is felt that this material is the answer, for the present at least, for the small operator, since it is a much less expensive collector than the conventional egg case filler type and separation of spat from it is relatively simple. This material will again be tried on a much more extensive basis in 1961.

Oyster Leasing

During 1960 oyster leasing activities increased over 1959. In Prince Edward Island this increase is attributed to the high market value and demand. In New Brunswick, where the oyster populations have been wiped out by the epidemic oyster disease, the increased activity in leasing is attributed to the results of the Department's rehabilitation program. Fishermen in this area, seeing the results of the transplants and cultivation, have apparently become convinced that much can be done by oyster farming.

As of December 31, 1960, a total of 1380 oyster leases were in effect in the three Maritime Provinces, including a total of 3520.74 acres under lease. A breakdown of these figures is contained in the following tabulation:

OYSTER LEASES IN EFFECT AS OF DECEMBER 31, 1960

Location	Number of Leases	Number of Acres	Average Acreage
Prince Edward Island			
Malpeque Bay Area	282	1,040.91	3.69
Other P.E.I. areas	475	1,194.74	2.51
P.E.I. Totals	757	2,235.65	2.95
Nova Scotia			
Bras d'Or Lakes area	87	171.77	1.97
Other N.S. areas	74	180.1	2.43
Nova Scotia totals	161	351.87	2.18
New Brunswick			
Gloucester County	400	754.22	1.88
Northumberland County	99	167.0	2.83
Westmorland County	3	12.0	4.00
New Brunswick Totals	462	933.22	2.01
MARITIMES TOTAL	1,380	3,520.74	2.55

Oyster Lease Surveys

During 1960 a total of 207 surveys of areas for oyster leases were completed, as well as other survey work pertaining to the establishment and maintenance of oyster lease boundaries in Prince Edward Island, Nova Scotia and New Brunswick.

The Canadian Atlantic Oyster Industry

The Canadian Atlantic oyster industry continued in 1960 to feel the effects of the epidemic oyster disease.

Landings in New Brunswick dropped to an all time low of 31 barrels. It is therefore now obvious that until the rehabilitation of the New Brunswick oyster population is established, there will be no more oyster landings from these waters.

Nova Scotia landings continued at about the same low level, 3558 barrels in 1960. Since there are still some areas in this province not yet affected by the epidemic disease, it is anticipated that Nova Scotia landings will continue at this low level until the spread of the disease wipes out the present unaffected areas.

In Prince Edward Island, the 1960 landings of 13,958 barrels represents a drop of roughly 1000 barrels over 1959. This drop was anticipated and was forecast in our 1959 report. It is attributed to the intense fishing activity in this province resulting from the strong market demand and high market prices for oysters. The Prince Edward Island fishery has reached the point where practically all market size stocks have been fished and growing stocks are not maturing fast enough to meet the market demand. This again amplified the need for the development of techniques of controlled spawning and more rapid growth of seed stocks which, in turn, will result in greater quantity maturing in less time.

The value of the total Maritime oyster landings of 17,547 barrels is estimated at $402,240.

Forest Fires in Prince Edward Island

Extensive forest fires in west Prince County in Prince Edward Island, where the Shellfish Culture field headquarters is located at Bideford, seriously affected the work of the establishment during the three-week period the fires raged. All work of the establishment was terminated and all personnel devoted their efforts to fire fighting. At one period during the course of the fires, the buildings were in danger from flying embers and during the whole course of the fire the dense smoke in the area would have made normal work almost impossible.

BIOLOGICAL ENGINEERING SECTION

Major emphasis in 1960 was placed on studies leading to Atlantic salmon management and pollution control. Miscellaneous projects were worked in when priority dictated or programming permitted. For the first time one member of the staff was assigned to fish cultural problems consisting chiefly of nutritional and pathological tests and marking operations. Lake studies had to be neglected because of pressure of other committments.

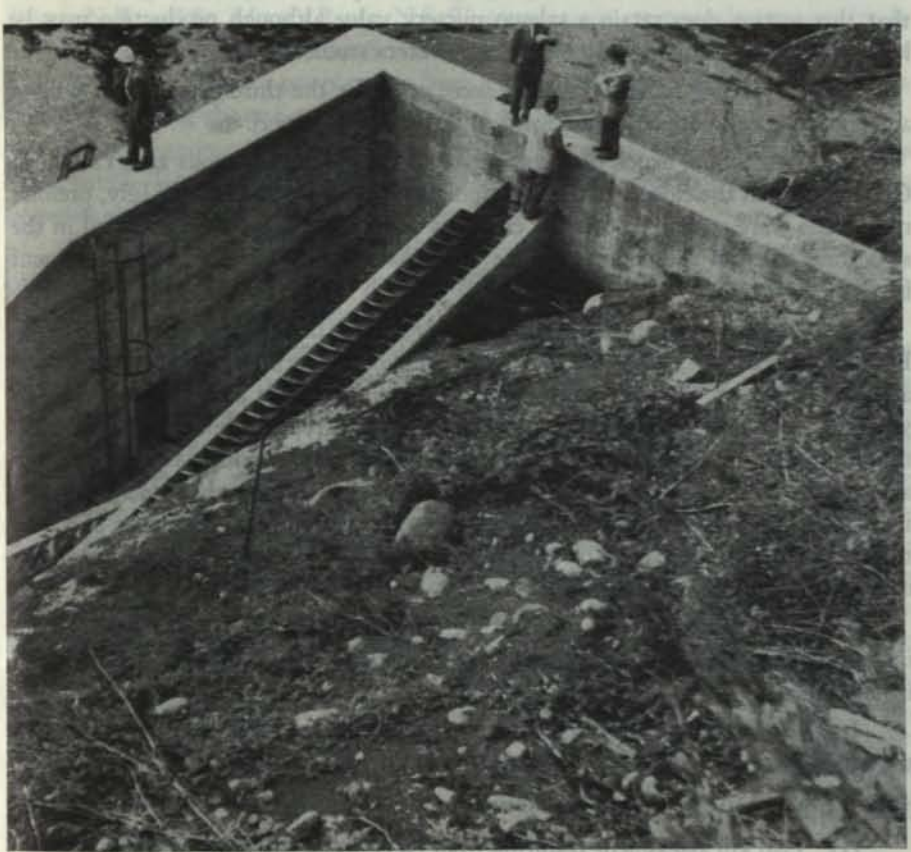
Roughly 40 per cent of the staff and the same percentage of time were allocated to the continuation of the Saint John River project where the object, although complicated by DDT pollution effects, is to study the impact on fisheries of hydropower developments. Observations have continued at Tobique Dam since 1953 and at Beechwood Dam since 1957.

The total 1960 Saint John River salmon run, as estimated from commercial and angling data, was strong and compared well with that of 1959. The commercial catch at 1559 cwt. was down 18 per cent but the angling catch was the same as 1959 at 2303 fish, although more grilse turned up in the 1960 anglers' catch. The upriver fishway counts for salmon were up slightly but the figures are still only one-quarter to one-third of the estimated normal run past these points.

Beechwood Fishway—2688 (1959—2588)

Tobique Fishway —1120 (1959— 949)

At Beechwood, some success was experienced in passing both shad and gaspereau. Fishway entrance studies were continued and tests were conducted on



Denil type fishway on Rainy River, British Columbia.

problems related to the downstream movement of young salmon smolt. Preliminary work was started to test the effectiveness of counting fish passage by photographic methods.

The privately sponsored transfer of mature salmon from Beechwood to the Upper Tobique flowage was again conducted and 1089 salmon were transferred by tank truck between June 2 and August 15.

The Tobique operations consisted of a second turbine mortality study and a removal of lampreys from the fishway. Mortality tests showed that losses of young salmon smolt $5\frac{1}{2}''$ to $8''$ in length moving through the turbines could be expected to run to 23.5 per cent or nearly one-quarter of the run. For the first time very few lampreys turned up in the Tobique fishway, strongly indicating positive results from the seven-year elimination program.

Tests were continued to ascertain the migration time of salmon between the two dams but results are not significantly different from previous years. Flowage studies and spawning checks were also made.

A comprehensive nursery assessment of the main river stem below Beechwood Dam was undertaken. Results must be regarded as preliminary but they do indicate that this section does retain a salmon nursery value although production may be lower than that occurring in other salmon waters studied.

Heavy yearling salmon plantings were made for the third consecutive year in an effort to speed population recovery in this upriver section.

In Nova Scotia, major projects were undertaken in Annapolis and Yarmouth Counties. With the closure of the Annapolis Aboideau or tide gate in July, preliminary plans were started to test the efficiency of the two fish passes installed in the structure. Most of the important runs were past by July but a critical assessment is planned for 1961.

A biological and physical features survey was undertaken on the Carleton River Branch of the Tusket River system. Preliminary turbine mortality tests were also conducted at Tusket powerhouse on salmon yearlings and gaspereau under-yearlings. The low head powerplant utilizing Kaplan type turbines produced mortalities of 16.5 per cent in salmon and over 50 per cent in young gaspereau. There appears to be a possibility, however, that gaspereau will strongly avoid this route if an alternative is available. The above work represents partial fulfilment of a plan to gain complete information on the Tusket system in order that adequate management procedures may be applied.

Maritime fishways were checked for operational and siting problems. Seven inspections involved new or proposed constructions and 15 involved established installations.

In the field of pollution assessment and control, the Branch participated in the following:

New Brunswick:

(1) Fish kill assessment resulting from DDT forest spraying operations.
(2) Base metal mine pollution, Miramichi River.
(3) Pulp mill pollution, St. Croix River, N.B.

Nova Scotia:

(1) Industrial waste pollution, Cornwallis River.
(2) Industrial waste pollution, Annapolis River.
(3) Gravel washing damage, Little Salmon River, N.S.
(4) Fish losses—Shubenacadie River—cause not fully determined to date.

In addition, negotiations were carried out with one pulp mill concern in Nova Scotia which resulted in measures being taken by the firm to apply effluent control to a degree that will be satisfactory for fisheries requirements. The Branch was also represented at several meetings of the New Brunswick Water Authority where problems of mutual concern were discussed.

An examination for marked salmon returns, progeny of early run fish, continued at River Philip, N.S. The highest returns yet recorded were made on this exceptionally low water year and the majority were early fish. This is strongly indicative that the early run characteristic is hereditary. A repeat experiment is underway in Big Salmon River, N.B.

The experimental merganser control program continued on the Miramichi River, N.B. and St. Mary's River, N.S. The operations are now almost completely in the hands of the Protection Service but analysis of records remains with this Branch. The St. Mary's program has been extended to give a year-round patrol in an effort to bring about a greater measure of control.

One poisoning operation for reclamation purposes was carried out in the Comeauville River system. This system, consisting of five lakes and intervening waterways, was treated with Toxaphene.

Miscellaneous operations included fish and ova transfers, data compilation, obstruction and nursery area surveys. In addition, the staff was called upon to answer many enquiries for information.

In 1960 the engineering section was restricted to maintenance tasks necessary to keep the physical plants at the fish culture stations in running order. This is a more or less perpetual chore of considerable magnitude and it occupies most of the time of the two engineers and the one technician who constitute the entire staff of this section. Partly through the Branch's efforts and partly by assistance from the Headquarters Engineer in Ottawa, inspections and recommendations for improvements were completed at fishways at Flume Ridge and St. George on the Magaguadavic River in New Brunswick and on the LaHave River in Nova Scotia. Plans have been drawn up for the further development of the Big Salmon River in New Brunswick. It is proposed that a fishway be constructed at Walton Dam to enable salmon to ascend the river to suitable spawning areas in the upper reaches. A preliminary engineering survey has been conducted of the obstacles on the East River, Sheet Harbour, N.S., with a view to restoring this as a salmon river. Discussions have been held with the Nova Scotia Power Commission which will lead to restoration of other salmon rivers by the circumvention of obstacles, notably in the Tusket and Liscombe Rivers.

NEWFOUNDLAND AREA

Less than 10 per cent of the Exploits River (largest on the Island of Newfoundland) is now accessible to salmon, due to physical obstructions on the main stem and on major tributaries. A program of investigation was initiated in 1958 to determine the feasibility of opening up the now inaccessible area for salmon production. Investigations include general biological surveys of the river system, engineering and biological surveys of major obstructions, and a pollution survey of the lower river. Major survey work will be completed in 1961 with the conclusion of a pollution

survey of the lower river. When all survey data, both engineering and biological, have been collated, it will be possible to determine the biological, engineering, and economic feasibility of opening up the Exploits River for additional Atlantic salmon production.

The "Rattling Brook" adult salmon transfer was commenced in 1956 as a result of hydro-development on Little Rattling Brook near Norris Arm. The program involves the annual transfer of the complete adult salmon run from that stream to Great Rattling Brook, a tributary of the Exploits River. With the conclusion of the 1961 transfer, the major portion of the run to this stream will have been relocated.

A joint survey of many of the freshwater fish populations of the island was carried out by the Department and the Royal Ontario Museum of Zoology. Approximately one month was spent in the field by two members of the museum staff and much useful information was gathered during this survey. A report of the findings of the survey team will be published.

Reconnaissance surveys were carried out on Salmon River (Bay D'Espoir) and Grey River on Newfoundland's south coast. These surveys were initiated to gain preliminary information on the salmon runs to these rivers which may become involved in major hydro-development in the foreseeable future. Preliminary data were also obtained on Conne River, and on a few smaller streams in the same general area.

Discussions having to do with mining and hydro-development in Labrador were also held. Two development sites in the area were visited during August. The Department's interest is to guard against *unnecessary* damage to fish populations as a result of such developments.

Discussions have also been held with the principals associated with the oil refinery now under construction at Holyrood, Conception Bay.

A pool and weir fishway, surmounting a formerly impassable obstruction 26 feet in height, was completed below Little Bonne Bay Pond on the Lomond River. This fishway opens up a considerable area of stream that has not formerly been available to Atlantic salmon. Minor work was also carried out at a lesser obstruction downstream on the Lomond River.

Major survey effort was again concentrated on several areas of the Exploits River. Areas of this river surveyed during 1960 include Bishop's Falls, Grand Falls and Red Indian Falls. Lesser surveys were carried out at other locations on the Lomond River, Isle aux Morts, Tommy's Arm River, North River, Rocky River, Peters River and South River in Hall's Bay.

PACIFIC AREA

In 1959, a trend away from the primary industries into expansion of secondary industries was noted in British Columbia. This trend, which affected the work of the Fish Culture Branch, was continued in 1960, although towards the end of the year it became apparent that further expansion in the primary industries would probably occur in years to come.

In 1960, no new hydroelectric developments were under construction or planned for the immediate future on salmon streams in B.C. and the Yukon. The development of the Somass River system, however, was still under consideration by the B.C.

Hydro. The B.C. Electric Thermal Electric Plant on Burrard Inlet was under construction during 1959 and the final plans for screening and for the effluent disposal system were received by the Department. Many new secondary industries were established or planned which either use water from salmon streams, or pass effluent into the streams, or both. A plant proposed by Dow Chemical Co. on the Fraser River near the mouth was a typical example. Phenols for the plywood industry will be manufactured in this plant and effluent containing phenols will be disposed of into the river. In addition process water is required from the Fraser. After discussions with the company and study of the processes used, satisfactory screens were evolved for the water intake, and a modern biological oxidation plant was devised for reduction of phenol concentrations to safe levels.

Screens were devised and approved for the water intakes of several other plants, and for the domestic supply to several communities throughout the province. These screens complied with the requirements necessary to protect the smallest salmon fry, i.e. not more than 0.10 ins. clear opening through the mesh and an approach velocity to the screen of not more than 0.10 feet per second. Where travelling screens were used, a higher approach velocity was allowed.

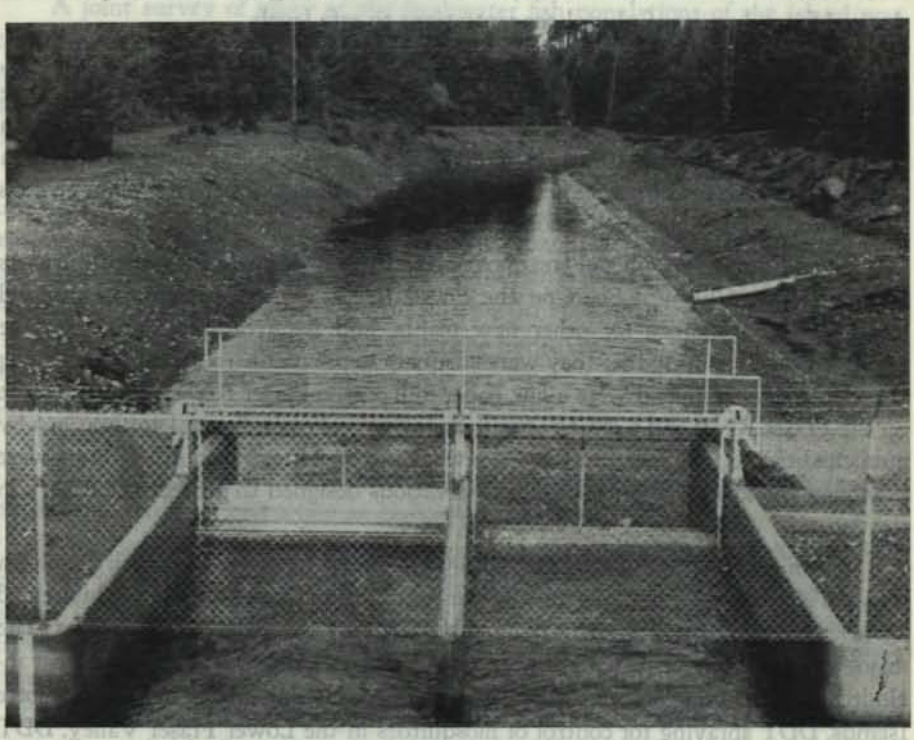
In addition to the phenol treatment plant described above for treating wastes from the Dow Chemical Plant on the Fraser River, several other waste disposal systems were examined for other new plants, and the treatment facilities were approved after ensuring that they were adequate to prevent harm to the fish. Among the plants thus examined were a fine paper mill on the Fraser River, a cement plant on the Fraser River and a meat-packing plant on the Fraser. Several applications by municipalities to pass raw and treated sewage into the Fraser and other rivers were examined and approved with certain reservations designed to protect the fishery in the future.

Chemical insecticides and herbicides were used extensively in British Columbia during 1960. Fortunately, an excellent liaison was established between the interested agencies which resulted in the maximum protection to the salmon populations. The major aircraft spray operations carried out in British Columbia during the year included DDT spraying for control of black-headed budworm on the Queen Charlotte Islands, DDT spraying for control of mosquitoes in the Lower Fraser Valley, DDT spraying for control of saddle-backed looper at Kitimat, and Benzene Hexachloride spraying for control of ambrosia beetle at Cowichan Lake and Tahsis Inlet. These spray operations required rather extensive experimental programs for the purpose of fully assessing the effect of the insecticides on the aquatic life. The use of sodium arsenite for control of marine borers was also approved at Crofton, Theodosia Arm, and other infested areas. Spraying with 2-4-D by helicopter for control of competing species of trees was conducted at Cowichan Lake, Courtenay, Nanaimo Lakes and San Juan with no damage to the fish populations.

Three important iron mine developments, Benson River, Nimpkish River and Zaballos required investigation in 1960 to determine the necessary fisheries requirements for water intake and effluent disposal systems. Copper mills at Cowichan Lake and in the Nicola River valley received similar attention in order to ensure there were no fisheries problems.

The assessment of facilities for disposal of pulp mill effluent was continued at Crofton during 1960. The construction of new pulp mills at Woodfibre and Gold River, together with the expansion of the plant at Port Alberni were the object s of investigation by the Fish Culture Development Branch.

A fishway in a new water supply dam on the Rainy River to service an existing pulp mill at Port Mellon was an interesting development during the year. This fishway is a Denil type, the first to be used at a dam in British Columbia. It was designed by departmental engineers, using features developed by the Washington State Department of Fisheries.



Upper end of Robertson Creek spawning channel, showing controls. Vancouver Island.

While no new hydroelectric projects were being planned for the immediate future, investigations continued on the Stamp River, in an attempt to find a solution to the fisheries problems it poses.

Research on louver deflectors was intensified in the Department's test flume at Robertson Creek near Great Central Lake, with the hope that these deflectors would prove efficient enough to recommend their use to prevent entry of downstream migrant salmon into the turbines of the Stamp River or similar hydroelectric projects. This research was not completed during the year and will be continued in 1961.

On Great Central Lake, studies of the beach spawning grounds of sockeye salmon were continued, with the hope of finding a solution to the problem of flooding of beach spawning grounds which would occur in connection with the Stamp River

hydroelectric project. Biologists, engineers and technicians used skin-diving equipment extensively in their studies, and were able to collect important data on the migration, spawning and incubation of sockeye in these areas. Construction of the experimental beach was started in 1960. It is anticipated that the results of this experiment will provide conclusive evidence on the environmental factors associated with lake spawning.

Also in this general area, the construction of the world's largest artificial spawning ground for salmon was completed during the year. This was the Robertson Creek Spawning Channel, officially opened by the Minister of Fisheries on November 4. The channel was designed and constructed by the Department to increase the runs of chinook, coho, and pink salmon to the Stamp River. It represents an important step in the Department's program of development of the salmon fishery on the Pacific coast.

Further plants of eyed pink salmon eggs were made in this channel during the fall. A total of 679,261 eggs were collected by fish culture personnel from the Tsolum River on Vancouver Island, and 172,672 eggs were obtained from the Fisheries Research Board's Kleanza Creek experimental hatchery. The previous year's eyed egg plants were extremely successful, showing a fry survival of 91 per cent from the eggs planted in the gravel. It was hoped that this success would be repeated during the winter of 1960-61.

The assessment of the Jones Creek spawning channel was continued in 1960. An excellent pink salmon fry survival of 63 per cent was recorded in the spring and the number of fry migrating seaward was the largest since the construction of the channel.

Another project in the Department's development program was also commenced during the year. Work was started on clearing the site and right-of-way for the Big Qualicum River project. This flow control project on Vancouver Island will ensure a minimum flow of 200 cubic feet per second in seven miles of river, in addition to eliminating all freshets of over 500 cubic feet per second in the river. The main part of the flow control works will be constructed in 1961 and 1962, and improvements to the natural spawning grounds will follow in the future.

In an effort to counteract a recent serious decline in the sockeye salmon run to the Morice-Nanika system tributary to the Skeena River, a hatchery was constructed on the Nanika River near its junction with Morice Lake. The hatchery is actually an egg-incubating station, from which the fry will be allowed to migrate naturally into the Nanika River in the spring. When completed in 1961, it will accommodate 10 million eggs in banks of drip-incubator-type trays. In 1960, 308,000 eggs were collected from Babine Lake and placed in the hatchery, to provide operating experience during the first winter. Source of the eggs for the project will be 15-Mile Creek on Babine Lake.

A crib dam was constructed on the Koeye River near Namu to prevent salmon from entering an impassable side channel. Observations had shown that there was a high mortality to salmon attempting to pass the impassable falls in the channel.

On Vancouver Island small fishways were constructed by the Department at natural rock falls on the Quatse River and French Creek.

While the development program described combined with the pollution and screening problems, occupied a good part of the time of the fish culture staff, certain other work was accomplished during the year. As in previous years, counts were made of the salmon runs to the Cheakamus River, Jones Creek, and the headwaters of the Yukon River, in connection with the existing hydroelectric developments on these streams. In addition, a tagging program on the Rivers Inlet sockeye runs and a limnological and biological survey of Owikeno Lake and its tributaries was implemented to give the Department basic information needed to protect the runs from the effects of floods, erosion, and future industrial expansion.

Protection Officers on Great Slave Lake calling their base at Hay River, N.W.T., from bombardier.

A biological program was also implemented on chum salmon in the Fraser River, at the request of the Protection Branch, to give basic data required for management of the chum salmon fishery.

The more routine work of the Branch included the examination of more than 900 applications for water rights, and more than 60 applications for placer-mining leases, which were forwarded by the provincial Government. Where the granting of the licenses would have detrimental effects on the fishery, representations were made to the applicant and to the province, and conditions to protect the fishery were placed on the granting of the application. In addition arrangements were made during the year to receive copies of all applications from the Provincial Pollution Control Board, in order that measures to protect the fishery could be incorporated in all permits granted.

During 1960 an agreement was made with the British Columbia Forest Service, to insert conditional protective clauses in all timber sale licenses and special use permits issued in the Vancouver Forest District. These clauses are designed to control stream damage from the deposition of slash and other logging debris, road building, stream crossings and fallen trees into and across stream beds. The processing of the licenses and permits requires close liaison between personnel of the B.C. Forest Service and the Department.

Studies required under the Terms of Reference of the Fraser River Board were continued in 1960. A biologist and two technicians were employed by the board to carry out fisheries studies in connection with a proposed system of dams in the Fraser which would provide flood control in the Lower Fraser Valley, produce a substantial block of power, and have only minor effects on the fisheries. In 1960 extensive ground and air surveys were carried out on the spawning grounds of the Upper Fraser, and Clearwater and Quesnel systems.

Co-operative investigations with other fisheries agencies were continued in 1960. The Fisheries Research Board, the International Pacific Salmon Fisheries Commission, the Fish and Game Branch of the Provincial Department of Recreation and Conservation, the Washington State Department of Fisheries, the Alaska Department of Fisheries, and the U.S. Fish and Wildlife Service were the chief agencies concerned, and investigations covered a variety of problems of mutual interest.

PROTECTION BRANCH

MARITIMES AREA

Protection Officers of the Conservation and Development Service perform varied duties in addition to their main responsibility, that of enforcing regulations; they collect statistical data for the Economics Service, provide sundry information for other services of the Department and, what is becoming increasingly important, they do a considerable amount of educational work, with both commercial and sport fishermen, in the interests of conservation.

In 1960, the Protection Branch in the Maritimes Area was represented by 108 Fishery Officers, 123 Wardens, 137 Guardians and the 120 officers and men in the 33-vessel Protection Fleet. As one result of their activities, the Branch dealt with 647 prosecutions which resulted in fines totalling $12,271 and jail terms for 12 people. Nearly two-thirds of the prosecutions, 400, were the result of illegal lobster fishing, which accounted for $8,603 in fines and two of the jail sentences. The other 10 jail terms were for illegal clam fishing. The patrol vessels sailed a total of 175,000 miles during the year and aircraft service was also employed when necessary.

In addition to the prosecutions, there were 2450 confiscations, in which 151,084 lobsters and 16,858 lobster traps were seized. All live lobsters were liberated. The special force of Protection Officers, drawn from the regular staff in 1959, continued to concentrate efforts against illegal lobster fishing.

As noted at the beginning of this report, 1960 was a good year for commercial fishermen in the Maritimes Area. The total landings were higher than those of the previous year but were somewhat lower in value. Groundfish generally were down

in weight and value, although pollock and flatfish catches showed substantial increases. Herring and mackerel were more plentiful than in 1959. Lobsters continued to be the most valuable species taken in the Area. Scallops, taken mainly in offshore waters, showed a large increase in landings.

The sport fishery each year attracts more and more people. During 1960, a low water year, salmon angling was poor in the Maritimes, but trout fishing was good, especially in headwater streams. The increasing interest in salt water angling, already referred to, has tended to take some of the pressure off freshwater species.

There are now about 28,000 commercial fishermen in the provinces of Nova Scotia, New Brunswick and Prince Edward Island, which together have a coastline of 6735 miles. A total of 38,065 licenses of all kinds, commercial and sport, were issued during the year. They included 21,178 lobster fishing licenses and 5430 special angling permits.

Pollution of the Area's fresh waters is increasing, due mainly to industrial development and the many uses to which streams and rivers are subjected. This carries a grave threat to the fresh water habitat of many fishes, especially the anadromous species.

PACIFIC AREA

The major concern of the Protection Branch in the Pacific Area is the regulation of the salmon fishery, including the Fraser River sockeye and pink salmon, which are under joint Canadian-United States control (see "International Commissions") and the Skeena River runs, which are the responsibility of a special management committee.

The other fisheries of major importance are halibut, where the regulations for management are recommended by the International Pacific Halibut Fisheries Commission, and herring, controlled by quota restrictions and limited open seasons in certain areas where these actions are deemed necessary for conservation purposes.

In 1960 regulatory measures, in the form of shortened fishing weeks and partial or complete closures of fishing areas, were among the most stringent and restrictive ever imposed. This was not unexpected because the pink salmon runs were exceptionally light and in many cases the returns of chum salmon were small. Then, too, there was the continuity of heavy fishing pressures, brought about by the ever-increasing efficiency of fishing gear and vessels and, indeed, the increased skills of the fishermen themselves.

Fishery Officers issued 22,975 commercial fishing licenses during the year as well as 2036 Indian Fishing Permits. In addition, 986 angling permits were issued for sport fishing in tidal areas where such permits are required by regulation, viz., Rivers Inlet, Phillips Arm and Muchalat Inlet.

There were 290 prosecutions for various violations of the Acts and Regulations, the administration of which is the responsibility of the Department. Revenue amounted to $13,601.66 from fines and $10,007.10 from the sale of confiscated articles and fish. Other duties of Fishery Officers in the Area included predator control, stream clearance and fry salvage. Officers destroyed 348 hair seals and 350 sea lions in 1960, and other efforts saved 314,850 salmon fry which had become stranded, chiefly along the lower east coast of Vancouver Island.

The number of departmental vessels on patrol duty in the Pacific Area was maintained at 40. Two wooden craft were launched during the year, the 50-foot *Falcon Rock* to replace FPL *Clupea* on the Skeena River and the 45-foot *Temple Rock* to replace FPL *Pursepa* in the Pender Harbour-Westview area. FPL *Ardea* on Stuart Lake, which was lost through fire late in 1959, was replaced by *Takla Rock*, a 26-foot fibre glass vessel of speedboat design. Re-engining of the Department's 125-foot steel Protection Cruiser *Howay* with twin 500 hp Diesel propulsion plants was completed early in 1960.

The policy of equipping Fishery Officers with small fast boats was continued in 1960. This type of vessel adds greatly to the efficiency of the Service in supplementing the work of patrol vessels and carrying out the many duties associated with the ever-increasing sport fishery in tidal waters.

The required maintenance and overhaul work on departmental vessels was carried out either under contract to private shipyards or at the Department's marine stations in New Westminster and Prince Rupert. Major rebuilding of hull and deck structures was carried out on the FPC's *Atlin Post* and *Clavella* and FPL 102.

The number of motor vehicles operated by the Protection Branch was increased from 27 to 28 by the purchase of an automobile for use of the officer on the Vancouver waterfront. Replacement vehicles were also obtained for several sub-districts in British Columbia. The number of officers' residences operated by the Department on the Pacific coast now stands at 17 with completion of an attractive and modern residence for the Fishery Officer at Port Hardy.

An additional Fishery Officer was assigned to the Yukon Territory, bringing the number of officers there to two. The area covered by these men is a large one and they have been kept busy on surveys of the potential of lakes in the Territory from the standpoint of possible commercial freshwater fisheries, as well as checking on the rapidly increasing sport fishery, pollution problems, and other conservation matters. These officers issued 6,370 licenses during the year, 6,332 of them angling permits for sport fishermen.

The most important feature of the year in the Pacific Area was the drop in salmon landings, which totalled only 11,590,000 fish, the lowest number since records were first kept in 1910, and only about one-half the average annual landings of the past 10 years.

The pink salmon pack, 220,000 cases, was the lowest since 1946, when only 116,000 cases were put up. The run to the Skeena (catch, plus escapement) was one of the poorest on record, totalling only half a million fish. At Massett, where two years ago the catch exceeded half a million pinks, the take for 1960 was only 25,000 fish, and the resulting escapement was an extremely poor one. In the Johnstone Strait and the Gulf of Georgia areas the pink runs were poor, much less than in 1958 and only about 25 per cent of normal.

The only bright spot in the coastwise pink salmon situation was the Bella Coola sub-district, where there was a large run and a good catch, approximating 1,500,000 fish. The run was also reflected in the good escapement to the Bella Coola-Atnarko system, where pinks approximating one million in number were observed on the spawning grounds. Returns of chum salmon to northern coastal areas were low and

continued to be of major concern. Of some encouragement was the fact that the spawning escapement along the east coast of the Queen Charlotte Islands, where escapements in the past six years have been especially poor, showed definite improvement over the 1956 cycle year.

In the southern coastal areas there was some improvement in the chum picture, with the run being generally somewhat better than in 1956. In some areas, however, the escapement of this species continued to be of concern, e.g., the Nanaimo-Ladysmith sub-district where the escapement was only about ten per cent of what is considered adequate and in the Fraser River system where runs, though showing some improvement over 1956, were still not satisfactory and in the case of the lower Fraser River tributaries, far from adequate.

On a coastwise basis there was general decline in the runs of coho salmon and the aggregate catch was about 30 per cent below normal. Here again this was reflected in the escapement which, in most areas, was less than in 1957.

Spring salmon returns also showed a sharp decline and the catch by trollers was in some cases down as much as 20 per cent from the five-year average. Notwithstanding the lighter runs of this species, escapements were generally fairly well maintained except in portions of the Upper Fraser watershed, the Cowichan system and the Bella Coola-Atnarko system.

NEWFOUNDLAND AREA

An intensified educational program was carried out during 1960 to acquaint not only fishermen but others of the increasing need for conservation measures. Discussions were held between fishermen and Fishery Officers and lectures were given in schools. Posters depicting the conservation theme were widely distributed and prominently displayed, evidence that there is an increasing public awareness of the need for regulation.

Lobster operations were carefully checked, and special attention was given to the enforcement of the commercial salmon fishery regulations. It was found in a number of instances that fishermen were not observing the regulations governing the weekly closed time, and there were also breaches of the regulations involving undersized mesh in nets. The extremely low water conditions during the season created additional problems in the enforcement of angling regulations.

There were 110 prosecutions for various breaches of the Fishery Regulations. The majority of offences were of a minor nature. However, there were several serious violations for which heavy penalties were imposed.

Eleven patrol vessels were in service in the coastal waters of Newfoundland and Labrador. The vessels were used for offshore patrol duties in areas where trawlers and draggers were active, in coastal areas to transfer officers to and from various assignments, and on inland river protection duties. One new vessel, the *Lomond*, went into service, and two others, a 65-footer and a 179-foot steel offshore vessel, are under construction.

During the winter months two of the larger vessels were stationed in the Port aux Basques-Rose Blanche areas, where they maintained a continuous patrol of areas fished by the inshore fleet.

On a number of occasions vessels operated by the Department were called upon to assist other vessels in distress and to carry sick and injured patients from outlying places to hospital.

The 1960 salmon angling season was not as productive as that of 1959. The very low water conditions referred to above existed in practically all rivers in the Area, making it difficult for salmon to enter some of the streams and to rest in some of the better pools, thus restricting the angling effort. The total catch by anglers was approximately 18,000 salmon, while in 1959 20,000 were landed.

Bounty payments amounting to approximately $10,000 were made to hunters on the island of Newfoundland and in Labrador for bay seals killed during 1960.

Central Area

Two patrol vessels and three bombardier snowmobiles supplemented by aircraft on occasion, were used for protection and enforcement work in the Northwest Territories during the year. All units are equipped with radio-telephones to facilitate the co-ordination of patrols through the base station at Hay River.

The number of violations totalled 11, five of which were by persons unknown. A total of $90 was levied in fines and 17 gill nets were confiscated.

For the first time in the history of the commercial fishery of Great Slave Lake, summer fishing got underway on May 16 and continued until the official closing date, September 25. This was the longest summer operation on record, and it was also the first time that fishermen were permitted to use 1,500 yards of gill net during a summer operation.

Other than the foregoing, no changes in the method of operations from previous years took place. One company experimented with bottom and mid-water trawling equipment, but attempts to catch fish in any quantities in this manner proved fruitless.

As in the past years, most of the production was trucked from Hay River, N.W.T., over the Mackenzie Highway to Peace River. However, a greater percentage of the fish was trucked through to Edmonton during the summer because of a reduction in freight rates. The total landings of whitefish and lake trout from Great Slave Lake were greater than those of the two previous years, but the percentage of trout caught was considerably smaller than in other summers. This could be due to limited fishing on the trout grounds; however, since other factors may also be involved, this fishery is being closely followed for significant changes in population.

Tourist traffic into the Northwest Territories is continuing to expand each year. Sport fishing, which is the major attraction, is increasing in importance. Most of the angling licenses sold are to United States citizens. With the highway now extended to Yellowknife the number of tourists visiting the Territories is at times more than the number of permanent residents of Hay River and Yellowknife. Four lodges are now operating on Great Slave Lake and there are plans for new ones at Fort Smith, Yellowknife and Great Bear Lake.

Accidents claimed the lives of six fishermen on Great Slave Lake during the summer of 1960, a higher toll than for several years.

During the winter season, weather conditions were ideal for the commercial fishery. Only two companies operated through the ice and both fishermen and their firms had a successful season. The domestic fishery at most Indian settlements is decreasing year by year and as a result, catches for local use show a decrease. Production in Great Slave Lake in 1960 amounted to 5,324,336 pounds, compared with 5,586,924 pounds for 1959. The 1960 catch included 3,851,922 pounds of whitefish and 1,099,730 pounds of lake trout. The small balance was made up of inconnu, jackfish, pickerel and mullet. Other lakes fished commercially during the year were Thubum, MacDonald, Kakisa, Tathlina, Reade and MacEwan. The catch in those lakes amounted to about 250,000 pounds. Interest in waters previously unfished is evidenced by the fact that the Department was asked to test fish another 30 lakes.

One hundred and eighty fishermen were employed in the commercial fishery of the entire Northwest Territories during 1960, the landed value of their catch amounting to $468,922.

The Hudson Bay beluga fishery was again prosecuted at Churchill, Manitoba, a total of 385 animals being captured, compared with 268 in 1959.

The Department's protection fleet of 81 vessels, listed in the following chapter, maintains constant patrols of commercial fishing areas of the Atlantic and Pacific Oceans and in certain inland areas. Both Canadian and international regulations are enforced in offshore waters by the larger vessels of the fleet. Smaller, fast boats are used on inshore and inland waters to protect the fisheries. All craft are subject to call at any time for service under Canada's over-all Search and Rescue Plan of Co-ordinated Assistance.

DEPARTMENTAL VESSELS

DURING the year a contract was let for the construction of a 179-foot multi-purpose fisheries patrol vessel for Canada's Atlantic waters. She will be based on St. John's, Newfoundland. The cost of this ship will be $1,114,516. She will be used primarily in protection work but will be equipped also to operate when necessary in the Department's Newfoundland Bait Service. The largest patrol vessel in the Atlantic, she will be adaptable for oceanographic duties, and laboratories and other special equipment can be installed if necessary.

In addition to the 81 vessels operated by the Protection Branch, referred to in the preceding chapter, the Department maintains a floating bait depot, the *Arctica*, in Newfoundland, a floating fish inspection laboratory, the *Belle Bay*, also in Newfoundland, and a smaller vessel, the *Ostrea*, for oyster culture work. The Fisheries Research Board of Canada has a fleet of 18 vessels of various sizes to aid in its widespread investigations.

The makeup of these fleets is as follows:

Protection Service

Name	Tonnage	Length	Crew
Maritimes Area—			
Acartia	7.16	37′	2
Alosa	52	62.5′	5
Cardita	15	45′	3
Cratena	56	65′	5
Crumella	65	65′	6
Cygnus	524	146.3′	29
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	38.7′	2
Mya II	13	38.7′	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
Yorke Point	—	26′	1

Name	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	58	73.5′	8
Lomond	17	46.6′	2
Louise Ruth	20	41.8′	2
Nebalia	29	48′	3
Pecten	13	36′	2
Point May	31	53′	3
Porella	20	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
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
Comox Post	45	54.2′	4
Daphnia	13	34′	1
Diaphus	16	39.6′	1
Egret Plume II	25	46.5′	3
Falcon Rock	18	50′	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
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
Temple Rock	16	45′	2
Takla Rock	6	26′	1

Name	Tonnage	Length	Crew
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′	2 (when required)
Fisheries Research Board			
St. John's, Nfld.—			
A. T. Cameron	330	107.5′	25
Investigator II	52	78.4′	9
Marinus	35	58.5′	6
Parr	18	44.4′	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	11	30.2′	1
Cyprina	10	34.8′	2
Montreal, P.Q. (Arctic Unit)—			
Calanus	5	47′	2
Salvelinus	13	35′	—
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

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INSPECTION AND CONSUMER SERVICE

Maritimes Area

UNDER the authority of the Fish Inspection Act and Regulations, officers of the field service in the Maritimes Area, during 1960, inspected 84,966,527 pounds of salted, dried, smoked and pickled fish and other products, including fresh and frozen lobster meat and Irish moss. This was an increase of 877,942 pounds over the previous year. These inspections did not include those conducted under the Canadian Government Specifications Board specification, which approved 25,801,942 pounds of fishery products. Most of the latter were in the fillet or processed form, with cod and haddock fillets and blocks accounting for nearly 18,000,000 pounds.

It was the first full year of operation under the C.G.S.B. program, which made systematic inspection available for the first time, on a voluntary basis, in April 1959. The C.G.S.B. standards adopted with the approval of the government and the industry are for fresh and frozen fishery products and the plants that process them. Processors meeting these standards are now permitted to use quality designations on their products. Frozen products of these plants may be marked "Canada Inspected", and fish sold fresh may be marked "Processed under Government Supervision". In each case the emblem consists of the words quoted, enclosed in the outline of a maple leaf.

The system of dockside grading started in 1957 was continued in 1960, when 73,461,500 pounds of fresh fish was inspected at the time of landing. Of this amount, 73.8 per cent was approved for packing under C.G.S.B. standards, 24.8 per cent was judged edible but not to be sold under an "approved" label, and 1.5 per cent was designated cull, not good enough for human consumption.

There was an increase in 1960 of over two and one-quarter million pounds in the quantity of salted and dried fish inspected, 58,282,456 pounds in 1960 as against 56,090,237 in 1959. There were increases in the amounts of dry pollock, dry hake, dry cusk and boneless miscellaneous species, and decreases in dry cod, green salted cod, and boneless cod. A decrease was noted in the amount of pickled, smoked and other types of fish inspected.

During the year, 339,421 containers were inspected, mostly bloater boxes. The quantities of various kinds of fish reinspected under the Fish Inspection Act during 1960 amounted to 1,671,920 pounds, the amount being somewhat smaller than that of the year before.

Two thousand, eight hundred and twenty-six lots of imported canned fish were submitted to the inspection laboratories, representing 485,147 cases of 48 cans to the case, an increase of about 17,000 cases over 1959. Seventy-one of the lots inspected and parts of 18 other lots were recommended for rejection. A total of 90 lots were

re-inspected, and of these 39 were rejected. The rejections were mainly for poor quality or the use of non-permitted chemical preservatives or colouring agents.

The field force of the Inspection Service is responsible for carrying out the requirements of the Meat and Canned Foods Act, the Fish Inspection Act, and the regulations under these acts. Among their duties are the inspection and grading of dried and salted cod, pollock, hake and cusk (including boneless fish prepared from these species), pickled herring, alewives, mackerel (split and fillets) and salmon, smoked herring, bloaters (boneless and mild cured), oysters, frozen smelts, and fresh and frozen lobster meat. Also inspected are containers (barrels, pails and boxes). Canneries, lobster meat plants, shellfish shucking plants and fish plants are inspected and graded. The species of fish inspected at dockside under the system inaugurated in 1957 are cod, haddock, redfish, grey sole, Canadian plaice, witch, catfish, pollock, hake and halibut. In 1960 scallops were included.

Inspectors also are required to check the weight of numerous fish products to prevent the marketing of "short weight" packs; to see that container markings and descriptions are according to requirements; to check labels and labelling requirements for canned fish, fresh and frozen fish, and shucked shellfish products; to maintain a constant check on sanitary conditions and operating methods in canneries, shellfish shucking plants and fish plants; to be responsible for withdrawals of routine samples of domestic canned fish for grading and inspection purposes, and of imported canned and frozen fish products for inspection, and to issue inspection and grading certificates on all types of inspected and graded fish products. Other duties of the inspectors are to give advice to fishermen and the industry on fish processing and canning, and to provide information with regard to the regulations under the Acts. Educational work is carried out among fishermen, vessel owners and plant employees.

The main fish inspection laboratory for the Maritimes Area is in Halifax, and there are regional laboratories at St. Andrews and Shediac, N.B., and Charlottetown, P.E.I. In addition, a large mobile laboratory is operated throughout the year, and two smaller mobile laboratories are operated on a seasonal basis. Temporary laboratory services were provided in the Magdalen Islands, for the benefit of canneries and other plants there.

The chemists, bacteriologists and technicians of these laboratories are responsible for the grading and inspection of domestic and imported canned fish; the determination of quality of routine samples of fish products; the examination and quality analysis of salted, smoked, fresh, frozen and marinated fish products; the chemical and bacteriological analyis of plant water supplies; the bacteriological examination, as well as chemical and physical examination of fish plants and equipment; bacteriological surveys of shellfish producing areas; the bacteriological examination of the quality of fresh and frozen lobster meat and the chemical and bacteriological analysis of groundfish fillets.

Important and large scale improvements and additions to existing fish producing facilities were the outstanding features of the fishing industry in the Maritimes in 1960. Nine plants met the C.G.S.B. standards, eight of them certified to pack groundfish under the C.G.S.B. emblem, and one for scallops only.

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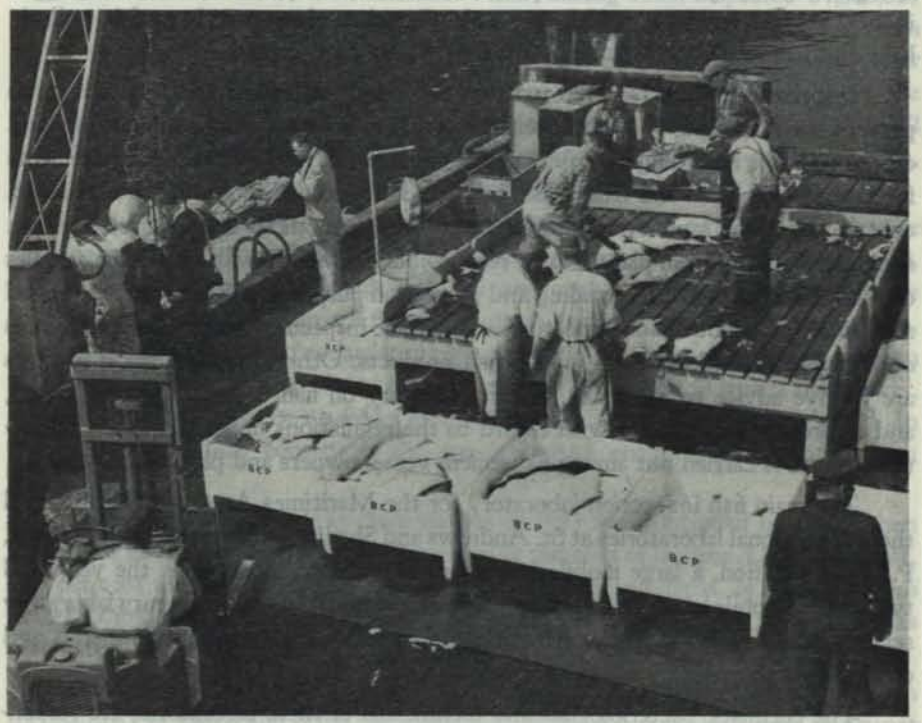
Fishery inspectors attended training courses from time to time in various parts of the Maritimes, and a successful week-long course for fish plant foremen was conducted in Halifax, with 34 men from 13 plants in attendance.

PACIFIC AREA

During 1960 the Fish Inspection Laboratory at Vancouver inspected 1891 parcels of British Columbia canned salmon totalling the equivalent of 633,764 cases (48 pounds to the case). This represented a decrease of 565 parcels and 462,669 cases from the previous year. There were no inspections of canned herring during 1960 although two plants were preparing to go into limited production in late December.



Newly landed halibut under inspection at Vancouver, B.C.

There were 1798 inspections of imported canned fish and shellfish, representing importations of more than 380,000 cases made through ports of entry west of the Great Lakes, and including eight shipments comprising nearly 18,000 cases of canned sockeye salmon from Alaska. Of the total importations, 84 lots consisting of more than 25,000 cases were refused entry because of unsound quality, and 94 lots, approximately 5900 cases, were detained until labelling had been amended to comply with the requirements of the Meat and Canned Foods Act. There were 470 inspections of imported fresh, frozen and cured fish during 1960. These represented shipments of more than 1,600,000 pounds shipped into Canada through ports in the Greater Vancouver area. Two lots of 385 boxes altogether, or about 80 tons, of dry salt herring were inspected for shipment to the Orient.

Eight plants processed fresh and frozen fish under C.G.S.B. Specification throughout 1960. In mid-season an additional plant in the Prince Rupert area completed its modernization and commenced dressing, filleting and freezing under the Specification. The other plants are at Vancouver, Victoria, Butedale, Namu and Steveston. The fish approved under the specification during the year amounted to 24,529,200 pounds, fresh and frozen.

The development of permanent reference colour standards for use in grading canned salmon has been nearly completed. Work continued on the development of grade standards for Fancy and Standard grades within the Certificate Quality classification.

During the year the bacteriological section did a great deal of work on the standardization of bacteriological methods for fishery inspection with other departmental laboratories. The bacteriologists also made many routine tests as indices of sanitation and processing efficiency in all plants processing under C.G.S.B. Specification. They also made many bacteriological tests to determine the sanitary standards of imported frozen fish and shellfish, including pre-cooked products, and investigated causes of blackening and a problem of non-sterility in an imported canned fish product.

NEWFOUNDLAND AREA

An early trap fishery and favourable drying conditions resulted in substantial quantities of salted fish being ready for market much earlier than usual.

Improved handling conditions and processing methods were evidenced in many instances, which resulted in a higher percentage of good quality fish being produced. It was noted, however, that large quantities of only partially cured fish were purchased from fishermen, which necessitated further drying before shipment.

The production of light salted fish was not sufficient to meet market demand which was unusually brisk, particularly in the case of Spain and Italy.

A total of 2565 inspections were carried out on 438,651 quintals of salted fish—195,978 quintals light salted and 242,673 quintals heavy salted. Inspection officers were stationed at all fresh and frozen fish processing plants. The voluntary inspection program adopted in 1959 under C.G.S.B. standards was continued.

Pickled fish production was disappointing. Inspection was carried out on 6560 barrels of pickled herring and 3330 barrels of pickled turbot.

In addition to training courses for Inspection Officers which are held annually, it was possible early in the year, with the co-operation of the Newfoundland Fish Trades Association, to arrange a refresher course at St. John's for plant foreman and senior employees of filleting and freezing plants. Such topics as fish handling and freezing, problems of water supply, fish spoilage, etc., were discussed by qualified personnel from Memorial University, the Fisheries Research Board, the Fish Inspection Laboratory, and the Engineering Division of the Department of National Health and Welfare. Attendance was gratifying.

Visits were made by officers to as many fish producing areas as possible. Advice and assistance was given to plant operators and fishermen where necessary. This was augmented by the showing of instructional films.

The Department's Inspection Service is assisted scientifically by the Fish Inspection Laboratory. Samples of the daily production of filleting plants were tested, and the Service's floating laboratory, the *Belle Bay*, visited most of the plants to make on-the-spot checks.

By-product analyses included the determination of the protein content of fish meal, vitamin A content of fish liver oils and bacterial counts on glues. Technical assistance was provided industry, both through laboratory and field service work, in the production of cod-liver solubles, canning, fish meal production and filleting and freezing oprations.

CENTRAL AREA

The poundage of whitefish inspected during 1960 exceeded that of any previous year on record. A total of 21,381,165 pounds were examined at the various stations and sub-stations in the Central Area and at Montreal. The trend continues towards inspection at source rather than at border-crossing points. This is evident from the fact that the bulk of the poundage, over 15,500,000 pounds, was inspected in the three western provinces. Net rejections amounted to 914,452 pounds, as compared to over one million in 1959. Whitefish rejections by the United States Food and Drug Administration increased by 100,000 pounds over those of the previous year to bring their total rejections to 436,810 pounds for 1960.

The voluntary quality inspection of freshwater species other than whitefish is a service provided to the industry on request. During the year more than 2,750,000 pounds of fish were inspected in the Northwest Territories and the Prairie Provinces. Only a small percentage was examined in Ontario.

The number of inspections of canned fish imports continues to rise. There was an increase from 331,000 to 377,767 in the number of cases inspected.

All fresh, frozen and processed fish imported into Canada is inspected for labelling requirements as well as for quality. The poundage inspected during the year is not a true reflection of the amount imported. The Department has a good working arrangement with Canadian Customs which keeps it advised of arrivals at border points. However, staff is not always available to carry out 100 per cent inspection. A total of 5,192,000 pounds were inspected in the Central Area in 1960.

The number of approved C.G.S.B. processing plants in the Central Area was reduced by one late in the year, when a plant at Beaver Lake, Saskatchewan, was destroyed by fire. Ontario, Manitoba and Alberta each have one C.G.S.B. approved plant and Saskatchewan now has five. More than two million pounds of fish processed at these plants during the year carried the Maple Leaf quality emblem.

A mobile laboratory for the Central Area was completed in March 1960 and was on display at the University of Manitoba during a course in fish microbiology conducted in May. Subsequently, the unit participated in field work in Manitoba, Saskatchewan and Alberta, filling much the same functions as the permanent laboratories in Toronto and Winnipeg. Much of the mobile unit's work was in connection with the C.G.S.B. program, but it also investigated various aspects of fish plant sanitation and production in uncertified processing plants.

There was one prosecution under the Whitefish Export Regulations, in which the offender was found guilty and fined $50. In addition, 18 boxes of whitefish valued at $238 were confiscated.

QUEBEC AREA

In the Quebec Area the activities of the federal Department of Fisheries are limited to inspection and consumer matters, the fishing regulations being administered by the Quebec Department of Fisheries. The provincial inspection service was transferred to the federal Department in 1959.

Fishery Officer gives organoleptic test to fish just off the boat.

Laboratory facilities are contained in a central laboratory at Quebec City and a mobile unit; the latter began its operations in December 1960 on the Gaspé coast. Two plants in the Quebec Area have adopted the C.G.S.B. Specification for their products.

During the year officers of the Area inspected 28,690,979 pounds of fresh, frozen and salted fish, 277,796 cases of canned fish, and 35,138 gallons of fish oils. The total was 2,341,910 pounds smaller than the amount inspected in 1959, due to a drop in landings and smaller imports of canned fish.

CONSUMER BRANCH

The number of consumer programs of various kinds, given by the Department's home economists in Ottawa, Toronto, Montreal, Halifax, Winnipeg, Vancouver and Edmonton, showed an increase during 1960. The trend toward increased use of television has continued and is expected to be even more noticeable with the opening of new private stations. Television programs given during the year included the CBC's nationwide "Open House" from Toronto and several shows on "Cuisine 30" produced by the CBC in Vancouver and taped for later showing in the Maritimes.

In October a bilingual home economist was transferred from Ottawa to Montreal and a new home economist was taken on staff in Ottawa. In early January, a new test kitchen in Vancouver was ready for use and was viewed by industry members in July when "Open House" was held by the Fish Inspection Laboratory and Test Kitchen. The test kitchen in Toronto was moved to a new location during the year.

During "National Fish 'n' Seafood Week", Open House was held for dietitians and home economists in Ottawa and a luncheon was given for members of the press and representatives from radio and television. In addition, four other special luncheons were held in the Ottawa kitchen. In Vancouver, assistance was given in catering for a seafood luncheon held by the Vancouver Parks Board for the Governor General and his party at the dedication of a statue in Stanley Park. Similar help was given at the official opening of the Robertson Creek Spawning Channel and at a public relations party of the Fisheries Association of British Columbia.

During 1960, the home economists gave 365 demonstrations, 36 television shows, 55 radio talks and 11 illustrated lectures. A large proportion of the demonstrations were aimed, as in the past years, at students in high schools, technical schools, teachers' colleges and universities. Large demonstrations arranged by the Canadian Association of Consumers were given in several areas and the home economists participated with the industry in seafood displays, special promotions and testing of new products.

Requests for the assistance of the home economists in special training programs are most gratifying, and in 1960 such instructional help was given at three special courses for hospital and restaurant cooks in Prince Edward Island and Nova Scotia, one course for R.C.A.F. personnel in training at Clinton, Ontario; one for army personnel at Camp Borden, an institute for hospital cooks from 21 small hospitals in the Prince Albert area, and a cooks' course for employees of the mental hospital at New Westminster, B.C. Equipment in the "quantity" test kitchen in Ottawa was in operation before the end of the year and a new supplement for the "quantity" booklet was prepared for the Canadian Restaurant Association. An accelerated program of quantity testing was planned for 1961 with a view to producing recipes for 100 servings.

In answer to demand from the Central Area, a film strip entitled "Let's Serve Freshwater Fish" was produced in co-operation with the Information Service. A recipe booklet to accompany this filmstrip has been prepared, as also was a salad recipe booklet.

Recipes were tested for use in newspapers, radio and television releases and in the preparation of cook books.

The Consumer Branch participated in the following conventions and exhibitions during the year: the Canadian Restaurant Association; the Hotel and Restaurant Suppliers' Show; the Western Restaurant Suppliers' Association; the Retail Merchants' Association Convention; the Canadian Dietetic Convention; the Canadian Home Economics Convention; the Nova Scotia Fisheries Exhibition; Open House at University of Toronto; the Canadian Association of Consumers Annual Meeting and the Conference on Nutrition Education of the Public at University of Toronto.

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ECONOMICS SERVICE

THE ACTIVITIES of the Economics Service fall broadly into two groups, economic intelligence and economic research. In 1960 as in previous years these two groups have been engaged in a variety of operations, supplying special statistics and economic analyses for the Department and other agencies, firms and individuals interested in the fishing industry.

Research in various phases of the primary industry was continued on both the Atlantic and Pacific coasts. Reports on two major research projects were published during the year. An economist from the University of Manitoba, employed as a consultant with the Service, completed a study which explored factors pertaining to the economic management of the salmon and halibut fisheries in British Columbia. With reference to the Atlantic coast, further reports in the series on costs and earnings in assisted fishing enterprises were published.

This year an investigation was undertaken into the economy of the freshwater fisheries. This project, although having special reference to the Canadian fisheries of the Great Lakes, is to include certain aspects of the freshwater fisheries of the Prairie Provinces. During the summer and early fall months of 1960 field interviews with fishermen, packers, processors and fishery officers were carried out. These interviews recorded the experiences and opinions of those familiar with the principal fishing areas of the Great Lakes. In addition, visits were made to provincial officials in Manitoba, Saskatchewan and Alberta and through them opportunities were afforded for some field observation of the Prairie fisheries.

Late in 1960, plans were being developed for an economic study of the lobster fishery of the Atlantic coast. Statistical and biological materials relative to the study were assembled and preliminary preparations were made for a program of field survey work.

As in other recent years, further progress was made in improving the quality of the statistical services on both the Atlantic and Pacific coasts. On the Atlantic coast additional experience was gained in assembly and tabulation processes in statistical operations. A survey of collection procedures in the field was carried out with a view to improving their efficiency. On the Pacific Coast, a new installation for mechanical tabulation (IBM) was being planned in collaboration with the Dominion Bureau of Statistics. The new system, in addition to yielding the information previously made available, will permit the development of other compilations from current sources as well as from special surveys as required.

In 1960, as in several years past, the Economics Service in the Maritimes and Newfoundland Areas was called on for assistance in providing information for the Department of Public Works to be used in assessing proposed projects bearing upon the commercial fisheries. This involved a number of special investigations in the field. Similar investigations were related to applications from the industry for assistance

of various kinds. An up-to-date tabulation of men, boats and gear, classified according to port of landing, served to improve the quality of this service and also to provide a basis for further economic surveys.

Representatives of the Department of Fisheries, the Fisheries Research Board and the Dominion Bureau of Statistics held meetings and consultations throughout the year on various questions related to fishery statistical services. Because of the range in variety of statistical needs—administrative, scientific, business and so on—the co-ordination of the efforts of all concerned is a major assignment of this Service.

As indicated in earlier reports, a large proportion of staff time is allocated to liaison duties with various international organizations, with other government departments both federal and provincial, and with the fishing industry. This involves attendance at numerous meetings in this country and abroad, as well, usually, as the preparation of papers or other documentation and the like. Detailed reports of these activities would not be appropriate here but much of this unspecified work is reflected elsewhere in other sections of this Annual Report.

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INFORMATION AND EDUCATIONAL SERVICE

THROUGHOUT 1960, the Information and Educational Service continued to work closely with other Departmental services and the Fisheries Research Board of Canada to bring to the attention of the Canadian public the importance of the fisheries to the national economy; to stress the nutritive value of fish products and to familiarize all sections of the fishing industry with biological, technological and other developments of interest to them, including new regulations or changes in existing statutes.

In fulfilling its responsibility of creating a greater public awareness of the fisheries in the broadest sense, the Service carries out a highly diversified program of communications through all publicity media, i.e., the daily and weekly press, magazines, radio and television outlets. The Service works closely with various other departments of government, scientists and technologists, and those whose activities affect or are related to some phase of the fishing industry.

The Service implements this over-all program by issuing a steady flow of material on a wide range of fishery topics of national and local interest. This material, which is compiled by the Service's headquarters unit in Ottawa and its information officers in the Pacific, Maritimes and Newfoundland areas, takes the form of periodical publications, press releases, pamphlets, booklets, and informational sheets. Supplementing this aspect of the Service's functions are the publications which it produces, each of which is designed to meet a specific need.

A principal means of disseminating information on a wide variety of fisheries subjects is the Department's monthly magazine, *Trade News*. Through its various sections, this periodical not only covers the Canadian fisheries scene but provides selected information on fisheries developments in other countries, in order to keep its readers abreast of the rapid strides in fisheries technology and processing.

Trade News enjoys an enviable reputation as an authoritative source providing up-to-date information on the fisheries, and many of its articles are reprinted in other fisheries magazines, both Canadian and foreign. A large number of people concerned with Canada's fisheries, i.e. fishermen, industry officials, and federal and provincial fisheries personnel receive the magazine; it is also widely circulated abroad.

Another Departmental publication for which the Service is responsible is *The Canadian Fish Culturist*. This journal is designed to provide a forum for the dissemination of information on developments in fish culture. It is composed of papers on fish cultural practices, and is distributed to people or organizations with a direct interest in this field.

Preparatory work was done for the first issue of a new publication, *Canadian Fisheries Reports*, which is being established to provide a medium for information

which might otherwise not become generally available to those whose interests are identified with or related to the fishing industry. This will include material which, while perhaps not suitable for purely scientific journals, might at the same time be of too technical a nature to find ready acceptance in more general publications. The contents will deal with conservation, inspection, development, economics and related subjects.

Numerous special articles on the fisheries were written by the staff during the year, often on request, for governmental and other publications.

The Service's Radio and Television section continued to broaden its activities during the year. Many departmental and Research Board officials were interviewed

Headquarters of the Department of Fisheries of Canada are in the "A" Block (foreground) of the new Sir Charles Tupper Building, Confederation Heights, Ottawa. The Rideau River can be seen in the background.

by the Radio Information Officer at Ottawa and some 60 tapes were made for distribution to the Canadian Broadcasting Corporation and independent radio stations. The CBC's Fishermen's Broadcasts, which are aired over stations in the Pacific, Maritimes and Newfoundland Areas, are the chief outlets for these tapes; in addition, they are now being used to a greater extent by the private stations. Several of these productions were used on the program "Assignment", which is carried by a network of independent stations. Area Information Officers also contributed taped interviews to local stations. As a result of these activities, a wide range of fisheries topics is brought to the attention of many Canadians through the medium of radio.

In 1960, the Area Information Officers and the headquarters staff were instrumental in arranging for several television appearances of departmental officials as well as fish cooking displays by departmental home economists. In all Areas there was an increased demand by local television stations for this service.

As in other years, a great variety of informational material dealing with consumer education was developed and distributed. Releases of consumer interest were sent out regularly to daily and weekly newspapers and a periodical release was supplied to radio and television stations. A regular press release, "Featuring Fish", is distributed to 60 daily and 135 weekly newspapers which have expressed a desire for the material. A radio release, "Fisheries Flashes", is sent monthly to 94 radio and 16 television stations. Both releases are published in French as well as English and are available, on request, to other food editors and commentators anywhere in Canada. The two releases are written in a different style, and give recipes and up-to-date information on the purchasing, storing, and preparation of fish products. Both bring to public attention new developments in marketing and merchandising of the products. In connection with the press release, illustrations of fish dishes, in the form of glossy prints or mats, are supplied to editors.

During the special industry promotional campaign, "Fish 'n' Seafood Week", sets of six matte finish food photographs with accompanying scripts were supplied to 55 TV stations. A booklet containing recipes for the dishes pictured was prepared and made available to the public.

Editorial assistance was given to the Department's home economists in the preparation and revision of fish recipe booklets. The latest one, "Fish for Year 'Round Salads", has had wide distribution. In addition, feature articles publicizing their work were prepared for the magazines *Professional Public Service* and *The Canadian Home Economics Journal*. Ten thousand reprints of the article appearing in the former magazine were obtained for distribution at conventions and exhibitions attended by home economists and others connected with the food industry.

The educational activities of the Service include the distribution of pamphlets on the fisheries, the showing of films and filmstrips, and the designing of displays for fisheries exhibitions. "Fisheries Fact Sheets" are the most widely distributed informational material. These provide background information on fish and fishing, and many other related topics, and are designed primarily for classroom use and adult study groups. The fact sheets, which cover nearly 100 different subjects, are distributed without charge.

The Department's educational booklets, of which over 350,000 copies have been distributed to the general public, are another important part of the Service's educational operations. These are printed in both French and English and are made available without charge to provincial educational authorities for distribution to schools. Booklets in this series deal with the salmon of the Pacific and Atlantic regions, science in fisheries, oceanography and fishing methods, the lobster fishery and Canada's fisheries as a whole.

An important feature of the Service's educational work in 1960 was its continued effort to make lobster fishermen realize the need for conservation practices. Illegal lobster fishing in a few areas of the Maritime Provinces had taken on serious

proportions, and in a co-ordinated attempt to reduce this hazard to the fisheries, some 25,000 copies of the educational booklet, *Canada's Lobster Fishery*, were distributed among fishermen. This was followed by a series of four posters pointing out the benefits derived by all fishermen when they follow sound conservation policies. Nearly 7000 copies of these, in both French and English, were displayed in post offices and other public places in all lobster fishing areas in the Maritimes, Quebec, and Newfoundland.

The importance of visual aids as an effective way of educating the public on fisheries matters is an integral part of the Service's educational work. During the

A few of the fish recipe books published by the Department over the years. The latest one, lower right, is a best seller. The Department of Public Printing and Stationery has sold more than 25,000 copies at $1.00 each.

year, Area Information Officers in particular were active in screening the Department's various films and filmstrips. The Department's film work is channelled through the National Film Board, and the high calibre of work produced has brought credit to both the Department and the Board. This was in evidence again last year when the filmstrip *How to Buy Fish* was selected for showing at the American Film Festival in New York City. The filmstrip *The Story of Pacific Salmon* has proved very popular. It was released in 1959 and 289 prints were sold in 1960, bringing the total distribution to 460.

As in the past, the Information and Educational Service did press and public relations work for the annual meeting of the Fisheries Research Board and for various national and international commissions meeting in Canada, as well as assuming other information functions at various "Open House" programs conducted at the Research Board's biological and technological stations. Another responsibility is to provide assistance to the secretariat of Departmental, inter-departmental and national fisheries committee meetings when required.

The Service plans and arranges for the showing of displays when and where they will be of benefit to fisheries. As in other years, in 1960 it provided one for the Nova Scotia Fisheries Exhibition and Fishermen's Reunion at Lunenburg, N.S., and others for similar affairs in other parts of Canada, as well as for conventions in which the Department's home economists participated.

One of the important tasks of the Pacific Area Information Officer in 1960 was to make public relations arrangements for the official opening by the Minister of Fisheries of the Robertson Creek Salmon Spawning Channel, a major project on Vancouver Island completed by the Department's Fish Culture Branch. This was an event of great significance from the standpoint of public relations and the extensive coverage given it by newspapers, radio and television stations was most gratifying. The Maritimes Officer continued to provide a weekly review of the commercial fisheries for the CBC's Farm and Fisheries Broadcast, and the Newfoundland Area Information Officer carried out similar duties. The latter also was the Department's representative 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. In Ottawa, a member of the Information staff represented the Department on the interdepartmental committee on the Government's forthcoming new edition of the Style Manual for Writers and Editors.

INDUSTRIAL DEVELOPMENT SERVICE

THE INDUSTRIAL DEVELOPMENT SERVICE has as its primary objective the 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, and the administration of related financial aids. The Service encourages the fishing industry, provincial fisheries authorities, and others to suggest and recommend areas of study and investigation and to participate in so far as is practicable in the developmental projects undertaken. The Service keeps in close touch with results of fisheries technological developments both at home and abroad in order that those findings showing promise may be applied in a practical way to the Canadian fisheries.

The activities of the Service may be classified under three main headings, i.e. *engineering, vessel and gear design and development,* and *special services.* The following is an outline of the current program identified with the responsible organizational unit:

ENGINEERING SECTION

The services rendered by this section have relationship to:

(a) Plant layout and design.
(b) Development and demonstration of processing equipment and techniques.
(c) Development and demonstration of transportation and handling equipment.
(d) Development and improvement of fish products.
(e) Development and improvement of packaging.

During the year a number of projects, including the following, were either studied or undertaken:

Refrigerated Road Transportation

As a result of a joint survey of some sixty refrigerated trailers by the National Research Council and the Department, it was determined that frozen fish was frequently transported at higher than desirable temperatures. Subsequent road tests carried out with the co-operation of a trailer manufacturer and the Council pointed up a number of insufficiencies which contributed to these conditions. Studies have led to an improved design for refrigerated trailers which it is believed will assure zero temperatures throughout the load without any significant increase in capital cost or any decrease in payload.

Continuous Salt Fish Dryer

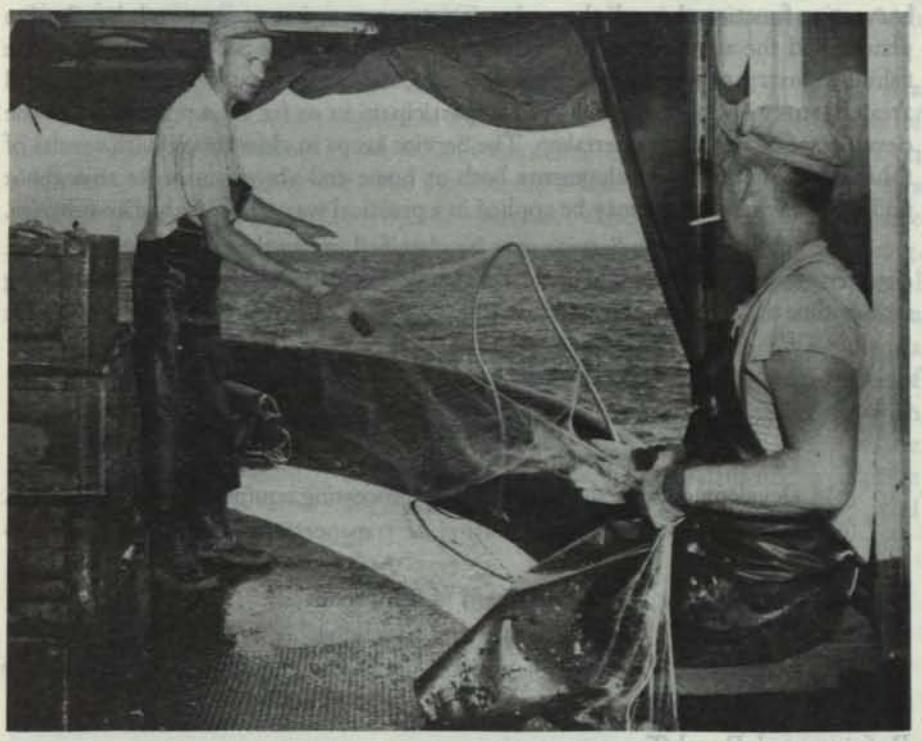
This dryer, developed by the Department, was the subject of further studies during the year. The objective of reducing processing costs by a reduction in labour has been achieved.

Preliminary Layout and Design of Fish Plants

A number of problems relating to the expansion and improvement of salt fish plants were studied and recommendations and technical assistance made available. Work was also undertaken in the design of facilities required for the processing of fresh and frozen fish.

Design of Processing Equipment

A herring-mackerel filleting machine and a semi-automatic pre-cooker to meet the needs of processors of chicken haddie were designed for small cannery operations.



Lake Erie fishermen pay out a gill net.

Fish Processing Experimental Plant

The principal effort of this plant, located at Valleyfield, Nfld., was directed to the development of commercial processing methods for the production of skinless and boneless salt cod blocks of various cures and in various types of packages. In addition to the successful development of the processing techniques and packaging methods, substantial quantities of this new product were shipped to world markets in order to determine consumer acceptance.

A commercial scale dryer was designed and installed to study the effect of relatively high air velocities on the drying of salt fish products from quality and economic aspects. The principle of utilizing higher velocities evolved from research work carried out by the Memorial University of Newfoundland.

Community Processing Facilities

The construction of community stages in Newfoundland is progressing and the fishermen operators are producing better quality fish under improved control and sanitary conditions.

VESSEL AND GEAR SECTION

The services rendered by this section have relationship to:

(a) Development and demonstration of new and improved vessels, gear, catching techniques and devices.

(b) The finding and exploitation of commercial fish stocks.

Many of the activities, including those in the following list, were undertaken in co-operation with provincial fisheries authorities and other agencies:

Technical assistance in instructional courses for fishermen.

Experiment in great long-lining.

Demonstrations of improved gill netting techniques.

Study of herring fishing techniques.

Demonstrations of Danish seining.

Mackerel seining experiments.

Commercial trials of aluminum lobster traps.

Plastic lobster trap experiments.

Development and introduction of trawling gear for freshwater smelt and perch.

Survey of fish catching methods.

Technical assistance in the introduction of fish traps.

Development of stern scallop dragger design.

Trials and modifications to a new 50-foot multi-purpose vessel.

Small boat dragger experiments.

Technical advice on the transition of wooden to steel trawlers.

The development of deck arrangements and introduction of more efficient deck gear.

Hydrodynamic and vessel design studies.

Demonstration of mechanical clam digger.

Clam explorations.

Shrimp explorations.

Ocean quahaug harvesting and transfer.

Fish finding equipment studies.

Studies directed to improving fishing craft propulsion.

SPECIAL SERVICES SECTION

The administration of financial programs by this section is designed to aid in the development of the fisheries and includes operations under the dragger and long-liner assistance program, the bait storage assistance program and responsibilities in the fields of marine aids to navigation and public works.

Dragger and Long-Liner Assistance

Regulations provide for the making of grants for the construction of fishing vessels of the dragger and long-liner types constructed in the Atlantic coast provinces; this assistance is directed to the modernization and increased efficiency of fishing craft. During 1960 grants totalled $428,738 for 67 vessels.

Bait Storage Assistance

The availability of bait in quantities sufficient to meet the needs of fishermen on the Atlantic coast is a continuing problem. Under Regulations assistance is provided operators of frozen bait storages where fishing conditions require such facilities. During 1960 such assistance totalled $42,992 toward the construction of six bait storages.

FISHERMEN'S INDEMNITY PLAN

THE FISHERMEN'S INDEMNITY PLAN, a form of marine insurance for small boat fishermen, came into operation in 1953. Under the Plan, fishermen engaged in the sea fisheries owning and operating fishing vessels valued at between $250 and $10,000 are able to secure protection against total or partial loss of their fishing vessels for a nominal premium of one per cent of the appraised value per annum. Lobster fishermen in the Atlantic coast provinces may also secure partial insurance coverage on their lobster traps during the lobster fishing season by paying a nominal premium based on the number of traps used during the season.

The Plan, in so far as it applies to fishing vessels, has proved extremely popular with fishermen who previously were unable to secure this type of protection through commercial channels. The ability to insure these small fishing vessels has not only significantly assisted those fishermen who suffered unexpected loss or damage but has also proved useful in enhancing the security value of such fishing vessels as a basis for credit.

The indemnity payable in the event of total loss is limited to 60 per cent of the appraised value in the Atlantic provinces but in British Columbia, where the loss experience has been less severe, the rate of indemnity has been increased to 70 per cent of the appraised value. On the Atlantic coast, indemnity in the event of partial loss is limited to that part of the cost of repairing the damage in excess of 30 per cent of the appraised value while on the Pacific coast that part of the repair cost in excess of 15 per cent is paid.

TABLE—FISHERMEN'S INDEMNITY PLAN
NET PREMIUMS COLLECTED AND INDEMNITIES PAID FROM INCEPTION OF PLAN (JULY 1953) TO DECEMBER 31, 1960

Province	Vessels		Lobster Traps	
	Net Premiums	Indemnity	Net Premiums	Indemnity
	$	$	$	$
Newfoundland	95,648	185,550	13,996	58,138
Nova Scotia	118,838	136,229	98,918	347,895
New Brunswick	36,790	33,054	628	1,070
Prince Edward Island	15,751	8,403	15,207	43,859
Maritimes	171,379	177,686	114,753	392,824
Quebec	25,943	57,720	10,788	22,833
Atlantic Coast	292,970	420,956	139,537	473,795
British Columbia	499,504	422,527	—	—
TOTAL	792,474	843,483	139,537	473,795

At the end of December 1960, a total of 5560 vessels were insured in the Plan for a total appraised value of $17,545,505. This total represents an increase of 282 vessels valued at $1,596,355 over the corresponding figure a year previously. Most of the increased business occurred in British Columbia where the Plan has been very well received by fishermen.

Since the inception of the Plan in July 1953, a total of 890 claims have been settled for a total of $843,483. During 1960, new claims amounted to 151 for a value of $166,180. Fire and storm continue to be a most frequent cause of loss or damage.

FISHERIES PRICES SUPPORT BOARD

INCOME to sea fishermen, as measured by the landed value of the catch, declined by seven per cent in 1960 as compared to 1959. The results by provinces, however, show considerable variation; Newfoundland, New Brunswick and Prince Edward Island fishermen enjoyed an increase in the landed value of their catches while those of Nova Scotia, Quebec and particularly British Columbia had a less favourable experience. The decline in British Columbia was associated with low runs of all important species of salmon and curtailed operations in the herring fishery arising out of a collapse in world prices of fish meal. There was no significant change in landings or landed values of the freshwater fisheries in 1960 as compared to 1959.

From the point of view of markets and prices to fishermen, 1960 was characterized on the Atlantic coast by exceptionally strong demand for salted fish and increasing strength in the fresh and frozen sector as the year progressed. The strong demand for salted fish was largely responsible for the record value of the Newfoundland catch which is dominated by cod. On the Pacific coast, prices for the short runs of salmon were strong but the severe drop in world prices of fish meal brought about a re-negotiation of purchasing arrangements between fishermen and processors before production was resumed on November 20. The new agreement called for elimination of tendermen from the operation rather than a direct change in prices to fishermen for the raw fish.

During the year, a number of investigations were carried out by the Prices Support Board, both in the sea and inland fisheries, but no action programs were initiated.

The staff of the Board continued to administer the Fisheries Salt Assistance Program and the headquarters activities of the Fishermen's Indemnity Plan. Under the Salt Assistance Program fishermen and other fish processors using salt for the curing of fish receive a rebate of 50 per cent on their laid down cost of salt. On the basis of 1960 production of these items, payments were made to 6201 fishermen totalling $475,773.78. Payments were also made to 423 processors amounting to $272,404.26. Total payments were $748,178.04.

The Board continued to co-operate with the Economics Service of the Department in the collection and analysis of costs of fishing operations in the Atlantic coast 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.; Francis Millerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.

FISHERIES RESEARCH BOARD OF CANADA

THE INVESTIGATION of Canada's aquatic living resources, their constitution and utilization as well as the productivity and the climate of the aquatic environment, has been entrusted to the Fisheries Research Board of Canada. The Board derives its authority from a special Act of Parliament, and operates under the control of the Minister of Fisheries. Organized initially in 1898 as the Board of Management of the Marine Biological Station, it is one of the oldest government-sponsored research units in Canada and the oldest research body in North America which has been continuously supervised by a selected honorary board of specialists. It has had a long and productive history.

Board membership, excepting the Chairman, during 1960 numbered 17. Members included leading scientists from Canadian universities, businessmen with an intimate knowledge of fishing and the fishing industry and officers of the Department of Fisheries. The Chairman of the Board, Dr. J. L. Kask, appointed by the Governor in Council, is a member of the public service of Canada. All other members hold honorary appointments from the Minister of Fisheries, and serve for five-year terms.

Deputy Minister G. R. Clark of the Department of Fisheries, and A. D. Wymbs, Chief Treasury Officer of the Department of Fisheries and Honorary Treasurer of the Board, serve as ex-officio members of the Board's Executive Committee and attend all Board and Executive Committee meetings. The Assistant Chairman is O. C. Young, who acts for the Chairman in his absence.

The Board has both advisory and administrative functions. The advisory functions are assigned initially to four regional committees, the Eastern, Central, Western and Arctic Advisory Committees. These committees each met once during the year at one or another of the Board's principal research stations and once again at the time of the annual meetings in Ottawa. Their function is program review with a view to program improvement. The administrative functions are referred to the Executive Committee. This committee met three times during the year to deal with the business and personnel aspects of the Board's responsibilities. The Board as a whole meets once a year to review over-all programs and to consider Advisory and Executive Committee recommendations and actions.

The Board's research activities are almost completely decentralized. Day-to-day administration at headquarters in Ottawa is carried out by the Chairman and his associates.

The research work of the Board is divided into three principal branches: research in aquatic biology with emphasis on fishery biology; research in fishery technology, and research in oceanography. A large fraction of the biological effort is taken up by investigations carried out for a number of international fishery and

sea mammal commissions to which Canada is party. These include the International Commission for the Northwest Atlantic Fisheries, the International North Pacific Fisheries Commission, the International Whaling Commission, the Great Lakes Fishery Commission and the North Pacific Fur Seal Commission. Fishery technology includes investigations leading toward improvements in fish handling, preservation, processing and utilization. Oceanography includes the study of ocean transport, climate of marine waters, and aquatic productivity.

Co-operative research programs in oceanography were carried out during the year with the Royal Canadian Navy, the Department of Transport and the Department of Mines and Technical Surveys, while close liaison was maintained with the Institute of Oceanography at the University of British Columbia, the University of Toronto's Great Lakes Institute, and Dalhousie University's Institute of Oceanography. Joint programs of research have also been carried out with provincial governments and with the International Pacific Salmon Fisheries Commission. A number of industrial development projects have been continued with the Department of Fisheries, and the National Research Council has again given administrative assistance in managing Board-sponsored post-graduate scholarships.

The Board's researches are carried out from four biological stations, an Arctic Unit, three technological stations, two technological units and two oceanographic groups.

BIOLOGICAL INVESTIGATIONS

The Board's principal biological stations are situated at St. John's, Nfld., St. Andrews, N.B., London, Ont., and Nanaimo, B.C. In the interests of economy and efficient operation these stations often maintain port observers and field stations in distant areas.

Atlantic Fisheries—Newfoundland Area

Total groundfish landings in Newfoundland in 1960 decreased somewhat below 1959, but there were increases in redfish and American plaice. Inshore cod landings were sustained by the abundant 1955 year-class, in its second year in the fishery. The annual inshore survey showed that one-year-old cod were numerous. This abundant 1959 year-class will be available for harvest in 1963 and subsequent years. Haddock landings were a little less than in 1959. Almost all came from the south-western Grand Bank region, with five-year-old fish predominating. Again it was found that St. Pierre Bank had not been significantly replenished since the 1949 year-class provided a large fishery there in 1954-56.

Redfish surveys were continued in 1960. Commercial quantities of redfish were found southeast of Hamilton Inlet Bank from 150 to 300 fathoms, and locally in areas off northeastern Newfoundland. Utilization of redfish by foreign vessels increased to even higher levels in 1960. Newfoundland landings, though small relatively, were up by 25 per cent. American plaice landings in Newfoundland were up 15 per cent over 1959, compensating for the reduction in haddock. Exploratory fishing indicated continued high availability of plaice along the eastern slope of the Grand Bank, while the undesirable "jellied" condition of the larger plaice has greatly decreased since 1950-52.

The shrimp surveys of 1957 and 1958 were summarized and put into permanent record in a Bulletin now being printed.

Calculations of the probable effect of changing trawl mesh size show that sizes up to five inches for cod and four and one-half inches for haddock would increase sustained yield from a given number of recruits, with only a small immediate loss.

Atlantic Fisheries—Southern Area

The fishery for lobsters in the Maritime Provinces continues to be intensive; up to 80 per cent of available lobsters are taken each year. Landings remained at a high level during 1960. A blood disease caused severe losses locally among impounded lobsters in the Nova Scotia region. Laboratory studies were made on this and on holding procedures. Oyster stocks on the mainland are still suffering from epidemic disease. The last important New Brunswick area fell in 1960 and the last two in Nova Scotia may now be infected. Prince Edward Island oysters are disease-resistant and thriving. There the search for larger supplies of "bedding" oysters continued, with encouraging results from trial rearing of spat to bedding size (one to two inches). The experiments were carried out in tanks treated with chemicals to destroy competitors and covered with plastic to maintain high water temperatures. The scallop harvest from Georges Bank reached a new high in 1960, though the smaller size of approaching year-classes will probably reduce the catch per boat in 1961 and 1962.

Movement of cod in the Gulf of St. Lawrence was demonstrated between the Bay Chaleur region in summer to off Cape Breton in winter. Discards of undersize cod from Gulf of St. Lawrence draggers at sea were again studied; using $4\frac{3}{8}$-to $4\frac{1}{2}$-inch nylon cod-ends, discards amounted to 13 per cent by number and six per cent by weight. Comparative fishing tests showed that longliners take much larger cod than draggers when fishing on the same ground. Assessment studies demonstrated that higher landings of ICNAF Subarea 4 cod should result from use of 5-inch or $5\frac{1}{2}$-inch trawl meshes. Haddock on the Nova Scotia Banks depended mainly on the 1955 brood in 1960, but smaller broods now growing up suggest a temporary decline in landings by 1962. Discards of American plaice from Gulf of St. Lawrence draggers continue to be high, about 80 per cent by number. Pollock studies of growth and distribution were begun in 1960 in the Bay of Fundy, where these fish feed mainly on crustaceans.

Salmon catches in the Gulf of St. Lawrence were down in 1960, following extensive mortality among the broods in question from DDT spraying of New Brunswick forests through 1958. Since then spraying of the more northerly areas has been greatly reduced. A smolt migration of close to pre-DDT levels occurred on the Miramichi River in 1960, so improvement in the supply of large salmon may be expected two years hence. Evidence for distant journeys made by salmon was increased this year by the capture in a Greenland fishery of an eight-pound salmon tagged as a smolt in the Miramichi. Another entered the Bay of Fundy. Pollution and obstruction of salmon waters increased somewhat in 1960. A zinc mine released poisonous water into the Northwest Miramichi which delayed the upriver migration of adult salmon and severly reduced populations of young salmon. The Beechwood Dam on the Saint John River continues to offer difficulty for downstream migrating smolts, and summer oxygen contents are low in deep water. Indirect or latent

damage from metallic pollutants and from DDT was demonstrated. Young salmon that were not killed immediately were weakened so that, some weeks later, many of them succumbed to environmental stresses that are not lethal to healthy fish—for example, low temperature.

Pacific Fisheries

Exploration and analysis of data by three nations has provided a fairly comprehensive picture of the ocean distribution of salmon in the Bering Sea and south of the Aleutian Islands. Mixing of Asiatic and American salmon occurs over a broad zone

Scientists from the Biological Station at St. John's, Newfoundland, gather data at a hydrographic station in the Northwest Atlantic.

extending at least from 170° E (near the Commander Islands) to 163° W (off the Alaskan Peninsula). The Fisheries Research Board's contribution to this has included identification of sockeye by distinctive parasites, and of chum and certain sockeye by a characteristic scale pattern. Exploration and some tagging on the high seas was also done. Some Canadian-bred salmon inhabit the eastern part of the zone, and a

few go west far enough to be taken in the present Japanese oceanic fishery. Further study is expected to fill in details of distribution of Canadian salmon, especially in the eastern part of the Gulf of Alaska where little work has been done so far.

Along the coast of British Columbia and in adjacent regions salmon runs were almost uniformly very disappointing in 1960—a combination of low abundance and small size of the fish suggests unfavourable oceanographic conditions over a wide area. Fortunately conditions for spawning and fry survival were good in most areas: in a small stream of the central coast survival to fry stage during the winter 1960-61 was 22 per cent for chum salmon and 40 per cent for pink salmon—about four times what is usual. At Babine Lake a large brood of sockeye smolts was produced for the third year in succession—presaging good adult stocks in 1961-63.

Studies were continued on the capacity of adult and young salmon to withstand stresses such as are imposed by fishways and harmful chemicals. Adult sockeye were able to swim at 2.5 feet per second more or less indefinitely, but at three feet per second they became fatigued. To avoid continued encounters with fast currents in rivers, sockeye can glide in surface waves or hold to the bottom with fins extended; they also select definite favourable pathways in surmounting obstacles.

Groundfish investigations obtained better information on distribution of stocks of cod, lingcod, lemon sole, petrale sole, rock sole and others. Rock sole landings increased as a result of a large brood or broods of young now reaching commercial size, while the vulnerable petrale sole again slumped. Herring stocks remain large and reasonably stable.

New checks on clam toxicity showed that this had almost disappeared in 1960. Extensive deep water explorations for clams and scallops showed only small supplies in the few areas where the dredges could be used. Most bottoms were too stony for dredging—even those marked as "sand" on charts.

Fur seals were taken and studied for the purposes of the International Commission on Conservation of North Pacific Fur Seals. Off British Columbia their food was mostly herring. At the present high level of the east Pacific stock, reproductive rate is less than the maximum, as shown by many abortions among the females taken. Sea lions were sampled and tagged to learn more of their potential as a resource and for damage to fisheries.

Some improvement in design of a midwater trawl was accomplished, and basic work in progress will permit additional decrease in its water resistance, hence greater towing speeds. Numerous tests and measurements of net twines will serve as a basis for new official specifications.

Inland Fisheries

An experiment in sea lamprey control continues to occupy a large part of the Board's attention in fresh waters. In 1960 additional streams were treated with the selective lamprey toxicant, and stream barriers to adult lampreys were maintained. The decline in lake trout abundance has not yet been arrested, but the full effects of chemical treatment will not be apparent until 1962. However, surveys again showed that there are considerable numbers of young ammocoete lampreys living in

the lake, out of the range of lampricide applications. Laboratory studies of radioactive isotopes were conducted, to find a superior mark for young lampreys and fish.

At Great Slave Lake the annual sampling of the catch showed that the size of lake trout and whitefish taken in 4½-inch mesh gill nets has become stabilized. The total catch was somewhat less than the lake's quota because of reduced fishing. At Heming Lake methods of capture and tagging of live fish were tested in 1960, in preparation for intensive evaluation of methods of estimating stock size and rate of fishing.

Arctic Fisheries

In 1960 exploratory fishing and dredging up to moderate depths in western arctic waters revealed a rich food supply for fishes, but no large concentrations of usable marine fishes were located. Capelin again appeared in large numbers on shore at Herschel, and sea-running whitefishes and ciscoes were numerous at the river mouths. In the eastern Arctic, exploration for additional usable arctic char stocks was carried out around Baffin Island. Studies of mammals, fishes and fish foods were carried out over a wide area from the polar continental shelf off Ellef Ringnes Island down to the Gulf of St. Lawrence. At the Belcher Islands, Hudson Bay, catching ringed seals with nylon nets was shown to be feasible and economical of the stock, because none are lost from sinking. The prospects of the harp seal industry off Newfoundland again deteriorated, as a third nation joined the sealing fleet. The present unregulated fishery is dipping deeply into future breeding stocks; under these conditions commercial extinction of the herds is only about 10 years off.

Continued studies in biological oceanography, particularly on secondary production, have produced new knowledge of marine arctic biology which is a useful complement to physical oceanographic data in interpreting water movements and mixing in the arctic and subarctic regions.

OCEANOGRAPHIC INVESTIGATIONS

Oceanographic activities in Canada are co-ordinated under the Canadian Committee on Oceanography, which is now representative of eight federal agencies and three teaching and research institutes. For over half a century the Fisheries Research Board has been one of the more active agencies in furthering the science of oceanography. Under a five-year plan developed under the Committee on Oceanography, the Board will continue its active role in the expanded Canadian program but its main activity will be directed to the problems of fisheries oceanography.

Oceanography for fisheries is a study of environments and of the fundamental processes in the ocean that relate to these environments. The cycle of life in the sea is an intricate process, and fish is one of the products.

Oceanographic studies are carried out by the Board's Atlantic Oceanographic Group at Halifax, N.S., and the Pacific Oceanographic Group at Nanaimo, B.C. The biological stations at St. John's, Nfld., St. Andrews, N.B., and Nanaimo, B.C., as well as the Arctic Unit at Montreal, Que., further the collection and analysis of oceanographic data which are of immediate concern to fishery investigations in progress.

On the Atlantic coast considerable attention has been directed to the study of the circulation of surface waters. This has a very important bearing on the drift of fish eggs and larvae. These studies have been furthered by releases of drift bottles from lightships and ships on regular ferry routes; by the use of radar drift-poles; and by modern electromagnetic methods. These studies are integrated with similar activities of the U.S. Fish and Wildlife Service in adjacent waters.

Water temperature conditions were monitored from northern Labrador to the southern Grand Bank, in the Gulf of St. Lawrence, and over the Scotian Shelf and in the Bay of Fundy. Unusually high summer surface water temperatures were experienced, with rapid cooling in late autumn which culminated with a heavy winter ice season extending into May. It has been shown from a study of heat balances in the Gulf of St. Lawrence that water transport is a significant factor. Over a 2-year period more energy was lost in the air-sea boundary by evaporation and conduction than was gained from the sun. The general downward trend of water temperatures since the mid-'50s has continued and even lower average water temperatures are forecast for 1961. Attention is being directed to energy studies of the mud-water interface, as one phase of productivity studies which are being pressed.

A number of extensive oceanographic cruises were made over various areas of the western North Atlantic. The *Sackville—Vema* cruise which extended into the Labrador Sea was a co-operative effort involving the Board, the Lamont Geophysical Laboratory of Columbia University, and the Institute of Oceanography of Dalhousie University.

The Board's Arctic Unit furthered a study of the distribution of two species of copepods in areas of the western North Atlantic and the Canadian Arctic. This study served to outline the areas of penetration of Atlantic water into the Arctic, and the distribution of arctic waters into Canadian Atlantic areas. Oceanographic investigations in the Arctic are now being accelerated with the expanding activities of the Department of Mines and Technical Surveys.

In the North Pacific, oceanographic observation and research are carried out in the area north of Lat. 40°N and east of Long. 165°W. This is the area of immediate concern as the ocean pasture of fish from the Canadian river systems. The programs and services initiated during the past five years have been maintained and in most cases expanded. Winter and summer surveys in the oceanic and coastal regions and the inland seaways, and monitoring at Ocean Station "P", Swiftsure Lightship, and at shore stations along the coast, were continued. On the basis of this research, the details of procedures and logistics have been worked out for a comprehensive Oceanographic Information Service, similar in concept to the Meteorological Service.

Wind-stress models correlating barometric pressure distribution with water transport in the North Pacific Ocean have been completed. Progress is being made in the theoretical assessment of the lag of the ocean's response to meteorological forces.

Studies in primary productivity are centred around the dynamics of growth, and the food potential of the dissolved organic matter, living organisms and detritus. These are producing results of wide applicability and ecological significance.

In co-operation with oceanographers of Japan and the United States, a joint report on the oceanography of the subarctic Pacific is in preparation.

TECHNOLOGICAL INVESTIGATIONS

The Board's technological investigations on Atlantic coast fish and fishery products are conducted at the technological stations in Halifax, N.S., and Grande-Riviere on the Gaspé Peninsula, Que., also at the technological unit in St. John's, Nfld.; the technological unit at London, Ont., handles problems concerning fresh-water fisheries products; corresponding investigations on the Pacific coast are carried out at the technological station in Vancouver, B.C.

Atlantic Coast

Commercial application of a preservative treatment for fresh fish fillets by dipping them in a solution of chlortetracycline (CTC) antibiotic exceeded eight million pounds in 1960 and the Halifax station continued its studies of factors that

Ammocoetes taken in a lamprey poisoning project on the Pancake River, north of Lake Superior.

at times cause CTC dips to lose some of their effectiveness. The stability and preservative action of CTC varied considerably with the nature of the fish or shellfish flesh being treated, also with the nature of the water used for preparing the solution, and of the metallic surfaces in contact with the solution.

Since very fresh shore-caught cod sometimes give rise to unusual problems in quality maintenance during cold storage, the station investigated various possible causes, including even the degree of muscular and feeding activity of the cod before being caught. The state of freshness of the fish before freezing, especially the extent of the biochemical changes associated with rigor mortis of the flesh, has marked effect on the storage quality of the frozen product. To elucidate the possibility that

free fatty acids liberated by the gradual breakdown of certain lipid (fatty) constituents of cod flesh during frozen storage may promote the denaturation that undesirably alters the flesh proteins, examinations of the reactions whereby these fatty acids are liberated continued.

In the course of the station's long-term study of the protein structure of cod and other marine muscle tissue as altered by rigor mortis, freezing and cold storage, improved procedures for isolating simple protein fractions are disclosing their role in promoting the onset of rigor, also in causing the cold-storage denaturation characterized by irreversible decrease in protein "solubility". The histology of cod muscle and the proteins of scallops also received attention.

Another of the station's long-term investigations, namely determination of the chemical constitution of marine animal oils and exploration of new uses for them and their constituents, has been greatly aided by the recent development of gas-liquid chromatography as a research tool for separating and identifying the various components in a complex mixture of closely similar liquids such as can result from a marine oil. By this means the station has shown, for example, that seal oil may contain at least 40 different components. Ozonolysis has been employed for identification of the finer structure of individual fatty acid components. Work on the recovery of glycerol and preparation of fatty alcohols from fish and seal oils appears to be of commercial interest.

Experiments showed that adding a mixture of salt and flaked ice between layers of "green" bulk salt fish simplifies and hastens their precooling before cool storage, thereby minimizing the opportunity for growth of the red-producing bacteria with which some of the fish may have been contaminated.

The Halifax station's development of an edible fish flour from filleting-line trimmings and other wholesome flesh offal has been described in previous reports. In 1960 a simplification of the process was worked out whereby the same kind of alcohol as used later for the extraction of the fat can be employed for preservation and stockpiling of the raw material at fish plants until ready to be processed into flour by fewer steps and with slightly greater yield. After storing ground whole herring with the same preservative alcohol until they undergo enzymic digestion to a liquid removal of the alcohol, the concentration of the residue resulted in a palatable soup stock.

The research projects of the Grande-Riviere station are designed to be of practical and fundamental interest with emphasis on the salt curing of fish.

In determinations of several nitrogenous constituents of heavy-salt, fall-cure and Gaspé-cure cod, the trimethylamine content proved the best characteristic for differentiating light- and heavy-salted cures, the latter having the lower content. Probably because atmospheric conditions for salting were more favourable in 1960 than in 1959, the amounts of volatile acids in the fall- and Gaspé-cured cod were lower than those found in 1959. Most of the acids, which contribute to the characteristic flavours of the different cures, were identified. Almost 90 per cent of them may be lost in desalting, but the remainder may contribute most to the flavour. The effect of different stages of Gaspé-curing on production of trimethylamine, ammonia and volatile acids was determined. Of several methods of assessing the moisture content of salt fish, the moisture-balance procedure proved most suitable.

Further experiments involving injection of radioactive compounds into live lobsters shed more light on the biochemical processes that provide the precursor of the trimethylamine which is later useful as an index of quality in marine fish as well as lobster meat.

The station resumed its investigation of the microbiology of light-salt fish brines by further ascertaining the effect of salt and moisture distribution on bacterial action in Gaspé-cure cod. Some of the types of bacteria responsible for the characteristics of the cure were isolated, followed by examination of their relation to the formation of volatile flavour-producing substances.

Resumption of brine-salting experiments in conjunction with the station's automatic dryer showed that the dryer can cope with the higher moisture content of brine-salted cod as compared with dry-salted cod, to yield a product practically indistinguishable from the conventional Gaspé cure. Progress was made in determining the best combination of temperature and relative humidity for storage of semi-dried light-salted cod. Another set of experiments showed that although water-horsing before drying showed practically no effect on the drying rate in the dryer, water-horsing seems necessary for obtaining a choice quality product. Press-piling between drying stages should not be for more than three days if the relative humidity of the air is greater than 70 per cent.

Additional work was done on the application of vacuum freeze-drying of codfish steaks and the reasons for some of the difficulties encountered were examined.

The Newfoundland Technological Unit at St. John's resumed activities upon establishment in new quarters and was engaged in research work on biochemical, bacteriological and engineering problems concerned mainly with cod from the time of capture.

Increased commercial freezing of fresh Newfoundland cod fillets has resulted in appreciation of the fact that if prime quality fillets are to result, the whole or gutted fish, particularly if trap-caught, must be treated with greater care than if the fish were to be salted. Very fresh trap-caught fish, if allowed to warm up to 60°F or if abused during handling, are prone to develop soft-textured flesh that does not well withstand some of the mechanical procedures of filleting, skinning and packaging, and the fillets are apt to "drip" in fillet blocks packed for freezing. The unit's experiments showed that firm fillets can be produced from trap-caught cod if they are iced at or very shortly after catching; softness appeared to be due to allowing them to warm up, rather than to roughness in handling. The average pH of iced trap-caught cod between two and 24 hours post-mortem age was found to be about 6.1, this being lower than that recorded by others for fresh trawler-caught cod.

Causes of, and ways of minimizing, development of "bilginess" in gutted cod stowed in trawlers are now known; but as a supplement to structural arrangements in fish holds to discourage growth of causative bacteria the unit tested the efficacy of the sometimes commercially adopted practice of spraying contaminated wooden parts of the hold with a disinfectant. A dilute solution of formaldehyde proved most effective and provided protection against bilginess in cod stowed for up to seven days.

A program to devise new canned and specialty products from Newfoundland fish was instituted. Test packs included canned codfish loaf, smoked and non-smoked capelin.

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Inland

The London Technological Unit augmented its culture collection of 70 different freshwater fish-spoiling bacteria by another 15 different strains and continued to classify these according to their morphological characteristics and biochemical reactions. Their salt tolerance and sensitivity towards nine antibiotics indicated these reactions are providing useful new classification criteria for such bacteria. From the standpoint of discouraging bacterial attack on fish flesh, antibiotics of the tetracycline group (of which CTC is a member) were most effective; however, one culture of bacteria was unaffected by all nine antibiotics.

Further search for the cause of discoloration of perch flesh during frozen storage and on thawing indicated that the discoloration is related, among other things, to the differences in the state of freshness at time of freezing.

A great deal of effort went into a study of preparation of new products from smelt and coarse species of freshwater fish. Delicatessen such as fish loaf, fish wieners and fish patties were made from smelt, carp, sucker, catfish, sheepshead and whitefish flesh or mixtures of flesh. Canning experiments conducted with smelt, perch, alewife and whitefish showed promise for some of the samples; particular attention was paid to canning of whitefish as a supplement to their utilization as fresh or frozen fillets. Eight types of freshwater fishes and products therefrom were analyzed for their principal nutrient constituents.

The unit placed in use its mechanized vertical-type smokehouse, and conducted experiments on a pumping system for moving fish within a fish plant. Several types of fish-processing equipment, including a portable fish-reduction plant, were designed and demonstrated for use in northern Canadian freshwater fisheries.

Pacific Coast

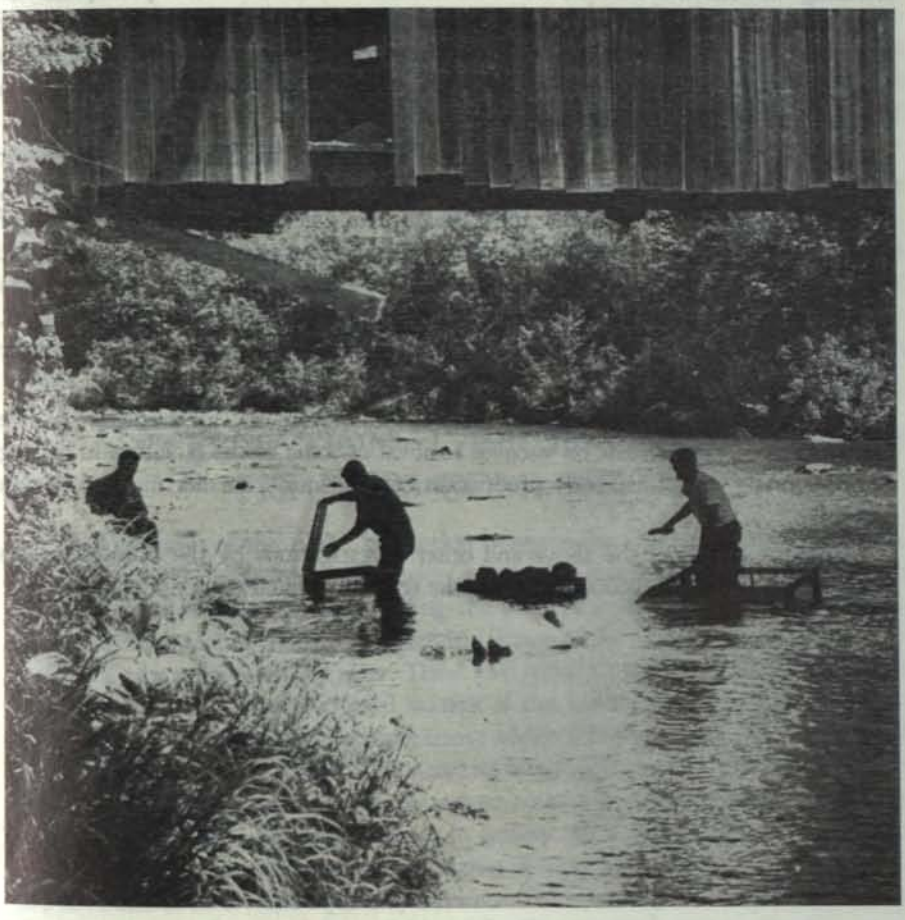
The Vancouver Technological Station continued the utilization of its specialized chemical services as applied to the study of energy reserves and energy expenditures in the different races of Fraser River sockeye salmon during their spawning migration. Some of the more applied phases of the investigation neared completion but research on many challenging facets of the general problem actively progressed. Several steroid hormones of salmon were isolated and identified and the role of at least one of them in maturation phenomena has been recognized. The chemical nature of the "trigger" that initiates the up-river part of the spawning migration is still unknown, but a promising clue to its solution was observed in the sudden changes that occur in the proportion of two hormones in the blood of male and female sockeye as soon as they begin their river migration.

Efforts to identify the nature of a chemical substance or substances in the waters which may be responsible for leading salmon back to their natal stream for spawning resulted in determination of some of the chemical properties of these attractants. Using salmon held in tanks, further studies were made of the response of sexually maturing fish to a repellent previously noted to be present in mammalian skin, also of the response of smolts to a food attractant extract prepared from brine shrimps.

Bacteriological investigations included comparison of techniques for sampling whole fish or flesh for determination of bacterial contamination and testing the

effectiveness of antibiotics and other preservatives in preserving fish products from bacterial attack. The magnesium ions in fish flesh and sea water were shown to be an important factor in allowing CTC to be the most effective of the tetracycline group of antibiotics when applied in a fish preservative.

In preparation for a project on freezing fish at sea, lack of exact knowledge regarding the course of rigor or of the biochemical changes that accompany it in commercially important Pacific coast fishes prompted a comprehensive study of the



Research Board workers checking survival of young salmon and trout held in cages in Cross Creek, New Brunswick, after the region had been sprayed with DDT to combat the spruce budworm.

chemical alterations associated with death of the fish that occur in the protein and other constituents of the flesh. These alterations were found to have an important bearing on the reactions of the flesh before, during and after freezing, and on the quality of the thawed product.

A recent commercial utilization of an enzymic process developed earlier at this station renewed the station's interest in the possibilities of using fish enzymes to prepare rare biochemical and pharmaceutical chemicals. Several products were thus

prepared from salmon milt, employing salmon kidney and liver enzymes. As part of a program for finding uses for dogfish, gelatin was prepared from the skin and skeleton, but yields were low.

In the field of fish oils and compounds associated with them, the first year of investigation on the nutritive value of the extracted fatty fraction of stored anti-oxidant-treated and untreated herring meals was completed. Additional tests in 1960 lent confirmation to the observation in 1959 that the effect of lingcod liver oil in lowering the concentration of cholesterol in blood serum in chicks is perhaps due to the vitamin A in the liver oil. Although vitamin A is the principal contributor to the lowering effect, some other component of the liver oil also contributes to it. Sterols from clams were shown to have a similar effect, as part of a wider research program on clam and other marine sterols.

The station's further developments in the use of refrigerated sea water for transporting or storing catches of fish, a system now widely adopted commercially, consisted chiefly of consultation and assistance in the designing or conversion of fish-holding equipment on vessels. One large fish-packing vessel conversion allows it to carry 600,000 pounds of fish in refrigerated sea water. The bacteriological aspects of sea-water holding tanks and ancillary equipment received additional attention. Various types of coating materials for lining holding tanks were tested for their ability to facilitate sanitation.

Also included in the station's investigations were the air transport of live crabs, renewed experiments on vacuum removal of some of the moisture in herring before canning, and small-scale production of fish flour from herring and dogfish presscake.

Further details of the above and other investigations by the Board's various establishments during 1960 are given in the separate annual report of the Board.

INTERNATIONAL COMMISSIONS

ALTHOUGH they are self-renewing resources, the fish populations of oceans as well as inland waters are vulnerable to threats from both natural and human causes, and in many cases there are stocks which are fished by anywhere from two to a score of nations. Canada was one of the first countries to realize that this situation demanded some form of international control, and has taken an active part in the establishment of international commissions which co-ordinate scientific investigations and recommend management procedures to the governments concerned.

The Canadian government is signatory to seven Conventions which provide for the operation of such commissions, and this chapter deals with their 1960 programs. Three of the conventions are bilateral agreements with the United States, dealing with Pacific sockeye and pink salmon of the Fraser River System, halibut of the North Pacific Ocean, and the fisheries of the Great Lakes. The other four conventions are multilateral, and deal with fisheries of the Northwest Atlantic Ocean, certain fisheries of the North Pacific Ocean, fur seals and whales.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

As the result of the 1937 Convention between the United States and Canada, the International Pacific Salmon Fisheries Commission was established for the purpose of preserving, protecting and extending the sockeye salmon fisheries of the Fraser River in British Columbia. In 1957 the jurisdiction of the Commission was extended to include pink salmon of the Fraser. These two species, on their spawning migration, pass through contiguous territorial waters of the United States and Canada and, historically, fishermen of the two countries competed in the exploitation of these fish to the detriment of the stocks. The primary responsibilities of the Commission are to produce maximum sustained yields and to insure equal sharing of the catches by Canadian and United States fishermen. In general the Commission has been highly successful in pursuit of its basic aims. Catches of sockeye have been greatly increased and have also been divided equitably between the two countries. Detailed statistical and descriptive information is available in the Commission's annual reports.

The management of Fraser River sockeye has been based on the fact that the stocks are composed of separate races, to a large extent migrating through the fishery at different times and reproducing in discrete areas within the river system. By the application of suitable regulatory controls on the fishery, the escapements to the major producing areas have been increased. By the same means these racial escapements have been suitably timed to allow maximum production in their particular freshwater environments. The persistent practice of these management procedures has resulted in consistently high freshwater production of sockeye over the past decade.

Over the same period in which the freshwater production has been improved a great deal of information has been obtained on survival rates of Fraser River sockeye in the sea as well as in fresh water. The data have shown that, regardless of freshwater production, the marine survival can vary by a factor of at least four and thus can have very considerable effects on the final size of a run. (Providing, however, the number of seaward migrants is maintained at a high level, the years of poor marine survival will return fair runs and the years of high survival will return very large populations.) Means of forecasting marine survival are now being developed and these will be of great value in the management of the fishery and to the fishing industry.

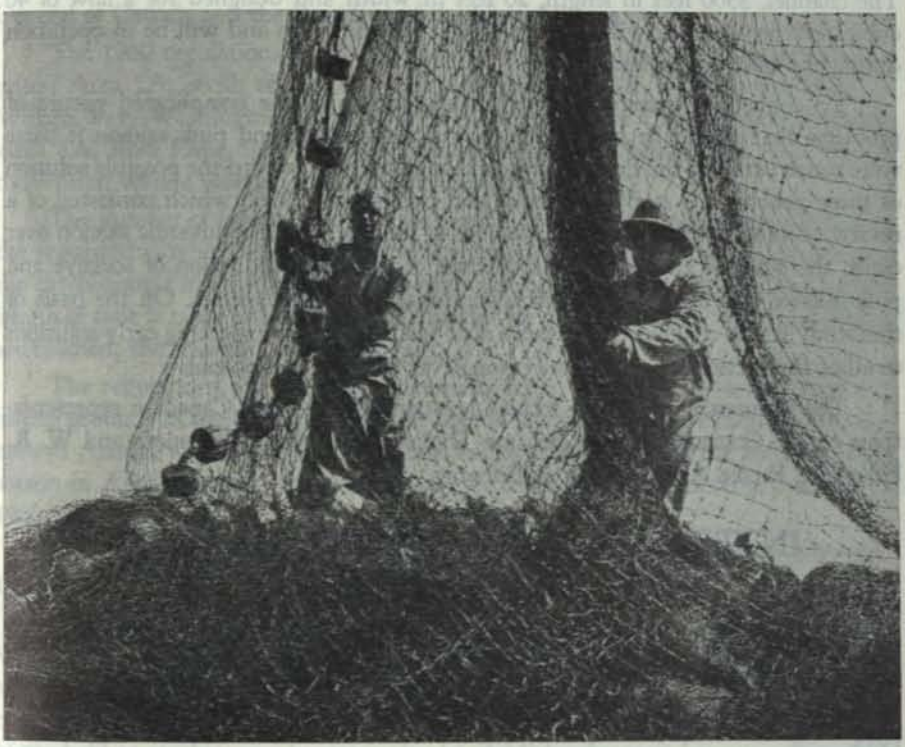
In spite of relatively low marine survival, the 1960 sockeye run was one of the best in the history of this cycle year. Of the total catch of 2,454,000, Canadian fishermen took 1,255,000 fish or 51 per cent. The Chilko race contributed about 70 per cent of the run. The fish were of the smallest size for this cycle year since 1916. Although the run appeared in the fishery eight days later than anticipated and as a result special regulatory changes were necessitated, a satisfactory escapement was obtained to most of the spawning areas.

The runs to two lower river tributaries (Pitt and Birkenhead) have shown a continuing decline in abundance, apparently due to unstable hydraulic conditions on the spawning grounds. Stringent restriction of the fishery has not been successful in arresting the decline of these races. Since further restriction of the fishery during the passage of these runs would not be compatible with the proper harvest of more abundant races migrating at approximately the same time, artificial measures offer the only hope of rehabilitation. For these reasons an experimental hatchery was built in 1960 on the Upper Pitt River to increase the fry production of this area. The 3,665,000 eggs incubated at the hatchery were obtained from fish spawning in shallow side channels where deposited eggs would have been exposed and lost during a winter low flow period. Artificial means of increasing fry production are also being considered for the Birkenhead River.

Sockeye have now been established by egg transfers in four previously barren streams. However in most of these the number of adult salmon returning has been disappointingly small and complete failures of some transplantations continue to occur. With the rapid increase of spawning runs to donor streams it is now planned to increase substantially the size of egg transfers, in the hope that larger numbers of adult fish will return to the recipient streams.

Pink salmon runs do not occur in the Fraser River in the even-numbered years but during 1960 an exploratory investigation of the early estuarial and marine life of young pink salmon was conducted on the progeny of the previous run. This work was prompted by the discovery of a relationship between coastal water temperatures in the "even" years and catches of Fraser River pinks in the "odd" years over the previous 13 biennial runs. The field investigation of 1960 showed that young pink salmon, on entering salt water, tended to disperse rapidly along shorelines adjacent to the river mouth and to remain in shallow water for some time. The fact that they were found to be present in Georgia Strait until late summer added to the significance and usefulness of the relationship between coastal temperatures and subsequent catches.

During 1960 the Commission continued a co-operative research program with Washington State Department of Fisheries, the Fisheries Research Board and the Department of Fisheries of Canada on the migratory movements of pink salmon stocks which enter Convention waters, as required by the Pink Salmon Protocol to the Convention. During the year the Pink Salmon Co-ordinating Committee, consisting of representatives of the above mentioned agencies, completed a progress report assessing the 1959 field program. At a meeting in December the Committee was able to conclude that, although a very considerable amount of data analysis was



Fishermen place net on the table of a British Columbia purse seiner.

yet required, the field program in general had been highly successful in providing a body of basic information on the movements and exploitation of the various pink salmon stocks in and adjacent to the Convention area. However, at the same meeting, the Committee made preliminary plans for a restricted co-operative program of field studies to be conducted in 1961 since it was found that additional information was desirable both to augment that obtained in 1959, and to estimate the degree of annual variation in the characteristics of migration. For these purposes it was agreed that both catches and escapements of pink salmon should be enumerated again throughout the area of study between Juan de Fuca Strait and Johnstone Strait. In addition, it was proposed that the Commission conduct a limited marine tagging program during the early period of the run in Juan de Fuca Strait to augment the information on exploitation of United States stocks in this area. It was also proposed that the

Commission conduct an exploratory study of pink salmon migration through the combined United States and Canadian High Seas troll fishery on the approaches to Juan de Fuca Strait. Tentative plans were made to conduct both these programs in 1961.

The construction of a stream-type artificial spawning channel for the pink salmon of Seton Creek was started in 1960. This installation will serve as a full-scale test for this type of facility and will also provide a substitute for that portion of the spawning area which has been made unavailable by a hydroelectric development. The channel, 3500 feet in length, 20 feet in width and designed for a flow of 40 cubic feet per second, will support 10,000 spawning fish and will be in operation during the 1961 pink salmon run.

To contribute toward a better understanding of the complicated nature of problems that would be involved in preserving sockeye and pink salmon if dams were constructed on the Fraser River, and to contribute toward the possible solution of these problems, a study was made and published in 1960 which consisted of a review of information concerning methods of passing adult and juvenile salmon over dams, the possible effects of environmental changes on production of sockeye and pink salmon, and methods of artificially propagating these species. On the basis of this study it was concluded that there is no justification for expecting early solutions to all of the particularly complex Fraser River fish-power problems.

The Commission held ten formal meetings during 1960. Canadian representatives on the Commission were Senator Thomas Reid, A. J. Whitmore and W. R. Hourston, Pacific Area Director of Fisheries.

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.

The terms of the 1953 treaty make the Commission 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. They authorize the Commission to apply specific types of regulation and require it to justify its regulatory actions by scientific investigations.

Management of the fishery, based upon scientific research, has now been in operation for 30 years. As a result of the Commission's regulations, effective each year since 1932, the stocks of halibut and the annual catches have been rebuilt from low declining levels to high levels. The fishery, which had become unprofitable prior to management, has been restored to a highly profitable condition.

The Commission consists of six members, three from each country. Canadian members in 1960 were: Dr. William M. Sprules, Ottawa, elected Vice Chairman; Harold S. Helland, Prince Rupert, and Richard Nelson, Vancouver.

The Commission held its annual meeting at its office and research headquarters, University of Washington, Seattle, from February 23 to 26 inclusive. It met with its scientific staff and representatives of the wholesale halibut dealers' organizations and halibut fishermen and vessel owners in several conferences during which the results of fishing and of scientific investigations in 1959 were reviewed and discussed and various proposals regarding regulation in 1960 were considered in the light of scientific findings. Thereafter the Commission approved a research program, dealt with fiscal and other internal matters and adopted regulations for the 1960 fishing season. These regulations became effective on March 24 upon approval by both the Governor General of Canada and the President of the United States.

The 1960 regulations continued the five regulatory areas of the previous five years: Area 1A, south of Heceta Head, Oregon; Area 1B, from Heceta Head to Willapa Bay, Washington; Area 2, from Willapa Bay to Cape Spencer, Alaska; Area 3A, from Cape Spencer to the Shumagin Islands, Alaska; and Area 3B, all convention waters west of Area 3A, including Bering Sea.

The number of fishing seasons (one in some areas, two in others) is specified in the regulations, which also set the opening and closing dates of fishing seasons and the catch quotas in most areas. The closing dates are in general determined by the length of time it takes to fill the catch quotas set for particular areas; when the quotas are reached, the season is declared closed.

The regulations did not differ materially from those of 1959 except that the fishing grounds in the Cape Scott-Goose Islands region and in the channels of southeastern Alaska, which had been closed to halibut fishing during the second fishing season in Area 2 during 1959, were reopened during the second Area 2 season in 1960.

Total halibut production by the combined Canadian and United States fleets in 1960 was 71.8 million pounds, approximately the same as in 1959.

Sampling of the commercial landings was continued in 1960 at Seattle, Washington, at Prince Rupert, British Columbia, and at Petersburg, Alaska. Limited sampling was also conducted at Vancouver, British Columbia. Materials were obtained for study of changes in the composition, growth, mortality and recruitment of the halibut stocks upon important banks. Additional materials were collected at sea during the operation of a chartered vessel for tagging, and assistants were placed upon commercial vessels for the same purpose.

Intensive study of growth of halibut from the major grounds in all areas, utilizing the measurements of the widths of the annual growth zones in the otoliths to estimate the lengths of fish at each earlier age, was continued throughout 1960. Data obtained from these investigations during the past several years were used in studies of the dynamics of the Pacific halibut stocks.

Tagging experiments were conducted on grounds in Hecate Strait, Dixon Entrance and southeastern Alaska to determine the relative utilization and migrations of halibut on different banks. Such information is necessary to and plays an important role in the Commissions's management program.

The Canadian halibut vessel *Sunnfjord* was chartered for a 140-day period from mid-April to early September. Eight trips were made in this period and 9,362 halibut,

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weighing 160,000 pounds, were tagged. This is the second greatest number of fish tagged during a single charter, being only 80 fish less than the number tagged during the operation of the halibut vessel *Eclipse* in 1951.

Investigations of the life history and the abundance of halibut during their early years, prior to recruitment to the fishery, were continued in 1960 as an essential part of the Commission's research program. The research vessel *Commando* was chartered for a 99-day period from mid-June to late September. Already known concentrations of young halibut were sampled with fine-meshed trawls and exploratory fishing was done between Vancouver Island and Kodiak Island to discover still other concentrations.

A total of 11,462 small halibut were caught, ranging from two to 25 inches in length and from one to eight years of age. Of these, 1108 were less than one year old, 7851 were one year old, 1170 were two years old, 871 were three years old and 455 were from four to eight years of age.

A general report upon the regulation of the fishery and investigations during 1959 and a scientific report upon the theoretical dynamics of the Pacific halibut stocks were published during the year. A technical report on the utilization of the halibut stocks in the Bering Sea was also prepared for publication.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

The International Convention for the High Seas Fisheries of the North Pacific Ocean was brought into force on June 12, 1953 for the purpose of ensuring the maximum sustained productivity of the fishery resources of the Convention area. Member governments are those of Canada, Japan and the United States. The Convention provided for the establishment of the International North Pacific Fisheries Commission to promote and co-ordinate the necessary scientific studies and to recommend the required conservation measures in order to secure the maximum sustained productivity of fisheries of joint interest.

The principle of abstention is embodied in this Convention and one of the primary responsibilities of the Commission is to determine which stocks of fish found in the Convention Area qualify for abstention by one or more of the Contracting Parties. To qualify for abstention it must be shown that a stock of fish reasonably satisfies three conditions, namely, full utilization, regulation designed to maintain or increase maximum sustained productivity and scientific investigation.

The North Pacific Convention provides that Japan, and in one case, Canada, refrain from fishing certain stocks of fish in certain areas of the North Pacific, provided that the contracting parties which continue to fish these stocks continue to fulfill certain obligations, described above. Japan abstains from fishing salmon and halibut in the eastern Bering Sea and the eastern North Pacific Ocean. Japan also abstains from fishing herring off the Pacific coast of Canada and off the coast of the United States south of the entrance to the Strait of Juan de Fuca. Canada abstains from fishing salmon of United States origin in the eastern Bering Sea.

Since the Commission began its co-ordinated research program in 1954, particular attention has been paid to the scientific problems raised by the Protocol to the Convention. The Protocol requires 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 of America 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 best divide salmon of Asian origin and salmon of North American origin and to determine whether it can be shown beyond a reasonable doubt that this line or lines more equitably divide such salmon than the provisional lines now established at or near 175°W Longitude.

Before summarizing results from the Commission's research program on salmon on the high seas, attention should be called to a problem, involving interpretation of the Convention, which was not resolved by the end of 1960.

At its sixth annual meeting (1959) the Commission reported that it was unable to agree on an interpretation of the Protocol to the Convention and asked the member governments to provide an agreed interpretation. The Protocol states the principles by which lines dividing salmon of Asian and North American origin are to be confirmed in their present locations or relocated in accordance with results of research. At the time of its seventh annual meeting, held in November, 1960, the Commission had not received an agreed interpretation of the Protocol from the three Contracting Parties. For this reason, the Commission was unable, at its seventh annual meeting, to consider any further steps toward carrying out the mandate of the Protocol with respect to relocating or confirming the dividing lines.

Although the Commission did not take action toward applying the results of research to determining the location of the dividing lines for salmon stocks, research on salmon origin, distribution, abundance and movements on the high seas continued. The following statement was adopted at the seventh annual meeting (1960) to clarify and delimit the objectives of research being conducted on the scientific problems raised by the Protocol:

"To determine the distribution and abundance of continental stocks of salmon in the northern Pacific Ocean and in the Bering Sea.

"(*a*) The three most abundant species, i.e. sockeye, chum and pink salmon, are of primary concern.

"(*b*) We are seeking information on the abundance, origin, distribution and intermingling of salmon on the high seas in a quantative sense.

"(*c*) The period of each year with which we are concerned is the late spring and summer.

"(*d*) We are seeking knowledge of average conditions with respect to the distribution and intermingling of salmon by conducting research for a number of years and knowledge of the factors causing year-to-year fluctuations.

"(*e*) We are considering separately the mature and immature forms of these species of salmon, since their distribution and movements in offshore waters are different.

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"(*f*) We have become aware of the essential dynamic nature and variability of abundance, distribution and intermingling of salmon on the high seas. We must expect that it will be very difficult to forecast many of the factors which will control abundance, distribution and intermingling in the future."

The scope of the salmon investigations and the techniques used in 1960 were substantially the same as in the past years. Although the Commission plans and co-ordinates its scientific investigations, these are executed by fisheries research agencies of the member countries. Results of the investigations by the various agencies are then reported to the Commission, which discusses and analyzes the results and uses them as a basis for its decisions and further actions. For Canada, the Fisheries Research Board is extensively involved in investigations under the INPFC program. For the United States, investigations are conducted by the research workers of the Bureau of Commercial Fisheries, with assistance from the Fisheries Research Institute of the University of Washington. For Japan, research is conducted by the Research Division of the Fisheries Agency of the Japanese Government.

Research vessels conducted studies of the distribution of salmon on the high seas and collected samples for determination of continental origin. Special vessels engaged in the tagging of salmon in order to trace movements from high-seas areas. Other vessels made oceanographic observations to relate variations in the oceanic environment to variations in the distribution and abundance of the salmon stocks. Extensive morphological, meristic, serological and parasitological studies were continued for the purpose of identifying the continent of origin of salmon taken in samples on the high seas. Studies of scale characteristics were continued.

The results of the investigations cannot be described properly in a brief summary. However, it may be said that investigations in 1960 disclosed that extensive intermingling of various populations of salmon from portions of the North American and Asian continent continues. The three most abundant species—sockeye, pink and chum salmon—from portions of North America west of Kodiak and from various portions of the Asian coast intermingle over broad areas of the north Pacific Ocean and the Bering Sea. Quantitatively, intermingling varies with the abundance of the various contributing stocks, the time of the year and numerous other factors.

At the present time, the scientists engaged in research under the Commission's program are concentrating their efforts and attention on analysis of data already collected.

At its sixth annual meeting (1959), in the course of its studies of the qualifications for abstention of the stocks listed in the Convention, the Commission determined that the herring stocks off the coast of Alaska south of the Alaskan Peninsula and east of the meridian passing through the extremity of the Alaskan Peninsula no longer met the requirements for continued abstention outlined in the Convention. On this basis, the Commission recommended to the contracting parties that the stocks of herring off the coast of Alaska be removed from the Annex to the Convention. On May 24, 1960, all of the contracting parties had signified their acceptance of the Commission's recommendation and, as of that date, Japan was no longer required to abstain from fishing herring off the coast of Alaska.

At its seventh annual meeting (1960), the Commission continued its studies of the qualifications of the stocks which remain under abstention. The Convention requires that these determinations be made annually, beginning in 1958. The Commission did not reach an agreement as to whether the halibut, salmon and herring stocks listed in the Annex continued to qualify for abstention. The Commission, therefore, did not make a determination that the stocks specified in the Annex no longer meet the conditions of abstention. In substance, this means that Japan is required to continue to abstain from fishing salmon and halibut in the eastern Bering Sea and the eastern North Pacific Ocean and from fishing herring off the coast of Canada and off the coast of the United States south of the entrance to the Strait of Juan de Fuca. Canada is required to continue to abstain from fishing salmon of United States origin in the eastern Bering Sea.

In 1954, at the request of the United States, the Commission undertook a study of the king crab stocks (*Paralithodes camtschatica*) of the eastern Bering Sea for the purpose of determining if joint conservation measures by Japan and the United States were required. Investigations of the king crab stocks in the area began in 1955. Scientists from Japan and the United States have conducted separate but co-ordinated and co-operative investigations.

Evidence presented to the Commission by the scientists led to the conclusion that there was no basis for recommending joint conservation measures with respect to the king crab stocks at the present time. However, it was apparent that the level of fishing effort was increasing significantly and that vessels from the U.S.S.R. had entered the fishery as well. It was therefore recommended that appropriate steps be taken by the Commission to obtain pertinent king crab statistics from the U.S.S.R. king crab fishery in the area. Studies of the biology of the species and of the effects of the fishery on the stocks will be continued.

The Commission publishes an annual report of its activities and a statistical yearbook, containing data on catches of important stocks of joint interest in the Convention area. In addition, it publishes, at irregular intervals, research bulletins, which contain reports of investigations conducted for the Commission by various research agencies. These will also contain reports on important phases of the Commission's investigations prepared jointly by groups of scientists from the three countries. At the end of 1960 eight research papers from national sources were in various stages of processing for publication in the Commission's bulletin series. Four additional papers were awaiting approval for publication by a board of editorial referees established by the Commission.

Working parties of scientists from the three countries are engaged in preparation of a joint report on the distribution of salmon on the high seas and a report on the oceanography of the sub-Arctic waters of the North Pacific Ocean.

In addition to these reports, the Commission has agreed in principle to the preparation of a comprehensive joint report on the results of the research program as a whole.

The seventh annual meeting of the Commission was held in Vancouver, British Columbia, from November 7 to 11, 1960. Preliminary sessions of various committees and sub-committees concerned with the Commission's work began on October 17,

1960 and continued for the whole period prior to and during the annual meeting. The total number of accredited participants for the meeting was 124, including 22 representatives from Canada, 19 from Japan, 60 from the United States, 13 observers, and 3 permanent and 7 temporary members of the Secretariat. Observers included representatives of the several international commissions active in the North Pacific Ocean and representatives of the U.S.S.R.

The seventh annual meeting was held under the chairmanship of Commissioner George R. Clark, Deputy Minister of Fisheries of Canada. The Honourable J. Angus MacLean, Minister of Fisheries for Canada, addressed the opening plenary session of the meeting.

In addition to Mr. Clark, Canada was represented by Commissioners John M. Buchanan, James C. Cameron and Roger T. Hager. The Canadian Commissioners were accompanied by a number of advisers and experts from the Biological Station of the Fisheries Research Board at Nanaimo, B.C., under the leadership of Dr. A. W. H. Needler, Director.

The following officers were elected by the Commission for 1961: Chairman, Iwao Fujita of Japan; Vice-Chairman, Edward W. Allen of the United States; Secretary, George R. Clark of Canada.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

The Commission's main purpose, as stated in the 1949 Convention, is "to make possible the maintenance of a maximum sustained catch" from the fisheries in the Northwest Atlantic—from Long Island in the south to North Greenland in the north, and east to 42°W Longitude (Cape Farewell, Greenland).

Members of the Commission are representatives of the following 12 countries: Canada, Denmark, France, the Federal Republic of Germany, Iceland, Italy, Norway, Portugal, Spain, the Union of Soviet Socialist Republics, the United Kingdom, and the United States of America. The Canadian Commissioners are George R. Clark, Deputy Minister of Fisheries, Ottawa, and J. H. MacKichan, Halifax, N.S.

All the member countries of ICNAF maintain more or less substantial fisheries in the Northwest Atlantic, and in recent years smaller fishing fleets belonging to other countries have carried out minor fisheries in the region. These fleets come from Poland, Belgium and Eastern Germany. The Commission co-operates with the organizations operating these fleets and collects statistics on their fishing efforts and landings.

The Convention area is divided into five subareas, and panels have been established within the Commission for each of these. Panel memberships are assigned by the Commission on the basis of maintenance of a substantial fishery by the individual countries in the subarea concerned.

The subareas are designated as follows; 1, West Greenland, 2, Off Labrador; 3, North, East and South of Newfoundland; 4, Gulf of St. Lawrence and Nova Scotian Seas; 5, East of New England.

During 1960 the work of the Commission was continued along the general lines of the preceding years. In addition to the collection of statistics on efforts and landings by member and non-member countries for publication in a statistical bulletin, data were studied on length- and age-distribution of samples of fish caught commercially or by research vessels, for publication in a sampling yearbook. Proposed research programs for the ensuing year were exchanged between member countries in mid-winter. Research reports for the preceding year, 1959, were submitted to the 1960 annual meeting and discussed in the various panels, committees and meetings of groups of advisers. These research reports are published in the ICNAF Annual Proceedings. The reports for 1959 gave evidence of a considerable increase in research work, not only by the "new" countries which have become members in recent years, but also by the "old" countries.

Every three years the Commission issues a list of vessels over 50 tons fishing in the Convention Area. This list for the year 1959 was published in 1960. The information given includes data on tonnage, length, gear used, areas fished, equipment of vessels, horsepower, propellers, radar, echo sounders, etc.

When compared with the lists for 1953 and 1956, the list for 1959 shows a considerable increase in the number and tonnage of vessels operating in the Convention Area. In 1953 there were 803 fishing vessels with a tonnage of 297,033; in 1959 there were 1162 vessels with a tonnage of 518,022. The increases were 45 per cent in number of vessels and 74 per cent in tonnage, and are attributed mainly to the new countries which have begun to fish in the area between the two years and, to a lesser degree, to the development of the fishing fleets of the old countries.

Apart from the general increase, the main changes in the fishing activities have been: *a*) general trend in the European fleets towards somewhat larger vessels (the North American fleets fish nearer their home ports and do not show this trend); *b*) the appearance of large, 2000- 3000-ton factory ships; *c*) a change in the Canadian fleet from dory schooners to other types of fishing vessels such as longliners and draggers, and *d*) the establishment of special fleets of scallop draggers in Canada and the U.S.A.

During recent years there has been great development in the fishery for redfish, especially in the waters of Southwest Greenland, Labrador, and north and east of Newfoundland. The newer member countries, West Germany and the U.S.S.R, are pursuing this fishery in particular, but some of the old countries, including Iceland, also participate. The large concentrations of redfish sustaining this fishery were first located through the activities of research vessels and scouting trawlers from Canada, Germany, Iceland and the U.S.S.R. The landings of redfish by all countries increased from 108,656 in 1956 to 389,221 tons in 1959. In expectation of a further large increase in the importance of redfish, the Commission accelerated its study, and a Redfish Symposium was held jointly with the International Council for the Exploration of the Sea, in Copenhagen, in 1959. During 1960 the proceedings of that meeting and the scientific documents prepared for it, were made ready for joint publication by the two organizations.

As mentioned in the report for 1959, the Commission has initiated special studies of the problems connected with a possible extension of fishery regulations.

A group of scientists appointed by the Commission worked with the assessment of fisheries and fish stocks at two special meetings in 1960, and at the Commission's Annual Meeting in 1960 an important preliminary report from this group was considered. The group planned a third meeting, and a final report on its findings will be presented to the Commission at its 1961 Annual Meeting.

For some years a special subcommittee on environmental research has been considering various problems connected with the biology and development of stocks of commercial fisheries, and with the planning of necessary research on these problems.

In the 1960 Annual Meeting the Commission, upon proposal by this subcommittee, appointed a special group of scientists, biologists and hydrographers, to meet and review the knowledge of the environmental conditions (hydrographical and planktonic) under which the commercial fish stocks live, and to elaborate and co-ordinate plans for future research.

The Commission's Tenth Annual Meeting was held in Bergen, Norway, in June 1960. It was attended by participants from all 12 member countries and by observers from Poland and from several international fisheries organizations. Two of the major subjects dealt with were the above-mentioned problems of Fishery Assessment in Relation to Regulations and Environmental Researches. Also considered at the meeting were the procedures adopted by the various member countries affecting the trawl regulations already enforced in the area following proposals by the Commission, and the results of inspection procedures introduced by the individual countries. The findings of the Commission were that these procedures were serving their purpose in a satisfactory way.

The meeting was convened under the Commission's Chairman, A. J. Suomela, U.S.A. The Vice-Chairman was Mr. Clark. Chairman of the Standing Committees were Mr. MacKichan, Canada (Finance and Administration), and Mario Ruivo, Portugal (Research and Statistics).

The Eleventh Annual Meeting was scheduled for June, 1961, in Washington, D.C., and an invitation by the U.S.S.R. to convene the 1962 annual meeting in Moscow was accepted.

GREAT LAKES FISHERY COMMISSION

The Great Lakes Fishery Commission was established by the Convention on Great Lakes Fisheries, ratified by the United States and Canada on October 11, 1956. Its two major responsibilities are to formulate and co-ordinate a program of research and, on the basis of the findings, recommend measures to permit the maximum sustained productivity of stocks of fish of common concern, and to formulate and implement a program to eradicate or minimize sea lamprey populations in the Great Lakes.

Canadian members of the Commission during 1960 were Dr. A. L. Pritchard, Ottawa, Dr. A. O. Blackhurst, Port Dover, Ont., and Dr. J. R. Dymond, Toronto, who replaced the late Dr. W. J. K. Harkness, of Toronto. At the annual meeting of the Commission on December 1-2, Claude Ver Duin of the United States was elected to succeed Dr. Pritchard as chairman.

The Commission is assisted by two committees. A Scientific Advisory Committee composed of scientists from both countries advises the Commission on such matters relating to lamprey control and general research as the Commission may submit to it. A Committee on Lake Trout Rehabilitation advises the Commission of measures which will facilitate the recovery of lake trout populations when sea lamprey are controlled. It also co-ordinates the lake trout research and propagation activities of various agencies concerned with the fisheries of the Upper Great Lakes.

The Commission is required by the Convention to make use of the official agencies of the countries and the states and provinces, or other private or public organizations insofar as feasible, in performing its duties. It maintains a small secretariat at its headquarters in Ann Arbor, Michigan.

Part of an 86,000-pound catch of halibut made possible under the International Pacific Halibut Convention.

The Commission has been primarily concerned with a program to control sea lamprey. Contributions to the Commission for this activity are shared, 69 per cent of the cost being borne by the United States and 31 per cent by Canada. The Commission's program in 1960 was carried out under contracts with the Fisheries Research Board of Canada and the U.S. Bureau of Commercial Fisheries.

The major accomplishment in 1960 was the completion of the initial chemical treatments on all known lamprey-producing streams in Lake Superior. Seventy-two streams have been successfully treated with several formulations of 3-trifluormethyl-4-nitrophenol (TFM), in the last three years. Fifty-two of the streams are in the

United States and 20 in Canada. Chemical treatments were started in 1960 on Lake Huron, where seven Georgian Bay tributaries were treated, and on Lake Michigan, where seven streams on the north shore were treated. Information was gathered in 1960 on the distribution of young sea lamprey, or ammocoetes, in many of the remaining streams of Lakes Michigan and Huron. Bioassays of the representative streams were carried out to determine the most favorable periods for treatment. The bioassays showed that most Lake Michigan and Lake Huron streams would require chemical concentrations two to three times higher than those required on Lake Superior.

A re-appraisal of electrical barrier operations became necessary in 1960 when chemical treatments provided evidence that these installations had not been uniformly successful in preventing lamprey spawning, and abnormally heavy rainfall and severe flooding in the spring of 1960 had resulted in the escapement of spawning lamprey in many streams. Selected barriers will be operated in the future to follow changes in numbers of spawning adults and thus measure the effectiveness of the chemical treatment program.

The catch of sea lamprey in the 45 barriers operated on Lake Superior in 1960 was 44,504, as compared with a catch of 55,547 at 59 barriers in 1959. The catch for those barriers operated in both years increased in Canada but decreased in the United States. However, these changes were not considered indicative of a major change in lamprey abundance. More substantial changes in the abundance of spawning lamprey are expected in 1961 and 1962, as a result of the extensive destruction of the young lamprey by chemicals in the last two years.

Several investigations into the early life history of sea lamprey were continued in 1960. Information was obtained on the distribution and abundance of lamprey ammocoetes living in the lake. These ammocoetes were found in significant numbers near the mouths of a number of spawning streams from which they had drifted. A laboratory study of the temperature tolerance of adult and larval sea lamprey was completed. The influence of temperature on embryological development will now be studied.

Changes in the effectiveness of TFM from stream to stream and season to season have complicated chemical treatment operations and studies of this phenomenon were continued. Laboratory tests showed that water temperature had little effect on the biological activity of TFM. Conversely, hardness and pH greatly influenced chemical activity. Ten mononitrophenols closely related to TFM were examined for larvicidal properties but none appeared to have any special advantages. Toxicity thresholds for TFM were established for several warm-water fish which will probably be encountered in treating Lake Michigan tributaries.

In 1960 the Lake Trout Rehabilitation Committee drew the Commission's attention to the continued decline of the commercial landings in Lake Superior, the continued scarcity of spawning trout and young trout on the south shore, and the high survival of planted trout and their substantial contribution to the catch in certain areas. It suggested to the Commission that more direct control over the catch of lake trout in Lake Superior might be desirable to facilitate recovery of the lake trout population when sea lamprey were controlled. An *ad hoc* committee of senior representatives from the regulatory agencies concerned was, therefore, appointed by

the Commission to study various methods of control. It proposed that a catch limit for the lake and quota system for the four jurisdictional areas be established. The Commission accepted these proposals and agreed to defer recommendations to the two governments until there was evidence that sea lamprey were controlled. It did, however, advise the governments of its intentions and suggested that the regulatory agencies consider the most effective means of implementing this system.

In 1959 the Commission submitted recommendations for research on Lakes Erie, St. Clair, Michigan and Superior. At an interim meeting (June 14-15, 1960), it adopted recommendations for Lake Ontario and Lake Huron, which called attention to the need for information on the abundance and composition of the deep-water fish populations. Although these populations have been lightly fished, improvements in fishing methods and gear might soon facilitate their capture and increase their importance in the fishery. The recommendations were submitted to the governments of Canada and the United States.

NORTH PACIFIC FUR SEAL COMMISSION

Activities during 1960 and the scientific program for 1961 were reviewed at the Fourth Annual Meeting of the North Pacific Fur Seal Commission, held in Tokyo, Japan, January 31 to February 4, 1961. The Commission was established in January 1958, pursuant to the Interim Convention on Conservation of North Pacific Fur Seals, signed in Washington, D.C., on February 9, 1957, by the governments of Canada, Japan, the Union of Soviet Socialist Republics and the United States of America.

In the absence of Commissioner G. R. Clark, Canada was represented at the Meeting by the Alternate Commissioner, Dr. W. M. Sprules. The Chairman was Kemjiro Nishimura of Japan and the Vice Chairman, A. A. Ishkov, of the U.S.S.R. The United States was represented by Commissioner Arnie J. Suomela. All were accompanied by advisers and experts. The Commission meeting was preceded by sessions of the Standing Scientific Committee, which began on January 21. In accepting this committee's report, the Commission agreed that there should be no change in the Schedule to the Convention with regard to the annual kill of seals at sea. Each country is authorized by the Convention to carry out pelagic sealing for scientific purposes only. The commercial kill, which also is controlled as to numbers taken, is made by the United States on the Pribilof Islands and by the U.S.S.R. on the Commander Islands and Robben Island. Under a sharing arrangement, Canada and Japan each receive 15 per cent of the fur sealskins taken commercially.

During 1960, a commercial kill of 36,320 seals was made on the Pribilof Islands and 60,000 pups were tagged as part of the research program. The 1960 harvest on the Pribilofs was reduced because of indications that there was an over-all population reduction on the rookeries. The commercial take on Robben Island during the year was 6200 seals, and on the Commander Islands, 4000, while more than 21,000 pups were tagged on these islands.

Canada's share of North Pacific fur seal skins sold during the fiscal year 1960-61 produced a net revenue of $284,000.

The over-all objective of international management of the fur seal resources of the North Pacific Ocean is to achieve maximum sustainable productivity. In the research carried out at sea, particular emphasis is placed on the ralation of fur seals to the productivity of other living marine resources of the area. This is amplified in the provisions of the Convention to determine by research "what the relationship is between fur seals and other living marine resources and whether fur seals have detrimental effects on other living marine resources substantially exploited by any of the parties and, if so, to what extent." In addition to date on this important phase of the fur seal program the pelagic research is providing information on the distribution and inter-mixture of fur seals at sea.

The results of tagging show little exchange of seals between Robben Island and the Pribilof Islands, but a greater extent of mixing between the Pribilof Islands population and that of the Commander Islands is evident.

At the 1960 meeting Mr. Ishkov was elected Chairman and Mr. Soumela Vice Chairman of the Commission. The meeting accepted an invitation extended by Dr. Sprules on behalf of the Canadian Government, to hold the 1962 annual meeting in Ottawa. Sessions will be held from February 7 to 10, inclusive. The Standing Scientific Committee will hold sessions in Ottawa starting on January 29.

INTERNATIONAL WHALING COMMISSION

The safeguarding of the whale stocks of the world is the responsibility of the International Whaling Commission, which held its Twelfth Annual Meeting in London, England, in June 1960. The meeting was under the chairmanship of R. G. R. Wall, United Kingdom Whaling Commissioner, who was succeeded for the ensuing three years by G. R. Clark, Deputy Minister of Fisheries of Canada. The Commission recommends catch quotas, closed seasons, minimum size limits and methods of catching whales to the contracting governments.

Member countries represented at the meeting were Argentina (which had acceded to the International Whaling Convention only the month before), Australia, Canada, Denmark, France, Iceland, Japan, New Zealand, South Africa, Sweden, the Union of Soviet Socialist Republics, the United States and the United Kingdom. Other member countries are Brazil, Mexico and Panama. Two of the world's leading whaling nations, Norway and the Netherlands, had withdrawn from the Convention as a result of failure outside the Convention of the Antarctic Whaling Nations to reach agreement on a division of the Antarctic annual quota established by the Commission.

Discussions regarding an agreement for a catch division formula between the five Antarctic whaling countries were expected to continue outside the Commission and hope was expressed that these would be successful, thus paving the way for Norway and the Netherlands to rejoin the convention.

Observers were present from the Food and Agriculture Organization of the United Nations, the International Council for the Exploration of the Sea, Norway, the Netherlands, Italy and Portugal.

Although Norway and the Netherlands were no longer party to the Convention, they had established catch limits for their fleets for the 1959-60 Antarctic season.

The three Antarctic pelagic whaling countries remaining party to the Convention—Japan, the United Kingdom and the U.S.S.R.—had operated within the ceiling of 15,000 blue whale units which was the maximum permitted catch established by the Commission for all whaling in the Antarctic (one blue whale unit is one blue whale or two and one-half humpback whales or six sei whales).

During the 1959-60 season 20 expeditions from these five countries operated in the Antarctic, where land stations also operated. Outside the Antarctic 47 land stations and three floating factories were in operation in 1959.

At the London meeting a resolution was adopted appealing to Norway and the Netherlands to rejoin the Convention in the interests of effective conservation action, which should include an arrangement for the sharing of the total catch and the introduction of an international observer scheme. To assist these purposes the Commission voted to suspend for the 1960-61 and 1961-62 seasons, the Antarctic blue whale unit limit. This action was taken on the understanding that if Norway and the Netherlands should not soon rejoin the Convention the suspension would be revoked.

The Commission provided for continuation of scientific investigations of whale stocks, the results of which could form the basis of recommendations for measures to ensure rational utilization of the whale resource.

A report of an expert working party which had been established the previous year to study the question of the humane slaughter of whales was studied by the Commissioners. The report said there had been no conclusive evidence that killing whales by electrical means was more humane than the present method of the explosive harpoon and that the chief criterion was the speed of killing. There were no other methods likely to prove more humane, the report said, although there was prospect of further progress towards the development of a satisfactory and effective electric harpoon. It was agreed that to this end there would be technical consultations between representatives of the whaling industries.

SPECIAL COMMITTEES

FEDERAL-PROVINCIAL COMMITTEE FOR ONTARIO FISHERIES

ALL FISHERIES matters within the province of Ontario of mutual interest to the federal and provincial agencies concerned are included in the terms of reference of the Federal-Provincial Committee for Ontario Fisheries, which before its name was changed in 1959 was the Federal-Provincial Great Lakes Co-ordinating Committee. At the 17th meeting of this Committee, held in Ottawa in May, 1960, problems of fishery management involving research, fishing techniques, control of fish stocks and elimination of predators were reviewed and the programme for the future was planned.

Federal representatives on the committee were Deputy Minister of Fisheries George R. Clark and Dr. W. M. Sprules, Special Assistant to the Deputy Minister, continuing chairman and secretary, respectively; Dr. A. L. Pritchard, Director of the Department's Conservation and Development Service, and Dr. J. L. Kask, Chairman of the Fisheries Research Board of Canada. The provincial representatives were F. A. MacDougall, Deputy Minister of the Ontario Department of Lands and Forests; the late Dr. W. J. K. Harkness, Chief of the Fish and Wildlife Branch of that Department; R. N. Johnston, Chief of its Research Branch, and Dr. F. E. J. Fry of the Department of Biology, University of Toronto.

Reports at the meeting gave details of a standardized sampling scheme for all lakes under consideration, which is being developed by federal and provincial research workers, and of the results of experimental fishing with gear new to fresh water operations, particularly mid-water and Gulf of Mexico bottom trawls. Other matters on which the Committee received reports included selective breeding experiments, sea lamprey control, the rehabilitation of lake trout populations, a project to bring about the utilization of lake fish as animal food, and an economic study of the Great Lakes fisheries which is under way.

The hydrographic program was reviewed, with reference to the cruises of the research vessel *Port Dauphine* on Lakes Ontario, Erie, Huron and Superior. The vessel was operated in 1960 under a committee headed by Dr. G. B. Langford of the University of Toronto.

Two new terms of reference for the Committee were adopted in 1960. One of these authorizes the Committee to receive and consider proposals and recommendations regarding fisheries matters of joint and common interest and to make recommendations to the respective governments with regard to such matters. The other provides for an exchange of information on matters of joint and common interest pertaining to the fisheries of the province.

The vacancy on the Committee caused by the death of Dr. Harkness shortly after the 1960 meeting was filled by the appointment of Dr. C. H. D. Clarke.

FEDERAL-PROVINCIAL ATLANTIC FISHERIES COMMITTEE

Composed of federal and provincial Deputy Ministers of departments concerned with fisheries developments in the Atlantic region, the Federal-Provincial Atlantic Fisheries Committee continued, in 1960, to review and consider solutions of fisheries problems of common interest.

At its Second Annual Meeting in May, the Committee reviewed the economic outlook for Atlantic fishermen and the industry, and studied policies in connection with industrial development projects and aid in the construction of fishing vessels. Good progress was reported in developmental projects for the industry, but many of these are of a long-term nature. The need for consideration of projects that would provide immediate results was discussed. Increasing costs in the construction of fishing vessels presented the Provincial Loan Boards with new difficulties in policies affecting the modernization of fishing fleets. Exchanges of information between provincial authorities and the dissemination of information about fisheries regulations were arranged as before.

Reports of the oyster section and the salmon and trout section of the main committee showed gratifying progress in overcoming problems which have beset the oyster industry in the Maritime Provinces, as well as in the efforts to find a method of checking the spruce budworm epidemic in the forests of the region without causing irreparable damage to stocks of Atlantic salmon.

The responsibilities of the industrial development section of the main committee, which examines and reports on prospects for the over-all modernization of Canadian Atlantic coast fishing enterprises, were widened to include reviews of the results of technological and biological research, engineering and development, both in Canada and abroad, relative to vessels and gear, and the processing, assembling, transportation and distributive phases of the industry. It will also recommend appropriate policies and programs of action.

At a meeting of the industrial development section held in Shediac, N.B., in November, notable advances in fishing boats and catching gear were in evidence. Progress in these fields is spread over a wide area and affects many activities. A number of experimental fishing projects were carried out during the year by various agencies and considerable fleet expansion was noted in certain areas. In a discussion on economic aspects of the fishing industry it was pointed out that the commercial fisheries are not only a major industry but also have a tremendous impact on other phases of the Atlantic coast economy. One example of this was the employment provided by the construction of 450 new fishing boats during the period 1947-60.

THE FISHING INDUSTRY, 1960

THE CANADIAN fishing industry experienced a mixture of gains and losses in 1960. While the season on the Pacific Coast was disappointing, the Atlantic Coast, on the whole, enjoyed a very successful season. The primary industry landed about 892,000 tons of fish in 1960, as compared with 1,030,000 tons in the previous year. The landed value of the catch fell from $107.7 million to $101.0 million between the two years. The drop in volume and value is largely attributable to the shortfall in catch in the British Columbia fishery. There were a few districts, however, within each of the three regions discussed in this brief outline, that did not conform to the conditions generally prevailing.

The value of all fishery products exported during the year amounted to $138.1 million, a seven per cent decrease from the $147.8 million reported in 1959. Lower sales of canned sockeye salmon, canned chum salmon and fish meal were mainly responsible for the drop in export value. Exports to the United States and the Caribbean area remained at the 1959 level, but exports to Europe were down by 37 per cent. Imports of fishery products at $17.2 million increased slightly from $16.3 million in 1959, due mainly to an increase in purchases of canned salmon from the United States.

The Pacific Coast Fisheries

The value of fish landed by British Columbia fishermen totalled only $29.0 million in 1960, as compared with $37.2 million in 1959 and $53.2 million in the record season of 1958. On a weight basis, landings decreased from 612.7 million pounds in 1959 to 340.5 million in 1960.

Prosperity in the Pacific Coast fisheries is determined to a major degree by the quantity of salmon landed. In 1960 all species of salmon were scarce. While the catch was expected to be low, due to the incidence of low points in the cycle of several important runs, the actual landings were below the most pessimistic forecasts. Total salmon landings, at 75.2 million pounds, were the lowest since records were first collected in 1910. Relatively high prices, however, resulted in a landed value of $18.4 million, which is roughly comparable to the 1955 season, a year in which almost 80 per cent more salmon was landed. The production of canned salmon in 1960, at 632,000 cases, was much below the average of 1,385,000 cases for the 1955-1959 period and was in fact the lowest pack in 40 years.

Only limited herring operations were carried on in 1960 due to the shutdown of the main herring-seine fishery in December, 1959. This shutdown was precipitated by the drop in world prices for fish meal and oil. The main herring fleet did not resume operations until late November, 1960, when the fishermen and the companies were able to agree on terms of operation. The fishery produced 146.2 million pounds between November 20 and the end of the year, approximating the average catch for that period.

A record quantity of 33.9 million pounds of halibut was landed during 1960. The value of these landings was lower than that of the previous year. Accordingly, the unit price received by fishermen was, for the most part, below that of 1959. The gray cod and oyster catch dropped off sharply in 1960 but landings of sablefish, soles, shrimp and crab increased significantly.

For the first time in several years no whaling operations were conducted on the Pacific coast in 1960—for reasons similar to those affecting the herring fishery.

The Lake Fisheries

Statistical data available at the time of writing indicate that the 1960 catch in the freshwater fisheries was in the vicinity of 110 million pounds, down approximately seven million pounds from 1959. Lower landings in Ontario account for this decline. Price levels were reported to be relatively high throughout the season and it is expected that, even though landings were below those of last year, the landed value in 1960 will approximate that of 1959.

In the western provinces, particularly, a trend is developing toward production of more highly processed fish, including frozen blocks for the United States gefilte-fish market. This change is in response to a declining demand for fish in the whole or round form. There was a fairly strong demand for these processed products during 1960 and indications point to increased demand in the future.

The freshwater fishery is extremely dependent on the export market, as approximately 90 per cent of the total production is shipped to the United States annually. This pattern was maintained in 1960; both the quantity and value of freshwater fishery products exported increased slightly.

Two technical innovations were tested experimentally in 1960, viz. a dragnet fishery for smelt in Lake Erie and a trapnet fishery for pickerel and whitefish in Lake Winnipeg. The outcome of these operations and their economic impact await final assessment.

The Atlantic Coast Fisheries

The Atlantic coast fisheries as a whole experienced a record season in 1960, Landings at 1333.5 million pounds exceeded those of the previous year by 2.4 million pounds, while the value of the landings increased by approximately $1.6 million to $60.0 million. The total value of landings decreased slightly in Nova Scotia. With the exception of Quebec, all Atlantic provinces registered increases in the volume of landings.

The groundfish industry on the Atlantic coast was marked by two distinct influences in 1960. A strong market for salt fish developed as supplies of this product became short in Europe. This resulted in relatively high prices for salt fish and also caused some diversion of cod landings from other forms of utilization to cured fish, particularly in the heavy-salted form. Towards the end of 1960, the market for frozen fish recovered considerably from the weak position that was apparent from the end of 1959 to the summer of 1960. Groundfish landings, at 961.4 million pounds, were a little lower than those of the 1959 season. Cod landings were down 37 million pounds and haddock landings also were lighter than in 1959. Landings of pollock and

flatfish (excluding halibut) showed fairly substantial increases, however, tending to offset some of the loss in groundfish landings generally caused by the midsummer scarcity of cod and halibut.

Newfoundland small-boat fishermen started the summer season with record landings in May and June but by midsummer the entire situation changed and catches began to dwindle. Longliners and inshore craft of several provinces fishing in the Gulf of St. Lawrence obtained poor catches throughout most of the year. On the other hand, draggers in this area and in the Bay of Fundy and the deep-sea fleet enjoyed a consistently successful season.

Hauling a codtrap in Newfoundland. Fishermen use dipnets to brail the cod from the trap into the boat.

In terms of landed value, lobster is the most important species caught by Atlantic coast fishermen. The 1960 season, aided by an early spring, produced the most valuable lobster catch on record. Although lobster prices were in general slightly lower than in 1959, fishing intensity was greater than in other years. Landings, at 50.1 million pounds, brought east coast fishermen approximately $18.0 million which constituted 30 per cent of the value of all fish landed on the Atlantic Coast.

Scallop landings on Canada's Atlantic coast in 1960 totalled 7.7 million pounds, a new quantity record and 58 per cent above the 1959 catch of 4.9 million pounds. In spite of lower unit prices, the scallop catch increased by nine per cent in value over 1959.

The pelagic and estuarial fisheries of the Atlantic coast also enjoyed a favourable season generally in 1960. Although the salmon catch decreased slightly, its landed value was approximately the same as in the previous year. Swordfishing vessels sailed to the fishing grounds early in the season but fish were scarce and landings consequently fell to 3.9 million pounds, 42 per cent less than the 6.7 million pounds caught in 1959. The herring fishery in the Bay of Islands area was a failure during the year but in the Bay of Fundy and Placentia Bay areas it was quite successful. Total regional landings, at 243 million pounds, were slightly above those of 1959.

In new vessel and plant construction there was some further expansion on the Atlantic coast in 1960, while on the Pacific coast there was a noticeable decline in vessel construction.

STATISTICS OF THE FISHERIES

Fish and Shellfish—Landings and Landed Values, 1959 and 1960

(Principal Species)

	Landings		Landed Values	
	1959	1960	1959	1960
	'000 lb.		$ '000	
Pacific Coast				
Salmon	105,679	75,154	20,503	18,401
Halibut	30,795	33,868	5,832	5,399
Herring	444,031	187,675	7,355	2,178
Crabs	4,323	5,068	438	515
Soles and Flounders	5,194	7,961	295	419
Ling Cod	4,224	4,516	390	402
Oysters	6,952	5,879	407	339
Shrimps and Prawns	1,043	1,678	172	299
Grey Cod	7,104	5,244	369	260
Atlantic Coast				
Lobster	45,549	50,114	17,279	18,056
Cod	642,244	605,615	17,110	16,867
Small Flatfishes	92,743	122,424	2,923	3,839
Haddock	111,943	95,328	4,965	3,690
Herring	235,849	243,417	3,389	3,683
Scallops	4,909	7,719	1,871	2,021
Halibut	6,386	6,538	1,680	1,690
Salmon	3,942	3,518	1,447	1,437
Swordfish	6,702	3,889	1,384	1,347
Pollock	46,355	57,608	920	1,262
Redfish	41,019	46,503	989	1,166
Mackerel	9,309	12,997	595	728

Fish and Shellfish—Landings and Values by Provinces and Areas, 1959 and 1960

	Landings		Landed Values	
	1959	1960	1959	1960
	'000 lb.		$ '000	
Sea fisheries—TOTAL	1,943,714	1,674,023	95,593	88,979
Atlantic Coast—TOTAL	1,331,058	1,333,522	58,435	59,997
Nova Scotia	421,885	427,741	27,112	26,079
Newfoundland	534,797	546,533	14,529	16,208
New Brunswick	222,530	225,881	8,635	9,197
Prince Edward Island	42,025	42,108	4,286	4,620
Quebec	109,821	91,259	3,873	3,893
Pacific Coast—TOTAL	612,656	340,501	37,158	28,982
Freshwater fisheries—TOTAL	117,212	109,655	12,103	11,974
Ontario	48,984	40,000	4,866	4,800
Manitoba	31,052	31,000	3,757	3,700
Saskatchewan	12,550	13,000	1,190	1,200
Alberta	12,664	13,000	1,016	1,000
Northwest Territories	5,747	5,613	703	683
Quebec	2,551	2,500	443	440
New Brunswick	3,664	4,542	128	151
GRAND TOTAL	2,060,926	1,703,678	107,696	100,953

Fish and Shellfish—Exports by Types of Products, 1959-1960

	Quantity		Value	
	1959	1960	1959	1960
	('000 lb)		($ '000)	
Fresh and Frozen Fish, whole or dressed	158,025	167,406	33,151	34,940
Fresh and Frozen Fillets	133,675	140,053	33,372	33,893
Smoked Fish	8,618	6,916	1,427	1,305
Pickled Fish	20,113	17,950	2,638	2,363
Salted and Dried Fish	106,937	107,766	17,726	18,485
Canned Fish	46,903	30,348	25,982	15,144
Molluscs and Crustaceans (fresh and canned)	28,212	32,932	21,231	23,268
Fish Oils ('000 gallons)	3,706	3,310	2,356	2,053
Miscellaneous	—	—	9,933	6,679
TOTAL	—	—	147,816	138,130

Number of Fishermen in Canada, by Areas, 1958 and 1959

	1958	1959
SEA FISHERIES	62,856	61,065
British Columbia	15,263	15,456
Maritimes and Quebec	29,229	27,303
Newfoundland	18,364	18,306
FRESHWATER FISHERIES	20,074	17,838
TOTAL	82,930	78,903

Value of Fishing Craft and Gear in Canada, by Areas, 1958 and 1959

	1958	1959
	$ '000	
SEA FISHERIES	103,452	108,478
British Columbia	51,461	52,839
Maritimes and Quebec	36,346	39,642
Newfoundland	15,645	15,997
FRESHWATER FISHERIES	11,342	12,671
TOTAL	114,794	121,149

APPENDIX 1

FINANCIAL STATEMENTS 1960-61

COMPARATIVE SUMMARY OF EXPENDITURE

Appropriation	1960-61	1959-60	Increase or Decrease—
	$	$	$
Miscellaneous Gratuities	1,775.00	.....	1,775.00
Minister's Salary and Motor Car Allowance	17,000.00	17,000.00	
GENERAL SERVICES			
Departmental Administration	420,532.33	372,447.78	48,084.55
Information and Educational Service	188,659.33	163,605.31	25,054.02
Economics Service	304,950.66	315,210.62	−10,259.96
Industrial Development Service	660,759.35	1,086,877.48	−426,118.13
Fishing Bounty	159,945.45	159,999.70	−54.25
FIELD SERVICES			
Field Services Administration	888,790.36	769,215.51	119,574.85
Conservation and Development Service—			
Operation and Maintenance	5,764,718.45	5,509,786.03	254,932.42
Buildings, Works, Land and Equipment	1,071,020.24	1,819,751.25	−748,731.01
Inspection and Consumer Branch	1,891,643.74	1,787,630.65	104,013.09
Fishermen's Indemnity Plan—			
Administration	225,555.70	213,888.94	11,666.76
SPECIAL			
Canadian share of Expenses of the Commissions	840,135.46	781,703.44	58,432.02
Acquisition of Land for the International Pacific Salmon Fisheries Commission	2,356.00	.....	2,356.00
Exchequer Court	7,111.46	.....	7,111.46
Newfoundland Bait Service	444,406.19	505,903.28	−61,497.09
Educational Work Among Fisherman	89,805.69	88,830.40	975.29
Fisheries Prices Support Act—			
Administration	54,117.40	51,840.07	2,277.33
Assistance to Producers of Salted Fish	755,104.97	600,000.00	155,104.97
Assistance in Construction of Vessels of the Dragger or Long Liner Type	345,887.85	474,511.95	−128,624.10
Assistance in Construction of Bait Freezing and Storage Facilities	42,992.00	23,275.00	19,717.00
Recoup Lobster Trap Indemnity Account—			
as at March 31, 1961	114,480.00	158,100.00	−43,620.00
Destruction of Dogfish and Other Predators	118,908.94	144,371.75	−25,462.81
Refunds of Amounts Credited to Revenue in Previous Years	900.00	1,100.00	—200.00
Contribution towards the Cost of a Special Meeting of the Food and Agriculture Organization of the United Nations regarding Distribution and use of Fish Meal	2,500.00	.....	2,500.00
FISHERIES RESEARCH BOARD			
Headquarters Administration	188,191.57	159,940.01	28,251.56
Operation and Maintenance	4,092,184.72	3,751,797.45	340,387.27
Land, Buildings and Equipment	501,248.49	924,127.55	−422,879.06
TOTALS	19,195,681.35	19,880,914.17	−685,232.82

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COMPARATIVE SUMMARY OF REVENUES

	1960-61	1959-60	Increase or Decrease—
	$	$	$
Return on Investments—			
Pelagic Sealing (Profit on sales of skins)	284,097.24	526,823.49	−242,726.25
Miscellaneous	21.20	67.82	−46.62
	284,118.44	526,891.31	−242,772.87
Privileges, Licenses and Permits	111,150.35	106,986.99	4,163.36
Proceeds from Sales	147,484.78	74,489.30	72,995.48
Service and Service Fees	50,282.64	69,042.22	−18,759.58
Refund of Previous Years' Expenditure	34,896.65	13,147.57	21,749.08
Miscellaneous	45,728.57	41,776.27	3,952.30
TOTALS	673,661.43	832,333.66	−158,672.23

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	257,412.91	4,410.00	51,022.14	312,845.05
Protection Officers	49,606.72	.....	19,916.42	69,523.14
Wardens	59,967.77	19,800.90	25,195.71	104,964.38
Guardians	.....	100,296.66	10,528.78	110,825.44
Departmental Boats—				
Garia Bay	.....	.....	310.60	310.60
Badger Bay	5,796.86	2,450.68	6,320.09	14,567.63
Pecten	.....	.....	1,041.98	1,041.98
Crago	.....	.....	2.00	2.00
Sabinea	.....	.....	421.77	421.77
Cinderella	8,244.54	.....	4,974.31	13,218.85
Louise Ruth	3,461.96	1,900.91	5,685.45	11,048.32
Lomond	.....	.....	3,736.65	3,736.65
Eastern Explorer	13,356.00	7,381.79	14,299.21	35,036.90
Point May	5,116.50	.....	1,023.30	6,139.80
Porella	6,216.00	2,460.00	6,097.67	14,773.67
Nebalia	5,778.73	2,408.56	6,194.91	14,382.20
Aurelia	5,854.11	2,715.92	5,516.38	14,086.41
Boltenia	8,740.34	2,411.86	8,860.56	20,012.76
Belle Bay (Floating Laboratory)	4,469.01	3,051.91	8,942.83	16,463.75
Fish Inspection Laboratory	48,411.96	648.00	12,097.51	61,157.47
Fisheries Area Office	21,252.50	131.18	323.86	21,707.54
Miscellaneous	.....	3,198.58	40,636.28	43,834.86
Totals	503,685.91	153,266.85	233,148.41	890,101.17

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	121,294.64	19,403.67								2,133.90	142,832.21
District No. 2	82,432.27	22,588.47								1,897.15	106,917.89
Protection Branch—District No. 1	47,699.17	15,438.26	15,931.07	11,308.85	9,286.17	7,028.05	206.22			1,775.47	108,673.26
District No. 2	97,122.27	27,286.22	24,603.09	15,731.33	11,219.09	16,581.00	209.32			5,252.09	198,004.41
District No. 3	37,919.24	10,287.94	21,532.82	15,274.40	8,392.11	16,810.15	269.32			4,830.65	115,307.63
District No. 4	49,146.52	14,924.78	6,427.50	4,342.50	3,838.60	10,621.69	231.11			2,771.82	92,304.52
Fish Inspection Laboratory—Halifax								95,345.19	4,717.09	44,640.33	144,702.61
New Fish Inspection Laboratory—Halifax										3,719.24	3,719.24
Miscellaneous—Protection								12,450.00		2,586.50	15,036.50
Inspection										71.15	71.15
Prince Edward Island—											
Inspection Branch—District No. 4B	52,373.41	7,878.78									60,252.19
Protection Branch—District No. 9	55,012.83	15,988.48	12,529.03	2,867.86	4,185.05	2,341.21	348.82				93,273.28
Fish Inspection Laboratory—Charlottetown								12,070.00		8,505.58	20,575.58
Miscellaneous—Protection										5,838.01	5,838.01
Inspection										1,013.82	1,013.82
New Brunswick—											
Inspection Branch—District No. 3	32,933.59	5,549.66								792.88	39,276.13
District No. 4A	45,022.50	21,188.90							948.47	3,006.23	70,166.10
Protection Branch—District No. 5	20,637.14	7,605.83	11,681.21	2,062.25	2,712.18	7,998.98	73.76			3,416.61	56,187.96
District No. 6	41,067.50	10,276.49	34,082.80	7,621.28	7,193.59	20,518.02	1,149.29			4,011.15	125,920.12
District No. 7	70,907.50	17,613.73	31,790.28	20,461.18	7,462.18	11,034.21	293.04			7,192.01	166,754.13
District No. 8	36,212.50	9,809.06	4,520.96	14,750.32	5,898.52	5,218.76	75.63			3,332.08	79,817.83
Fish Inspection Laboratory—Shediac								15,838.88	2,118.85	4,928.34	22,886.07
Fish Inspection Laboratory—St. Andrews								30,319.56		2,585.86	32,905.42
Miscellaneous—Protection										1,335.00	1,335.00
East—											
Inspection—Maritimes Area Office								13,519.66		11,322.74	24,842.40
Protection—Maritimes Area Office								14,180.00		33,781.06	47,961.06
Home Economics Service								5,295.00		1,747.42	7,042.42
Miscellaneous—Protection										9,915.13	9,915.13
Inspection										9,824.47	9,824.47
	789,781.08	205,840.27	163,098.76	94,419.97	60,187.49	98,152.07	2,856.51	199,018.29	7,784.41	182,226.69	1,803,356.54

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NOVA SCOTIA—				
Cratena	11,024.84	5,515.09	9,468.18	26,008.11
Marcia	4,773.56	2,928.00	4,998.66	12,700.22
Limanda	13,734.38	1,714.68	19,209.13	34,658.19
Lacuna	4,047.87	8,000.37	12,750.53	24,798.77
Sabella	8,424.44	7,154.70	18,127.26	33,706.40
Mya II	5,090.00	.....	3,502.36	8,592.36
Modiolus II	7,635.00	.....	4,924.73	12,559.73
Serpula	7,662.07	1,208.07	4,231.17	13,101.31
Scatari Light	.....	5,726.25	2,851.24	8,577.49
Sable Light	3,518.54	2,767.24	3,896.64	10,182.42
Chartered Boats	.....	1,731.28	950.88	2,682.16
PRINCE EDWARD ISLAND—				
Obelia	1,968.00	4,537.72	4,021.79	10,527.51
Kildare Point	1,968.00	2,485.14	3,776.32	8,229.46
Diala	.....	1,175.39	208.33	1,383.72
Yorke Point	.....	2,579.73	1,398.94	3,978.67
Fabia	.....	5,412.98	3,808.84	9,221.82
Acartia	.....	5,304.70	3,228.84	8,533.54
Prim Light	.....	7,863.07	3,707.68	11,570.75
Chartered Boats	.....	14,316.84	9,082.15	23,398.99
NEW BRUNSWICK—				
Rossia	.....	5,551.34	3,411.84	8,963.18
Ilea	5,441.06	.....	3,194.31	8,635.37
Tegula	5,478.80	2,084.56	5,072.15	12,635.51
Alosa	8,126.88	8,530.08	10,161.39	26,818.35
Osmerus	5,601.58	232.38	2,675.92	8,509.88
Shediac Bay	5,182.35	1,732.43	5,746.54	12,661.32
Cardita	4,990.75	2,661.50	4,212.39	11,864.64
Paphia	2,921.48	4,918.85	4,513.44	12,353.77
Cumella	11,162.85	9,005.91	14,714.61	34,883.37
Hyperia	5,638.12	.....	4,861.02	10,499.14
Gull Light	7,578.95	42.03	3,643.80	11,264.78
Neguac Light	.....	8,009.72	4,622.30	12,632.02
EAST—				
Lamna	3,980.89	.....	476.04	4,456.93
Cygnus	43,835.49	55,255.10	68,003.73	167,094.32
TOTALS	179,785.90	178,445.15	249,453.15	607,684.20

Quebec Area

—	Officers			General			Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Permanent Salaries	Temporary Salaries	Other Expenditure	
	$	$	$	$	$	$	$
Quebec—							
Home Economics Service						1,105.42	1,105.42
District No. 1	54,906.14	15,073.43				829.35	70,808.92
Chartered Boats						4,950.00	4,950.00
District No. 2	50,552.86	10,478.95		257.50		30.00	61,319.31
District No. 3	27,207.50	8,206.76				230.00	35,644.26
Grindstone—Office—Residence						2,137.39	2,137.39
Fish inspection Laboratory—Quebec				14,904.28		33,496.68	48,400.96
Quebec Area Office						64.59	64.59
General—Protection						1,415.59	1,415.59
Inspection						2,598.70	2,598.70
	132,666.50	33,759.14		15,161.78		46,857.72	228,445.14

Central Area

	Officers		Guardians		General			Total
	Permanent Salaries	Other Expenditure	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$
Ontario	71,670.76	5,432.57				718.48	16,310.81	94,132.62
Fish Inspection Laboratory—Toronto					8,922.50		1,757.55	10,680.05
Home Economics Service					5,780.00		1,527.84	7,307.84
Manitoba	41,073.18	5,094.59					4,770.12	50,937.89
Fish Inspection Laboratory—Winnipeg					25,595.23	1,938.33	5,415.51	32,949.07
Home Economics Service					5,404.72		1,681.88	7,086.60
Saskatchewan	17,255.45	15,945.96					3,343.74	36,545.15
Alberta	13,930.00	1,760.70					1,980.63	17,671.33
Home Economics Service					6,059.75		483.44	6,543.19
Yukon Territory	8,169.32	10,910.92					829.39	19,909.63
Northwest Territories—Protection	17,782.50	6,229.51	5,340.33	1,280.32			20,751.69	51,384.35
Inspection	21,170.25	6,013.47	5,214.70	1,376.27			3,326.85	37,101.54
Office Building							1,119.56	1,119.56
Staff House						4,201.05	4,496.24	8,697.29
Supervisor's Residence							1,841.10	1,841.10
Garage						5,033.60	4,189.10	9,222.70
Housing Units							6,184.18	6,184.18
Patrol Boat "Marila"							893.86	893.86
Patrol Boat "Mareca"							859.14	859.14
Home Economics Service—Central							89.51	89.51
Miscellaneous							2,785.29	2,785.29
Headquarters—Ottawa—Protection					91,993.85		8,380.79	100,374.64
Headquarters—Ottawa—Inspection					40,685.82		7,981.44	48,667.26
Home Economics Service—H.Q.					28,186.83	3,366.82	11,261.23	42,814.88
	191,051.46	51,387.72	10,555.03	2,656.59	212,628.70	15,258.28	112,260.89	595,798.67

Pacific Area

	Officers		Guardians			Miscellaneous			Total
	Permanent Salaries	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	Permanent Salaries	Temporary Assistance	Other Expenditure	
	$	$	$	$	$	$	$	$	$
British Columbia—									
District No. 1	50,890.00	20,500.27	169.34	11,587.19	4,839.01	.....	574.48	5,513.48	94,073.77
District No. 2	82,417.65	57,090.82	.....	49,115.17	11,318.74	.....	.....	11,272.87	211,215.25
Queen Charlotte City—Office—Residence	.....	.....	.....	.....	.....	.....	.....	632.81	632.81
Bella Bella—Office—Residence	.....	.....	.....	.....	.....	.....	.....	418.93	418.93
Bella Coola—Office—Residence	.....	.....	.....	.....	.....	.....	.....	2,087.16	2,087.16
Massett—Office—Residence	.....	.....	.....	.....	.....	.....	.....	622.55	622.55
Rivers Inlet—Office—Residence	.....	.....	.....	.....	.....	.....	.....	764.35	764.35
Sandspit—Office—Residence	.....	.....	.....	.....	.....	.....	.....	1,098.82	1,098.82
District No. 3	97,297.73	52,191.27	.....	13,791.89	2,213.62	.....	.....	7,701.27	173,195.78
Quatsino—Office—Residence	.....	.....	.....	.....	.....	.....	.....	2,001.89	2,001.89
Campbell River—Office—Residence	.....	.....	.....	.....	.....	.....	.....	556.81	556.81
Alert Bay—Office—Residence	.....	.....	.....	.....	.....	.....	.....	1,661.51	1,661.51
Pender Harbour—Office—Residence	.....	.....	.....	.....	.....	.....	.....	1,500.67	1,500.67
Kuyquot—Office—Residence	.....	.....	.....	.....	.....	.....	.....	1,284.13	1,284.13
Tofino—Office—Residence	.....	.....	.....	.....	.....	.....	.....	869.01	869.01
Westview—Office—Residence	.....	.....	.....	.....	.....	.....	.....	1,938.92	1,938.92
Port Hardy—Office—Residence	.....	.....	.....	.....	.....	.....	.....	232.74	232.74
Home Economics Service	.....	.....	.....	.....	.....	6,140.00	.....	2,386.09	8,526.09
Fisheries Area Office	.....	.....	.....	.....	.....	19,155.78	.....	2,121.07	21,276.85
Fisheries Station—Prince Rupert	.....	.....	.....	.....	.....	15,364.00	4,396.80	3,904.25	23,665.05
Fisheries Station—New Westminster	.....	.....	.....	.....	.....	46,292.54	5,096.00	22,976.22	74,364.76
Fisheries Inspection Laboratory—Vancouver	.....	.....	.....	.....	.....	107,156.94	90.00	35,213.95	142,460.89
General—Protection	.....	.....	.....	.....	.....	1,204.09	.....	24,745.74	25,949.83
Inspection	.....	.....	.....	.....	.....	.....	.....	12,976.25	12,976.25
B.C. District 2—Inspection	.....	.....	.....	.....	.....	.....	.....	1,201.01	1,201.01
B.C. District 3—Inspection	.....	.....	.....	.....	.....	.....	.....	541.10	541.10
	230,605.38	129,782.36	169.34	74,494.25	18,371.37	195,313.35	10,157.28	146,223.60	805,116.93

Particulars	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
BRITISH COLUMBIA—				
General				
Howay	59,239.43	21,566.11	56,450.87	137,256.41
Kitimat	27,617.62	10,845.81	30,894.70	69,358.13
Laurier	60,012.87	15,266.04	68,225.70	143,504.61
DISTRICT NO. 1—				
Gavia	12,961.61	.....	2,608.13	15,569.74
Chilco Post	22,619.12	3,413.00	8,919.93	34,952.05
Diaphus	6,259.32	1,307.33	1,759.77	9,326.42
Swantail II	7,611.39	.....	1,151.83	8,763.22
Rissa	8,692.32	.....	2,273.00	10,965.32
Ardea	.....	.....	85.44	85.44
Star Rock	10,093.12	.....	2,895.65	12,988.77
Seal Rock	11,523.95	496.00	3,452.54	15,472.49
Tackla Rock	1,125.84	953.26	1,764.18	3,843.28
Chartered Boats	.....	.....	21.35	21.35
DISTRICT NO. 2—				
Arrow Post	17,916.21	4,056.00	16,247.73	38,219.94
Babine I	.....	1,622.43	331.73	1,954.16
Babine Post	15,050.42	5,632.21	9,450.41	30,133.04
Beldis	9,704.04	2,215.13	10,917.11	22,836.28
Bonila Rock II	10,369.53	2,101.09	5,673.65	18,144.27
Clupea	510.00	659.00	8.16	1,177.16
Egret Plume II	11,241.96	2,192.00	13,289.11	26,723.07
F.D. 202	7,874.15	.....	2,418.27	10,292.42
Nicola Post	10,771.26	1,771.33	4,564.98	17,107.57
Onerka II	10,270.33	2,087.62	4,623.68	16,981.63
Sooke Post	15,729.82	3,251.00	16,865.92	35,846.74
Skeena	.....	.....	123.12	123.12
Agonus	10,335.36	507.43	4,276.77	15,119.56
Clavella	22,767.95	3,086.58	11,548.79	37,403.32
Branta	.....	2,498.78	1,652.31	4,151.09
Sterna	1,198.44	709.50	1,495.88	3,403.82
North Rock	4,906.82	1,822.66	3,965.49	10,694.97
Falcon Rock	11,571.00	4,585.23	5,615.13	21,771.36
Chartered Boats	.....	42,069.99	80,159.14	122,229.13
DISTRICT NO. 3—				
Atlin Post	21,835.19	4,327.27	11,752.25	37,914.71
Black Raven II	12,569.21	3,479.39	4,974.80	21,023.40
Comox Post	14,380.33	3,796.00	11,220.12	29,396.45
F.D. 102	5,464.96	.....	4,968.84	10,433.80
F.D. 201	6,092.21	.....	2,242.18	8,334.39
Daphnia	6,165.63	.....	4,254.61	10,420.24
Pholus	4,763.04	.....	2,840.06	7,603.10
Stuart Post	19,555.63	4,009.09	10,499.76	34,064.48
Atolla	4,763.04	.....	2,887.54	7,650.58
Ciona	5,192.42	.....	3,642.13	8,834.55
Sarda	240.92	.....	1,816.47	2,057.39
Statistic	5,927.97	.....	2,956.86	8,884.83
Brama	6,431.64	1,962.13	5,047.87	13,441.64
Temple Rock	9,145.88	3,178.09	4,290.27	16,614.24
Beaver Rock	.....	.....	99.56	99.56
Pursepa	.....	.....	46.53	46.53
Chartered Boats	2,496.52	69,763.95	48,757.13	121,017.60
TOTALS	512,998.47	225,231.45	496,027.45	1,234,257.37

PROTECTION AND INSPECTION SERVICES
SUMMARY

—	Headquarters Ottawa	Newfoundland	East General	Nova Scotia	Prince Edward Island	New Brunswick	Quebec	Ontario
	$	$	$	$	$	$	$	$
Newfoundland Area		724,857.88						
Newfoundland Patrol		165,243.29						
Maritimes Area			99,585.48	927,569.42	180,952.88	595,248.76		
Maritimes Patrol			171,551.25	187,567.16	76,844.46	171,721.33		
Quebec Area							228,445.14	
Central Area								112,120.51
Central Patrol								
Pacific Area								
Pacific Patrol								
Headquarters—Ottawa	191,856.78							
TOTALS	191,856.78	890,101.17	271,136.73	1,115,136.58	257,797.34	766,970.09	228,445.14	112,120.51

—	Central General	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon Territory	Total
	$	$	$	$	$	$	$	$
Newfoundland Area								724,857.88
Newfoundland Patrol								165,243.29
Maritimes Area								1,803,356.54
Maritimes Patrol								607,684.20
Quebec Area								228,445.14
Central Area	2,874.80	90,973.56	36,545.15	24,214.52		115,550.72	19,909.63	402,188.89
Central Patrol						1,753.00		1,753.00
Pacific Area					805,116.93			805,116.93
Pacific Patrol					1,234,257.37			1,234,257.37
Headquarters—Ottawa								191,856.78
TOTALS	2,874.80	90,973.56	36,545.15	24,214.52	2,039,374.30	117,303.72	19,909.63	6,164,760.02

FISH CULTURE DEVELOPMENT

Expenditure by Provinces and Establishments

Establishment	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NEWFOUNDLAND—				
Fisheries Area Office	33,652.67	8,172.75	7,067.07	48,892.49
Atlantic Salmon Programme—				
General	.....	5.231.95	5,507.38	10,739.33
General	.....	1,204.40	3,673.96	4,878.36
Total	33,652.67	14,609.10	16,248.41	64,510.18
NOVA SCOTIA—				
Fish Culture Stations—				
Antigonish	25,660.00	4,940.96	17,755.19	48,356.15
Bedford	10,678.04	7,074.00	6,718.27	24,470.31
Cobequid	21,300.00	2,507.95	9,513.46	33,321.41
Coldbrook	4,800.57	5,929.45	9,494.94	20,224.96
Kejimkujik	11,445.00	2,480.44	8,097.39	22,022.83
Lindloff	15,497.50	10,475.08	13,032.89	39,005.47
Margaree	19,690.24	3,001.06	14,956.49	37,647.79
Margaree Retaining Pond and Collection	.....	.....	76.00	76.00
Middleton	13,252.04	1,289.00	5,045.24	19,586.28
River Philip Retaining Pond	.....	61.83	245.01	306.84
Sackville Retaining Pond	.....	45.60	247.32	292.92
Yarmouth	16,692.50	3,668.00	19,488.35	39,848.85
Grand Lake	10,632.50	2,767.19	6,125.73	19,525.42
Mersey	6,200.00	1,891.40	2,778.44	10,869.84
Biological and Engineering Projects—				
Annapolis River	.....	937.44	4,939.87	5,877.31
Gaspereau River	.....	.....	15.40	15.40
Lake George	.....	.....	496.00	496.00
Randall Lakes	.....	1,042.50	263.26	1,305.76
Sissiboo River	.....	.....	609.10	609.10
Tusket River	.....	203.40	1,108.46	1,311.86
Lake Surveys	.....	.....	20.45	20.45
General	.....	.....	2,539.96	2,539.96
Atlantic Salmon Program—				
St. Mary's River	.....	1,949.51	1,454.94	3,404.45
LaHave River	.....	102.60	38.91	141.51
General	.....	.....	1,279.28	1,279.28
Shellfish Culture—				
Malagash Station	.....	4,284.80	181.26	4,466.06
Orangedale Station	4,340.00	2,144.00	309.28	6,793.28
Total	160,188.39	56.796.21	126,830.89	343,815.49
PRINCE EDWARD ISLAND—				
Fish Culture Stations—				
Kelly's Pond	.....	3,739.35	891.96	4,631.31
Cardigan	6,270.21	5,429.10	10,077.90	21,777.21
Biological and Engineering Projects—				
Simpson and Stevenson's Ponds	.....	.....	14.90	14.90
General	.....	986.40	91.42	1,077.82
Shellfish Culture—				
Ellerslie Station	16,277.50	20,922.97	5,139.27	42,339.74
Ostrea Departmental Boat	.....	.....	58.32	58.32
General	.....	.....	101.22	101.22
Total	22,547.71	31,077.82	16,374.99	70,000.52

Expenditure by Provinces and Establishments—*Concluded*

Establishment	Permanent Salaries	Temporary Assistance	Other Expenditure	Total
	$	$	$	$
NEW BRUNSWICK—				
Fish Culture Stations—				
Chamcook Collection Camp	.....	263.52	27.11	290.63
Florenceville	16,362.50	12,320.08	14,761.11	43,443.69
Grand Falls	10,480.00	6,715.56	8,270.40	25,465.96
Miramichi	17,748.21	9,052.79	12,266.90	39,067.90
Miramichi Retaining Pond	.....	2,633.57	1,723.90	4,357.47
New Mills Retaining Pond	20,300.00	4,825.26	7,491.46	32,616.72
Saint John	.....	16,197.18	36,577.16	52,774.34
Charlo	10,640.00	11,190.46	19,077.95	40,908.41
Haley Brook	5,970.39	3,591.83	5,752.82	15,315.04
Restigouche Collection Camp	.....	.....	61.83	61.83
Atlantic Salmon Programme—				
St. Croix River	.....	95.00	.....	95.00
St. John River	.....	971.89	2,284.08	3,255.97
Tobique River and Tributaries	.....	615.32	1,109.98	1,725.30
Miramichi River	.....	.....	3.50	3.50
General	.....	442.05	569.87	1,011.92
Biological and Engineering Projects—				
Crecy Lake	.....	3,072.24	4.56	3,076.80
Ritchie Lake	.....	.....	1.00	1.00
General	.....	.....	6,276.30	6,276.30
Shellfish Culture—				
Newcastle	4,081.96	.....	4,639.68	8,721.64
Shippegan Station	4,340.00	2,810.80	2,187.17	9,337.97
General	.....	.....	2.05	2.05
Total	89,923.06	74,797.55	123,088.83	287,809.44
EAST—				
Biological and Engineering—				
Maritimes Area Office	70,915.87	3,395.68	440.33	74,751.88
General	26,610.35	120.00	35,044.94	61,775.29
Shellfish Culture—				
Ellerslie Headquarters	10,442.61	2,675.00	16,592.24	29,709.85
Atlantic Salmon Programme—				
General	.....	.....	996.24	996.24
Total	107,968.83	6,190.68	53,073.75	167,233.26
BRITISH COLUMBIA—				
Biological	.....	3,691.97	2,584.55	6,276.52
Engineering	.....	1,938.56	2,854.67	4,793.23
District No. 1—				
Biological	.....	14,831.69	13,857.45	28,689.14
Engineering	.....	2,388.60	792.09	3,180.69
District No. 2—				
Biological	4,536.82	4,227.14	34,051.73	42,815.69
Engineering	18,861.60	2,373.76	17,866.54	39,101.90
District No. 3—				
Biological	6,326.40	5,474.02	8,903.73	20,704.15
Engineering	15,885.00	24,323.65	26,419.81	66,628.46
Pacific Area Office	.....	1,421.16	1,336.99	2,758.15
General	209,471.98	24,909.19	105,902.91	340,284.08
Total	255,081.80	85,579.74	214,570.47	555,232.01
YUKON TERRITORY—				
Biological—General	.....	102.40	2,898.87	3,001.27
Total	.....	102.40	2,898.87	3,001.27
GRAND TOTAL	669,362.46	269.153,50	553,086.21	1,491,602.17

50373-0—8½

FISHERIES RESEARCH BOARD OF CANADA

(Operation and Maintenance)

Expenditure 1960-61

Particulars		Gross Expenditure	Revenue and *Recoverable	Net Expenditure
		$	$	$
Administration—General		194,940.98	6,749.41	188,191.57
Biological Stations:				
St. John's, Nfld.		323,085.49	.....	323,085.49
St. Andrews, N.B. (General Research)		688,182.18	.....	688,182.18
Montreal, Que. "Arctic Unit"		136,096.79	.....	136,096.79
London, Ont. (General Research)		182,971.75	.....	182,971.75
*London, Ont. (Lamprey Control)		399,911.62	399,911.62	.....
Nanaimo, B.C.		1,038,201.16	.....	1,038,201.16
Technological Stations:				
St. John's, Nfld. (Unit)		27,070.95	.....	27,070.95
Halifax, N.S.		317,958.93	.....	317,958.93
Grand River, Que.		109,481.28	.....	109,481.28
London, Ont. (Unit)		44,501.05	.....	44,501.05
Vancouver, B.C.		277,604.49	.....	277,604.49
Oceanographic Groups:				
St. Andrews, N.B.		80,004.93	.....	80,004.93
Nanaimo, B.C.		203,738.65	.....	203,738.65
Contracts for Research		6,600.00	.....	6,600.00
Scholarships		25,715.29	.....	25,715.29
Vessels:				
St. John's, Nfld.:	*"A. T. Cameron"*	194,562.17	.....	194,562.17
	"Investigator II"	65,897.03	.....	65,897.03
	"Marinus"	37,957.71	.....	37,957.71
	"Parr"	10,201.12	.....	10,201.12
St. Andrews, N.B.:	*"J. J. Cowie"*	4,979.13	.....	4,979.13
	"Harengus"	61,141.56	.....	61,141.56
	"Mallotus"	7,613.31	.....	7,613.31
	"Pandalus II"	12,851.56	.....	12,851.56
London, Ont. (General Research)	*"Stenodus"*	1,440.01	.....	1,440.01
London, Ont. (Lamprey Control)	*"Cottus"*	17,069.28	17,069.28	.....
Arctic:	*"Calanus"*	18,153.90	.....	18,153.90
	"Salvelinus"	4,714.93	.....	4,714.93
Nanaimo, B.C.:	*"Alta"*	19,698.11	.....	19,698.11
	"Investigator I"	35,072.93	.....	35,072.93
	"A. P. Knight"	50,317.10	.....	50,317.10
	"Noctiluca"	1,177.38	.....	1,177.38
Chartered Vessels:	*"Fort Ross"*	30,665.81	.....	30,665.81
	"Key West II"	39,960.85	.....	39,960.85
	"Pacific Ocean"	34,553.57	.....	34,553.57
	"Sea Pride II"	13.60	.....	13.60
		4,704,106.60	423,730.31	4,280,376.29

*Recovered from the Great Lakes Fishery Commission.

BAIT SERVICE—NEWFOUNDLAND

Receipts and Payments—1960-61

RECEIPTS:		
Sales of Bait		$ 82,252.30
Storage and Other Service Charges		4,909.66
Refund of Previous Years' Expenditure		3,739.49
Total Receipts		90,901.45
PAYMENTS:		
Operating Expenses:		
Purchase of Bait	$ 82,388.69	
Salaries and Wages	172,029.73	
Allowances	20,348.73	
Professional and Special Services	146.65	
Travelling and Removal Expenses	6,320.76	
Freight, Express and Cartage	3,692.84	
Postage	250.00	
Telephones and Telegrams	2,273.59	
Office Stationery, Supplies and Equipment	1,043.71	
Materials and Supplies	39,050.43	
Repairs and Upkeep of Buildings, etc.	27,671.69	
Rental of Buildings	3,480.00	
Repairs and Upkeep of Equipment	10,926.13	
Light, Heat and Power	7,785.68	
Unemployment Insurance	867.34	
Sundries	347.90	
		378,623.87
		287,722.42
CAPITAL EXPENDITURES:		
Acquisition and Construction of Buildings	64,529.55	
Acquisition of Equipment	1,252.77	
		65,782.32
Excess of payments over Receipts		$ 353,504.74

FISHING BOUNTY PAYMENTS 1960-61

Province and County	Boats	Men	Amount	Vessels	Tons	Men	Amount	Total Amount
			$				$	$
NOVA SCOTIA—								
Annapolis	67	95	1,012.25	12	211	40	609.00	1,621.25
Antigonish	39	58	616.10					616.10
Cape Breton	149	234	2,477.30	62	2,002	303	5,016.85	7,494.15
Cumberland	10	23	238.85	2	24	4	63.80	302.65
Digby	122	184	1,952.80	70	1,032	147	2,494.65	4,447.45
Guysboro	297	423	4,505.85	38	1,547	233	3,865.35	8,371.20
Halifax	407	607	6,446.65	43	1,941	394	5,861.30	12,307.95
Inverness	84	143	1,506.85	20	517	65	1,163.75	2,670.60
Kings	22	28	300.60	3	49	6	108.70	409.30
Lunenburg	331	384	4,151.80	33	1,868	406	5,906.95	10,058.75
Pictou	22	42	439.90	.....	.....	.....	.....	439.90
Queens	109	177	1,870.15	24	475	74	1,211.30	3,081.45
Richmond	147	227	2,405.65	27	692	124	1,925.80	4,331.45
Shelburne	362	580	6,132.00	245	4,185	662	10,771.90	16,903.90
Victoria	149	220	2,338.00	7	108	18	287.10	2,625.10
Yarmouth	43	83	868.85	70	1,289	235	3,627.25	4,496.10
Total	2,360	3,508	37,263.60	656	15,940	2,711	42,913.70	80,177.30
PRINCE EDWARD ISLAND—								
Kings	232	314	3,356.30	17	674	87	1,539.65	4,895.95
Prince	378	643	6,775.85	3	40	8	119.60	6,895.45
Queens	122	224	2,350.80	1	32	3	61.85	2,412.65
Total	732	1,181	12,482.95	21	746	98	1,721.10	14,204.05

NEW BRUNSWICK—								
Charlotte	58	95	1,003.25	78	1,526	239	3,904.05	4,907.30
Gloucester	390	694	7,295.30	109	3,119	424	7,337.80	14,633.10
Kent	149	263	2,765.85	77	875	157	2,437.15	5,203.00
Northumberland	42	77	808.15	59	736	125	1,979.75	2,787.90
Restigouche	8	16	167.20	.....	.....	.....	.....	167.20
Saint John	5	13	134.35	.....	.....	.....	.....	134.35
Westmorland	37	50	534.50	4	49	7	118.65	653.15
Total	689	1,208	12,708.60	327	6,305	952	15,777.40	28,486.00
QUEBEC—								
Bonaventure	146	218	2,315.10	26	486	100	1,481.00	3,796.10
Gaspe	522	760	8,084.00	94	1,822	337	5,175.15	13,259.15
Magdalen Islands	393	817	8,522.15	38	896	146	2,348.70	10,870.85
Matane	54	82	869.90	.....	.....	.....	.....	869.90
Saguenay	541	778	8,282.10	.....	.....	.....	.....	8,282.10
Total	1,656	2,655	28,073.25	158	3,204	583	9,004.85	37,078.10
GRAND TOTAL	5,437	8,552	90,528.40	1,162	26,195	4,344	69,417.05	159,945.45

DISTRIBUTION OF EXPENDITURE

—	General	Newfound-land	East General	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$	$
Minister of Fisheries	17,000.00					
Departmental Administration	420,532.33					
Information and Educational Service	155,128.72	6,421.92	2,365.50	12,328.18		
Economics Service	128,303.49	41,912.88	67,027.16			
Industrial Development Service	165,683.53	417,828.06	262.92	21.07	66.28	
Fishing Bounty				80,177.30	14,204.05	28,486.0
Field Services Administration		334,188.60	162,146.99	17,138.57	10,832.27	23,880.1
Conservation and Development Service						
Operation and Maintenance	100,374.64	555,367.08	396,660.70	1,060,713.42	245,951.82	889,545.8
Construction or Acquisition	296.47	257,201.72	22,562.61	47,692.90	17,658.86	116,960.9
Inspection and Consumer Service	91,482.14	399,244.27	41,709.29	398,243.10	81,841.59	165,233.1
Fishermen's Indemnity Plan Administration	18,645.12	63,862.40	18,855.53	26,423.81	8,994.93	6,469.4
Canadian share of expenses of the International Fisheries Commissions	481,705.98					
Acquisition of Land International Pacific Salmon Commission						
Newfoundland Bait Service		444,406.19				
Extension of Educational Works				33,159.95	4,239.05	14,301.6
Fisheries Prices Support Act—						
Administration	52,118.22	361.54	609.90	694.52	29.45	303.7
Payment of Assistance to Producers of Salted Fish		497,475.37		146,433.22	19,495.42	39,865.6
Asistance in Construction of Vessels		19,169.70		117,682.95	49,226.10	36,831.9
Assistance in Construction of Bait Freezers				21,662.50		21,329.5
Recoup Lobster Trap Indemnity Account as at March 31, 1961	114,480.00					
Destruction of dogfish and other predators						
Contribution special meeting Food and Agriculture Organization of the United Nations	2,500.00					
Refunds of amounts credited to revenue in previous years						
Fisheries Research Board of Canada—						
Headquarters Administration	188,191.57					
Operation and Maintenance	32,315.29	658,774.47	78,704.93	317,958.93	41,871.27	732,896.9
Construction or Acquisition		80,172.36	5,670.97	16,595.98	2,456.81	110,655.7
Miscellaneous Gratuities	1,775.00					
Exchequer Court Awards	7,111.46					
	1,977,643.96	3,776,386.56	796,576.50	2,296,926.40	496,867.90	2,186,960.3

DISTRIBUTION OF REVENUE

—	General	Newfound-land	East General	Nova Scotia	Prince Edward Island	New Brunswick
	$	$	$	$	$	$
Return on Investments	284,097.24			21.20		
Privileges, Licenses and Permits		10,141.36		16,840.77	4,683.58	12,261.9
Proceeds from Sales		135,035.41		2,483.57		
Service and Service Fees		11,658.61		148.00		
Refund of Previous Years' Expenditure	34,896.65					
Miscellaneous	1,198.77	4,707.55		6,052.99	4,299.01	5,408.3
	320,192.66	161,542.93		25,546.53	8,982.59	17,670.2

BY PROVINCES 1960-61

Quebec	Ontario	Central General	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	17,000.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	420,532.33
.....	.....	.....	.....	.....	.....	12,415.01	.....	.....	188,659.33
.....	.....	.....	.....	.....	.....	67,707.13	.....	.....	304,950.66
.....	55,777.29	.....	.....	.....	.....	21,120.20	.....	.....	660,759.35
37,078.10	.....	.....	.....	.....	.....	.....	.....	.....	159,945.45
34,446.14	4,979.66	43,050.94	4,032.27	.....	.....	240,694.76	.....	13,400.05	888,790.36
1,415.59	.....	731.11	.....	.....	.....	2,428,900.97	22,910.90	62,146.41	5,764,718.45
.....	.....	.....	.....	.....	.....	597,559.12	3,040.18	8,048.19	1,071,020.24
227,029.55	112,120.51	2,143.69	90,973.56	36,545.15	24,214.52	165,705.34	.....	55,157.31	1,891,643.74
37,513.72	.....	.....	.....	.....	.....	44,790.78	.....	.....	225,555.70
.....	.....	.....	.....	.....	.....	358,429.48	.....	.....	840,135.46
.....	.....	.....	.....	.....	.....	2,356.00	.....	.....	2,356.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	444,406.19
27,099.08	.....	.....	.....	.....	.....	11,006.61	.....	.....	89,805.69
.....	.....	.....	.....	.....	.....	.....	.....	.....	54,117.40
51,835.34	.....	.....	.....	.....	.....	.....	.....	.....	755,104.97
122,976.15	.....	.....	.....	.....	.....	.....	.....	.....	345,887.85
.....	.....	.....	.....	.....	.....	.....	.....	.....	42,992.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	114,480.00
.....	.....	.....	.....	.....	.....	118,908.94	.....	.....	118,908.94
.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500.00
.....	.....	.....	.....	.....	.....	900.00	.....	.....	900.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	188,191.57
176,257.93	156,126.12	.....	34,821.45	.....	.....	1,731,003.65	.....	131,454.21	4,092,184.72
4,952.78	14,220.51	.....	1,138.99	.....	.....	251,385.87	.....	13,798.52	501,248.49
.....	.....	.....	.....	.....	.....	.....	.....	.....	1,775.00
.....	.....	.....	.....	.....	.....	.....	.....	.....	7,111.46
720,604.38	343,224.09	45,925.74	130,966.27	36,545.15	24,214.52	6,052,883.86	25,951.08	284,004.69	19,195,681.35

BY PROVINCES 1960-1961

Quebec	Ontario	Central General	Manitoba	Saskat-chewan	Alberta	British Columbia	Yukon Territory	Northwest Territories	Total
$	$	$	$	$	$	$	$	$	$
.....	.....	.....	.....	.....	.....	.....	.....	.....	284,118.44
250.00	.....	.....	11.00	.....	.....	42,392.04	10,525.88	14,043.76	111,150.35
.....	9,917.38	.....	.....	.....	.....	48.42	.....	.....	147,484.78
.....	35,070.23	.....	.....	.....	.....	3,405.80	.....	.....	50,282.64
.....	.....	.....	.....	.....	.....	.....	.....	.....	34,896.65
.....	.....	.....	.....	.....	.....	23,971.94	40.00	50.00	45,728.57
250.00	44,987.61	.....	11.00	.....	.....	69,818.20	10,565.88	14,093.76	673,661.43

APPENDIX 2

Fish Culture Development Statements, 1960.

FISH DISTRIBUTED BY SPECIES 1960

Species	Fry	Advanced fry	Fingerlings	Yearlings and Older	Total Distributions
Salmo salar—Atlantic salmon	.....	845,000	8,925,480	698,050	10,468,530
Salmo trutta—Brown trout	.....	347,000	2,061,310	17,240	2,425,550
Salmo gairdneri—Rainbow trout	.....	355,000	644,770	12,130	1,011,900
Salmo salar sebago—Sebago salmon	.....	.....	95,470	.....	95,470
Salvelinus fontinalis—Speckled trout	105,000	1,167,640	18,475,170	213,700	19,961,510
	105,000	2,714,640	30,202,200	941,120	33,962,960

DISTRIBUTIONS BY PROVINCES 1960

Eggs, Fry, Fingerlings, Yearlings and Older Fish

Province	Fry	Advanced fry	Fingerlings					Yearlings and Older	Total Distribution	
			No. 1	No. 2	No. 3	No. 4	No. 5		By Species	By Province
NOVA SCOTIA—										
Atlantic salmon			833,000	722,550	552,400	344,330	109,000	319,210	2,880,490	
Brown trout			861,840	629,420	216,860	108,160	89,810	16,960	1,923,050	
Rainbow trout			25,170	212,000	32,000	130,000	68,600	8,440	476,210	
Speckled trout		1,000	5,757,930	2,979,540	1,064,520	547,640	239,440	156,930	10,747,000	
		1,000	7,477,940	4,543,510	1,865,780	1,130,130	506,850	501,540	16,026,750	16,026,750
NEW BRUNSWICK—										
Atlantic salmon		845,000	3,750,470	1,454,040	750,070	68,420		378,840	7,246,840	
Brown trout		347,000	55,000	100,220				280	502,500	
Rainbow trout		355,000	85,000		15,000			3,690	458,690	
Sebago salmon			86,120	9,350					95,470	
Speckled trout	105,000	1,151,640	4,723,400	1,498,720	524,210	358,300	36,760	56,770	8,454,800	
	105,000	2,698,640	8,699,990	3,062,330	1,289,280	426,720	36,760	439,580	16,758,300	16,758,300
PRINCE EDWARD ISLAND—										
Atlantic salmon			46,200	125,000	170,000				341,200	
Rainbow trout				13,000	60,000	4,000			77,000	
Speckled trout		15,000	19,500	460,710	224,000	40,500			759,710	
		15,000	65,700	598,710	454,000	44,500			1,177,910	1,177,910
TOTALS	105,000	2,714,640	16,243,630	8,204,550	3,609,060	1,601,350	543,610	941,120	33,962,960	33,962,960

CO-OPERATIVE OR SPECIAL TRANSFERS AND STOCK SUPPLIED FOR SCIENTIFIC INVESTIGATIONS, 1960

Species	From	To	Number	Details	Date
Atlantic salmon	Bedford Fish Culture Station	Nova Scotia Dept. Trade & Industry, Charleston Ponds, Medway River	154,350	Advanced fry	May 18–20
	Grand Lake Fish Culture Station	Dalhousie University, Halifax	290	Yearlings	May 27, Oct. 13
	Kejimkujik Fish Culture Station	Nova Scotia Dept. Trade & Industry, Charleston Ponds, Medway River	150,000	Fingerlings	May 18–20
	Margaree Fish Culture Station	Memorial University of Newfoundland	210	Fingerlings	Mar. 3
	Margaree Fish Culture Station	Memorial University of Newfoundland	400	Yearlings	June 7, July 20
	Florenceville Fish Culture Station	University of New Brunswick, Fredericton	450	Fingerlings	Oct. 16, Nov. 17
	Miramichi Fish Culture Station	U.S. Fish Culture Station, Bucksport, Maine	200,000	Eyed eggs	Feb. 29
	Miramichi Fish Culture Station	State Fish Hatchery, Fort Edward, N.Y.	300,000	Eyed eggs	Mar. 1
	Miramichi Fish Culture Station	St. Johnsbury, Vermont	200,000	Eyed eggs	Mar. 1
	Miramichi Fish Culture Station	Banff National Park, Banff, Alta	100,000	Eyed eggs	Mar. 1
	Miramichi Fish Culture Station	Fisheries Research Board	450	Yearlings	May 26–27
	Miramichi Fish Culture Station	Fisheries Research Board	300	Advanced fry	May 27
Brown trout	National Fish Hatchery, Cortland, N.Y.	Antigonish Fish Culture Station	255,420	Eyed eggs	Nov. 3–10
	Fish and Wildlife Service, Boston, Mass.	Bedford Fish Culture Station	253,540	Eyed eggs	Nov. 17
	Fish and Game Service, Vermont	Middleton Fish Culture Station	200,000	Eyed eggs	Jan. 1, Dec. 19
Lake trout	Fish and Game Service, Vermont	Grand Falls Fish Culture Station	88,600	Eyed eggs	Nov. 3
Rainbow trout	National Fish Hatchery, Cortland, N.Y.	Antigonish Fish Culture Station	100,000	Eyed eggs	Jan. 23
	National Fish Hatchery, Cortland, N.Y.	Middleton Fish Culture Station	100,000	Eyed eggs	Jan. 22
	Fish and Game Service, Vermont	Middleton Fish Culture Station	200,000	Eyed eggs	Jan. 23
	Cardigan Fish Culture Station	Fisheries Research Board, P.E.I.	4,000	Fingerlings	Sept. 27
	Crown Point, New York Conservation Dept.	Kelly's Pond	100,000	Eyed eggs	Jan. 22
Speckled trout	Antigonish Fish Culture Station	Dalhousie University, Halifax	30	Yearlings	Sept. 7
	Antigonish Fish Culture Station	Dalhousie University, Halifax	60	Fingerlings	Sept. 7
	Bedford Fish Culture Station	Nova Scotia Dept. Trade and Industry, Charleston Ponds, Medway River	195,800	Fingerlings	May 9–10
	Bedford Fish Culture Station	Memorial University of Newfoundland	200	Eyed eggs	Feb. 8
	Grand Lake Fish Culture Station	Dalhousie University, Halifax	120	Yearlings	May 6–24
	Grand Lake Fish Culture Station	Dalhousie University, Halifax	250	Fingerlings	Oct. 13–Nov. 19
	Miramichi Fish Culture Station	Fisheries Research Board	300	Advanced fry	May 27
	Saint John Fish Culture Station	Banff National Park, Banff, Alta	150,000	Eyed eggs	Jan. 18
	Saint John Fish Culture Station	Jasper National Park, Jasper, Alta	150,000	Eyed eggs	Jan. 28
	Cardigan Fish Culture Station	Fisheries Research Board, P.E.I.	14,000	Fingerlings	Sept. 27–28

COLLECTION AND DISPOSAL OF EGGS BY SPECIES, 1960

Species	Collection Area	Egg Collecting Period	Number Collected	Disposal—Establishment at	Date eggs received	Number	Total by Species
Atlantic Salmon	Margaree River, N.S.	Nov. 3–25	1,403,500	Margaree	Nov. 3–25	1,403,500	
	River Philip, N.S.	Nov. 8–21	2,748,640	Cobequid	Nov. 8–21	1,346,400	
				Grand Lake	Nov. 10	402,240	
				KejimKujik	Nov. 16–21	1,000,000	
	Sackville Pond, N.S.	Oct. 29–Nov. 8	104,400	Bedford	Oct. 29–Nov. 8	104,400	
	Miramichi Pond, N.B.	Oct. 21–Nov. 14	12,004,050	Antigonish	Nov. 3	756,000	
				Bedford	Nov. 4	986,000	
				Florenceville	Nov. 1	1,512,000	
				Grand Falls	Oct. 31	1,503,600	
				Miramichi	Oct. 21–Nov. 14	6,796,450	
				Craig Brook, Maine	Oct. 27	450,000	
	New Mills Pond, N.B.	Oct. 24–Nov. 9	3,426,400	Charlo	Oct. 24–Nov. 9	3,426,400	
	Restigouche River, N.B.	Oct. 28–Nov. 5	1,644,100	Charlo	Oct. 28–Nov. 5	1,644,100	
	Saint John Ponds, N.B.	Oct. 28–Nov. 7	814,870	Saint John	Oct. 28–Nov. 7	814,870	22,145,960
Brown Trout	Cobequid Ponds, N.S.	Nov. 8–14	387,200	Cobequid	Nov. 8–14	387,200	
	Lindloff Ponds, N.S.	Oct. 27–Nov. 28	774,220	Lindloff	Oct. 27–Nov. 28	774,220	
	Yarmouth Ponds, N.S.	Oct. 21–Dec. 5	1,778,340	Yarmouth	Oct. 21–Dec. 5	1,778,340	
	Saint John Ponds, N.B.	Oct. 25–Nov. 7	516,130	Saint John	Oct. 25–Nov. 7	516,130	3,455,890
Rainbow Trout	Lindloff Ponds, N.S.	Apr. 14–26	406,620	Lindloff	Apr. 14–26	406,620	
	Saint John Ponds, N.B.	Apr. 27–28	711,480	Saint John	Apr. 27–28	711,480	1,118,100
Sebago Salmon	Grand Lake Ponds, N.S.	Nov. 11–28	22,200	Grand Lake	Nov. 11–28	22,200	
	Chamcook Lake, N.B.	Nov. 8–19	62,400	St. John	Nov. 8–19	62,400	
	Palfrey Lake, N.B.	Nov. 3–8	64,000	Florenceville	Nov. 3–8	64,000	148,600
Speckled Trout	Antigonish Ponds, N.S.	Nov. 14–Dec. 12	5,517,150	Antigonish	Nov. 14–Dec. 12	5,517,150	
	Cobequid Ponds, N.S.	Nov. 1–14	4,488,740	Cobequid	Nov. 1–14	2,988,740	
				Yarmouth	Nov. 2	1,500,000	
	Lindloff Ponds, N.S.	Oct. 31–Dec. 5	4,665,080	Lindloff	Oct. 31–Dec. 5	4,665,080	
	Margaree Ponds, N.S.	Oct. 27–Nov. 23	8,736,170	Bedford	Nov. 5–10	2,070,500	
				Margaree	Oct. 27–Nov. 23	4,535,090	
				Middleton	Oct. 28–Nov. 3	2,130,580	
	Charlo Ponds, N.B.	Oct. 31–Nov. 9	786,890	Charlo	Oct. 31–Nov. 9	786,890	
	Florenceville Ponds, N.B.	Oct. 24–Nov. 1	2,937,000	Florenceville	Oct. 24–Nov. 1	2,937,000	
	Grand Falls Ponds, N.B.	Oct. 19–Nov. 9	2,719,670	Grand Falls	Oct. 19–Nov. 9	2,719,670	
	Saint John Ponds, N.B.	Oct. 25–Nov. 16	8,703,310	Saint John	Oct. 25–Nov. 16	8,703,310	38,554,010
							65,422,560

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.

Distribution Statements By Fish Culture Stations

NOVA SCOTIA

Antigonish Fish Culture Station

Antigonish County—
- Afton River—7,500 S2.
  - Cudahie Lake—5,000 S2.
  - Delhanty's Lake—4,500 S2.
  - Merland Lake—5,500 S2.
- Brierly Brook—
  - Brierly Brook Lake—6,000 S2.
  - Mooneys Lake—3,000 S2.
- Lochaber Lake—32,000 S2, 1,200 Sf.
  - MacMillan Lake—5,000 S2, 3,000 S3.
  - Middleton Lake—5,000 S2.
- MacLean Lake—2,000 S3.
- Maryvale Brook—7,000 S2.
- Monastery River—
  - Linwood Lake—12,500 S2.
  - Shepards Lake—2,000 S3.
- Mullins Pond—300 Sh.
- Pomquet River—
  - Black River—7,500 S2.
  - Glenroy River—5,000 S2.
  - Meadow Green River—6,000 S2.
  - Springfield Brook—5,000 S2.
- Rights River—7,000 S2, 3,000 S3.
  - Clydesdale Brook—6,000 S2.
- St. George Bay—
  - North Lake—7,000 S2.
  - North River—7,000 S2.
- South River—5,000 A2, 6,000 B2, 208 Sg, 277 Sh.
  - Big Brook—6,000 S2.
  - Boyds Lake—1,000 S3.
  - MacDonald Lake—5,000 S3.
  - MacGillvrays Lake—5,000 S3.
  - Pinevale Lake—5,000 S3, 414 Sf, 260 Sh.
  - Polson Brook—4,000 S2.
  - South River Lake—4,000 S2, 5,000 S3, 600 Sf.
    - Copper Lake—3,500 S2.
    - Grants Lake—2,500 S2.
    - MacKinnons Lake—3,500 S2.
- Tracadie River—7,500 S2.
- West River—
  - Beaver Meadow River—9,000 S2.
  - Cameron Lake—11,000 S2.
  - Gaspereaux Lake—17,000 S2.
  - Indian Lake—3,000 S2.
  - James River—6,000 S2.
  - MacInnis Lake—6,000 S2.
  - MacKays Lake—7,000 S2.
  - Ohio River—8,000 S2.
  - St. Joseph Lake—16,000 S2.
  - Thompsons Lake—10,500 S2.

Guysborough County—
- Coddles Harbour—
  - Basin Lake—6,000 S2.
  - Eastern Brook—6,000 S2.
  - Sister Lakes (2)—8,000 S2.
- Cole Harbour—
  - Cooee Coffre Lake—11,000 S2.
  - Dobson Lake—10,000 S2.
- Cooper's Lake—6,000 S2.
- Country Harbour—
  - Country Harbour River—18,000 A2, 5,500 S2, 360 Sg.
    - Archibald Lake Brook—6,000 S2.
    - Cargill Lakes—4,000 S3.
    - Chain Lake—6,000 S2.
    - Christie Lake—7,000 S2.
    - Country Harbour Lake—6,000 S2.
    - Dummy Lake—5,000 S2.
    - Eight Island Lake—10,000 S2.
    - Frog Lake—2,500 S2.
    - Goshen Lake—8,000 S2, 600 Sf.
    - Grassy Lake—6,000 S2, 4,000 S3.
    - Horahan Lake—5,000 S2.
    - Hurley Lake—6,000 S2, 4,000 S3, 300 Sf.
    - Johns Lake—3,500 S2.
    - Jones Lake—6,000 S2, 3,000 S3.
    - Long Lake—11,000 S2.
    - Mills Lake—7,000 S2.
    - North Lakes—4,000 S3.
    - Polson Lake—8,000 S2.
    - Pringle Lake—11,000 S2, 500 Sf.
    - Round Lake—5,000 S2.
    - Tate Lake—3,000 S2.
    - Trout Lake—6,000 S2.
- Dover Bay—
  - Hazel Hill Lake—8,000 S2.
  - Three Mile Lake—10,000 S2.
  - Watkins Lake—9,000 S2.
  - Whistle Lake—10,000 S2.
- Ecum Secum River—20,000 A2.
  - Ash Lake—4,000 S2.
  - Big Pond—2,000 S3.
  - Spider Lake—4,000 S2.
  - West River Lakes—3,000 S2.
- Fishermans Harbour Lake—6,000 S2, 4,000 S3.
- Pougere Lake—6,500 S2.
- Gegoggin Harbour—
  - Gegoggin Brook—7,200 S2.
  - Gegoggin Lake—4,000 S3, 200 Sf.
  - Grassy Lake—3,000 S2, 3,000 S3.
- Goose Lake—6,000 S2.
- Guysboro River—20,000 B2.
  - Cudahy Lake—7,000 S2.
  - Donahue Lake—12,000 S2, 300 Sf.
    - Porters Lake—4,000 S2.
    - Toms Lake—8,000 S2.
  - Grants Lake—3,000 S2.
  - Harts Lake—8,000 S2.
  - Leets Lake—4,000 S3.
  - Meaghers Lake—4,000 S2, 5,000 S3.
  - Nickerson Lake—7,000 S2.
  - Simpson Lake—6,000 S2.

Guysborough Conunty—Conc.
- Harbour Boucher River—
  - Jellows Lake—5,500 S2.
  - Morrison Lake—11,500 S2.
- Hawbolt Lake—7,200 S2.
- Indian Harbour—
  - Indian Harbour Lakes—40,000 B2.
  - Indian Lakes—6,000 S3.
  - Indian River—6,000 S2.
    - Leonard Lake—6,000 S2.
  - Isaacs Harbour River—18,000 A2.
  - Liscomb River—15,000 A2.
    - Bear Lake—5,500 S2.
    - Gaspereaux Brook—10,000 A2, 7,200 S2.
    - Louse Lake—3,000 S2, 3,000 S3.
  - MacPherson Lake—7,000 S2.
  - Manassette Lake—6,000 S2.
  - Mattie Lake—5,500 S2.
- New Harbour—
  - Canter Lake—7,000 S2.
  - First Lake—6,000 S2.
  - New Harbour River—25,000 A2.
    - Cupboard Lake—4,000 S2.
    - Square Lake—4,000 S2.
  - Trout Lake—6,000 S2.
- St. Mary's River—
  - Archibald Lake—6,000 S2, 100 Sf.
  - Birch Brook Lake—5,000 S2.
  - Black Brook Lake—5,000 S2.
  - Broden Lake—5,000 S2.
  - Cameron Lake—8,500 S2, 300 Sf.
  - Cargill Lake—8,500 S2.
  - Demmons Lake—450 Sh.
  - East River—33,000 A2, 11,000 Af.
    - Cumminger Lake—11,000 S2.
    - Melrose Lake—10,500 S2.
    - North West Arm Lakes—4,000 S3.
    - Taylors Lake—5,000 S2.
    - Two Mile Lake—10,500 S2, 600 Sf.
  - Elbow Lake—6,000 S2.
  - Glencross Brook Lake—6,000 S2.
  - Hardwood Lake—4,000 S2.
  - Indian Man Lake—6,000 S2.
  - Kirk Lake—5,500 S2.
  - MacIntosh Lake—2,000 S3.
  - MacKeen Lake—5,500 S2.
  - MacLeod Lake—4,000 S2.
  - MacMullin Lake—8,500 S2.
  - Mitchells Lake—5,000 S2.
  - Murray Lake—4,000 S2.
  - Rocky Brook—5,000 S2.
  - Scanlon Brook—6,000 S2, 5,000 S3.
  - Sherbrooke Lake—5,500 S2, 300 Sf.
  - Shingle Lake—8,000 S2.
  - Square Lake—3,000 S2.
  - Taylor Lake—5,000 S2.
  - Twin Oak Lakes—6,000 S2.
  - West River—31,000 A2, 11,942 Af.
  - Whidden Lake—4,000 S2.
- Salmon River—15,000 A2.
  - Beaver Dam Lake—13,500 S2, 4,000 S3, 300 Sf.
  - Bordens Lake—9,000 S2, 5,000 S3.
  - Charley Lake—500 S2, 5,000 S3.
  - Desbarres Lake—6,000 S2.
  - East and West Ponds—7,500 S2.
  - Frasers Lake—4,000 S3.
  - Gearys Lakes—6,000 S2.
  - Glencove Lake—7,000 S2.
  - Lawlor Lake—4,000 S2.
  - Long Lake—6,000 S2, 4,000 S3.
  - Narrow Lake—8,000 S2.
  - North Branch Lake—4,000 S2.
  - Priests Lake—6,000 S2.
  - Ross Lake—4,000 S2.
  - Round Lake—8,000 S2.
  - Three Corner Lake—4,000 S2.
  - Whites Lake—3,000 S2.
- Seal Harbour—
  - Goldbrook Lake—6,000 S2.
  - Seal Harbour Lake—6,000 S2.
- South River—
  - Giants Lake—72,000 R2.
  - Kennedy Lake—7,500 S2, 2,000 S3.
  - MacInnis Lake—7,500 S2, 3,000 S3.
- Sundown Lake—7,000 S2.
- Trifords Brook—7,500 S2.

Halifax County—
- Beaver Harbour Lake—300 Sf.
- Hartling Lake—300 Sf.
- Rocky Lake—300 Sf.

Pictou County—
- Boyd Lake—1,000 S2.
- Caribou River—
  - Cole Pond—2,000 S2.
  - English Pond—2,000 S2.
  - Graham Pond—2,000 S2.
  - MacKays Dam—4,000 S2.
  - Mill Dam—4,000 S2.
- Chance Harbour Lake—365 Sh.
- East River—6,000 S2.
  - Calder Lake—14,000 S2, 900 Sf.
  - Grant Lake—6,000 S2, 600 Sf.
  - MacKay Lake—5,000 S2.
  - McKinnon Lake—5,000 S2.
  - MacLean Lake—5,000 S2.
  - McLellan Brook—11,000 S2.
  - McPherson Lake—6,000 S2, 600 Sf.
  - Sutherland Lake—3,500 S2.
  - Taylor Lake—5,000 S2.
  - Thompson Pond—600 S3.
  - West Branch Lake—5,000 S2.
- Eden Lake—6,000 S2, 425 Sf.
- Jocks Lake—300 Sf.
- Little Harbour—
  - Grahams Dam—6,000 S2.
  - Stewarts Dam—3,000 S2.
  - Trenton Dam—6,000 S2.
- Maple Lake—5,000 S2.
- Merrigomish Harbour—
  - Barney River—20,000 B2, 4,000 S2.
    - Brora Lake—5,000 S2.
    - Malcomn Lake—5,000 S2.
  - French River—20,000 B2, 4,000 S2.
    - Barrow Lake—4,000 S2.
    - Blue Mountain Pond—2,000 S2.
    - Gamble Lake—2,000 S2.
    - Robertson Lake—5,000 S2, 300 Sf.
  - Sutherland River—20,000 B2, 4,000 S2.

Antigonish Fish Culture Station—*Conc.*

Pictou County—Conc.
- Middle River—
  - Gairloch Lake—5,000 S2.
  - Kittle River—2,000 S2.
- River John—200 Sf.
  - West Branch—300 Sf.
- Toney River—200 Sf.

Atlantic Salmon	212,942
Brown Trout	126,000
Rainbow Trout	72,000
Speckled Trout	1,278,359
Total	1,689,301

Bedford Fish Culture Station

Colchester County—
- Wittenburg Lake—3,552 S1.

Halifax County—
- Black Brook—1,800 S4.
- Black Duck Run—4,736 S1.
- Bridge End Lake—3,750 S1.
- Chezzetcook River—8,320 A2.
  - Chezzetcook Lake—6,864 A4.
- College Lake—5,328 S1.
- East River—
  - Elbow Lake—5,052 S1.
  - Land O Laziness—5,052 S1.
  - Lewis Lake—5,052 S1.
  - Marshall Flowage—10,000 B1, 6,520 B2.
  - Taylor Lake—4,736 S1.
- Fraser Lake—5,052 S1.
- Hossier River—4,736 S1.
  - Cranberry Lake—4,736 S1.
  - Five Island Lake—5,052 S1.
- Hubbards River—10,816 A2.
  - Dorey Lake—10,632 A4, 3,750 S1.
  - Skinner Lake—3,020 S1.
  - Vinegar Lake—7,500 S1.
- Ingram River—11,232 A2, 10,632 A4.
  - Kiley Lake—4,736 S1.
- Maynard Lake—10,000 S1.
- Musquodoboit River—8,320 A2.
  - Hamilton Lake—4,144 S1.
- Newcombe Brook—
  - Lily Lake—8,320 A2, 7,200 A4, 5,328 S1.
  - Long Lake—2,000 S1.
  - Western Twin Lakes—3,750 S1.
- Nine Mile River—10,816 A2, 5,280 A4.
  - Cox Lake—1,052 S3.
  - Govenor Lake—4,736 S1.
- Oak Lake—2,000 S1.
- Pennant River—
  - Grand Lake—4,500 S1.
  - Hatchet Lake—4,144 S1.
  - Moody Lake—3,500 S1.
  - Ragged Lake—3,750 S1.
- Pockwock Lake—9,472 S1.
- Porters Lake—
  - Goose Lake—3,750 S1.
  - Snow Lake—3,750 S1.
- Queens Land Lake—3,750 S1.
- Sackville River—11,536 A2, 8,800 A4.
  - Barretts Lake—2,784 S2.
  - Lewis Lake—3,368 S1, 2,400 S3.
  - McCabe Lake—4,210 S1.
  - Swan Lake (Pentz)—4,210 S1.
- Salmon River—12,468 A2.
  - Echo Lake—6,864 A4.
  - Gammon Lake—3,750 S1.
  - Lake Eagle—3,750 S1.
  - Long Lake—3,750 S1.
  - McKay Lake—2,000 S1.
  - Spar Lake—4,000 S1.
  - West Lake—6,920 S1.
- Shubenacadie River—
  - Fenerty Lake—4,800 S2.
  - First Lake—1,463 S5.
  - Square Lake—6,000 S1.
  - Tucker Lake—8,000 S1.
  - Williams Lake—4,000 S1.
- Stewiacke River—8,320 A2.
  - Newton Brook—10,000 B1, 7,725 B2.
- Terrance Bay—
  - Dan Lake—4,144 S1.
  - Forth Lake—4,144 S1.
- Third Lake—1,000 S5.
- Veinot Lake—6,864 A4.
- Walches Lake—5,052 S1.
- West River—
  - Henery Lake—3,368 S1.
  - Lake Alma—6,736 S1.
- Whites Lake—4,144 S1.

Hants County—
- Kennetcook River—8,320 A2, 5,894 S1.
- McGraths Lake—8,000 S1.
- Piggott and Lily Lake—9,472 S1.
- St. Croix River—
  - Herbit River—10,000 S1.
    - Coxcomb Lake—9,472 S1.
    - Long Lake—5,000 S1.
  - Ponhook Lake—9,360 S1.
- Shubenacadie River—
  - Lewis Lake—10,000 S1, 3,840 S2, 2,400 S3.
  - Maitland Mill Pond—3,368 S1.
  - Withrow Lake—3,368 S1.

Lunenburg County—
- Chester Basin—
  - Bordal Pond—2,000 S1.
  - East River—10,816 A2.
    - Collander Lake—7,104 S1.
    - Hennebery Lake—2,000 S1.
    - Timber Lake—9,504 A4, 4,500 S1.
    - Whitford Lake—4,500 S1.
  - Eisnor Lake—3,750 S1.
  - Hutts Lake—3,750 S1.
  - Spectacle Lake—4,000 S1.
- Fox Point Lake—3,750 S1.
- Mahone Bay—
  - Gold River—10,800 A2.
    - Clarke Lake—3,750 S1.
    - Nevertell Lake—4,000 S1.
    - Veinot Lake—6,864 A4.
  - Hollahan Lake—4,000 S1.

Bedford Fish Culture Station—*Conc.*

Lunenburg County—Conc.
Martins River—8,320 A2.
Spondo Lake—7,200 A4, 6,750 S1.
Western Lake—4,500 S1.
Mushamush River—10,800 A2, 5,280 A4.
Mushamush Lake—8,250 S1.
Sucker Lake—4,500 S1.
Round Lake—6,000 S1.
Middle River—10,000 B1.
Half Way Brook—8,000 S1.
Henniger Lake—10,416 B3.
Simms Lake—3,750 S1.

Atlantic Salmon	231,188
Brown Trout	54,661
Speckled Trout	410,287
Total	691,366

Cobequid Fish Culture Station

Colchester County—
Bass River—15,000 S1, 10,000 S2.
Silica Lake—8,000 S1, 3,000 S3.
Bass River of Five Islands—15,000 S1, 10,000 S2.
Chiganois River—30,000 S1, 6,000 S3.
Galloping Brook—9,000 S2, 500 Sf.
Guyons Lake—5,500 S3.
East River at Five Islands—15,000 S2.
Beaver Brook—5,000 S2, 6,000 S3.
Economy River—30,000 A3.
Economy Lake—20,000 S1, 30,000 S2.
Newton Lake—19,000 S1, 26,000 S2.
Simpson Lake—45,000 S1, 10,000 S2, 400 Sf.
Folly River—35,000 A3, 500 Sf.
Folly Lake—20,000 S1, 15,000 S2, 1,300 Sf.
French River—35,000 S1, 7,000 S3.
Johnston Lake—300 Sh.
Hart Lake—20,000 S1, 25,000 S2, 10,000 S3.
Irwin Lake—500 Sf.
Moose Lake—544 Sf.
North River—35,000 A3.
North River, South Branch—1,000 Sf.
Portapique River—30,000 A3, 25,000 S1, 20,000 S2.
Salmon River—25,000 A4.
Stewiacke River—
Deyarmonds Lake—16,000 S3.
Little River—15,000 S2, 1,000 Sf.
Trenholm Pond—2,500 S2.
Moose Lake—16,000 S2.
Waughs River—94,000 B1, 45,000 B3.
Earltown Lake—11,000 S2, 1,000 Sf.
West Lake—9,000 S1.

Cumberland County—
Apple River—40,000 A3.
Dead Lake—2,250 S2.
Fox River—15,000 S1, 15,000 S3.
Lake Killarney—600 Sh.
LaPlanche River—
Long Lake—1,000 Sf.
McLellan Brook—200 Sf.
Sand Lake—500 Sf.
Maccan River—65,000 A3, 2,000 Af, 2,000 Sf.
Cleveland Lake—400 Sf.
Fordyce Brook—15,000 S1.
Harrison Lake—28,000 B1, 20,000 B3.
Lawrence Brook—21,000 S1.
South Brook—10,000 S1.
Mattatall Lake—350 Sg.
Parrsboro River—
Leaks Lake—500 Sf.
McAloney Lake—12,000 S2, 285 Sg.
Pont a' Buot Bog—4,500 S3.
Portapique River—
Fountain Lake—15,000 S1, 7,000 S2.
Isaac Lake—12,000 S1, 10,000 S2, 5,000 S3, 1,250 Sf.
Newfound Lake—12,000 S1, 10,000 S2, 5,000 S3, 1,200 Sf.
Little Lake—3,500 S2.
Otter Lake—4,500 S1.
Sutherland Lake—30,000 S1, 15,000 S2, 10,000 S3, 3,233 Sf.
Webb Lake—4,500 S1.
Pugwash River—15,000 S1, 7,000 S2.
Ramshead River—12,000 S1, 10,000 S2.
Ramshead Lake—13,000 S2.
River Hebert—15,000 S1, 10,000 S2, 5,000 S3.
Gilbert Lake—750 Sf.
Halfway River Lake—400 Sh.
River Philip—65,000 A3, 20,000 A4, 7,941 Af, 256 Ag.
Black River—20,000 S1, 6,000 S2.
Fitzsimmons Brook—15,000 S1.
Mountain Brook—15,000 S1, 7,000 S2.
Polly Brook—15,000 S1.
Sugarloaf Brook—15,000 S1, 13,000 S2.
Tillies Creek—15,000 S1, 10,000 S2.
West Branch—10,000 S1, 20,000 S2.
Shinimicas River—15,000 A3, 15,000 S1, 29,500 S2.
Tidnish River—25,000 S1, 20,000 S3.
Wallace River—65,000 A3, 1,500 Af, 100,000 S1, 47,000 S2, 45,000 S3, 2,000 Sf.
Barbour Lake—3,300 S2.
Dewar Lake—50 Sg, 380 Sh.
West Branch—80,000 S1, 15,000 S3.

Westmorland County—
Black's Pond—500 S2.
Bulmer Pond—8,000 S2.
Carters Brook—6,750 S3.
Clarklyn Brook—4,000 S2, 8,000 S3.
Silver Lake—20,000 S1, 15,000 S2, 10,000 S3, 1,500 Sf.
Calhouns Brook—13,000 S2.
Tantramar River—
Big Lake (Jolicure)—1,000 Sf.
Jenks Brook—13,000 S1.
North Brook—5,000 S3.
Robinson Brook—20,000 S1, 8,000 S2.

Atlantic Salmon	436,697
Brown Trout	187,000
Speckled Trout	1,555,942
Total	2,179,639

Coldbrook Fish Culture Station

Annapolis County—
Annapolis River—23,100 Af.

Halifax County—
Black Duck Run—864 S4.
Chezzetcook River—3,000 Af.
Cranberry Lake—864 S4.
Greens Lake—864 S4.
Ingram River—4,000 Af.
Mill Lake—
Little Kip Hill—432 S4.
Quacks Lake—432 S4.
Musner Lake—720 S4.
Nine Mile River—3,000 Af.
Queens Land Lake—720 S4.
Sackville River—3,100 Af.

Hants County—
Avon River—
Armstrong Lake—5,000 S5.
Card Lake—11,000 S4.
North Canoe Lake—12,000 S3.
Otter Lake—6,000 S5.
Shey Lake—5,000 S4.
Lily Lake—1,056 S4.
Ponhook Lake—21,000 S4.
Sackville River—2,600 Af.
Uniacke Lake—960 S4.
Valley Lake—5,000 S5.

Kings County—
Aylesford Lake—10,000 S2.
Lake George—18,600 S4, 1,400 S5.
Loon Lake—10,000 S3.
Bass Creek—5,000 S2.
Canard River—5,000 S2.
Cornwallis River—
Brandywine River—7,400 B4.
Farm Brook—5,000 S2.
McGee Lake—10,000 S2.
Mill Brook—5,000 S2.
Palmeter's Pond—500 S1.
Silver Lake—6,000 S2.
Tupper Lake—12,000 S3.
Gaspereau River—10,000 Af.
Blue Mountain Lake—5,000 S4.
Murphy Lake—6,200 S3.
North River—10,000 S2.
Sunken Lake—32,000 R3, 15,000 R5.
Habitant River—5,000 S2.
Hardwood Lake—10,000 S4.
Lake Paul Stream—10,000 S3.
Mill Creek—5,000 S2.
Pereau Creek—5,000 S2.

Lunenburg County—
East River—
Bezanson Lake—6,500 S4.
Connaught Lake—5,000 S4.
Mill Lake—5,000 S4.
Rocky Lake—3,000 S4.
Gold River—15,000 Af.
Duck Lake—5,000 S4.
Harris Lake—5,000 S4.
Horseshoe Lake—5,000 S4.
Hunts Lake—5,000 S4.
Indian Lake—5,000 S4.
Lewis Lake—5,000 S4.
Loon Lake—3,000 S4.
McGinnis Lake—5,000 S4.
Otter Lake—5,000 S4.
Ramsay Lake—5,000 S4.
Thatchers Lake—3,000 S4.
Round Lake—10,000 S4.
Wallaback Lake—11,000 S4.
Whelan Lake—5,000 S4.
Gull Lake—5,000 S4.
Middle River—
Cress Lake—5,000 S4.
Millet Lake—5,000 S4.
Nine Mile Lake—5,000 S4.
Whitney Lake—5,000 S4.
Seffern Lake—5,500 S4.
Sherbrooke River—20,000 R5.
Franey Lake—65,000 R4.

Shelburne County—
Pug Lake—4,500 R5.

Atlantic Salmon.....	63,800
Brown Trout.....	7,400
Rainbow Trout.....	136,500
Speckled Trout.....	343,612
Total.....	551,312

Grand Lake Fish Culture Station

Halifax County—
Beaver Harbour Lake—1,000 Sf.
Bell Lake—750 Sf.
Cousins Lake—1,000 Sf.
Cox Lake—1,000 Sf.
Hosier River—
Black Point Lake—2,000 Sf.
Long Lake—2,000 Sf.
Lower Sheldrake Lake—1,000 Sf.
Upper Sheldrake Lake—1,000 Sf.
Kip Hill Lake—1,000 Sf.
Lake Charlotte—2,000 Sf.
Moser River—
Bear Lake—1,000 Sf.
Siloam Lake—1,000 Sf.
Musquodoboit River—
East Lake—750 Sf.
Grand Lake—2,000 Sf.
Higgins Lake—1,000 Sf.
Lay Lake—1,000 Sf.
Lindsay Lake—15,000 S1.
McCaffery Lake—750 Sf.
McKiel Lake—750 Sf.
Milne Lake—15,000 S1.
Tully Lake—15,000 S1.
Nine Mile River—
Fraser Lake—1,000 Sf.
Half Mile Lake—1,000 Sf.
Patient Ross Lake—1,000 Sf.

Grand Lake Fish Culture Station—*Conc.*

Halifax County—Conc.
Pennant River—
McGrath Lake—1,000 Sf.
Parr Lake—1,000 Sf.
Salmon River—14,650 A4.
Sandy Lake (Marsh Lake)—1,000 Sf.
Seal Cove Lake—750 Sf.
Ship Harbour River—15,000 A3.
Shubenacadie River—
Buckley Lake—15,000 S1.
Gays River—15,000 S1.
Lake Egmont—13,200 S1.
Lake William—315 Sf.
Rawdon River—15,000 A4.
Stillwater Lake—1,000 Sf.
Tangier River—15,000 A3.
River Lake—2,000 Sf.
Trout Lake—750 Sf.
West River—15,000 A4.
Sams Lake—1,000 Sf.
Whimsical Lake—300 Sf.
Willis Lake—1,000 Sf.

Hants County—
Long Lake—1,000 Sf.
St. Croix River—
Cameron Lake—2,000 Sf.
Ponhook Lake—3,000 Sf.

Lunenburg County—
Riley Lake—1,000 Sf.
St. Margaret's Bay—
Bayswater Lake—1,000 Sf.
Mill Lake—2,000 Sf.
Mill Cove Lake—2,000 Sf.
Southwest Cove Lake—15,000 S1.
Timber Lake—1,000 Sf.
Walker Lake—1,000 Sf.
Whitney Lake..750 Sf.

Atlantic Salmon.....	74,650
Speckled Trout.....	152,065
Total.....	226,715

Kejimkujik Fish Culture Station

Annapolis County—
Annapolis River—8,000 A2, 7,000 Af.
Lequille River—8,000 A2, 8,000 A3, 7,000 A4, 7,000 Af.
Nictaux River—10,000 Af.
Round Hill River—8,000 A2, 8,000 A3, 7,000 A4, 7,000 Af.
Kejimkujik Lake—9,000 B2, 10,000 B4.
Little River—8,000 B4.
LaHave River—8,000 A2.

Kings County—
Annapolis River—56,000 A2, 11,000 A3, 60,000 A4, 29,843 Af.
LaHave River—16,000 A2, 5,000 A3, 10,246 Af.

Lunenburg County—
LaHave River—24,000 A2, 71,000 A3, 28,000 A4, 8,000 A5, 26,000 Af.

Queens County—
Kejimkujik Lake—27,000 B2, 10,193 B5.

Atlantic Salmon.....	438,089
Brown Trout.....	64,193
Total.....	502,282

Lindloff Fish Culture Station

Cape Breton County—
Campbell Pond—8,000 S3.
Chain Lake—3,500 S4.
Cochran Lake—6,000 S4.
Curry Lake—5,000 S5, 995 Sg.
East Bay—
Gillis Lake—20,000 S2.
MacAdam Lake—20,000 S2, 8,000 S4.
Gabarus Lake—12,000 S3.
Giant Lake—10,000 S3.
Grand Lake—20,000 S2, 10,000 S3, 6,000 S5, 10,000 Sf, 541 Sg.
Hardys Lake—6,000 S4.
Jackson Lake—10,000 S3.
Kelhones Lake—600 Sf.
Kilkenny Lake—40,000 B1, 110,000 B2, 24,665 B4, 5,000 Bf.
Levers Lake—80,000 R2.
Long Lake—10,000 S3.
MacIntyre Lake—10,000 S3.
MacMillan Lake—6,000 S4.
Mira Bay—
Catalone Lake—12,000 S3, 1,200 Sf.
Loon Lake—10,000 S3, 525 Sg.
McCormick Lake—3,500 S4.
MacDonald Pond—10,000 S3.
MacLeod Lake—8,000 S4.
Salmon River—100,000 B1, 85,000 B2, 32,000 B4, 4,830 Bf.
Mira River—
Cranberry Lake—5,000 S5.
Front Lake—5,000 S5.
Gaspereaux River—100,000 B1, 35,000 B3.
MacKeighan Lake—5,000 S5.
Northwest Brook—40,000 B2.
Point Edward Pond—7,000 S4.
Pottles Lake—15,000 S2.
Power Lake—10,000 S3.
Round Lake—8,000 S3.
Scotch Lake—5,000 S5.
Southwest Brook—40,000 B1, 8,000 B4.
Stewart Lake—10,000 S3.
Sydney River—
Blackett Lake—15,000 S2, 700 Sf.
Dutch Brook Lake—10,000 S3.
Meadow Brook—100,000 S1.
Wentworth Park—735 Sf, 165 Sg.

Lindloff Fish Culture Station—*Conc.*

Richmond County—
Beaver Lake—3,500 S4.
Black River—100,000 S1.
Buchanan Lake—10,000 S3.
Bras D'Or Lake—1,173 Sg.
Indian Lake—10,000 S2, 6,050 Sf.
MacDonald Lake—50,000 S1.
MacKenzie Lake—12,000 S3.
MacNab Lake—18,000 S3.
Mary Ann's Lake—3,000 S4.
River Tom—50,000 S1, 12,000 S3.
Breens Lake—10,000 S3.
Falls Bay Brook—15,000 S1.
Ferguson Brook—30,000 S1.
Ferguson Lake—50,000 S1, 600 Sf.
Framboise River—
Five Island Lake—25,000 S1.
Sterling Lake—25,000 S1.
Grand River—50,000 A1, 100,000 A2, 17,500 Af.
Barren Hill Lake—15,000 S3.
Loch Lomond Lake—100,000 S1, 20,000 S3, 11,193 Sf.
Isle Madame—15,000 S1.
Campbell Lake—5,000 S5.
Deep Lake—10,000 S3.
Forrest Lake—15,000 S2.
Grand Lake—30,000 S1, 8,000 S2, 8,000 S3, 1,193 Sf.
Mannette Lake—8,000 S3.
Potties Lake—15,000 S1, 6,000 S2, 5,000 S3.
Shaw Lake—30,000 S1, 8,000 S2.
Landry Lake—3,500 S4.
Lime Hill Lake—8,000 S1.
MacLeod Brook—30,000 S1.
Reid's Lake—15,000 S3.
River Inhabitants—8,000 Af.
River Tillard—700 Sg.
Lindloff Lake—60,000 R2, 25,000 R4, 8,440 Rf.
Mill Lake—18,000 S3, 7,000 Sf, 700 Sg.
Pringle Lake—10,000 S2.
Thompson Lake—10,000 S2.
River Tillard East—100,000 S1.
River Tillard West—100,000 S1.
Rockdale Lake—10,000 S3.
St. Esprit Lake—20,000 S1.
Straughton Brook—30,000 S1.
Taylor Lake—40,000 S1.

Atlantic Salmon.....	175,500
Brown Trout.....	624,495
Rainbow Trout.....	173,440
Speckled Trout.....	1,569,070
Total.....	2,542,505

Margaree Fish Culture Station

Cape Breton County—
Wentworth Park—700 Sf.

Halifax County—
Beaver Lake—9,783 S1.
Croft Lake—13,261 S1.
Gammon Lake—13,044 S1.
Goose Lake—13,044 S1.
Mosher Lake—22,610 S1.
Musquodoboit River—
Mill Lake—13,041 S1.
Moores Lake—19,566 S1.
Rocky Lake—19,566 S1.
Ruths Flowage—26,085 S1.

Inverness County—
Bras D'Or Lake—
Little Narrows Pond—25,000 S1, 10,000 S3, 930 Sf.
MacKenzie Brook—45,000 S1, 10,000 S2.
Skye Brook—40,000 S1, 5,000 S3.
Brigend Brook—35,000 S1, 5,000 S3.
Cheticamp Mountain Lake—1,000 Sf.
Corney Brook—750 Sf.
Eustabes Pond—10,000 S2, 500 Sg.
French Mountain Lake—1,000 Sf.
Grand Etang Brook—30,000 S1, 10,000 S2.
Horton Lake—40,000 S1, 10,000 S2, 8,000 S3.
Lac Du Rosseau—40,000 S1, 15,000 S2, 10,000 S3, 500 Sf.
Lewis Brook—30,000 S1, 7,500 S3.
Little Judique River—20,000 S2.
MacKenzie Mountain Lake—1,000 Sf.
Margaree River—500 Sh.
Gallant Brook—60,000 S1, 9,000 S3.
Northeast Margaree River—
Big Brook—25,000 S1, 5,000 S2.
Big Intervale—50,000 A1.
Coady Brook—10,000 S1.
Cranton Bridge Pool—50,000 A1.
Egypt Brook—80,000 S1, 6,000 S3, 340 Sh.
Forest Glen Brook—25,000 S1, 4,000 S3, 778 Sf.
Hatchery Pool—50,000 A1.
Ingraham Brook—85,000 A1, 20,300 Af, 80,000 S1, 5,000 S4, 800 Sh.
MacLeod Brook—5,000 S4.
Lake O'Law—55,000 S1, 15,000 S2, 5,000 S3.
Lake O'Law Brook—50,000 S1, 5,000 S3.
Lake O'Law (Lower)—50,000 S1, 6,000 S3, 500 Sg.
Lake O'Law (Upper)—55,000 S1, 15,000 S2, 3,000 S3.
Levis Brook—10,000 S1, 2,500 S3.
MacDonald Brook—5,000 S3.
MacLeod Brook—25,000 S1, 3,000 S3.
Mancini Pond—155 Sh.
Marsh Brook—20,000 S1, 2,500 S3.
Mill Brook—10,000 S2.
Murray Brook—15,000 S1, 3,000 S3.
Old Bridge Pool—50,000 A1.
Rock Pool—50,000 A1.
Salt Brook—25,000 S1, 5,000 S2.
Stewart Brook—15,000 S1, 3,000 S3.
Wards Rock Pool—50,000 A1.
Watson Brook—25,000 S1, 5,000 S2.
Scotch Hill Brook—10,000 S2.

Margaree Fish Culture Station—*Conc.*

Inverness County—Conc.
- Southwest Margaree River—
  - Captain Allan's Brook—40,000 S1, 7,500 S3.
  - Collins Brook—40,000 S1, 7,500 S3.
  - MacDonnell Brook—40,000 S1, 10,000 S2, 7,500 S3, 140 Sf, 260 Sg.
- McGinnis Brook—30,000 S1, 7,500 S3.
- Pembroke Lake—50,000 S2, 10,000 S3.
- Plateau Brook—30,000 S1, 15,000 S2, 4,000 S3, 538 Sg.
- Port Hood Island Pond—5,000 S2.
- Red River Lake—5,000 S3.
- River Denys—45,000 S1, 10,000 S2, 4,000 S3.
  - Big Brook—45,000 S1, 10,000 S2, 3,000 S3.
  - Glen Brook—45,000 S1, 15,000 S2.
- River Inhabitants—
  - McColl Brook—30,000 S1, 5,000 S2.
  - McPherson Brook—45,000 S1, 15,000 S2.
  - Rough Brook—30,000 S1, 5,000 S2.
- Strathlorne Brook—40,000 S1, 7,500 S3, 500 Sh.
- Sutherland Pond—15,000 S2.

Victoria County—
- Barrasois River—20,000 S2, 10,000 S3.
- Bras D'Or Lake—
  - Baddeck River—100,000 S1, 30,000 S2, 9,000 S3, 500 Sg, 70 Sh.
  - Farquhar Angus Brook—30,000 S1, 15,000 S2, 3,000 S4.
  - Gillis Brook—80,000 S1, 15,000 S2, 3,100 S4.
  - Washabuck River—45,000 S1, 15,000 S2.
- Breton Cove Pond—12,000 S2.
- Burton Lake—45,000 S1, 5,000 S3.
- Church Brook—15,000 S2.
- Clyburn Brook—2,000 Sf.
- Dingwall Lake—45,000 S1, 5,000 S3, 600 Sf.
- Freshwater Lake—5,000 Sf.
- Giffin Lake—70,000 S1, 10,000 S3, 600 Sf.
- Glen Evis Pond—5,000 S3.
- Jigging Cove Lake—4,035 Sf.
- MacDonald Pond—20,000 S2.
- Mary Ann Brook—1,000 Sf.
- Middle River—15,000 S2.
  - Beaver Brook—30,000 S1, 15,000 S2, 4,000 S4.
  - Black Brook—30,000 S1, 15,000 S2, 3,000 S4.
  - Cold Brook—30,000 S1, 15,000 S2, 3,000 S4.
  - Indian Brook—35,000 S1, 15,000 S2, 3,000 S4.
  - MacLeod Brook—30,000 S1, 3,000 S3.
- Morrison Lake—65,000 S1, 10,000 S3.
- North Aspy River—2,000 Sf.
- White Point Pond—45,000 S1, 5,000 S3.

Atlantic Salmon.....	405,300
Speckled Trout.....	2,995,796
Total.....	3,401,096

Mersey Fish Culture Station

Lunenburg County—
- Beaver Brook—1,200 S5.
- Bickle Pond—1,000 S2.
- Conrad Lake—2,900 S5.
- Crab Pond—1,000 S2.
- Fort Point Lily Pond—2,000 S5.
- Frog Pond—500 S2.
- Hirtle Pond—2,600 S5.
- Island Pond—1,600 S5.
- Island Lake—4,600 S5.
- Sperry Lake—3,100 B5.
- Kaulback Pond—1,200 S5.
- Keddys Pond—1,000 S5.
- LaHave River—
  - Beck Lake—3,000 S2, 1,500 S5.
  - Crouse Lake—3,000 S2, 1,300 S5.
- Mud Lake—1,200 S5.
- Mushamush River—9,200 A5.
- Petite River—16,100 A4, 11,500 A5.
  - Branch Lake—4,800 S5.
  - Corkum Pond—200 S2.
  - Fitch Long Lake—3,500 S2.
  - Wallace Lake—3,700 S2.
- Romkeys Pond—2,600 S5.
- Spectacle Lake—4,200 S5.
- Stage Pond—1,500 S2.
- Westhaver Pond—1,000 S5.
- Whynot Pond—1,000 S2.

Queens County—
- Five Rivers—4,000 S2, 3,800 S5.
- Herring Cove Lake—4,000 S2, 4,000 S5.
- Louis Lake—4,000 S3.
- McAlpine Brook—2,000 S2, 3,500 S5.
- Medway River—
  - Bangs Falls—14,200 A5.
  - Bangs Falls, West—11,400 A4.
  - Christopher Lake—6,000 S2, 5,000 S3, 4,400 S4.
  - Ponhook Lake—14,200 A3, 5,200 A4, 20,500 A5.
  - Ponhook Lake (East)—6,000 A5.
  - Russell Lake—5,000 S4.
  - Salter's Brook—2,100 S5.
  - South Brookfield—20,000 A5.
  - Wentworth Brook—2,000 S5.
- Mersey River—
  - Bar Pond—4,000 S4, 3,600 S5.
  - Cowie Falls—6,600 A5.
  - Deep Brook, Head Pond—17,600 S3.
  - George Brook No. 3, Head Pond—9,000 B2, 5,300 B5.
  - Lower Great Brook, Head Pond—24,500 B2, 4,500 B3, 6,300 B4, 21,700 B5.
  - No. 3, Head Pond—16,000 B2, 3,500 B3, 6,200 B4, 14,500 B5.
  - Sand Pit Road—11,900 B5.
- Ten Mile Lake—3,500 S2.
- Mitchell Brook—3,000 S2.

Shelburne County—
- Green Harbour Lake—4,600 S4.

50373-0—9

Mersey Fish Culture Station—Conc.

Shelburne County—Conc.
- Misery Lake Brook—2,200 S5.
- Ogden's Brook—2,100 S5.
- Sable River—
  - Log Brook—4,000 S5.
  - Tom Tigney Brook—9,000 S2, 4,700 S4.
- Wall Lake Brook—4,600 S4.

Atlantic Salmon	134,900
Brown Trout	126,500
Speckled Trout	164,800
Total	426,200

Middleton Fish Culture Station

Annapolis County—
- Annapolis River—
  - Barteaux Pond—1,000 Sd.
  - Bloody Creek—5,000 S1.
  - Evans Brook—10,000 S1.
  - Foster Lake—5,000 S4.
  - Little River—6,500 S1.
    - Twin Lakes—2,000 S4.
  - Morton Brook—6,000 S1.
  - Nictaux River—39,000 B2, 26,460 B3, 8,980 S5.
    - Birchbark Lake—2,785 S5.
    - Connell Lake—5,150 S4.
    - Oaks Brook—6,000 S1.
    - Private Brook—6,000 S1.
    - Quilty Lake—1,800 S5.
    - Scrag Lake—3,600 S5.
    - Shannon River—5,373 S1.
    - Trout Brook—6,000 S1.
    - Trout Lake—8,000 S4.
    - Waterloo Brook—6,000 S1.
    - Zwicker Lake—40,000 R4, 24,100 R5.
  - Paradise Brook—8,500 S2.
    - Paradise Lake—18,200 S2, 17,560 S4, 5,220 S5.
      - Three Lakes in Paradise—4,500 S5.
  - Parker Brook—6,000 S1.
  - Slocomb Brook—6,000 S1.
  - Spicer Pond—100 S2.
  - Tupperville Brook—1,200 S5.
  - Wade Lake—3,000 S5.
  - Wiswal Brook—6,000 S1.
  - Wright Lake—5,500 S5.
- Bear River—
  - Baillie Lake—5,600 S2.
  - Beeler Brook—8,000 S1.
  - Beeler Lake—4,000 S1, 10,000 S4.
  - Katy Lake—5,600 S2.
  - Lake Mulgrave—12,865 S5.
  - Nigger Line Brook—6,000 S1.
  - Power Lot Brook—6,000 S1.
  - Sundown Lake—9,100 S2.
  - Upper Mink Lake—8,400 S2.
- Goldsmith Lake—4,500 S5.
- LaHave River—6,500 S1.
  - Lake Pleasant—8,000 S1, 10,000 S4.
  - Lunenburg Lake—5,220 S5.
  - Sixty Brook—6,500 S1.
    - Sixty Lake—9,100 S2.
- LeQuille River—
  - Gibson Lake—8,000 S1, 6,600 S5.
  - Grand Lake—7,000 S2.
  - Lake LaRose—6,000 S1, 5,500 S5.
  - Lamb Lake—7,000 S2, 10,000 S4.
  - Little Lake—500 S1.
  - Lynch Lake Brook—8,000 S1.
  - Mickey Hill Brook—4,200 S2.
  - Ten Mile River—9,000 S1.
- Medway River—
  - Long Lake—5,220 S5.
  - Spectacle Lake—10,000 S4.
  - Wildcat Brook—2,400 S4.
- Mersey River—3,000 S4.
  - Boot Lake—13,000 S4.
  - Eleven Mile Brook—5,000 S1.
  - Eleven Mile Lakes—2,000 S4.
  - Fisher Lake—4,000 S4.
    - Munroe Lake—1,000 S4.
    - Pike Lake—1,000 S4.
    - View Lake—1,000 S4.
  - Minard Brook—5,000 S1.
  - Pike Brook—5,000 S1.
  - Sandy Bottom Lake—7,000 S2.
- Milbury Lake—9,800 S2.
- Rumsey Lake—25,166 R1, 5,000 R5.
- Sand Lake—5,000 S4.
- South Mountain Pond—300 S2.
- Springfield Lake—9,250 S1.
  - Ridge Road Brook—6,500 S1.
- Young Lake—8,400 S2.

Kings County—
- Annapolis River—10,000 S1, 14,000 S2.
  - Cloud Lake—4,500 S5.
  - Fales Stream—8,500 S1.
  - South River—6,000 S1.
    - South River Lake—4,500 S5.
  - Walker Brook—6,000 S1.
- LaHave River—
  - Armstrong Lake—10,000 S4.
  - East Twin Lake—7,000 S4.
  - Lake Torment—6,300 S2, 10,000 S4.
  - Mack Lake—5,600 S2.
  - North Twin Lake—6,600 S5.
  - Shell Camp Lake—8,000 S4.
  - Spectacle Lake—5,600 S2, 10,000 S4.
  - Upper Sixty Lake—9,100 S2.
  - West Twin Lake—3,000 S4.
- Lake Paul—10,000 S4.

Lunenburg County—
- LaHave River—14,000 S2.
  - Blystone Lake—7,560 S4.
  - Church Lake—7,160 S4.
  - Grant Lake—3,580 S4.
  - Hirtle Lake—3,580 S4.
  - New Canada Lake—3,580 S4.
  - New Germany Lake—5,500 S5.
  - North River—4,200 S2.
  - Rhyno Lake—3,580 S4.
  - Springfield Brook—7,500 S1.
- Trails End Ranch—15,000 S5.

Middleton Fish Culture Station—*Conc.*

Queens County—
Grafton Lake—3,000 S4.
Sweeney Brook—5,000 S1.
Medway River—
Christopher Lake—3,000 S4.
Harmony Brook—5,000 S1.
Harmony Lake—1,000 S4.
Smith Brook—10,000 S1.
Mersey River—
Kejimkujik Lake—4,000 S4.
Whiteburn Brook—5,000 S1.
Minard Lake—2,000 S4.

Brown Trout	65,460
Rainbow Trout	94,266
Speckled Trout	735,963
Total	895,689

Yarmouth Fish Culture Station

Digby County—
Bear River—
Barne's Lake—6,750 S1, 300 S4.
East Brook—12,400 S1.
Hill Lake—6,750 S1.
Lake Jolly—6,750 S1, 600 S4.
Lake LeMarchant—6,750 S1, 600 S4.
Mill Lake and Brook—18,600 S1.
Belliveau River—12,400 S1.
Budds or Handspiker Brook—6,750 S1, 1,100 S3.
Carleton River—2,280 S2.
Bear's Back Lake—20,640 S1, 2,400 S2.
Bear Brook—2,280 S2.
Bear Lake and Brook—2,400 S2.
Bill John Lake—2,750 S2.
Briar Lake—2,400 S2, 300 S5.
Briar Lake Brook—9,300 S1.
Bright's Lake—8,000 S2, 8,000 S3, 900 S4.
Hourglass Lake—8,400 S1, 2,800 S3.
Hunter Lake—16,512 S1, 2,400 S2, 300 S5.
Oliver Lake—2,400 S2, 1,800 S3.
Paul Lake—2,400 S2.
Payson's Meadow Brook—9,600 S1, 2,280 S2.
Placid Lake—8,400 S1.
Porcupine Lake—8,000 S1, 1,800 S3.
Seven Pence Ha'penny Brook—2,400 S2.
Shingle Mill Brook—6,400 S1.
Simonds Lake—4,400 S2.
Sprague Lake—8,000 S1, 2,280 S2.
Sullivan Lakes—4,800 S2.
Toad Brook—2,400 S2.
Wentworth Lake and Brook—11,200 S1, 2,280 S2.
Wentworth or Klondyke Brook—2,400 S2.
Church Point Brook—6,200 S1.
Doctor's Lake—2,400 S2.
Gaudet's Mill Pond—2,400 S2.
Gilbert Lake Brook—1,000 S3.
Grosses Coques River—15,500 S1.
Bartlett Lake and Brook—15,500 S1, 1,800 S3.
Mill Brook—9,300 S1.
Thibeault Lake and Brook—15,500 S1.
Lint Lake Brook—12,400 S1.
Long Island Brook—6,600 S3.
Loud Lake Brook—12,400 S1.
Lukes Pond—100 S2.
Metegan River—
Anselem Lake and Brook—5,400 S2.
Blackador's Brook—15,500 S1.
Bonaventure Lake—2,400 S2, 1,500 S3.
Bourneuf Lake—2,750 S2.
Bull Lake—5,400 S2.
Comeau Lake—4,800 S2, 1,800 S3.
Cranberry Lake—2,400 S2.
Danver's Lake—2,750 S2.
Eel Lake—9,300 S1, 4,800 S3.
Gatien Thibeault Brook—12,400 S1.
Griffith Lake—2,750 S2.
Irishman's Brook—12,400 S1.
Jerome Lake—700 S4.
Lewis Lake—2,750 S2, 400 S4.
Long Lake (Hasset)—4,200 S1.
Long Lake (Margo Rd.)—5,400 S2.
Margo River—5,400 S2, 592 S5.
Metegan Lake—5,400 S2, 1,800 S3, 600 S5.
Metegan River, East Branch—9,300 S1.
Metegan River (Hasset)—5,600 S1.
Nowlan Lake—5,600 S1, 2,000 S2, 1,800 S3
Partridge Lake—2,400 S2.
Philip Lake—3,000 S2.
Prime Lake Brook—2,750 S2.
Rocky Brook—5,400 S2.
Weaver Lake—2,750 S2.
Salmon River—133,800 A1, 72,700 A2, 12,600 A3, 13,000 A5, 19,592 Af.
Boney Lake—24,768 S1, 2,400 S2, 300 S5.
Clearwater Lake—4,600 S2, 1,000 S3.
Dean's Brook—12,384 S1.
Doucett Lake (East)—4,700 S2, 300 S5.
English Lake—4,600 S2.
Farish Lake—2,400 S2.
Gaspereaux Lake—2,400 S2, 1,000 S3.
Hectanooga Lake—20,640 S1, 2,400 S2, 600 S5.
Pierce Lake—2,400 S2, 4,500 S3.
Spider Lake—2,280 S2.
Springdale Brook—4,600 S2.
Silver River—
Barrio Lake and Brook—5,000 S2.
Carrying Road Lake—4,800 S2, 3,000 S3, 600 S4.
Lucky Lake—5,000 S2.
New France Lake and Brook—5,000 S2.
Travis Brook—4,200 S2.
Whistler Lake—4,800 S2, 600 S4.
Sissiboo River—
Andrews Lake—6,750 S1.
Arthur Lake—5,600 S1.
Dunbar Brook—6,720 S1.
Everett Lake—6,720 S1, 300 S4.
Hanes Lake—8,400 S1, 3,000 S3.
Mallett's Lake—6,720 S1, 1,000 S3.
Mistake Lake—10,080 S1, 3,000 S3.

Digby County—Conc.
Sissiboo River—*Conc.*
Wallace River—1,000 S3.
Wright Lake—6,720 S1, 300 S4.
Snarl Lake—15,400 B1, 8,000 B3, 200 Bh.
Tusket River—12,600 A3.

Shelburne County—
Alvin Lake—14,400 S1, 2,400 S2, 700 S5.
Barrington River—3,100 S2, 700 S5.
Beaver Dam Lake and Brook—28,800 S1, 3,280 S2.
Birchtown Brook—6,720 S1.
Birchtown Lake—2,000 S2, 700 S5.
Long Bridge Brook—12,400 S1.
Black's Brook—8,400 S1.
Campbell Lake—4,400 S2.
Churchover Lake Brook—18,000 S1.
Clyde River—54,000 A1, 47,650 A2, 28,000 A4, 17,510 Af, 3,000 S2.
Barn Brook—6,200 S1.
Big Goose Creek—21,600 S1, 1,800 S2.
Birch Hill Brook—12,400 S1.
Bloody Creek—6,100 S2.
George A. Brook—12,400 S1.
Hamilton Branch—6,100 S2.
Hemlock Creek—6,200 S1, 2,000 S2.
Little Goose Creek—21,600 S1.
McDonald Creek—9,300 S1.
Potter's Run—12,400 S1.
Purdy Hill Brook—12,400 S1.
Salmon Creek—12,400 S1.
Spring Creek—9,300 S1.
Stalker's Run—3,100 S2.
Thurston Creek—6,200 S1.
Dexter's Lake—21,600 S1.
Doane's Brook—7,200 S1.
Downey's Brook—7,200 S1.
Oak Park Lake—5,000 S2, 700 S5.
Fresh Brook—3,600 S2.
North West Branch, Port Latour—3,000 S2.
Purney's Brook and Lake—8,400 S1, 3,000 S2.
Roseway River—41,080 B1, 59,280 B2, 26,520 B3, 7,700 B5, 900 Bf, 165 Bh.
Beech Hill Brook—3,100 S2.
Clam and Pug Lakes—140 Bh.
Courtenay Lake—8,400 S1, 1,000 S2, 600 S5.
Deception Lake—6,720 S1, 3,000 S2.
John Lake—2,200 Bf, 210 Bg.
Jones Lake—2,200 Bf.
McKay Lakes—6,720 S1, 2,560 S2.
Sandy Point Brook—3,100 S2.
Shag Harbour Brook—3,600 S2, 600 S5.

Yarmouth County—
Allen Lake—2,000 S3.
Annis River—59,920 B1, 2,400 B2, 17,460 B3, 15,420 B5, 338 Bg, 454 Bh.
Big Brazil Lake—4,500 B2, 4,000 B3, 1,400 B4, 100 Bh.
Brazil Lake—16,400 B1.
Brazil Lake Brook—9,840 B1.
Crosby Brook—13,120 B1.
Dave Saunder's Mill Brook—28,080 B1, 4,000 B3.
Gardener's Mill Pond—19,680 B1, 5,000 B2.
Harris Lake and Brook—6,000 B2.
Hawley Road Brook—19,680 B1.
Hooper Lake—6,000 B2.
Lake Annis—32,800 B1, 9,500 B2, 4,000 B3, 1,400 B4, 25 Bg, 50 Bh.
Lake Edward—19,680 B1, 6,000 B2.
Lake Ellenwood—32,800 B1, 4,000 B3, 600 S5.
Lake Jessie—26,240 B1, 9,500 B2, 4,000 B3, 1,400 B4, 100 Bh.
Little Brazil Lake—32,800 B1, 9,500 B2, 1,400 B4, 50 Bh.
Pleasant Valley Brook—39,360 B1, 6,000 B2.
Salmon Lake and Brook—6,000 B2.
Scott Lake Brook—22,960 B1.
Argyle River—43,200 A1, 20,000 A2, 6,180 Af.
Frost Pond—4,500 S2, 2,000 S3.
Mespark Lake Brook—3,400 S2.
Moses Lake and Brook—4,500 S2, 2,640 S3.
Randall Lake and Brook—4,500 S2, 5,280 S3, 900 S5.
Brenton Lake—1,960 S4.
Carleton River—15,500 S1.
Beaver Lake—1,500 S3.
Bird Lake—4,800 S2, 3,000 S3.
Bullerwell's Brook—9,300 S1
Fanning Lake—12,400 S1.
Hamilton Lake—6,000 S2, 3,000 S3, 600 S5.
Hicks Brook—9,300 S1.
Nickerson's Brook—6,200 S1.
Richardson's Lake—12,400 S1, 2,000 S2.
Ryerson's Brook—6,200 S1.
Salter Lake and Brook—12,400 S1, 1,000 S3.
Sloan's Lake—4,800 S2, 3,000 S3.
Cedar Lake and Brook—9,300 S1, 3,500 S3, 2,500 S4.
Chegoggin River—6,000 S2.
Chegoggin Lake and Brook—18,600 S1, 3,000 S3.
Wellington Lake—6,000 S2, 1,960 S4.
Churchill Lake—6,200 S2.
Coggin's Lake Brook—15,500 S1.
Corning Lake—6,200 S2, 3,000 S3.
Darlings Lake—12,400 S1, 2,500 S3, 1,960 S4.
Delaport Pond—100 S2.
Mallett Lake—6,200 S2, 2,000 S3.
Pubnico Lake—5,000 S2, 5,000 S3, 900 S5.
Salmon River—7,725 Af.
Winter's Lake—16,500 S1, 3,000 S3.
Scott Brook—500 S2.
Silver River—
Braddie's Meadow Brook—12,400 S1.
Burrell's Brook—12,400 S1, 600 S4.
Tedford Lake—7,000 S3, 2,500 S4.
Trefry's Lake—3,000 S3.
Tusket River—167,000 A1, 25,000 A2, 26,874 Af.
Beaver Lake—4,800 S2.
Big Meadow Brook—12,400 S1, 1,500 S3.
Canoe Lake and Brook—6,400 S1.
Clearwater Lake and Brook—12,400 S1.
Coldstream River—9,600 S1, 2,000 S2.
Grey's Brook—9,300 S1.

Yarmouth Fish Culture Station—Conc.

Yarmouth County—Conc.
Tusket River—*Conc*
Harris Lake—4,800 S2, 1,500 S3.
James Lake—6,400 S1, 2,000 S2.
Kegeshook Lake—9,600 S1, 2,000 S2.
Little Meadow Brook—12,400 S1, 1,500 S3.
Louis Lake—4,800 S1.
Mill Brook—3,000 S2.
Rushy Lake—6,400 S1.
Schoolhouse Brook—9,300 S1.
Solomon Lake—4,800 S2.
Sunday Lake—4,800 S2, 1,500 S3.
Welchard Brook—4,500 S2.
Wilson Brook—4,500 S2.

Atlantic Salmon	707,431
Brown Trout	667,352
Speckled Trout	1,541,126
Total	2,915,909

NEW BRUNSWICK

Charlo Fish Culture Station

Gloucester County—
Caraquet River—10,000 S2.
Clarniere Lake—4,160 S3.
Little River Lake—6,000 S2.
Nipisiguit River—42,000 A2, 6,600 Af.
Gordon Brook—42,000 A2, 23,915 A4.
Middle River—35,000 A3.
Papineau River—210,000 A1.
Portage Lake—900 Sf, 183 Sg, 168 Sh.
Tetagouche River—6,900 Af.
Tetagouche Lake—882 Sf.
Pokemouche River—8,000 S3.
Sole Leather Lake—5,000 S2.
Strawns Lake—5,000 S2.
Teagues Lake—7,500 S2.
Tracadie River—140,000 A1.

Restigouche County—
Black Lake—5,000 S2.
Burntland Lake—10,000 S2.
Caldwell Lake—8,000 S2.
Christopher Brook—35,000 S1, 12,000 S2.
Black Brook—35,000 S1, 6,000 S2.
Loch Lomond—2,000 S2.
Duff Lake—3,225 S2.
Fourteen Mile Lake—6,000 S2.
Jacquet River—140,000 A1, 18,100 Af.
Antinori Lake—12,000 S2.
Juniper Lake—6,000 S2.
Louson River—35,000 S1.
McKenzie Lake—5,000 S2.
Nash Creek—35,000 S1.
North Branch Charlo River—17,900 S1.
Charlo Dam—500 Sf.
Pope Logan Lake—10,000 S2.
Restigouche River—80,000 A1, 42,000 A2, 35,000 A3, 24,870 Af.
Five Fingers Brook—5,000 S2.
Kedgwick River—60,000 A2, 59,000 A3, 24,000 A4, 28,980 Af.
Eight Mile Lake—9,000 S2.
Meadow Brook—107,250 A2.
Little Main River—24,000 A3, 16,250 Af.
Gunamitz River—70,000 A1, 65,250 A2, 24,000 A3
Two Brooks Lake—5,000 S2.
Upsalquitch River—9,350 Af.
Murray Lake—2,000 S3.
North West Upsalquitch River—130,000 A1, 107,250 A2, 6,900 Af.
South East Upsalquitch River—130,000 A1, 42,000 A2, 6,600 Af.
Meadow Brook Lake No. 1—2,000 S3.
Meadow Brook Lake No. 2—2,800 S3.
Tongue Lake—5,000 S3, 225 Sh.
South Branch Charlo River—18,000 S1.
Walker Brook—35,000 S1.

Atlantic Salmon	1,757,215
Speckled Trout	375,443
Total	2,132,658

Florenceville Fish Culture Station

Carleton County—
Debec Brook—30,000 S1.
Deer's Brook—
Cronin's Pond—5,000 S4.
Johnsville Pond—5,000 S4.
Priest's Lake—10,000 S4.
Eel River—
Bull Creek—30,000 S1.
Sherwood Lake—66,000 S1.
Colwell Brook—15,000 S1.
Lampeda Lake—10,000 S4.
McLeary Brook—30,000 S1.
Meduxnekeag River—
Carter Brook—6,000 S1.
Gartley Brook—21,000 S1.
Hagerman Brook—12,000 S1.
Marven Brook—12,000 S1.
McQuarrie Brook—6,000 S1.
Miramichi River—48,000 A3, 6,600 Af.
Argyle Pond—10,000 S4, 245 Sh.
Big Tague Brook—7,000 S3.
Bigger Brook—3,500 S3.
Brandy Brook—3,500 S3.
Clearwater Brook—7,000 S3.
Elliott Brook—6,000 S3.
Juniper Brook—6,000 S3.
Little Tague Brook—7,000 S3.
West Brook—6,000 S3.

Carleton County—Conc.
Saint John River—
Acker Creek—7,000 S3.
Beachwood Dam—1,000 Af.
Becaguimac River—48,000 A3, 3,500 Af, 6,000 S3.
Beaver Brook—5,000 S4.
Guthrie Brook—9,000 S1.
Manse Brook—9,000 S1.
Conroy Brook—5,000 S4.
Cross Creek—3,000 S3.
Day Brook—3,000 S3.
Gin Brook—3,000 S3.
Howard Brook—3,000 S3.
Indian Brook—5,000 S4.
Long Lake—4,000 S4.
Brummagen Brook—5,000 S4.
Burnt Land Brook—3,000 S3.
Coldstream Brook—12,000 S3, 150 Sf.
Hamilton Brook—3,000 S3.
Hartley Brook—3,000 S3.
Hayden Brook—3,000 S3.
Bulls Creek—18,000 S1.
Bedell Brook—9,000 S1.
Greens Lake—1,200 Sf.
Gibsons Creek—14,000 S3.
Guisiguit River—20,000 S4.
Big Guisiguit River—15,000 S1.
Little Guisiguit River—9,000 S1.
Lanes Creek—12,000 S1.
Monquart River—48,000 A3, 16,000 S3.
Presquile River—35,000 Ad, 20,000 A3, 3,500 Af.
Bradley Brook—16,000 S1.
Dingee Brook—9,000 S1.
Harold Brook—12,000 S1.
Ketch Lake—24,000 S1, 320 Sg, 280 Sh.
Lakeville Pond—1,200 Sf.
Little Presquile River—36,000 S1.
Gallivans Stream—6,000 S1.
Gowan Lake—15,000 S1.
Reids Lake—21,000 S1, 10,000 S4.
Two Mile Brook—18,000 S1.
Watsons Beaver Dam—1,000 S2.
Williamstown Lake—10,000 S4, 1,000 Sf, 795 Sg, 280 Sh.
River de Chute—21,000 S1, 5,000 S4.
Shiktahawk River—68,000 A3, 3,500 Af.
Big Shiktahawk River—7,000 S3.
Green Brook—9,000 S1, 6,000 S3.
McFarlane Brook—9,000 S1.
Little Shiktahawk River—7,000 S3.
Stickney Brook—7,000 S3.
Tweedie Lake—1,200 Sf.

Victoria County—
Tobique Dam—40,905 Af.
North Branch Gulquac River—4,200 S3.

York County—
Bolton Lake—1,000 Sf.

Eel River—
Fish Creek—9,000 S1.
Four Mile Brook—9,000 S1.
Risteen Brook—18,000 S1.
Risteen Lake—66,000 S1.
Second Eel Lake—66,000 S1, 10,000 S4.
Third Eel Lake—10,000 S4.
Five Mile Brook—5,250 S3.
Jones Forks—6,000 S3.
MacKenzie Brook—5,250 S3.
Magaguadavic River—
Clinch Brook—4,750 L2.
Cranberry Brook—5,000 S4.
Little Duck Lake—54,000 S1, 1,000 Sf.
Cranberry Lake—500 Sf.
Harvey Lake—33,000 S1, 5,000 S4, 1,200 Sf.
Musquash Lake—1,000 Sf.
Palfrey Lake—1,700 Sf.
Palfrey Brook—30,000 S1, 10,000 S4.
Grassy Lake—66,000 S1.
Skiff Lake—4,600 L2, 57,000 S1, 7,500 S3, 1,200 Sf.
Saint John River—
Keswick River—40,000 A3, 6,000 S3, 10,000 S4.
Green Hill Lake—6,000 S3, 320 Sg.
Haines Pond—1,000 S2.
Kilarney Lake—14,000 S3, 1,300 Sf.
Mactaquac River—20,000 A3, 10,000 S4.
Nackawic River—20,000 A3, 10,000 S4.
Nashwaak River—20,000 A3, 3,500 Af.
Cathal Brook—1,750 S3.
Cross Creek—3,500 S3.
Lime Kiln Brook—5,250 S3.
Manzer Mill Stream—3,000 S3.
McBanes Brook—5,250 S3.
McCallums Brook—3,500 S3.
McLean Brook—3,500 S3.
Napadogan Brook—7,000 S3.
Penniac Stream—6,000 S3.
Ryan Brook—3,500 S3.
Tay River—5,250 S3.
South Branch Tay River—3,500 S3.
Nashwaaksis River, East—3,500 S3.
Pokiok River—7,500 S3, 10,000 S4.
Davinson Lake—66,000 S1, 10,000 S4, 485 Sg, 125 Sh.
Lake George—1,200 Sf.
Shogomoc River—60,000 S1.
Charles Lake—10,000 S4, 1,200 Sf.
Jamieson Lake—66,000 S1.
Sixth Lake—63,000 S1.
Yoho Lake—54,000 S1.
Young's Brook—3,000 S3.

Atlantic Salmon	429,505
Sebago Salmon	9,350
Speckled Trout	1,723,100
Total	2,161,955

Grand Falls Fish Culture Station

Madawaska County—
- St. John Lake—20,000 Sc.
- St. John River—
  - Baker Brook—10,000 S1, 25,600 S2.
    - Baker Lake—10,000 S2, 8,000 S3, 2,000 S4, 300 Sg.
    - Reed Brook—12,500 S1.
  - Caron Lake—12,000 S2, 50 Sg.
  - Cedar Grove Pond—3,000 S1.
  - Couturier Pond—10,000 Sc.
  - Daigle Brook—8,000 Sd.
  - Dugal Brook—12,500 S1.
  - Euclide Albert's Pond—5,000 S1.
  - Grant River—36,000 S1, 32,000 S2, 4,000 S3, 2,880 S4.
  - Green River—45,000 S1, 32,000 S2, 18,000 S3, 2,000 S4, 450 Sf, 659 Sg.
    - Fifth Tier Brook—10,000 Sd.
    - Martin Brook—5,000 S1.
    - Miller Lake—8,000 S3.
    - Thibodeau Brook—5,000 S1.
  - Iroquois River—33,700 S1, 8,000 S3, 2,000 S4.
    - Beaver Brook—5,000 S1.
    - Blanchette Brook—15,000 S1.
  - Laforge Pond—6,000 Sc, 1,000 S2.
  - Lavoie Brook—10,000 Sd.
  - Levasseur Brook—10,000 S1.
  - Little River—700 Sg.
    - Deadwater Brook—20,000 S1.
      - Godbout Pond—10,000 Sc.
  - Marcel Cyr's Pond—10,000 Sc.
  - Michaud Brook—8,000 Sd.
  - Millstream—25,000 S1.
  - Millstream Pond—10,000 Sd.
  - Pelletier Brook—12,500 S1.
    - Caron Brook—10,000 S1.
  - Powers Brook—15,000 S1.
  - Quisibis River—10,000 S1, 32,000 S2.
    - Rob Brook—18,000 S1.
      - Rob Brook Branch—12,000 S1.
    - Quisibis Lake—200 Sf.
  - St. Joseph Pond—3,000 Sc.
  - Siegas River—18,000 S1, 32,000 S2.
    - Clark Brook—18,000 S1.
    - Siegas Lake—8,000 S3.
    - Tedley Brook—18,000 S1.
  - Smith Brook—10,000 Sd.
  - Thompson Lake—10,000 S1.
  - Three Mile Brook—8,000 Sd.
  - Upper Iroquois River—25,000 Sc.
- Trout River—10,000 S2, 10,000 S3.
  - South Trout River—12,500 S1.
- Unique Lake—10,000 S2, 500 Sf.

Northumberland County—
- Hazelton Brook—4,000 S3.

Restigouche County—
- Big Cedar Deadwaters—20,000 S1.
- Five Brook—14,300 S1.
- Range 10 Brook—11,400 S1.
- Range 14 Brook—17,150 S1.
- Range 14 Lake—20,000 S1.
- Range 16 Brook—17,150 S1.
- Twenty-Two Mile Brook—20,000 S1.
  - Twenty-Two Mile Lake—20,000 S1.

Victoria County—
- East Limestone River—36,000 S2.
  - Gillespie Brook—2,000 S3.
- Everett Brook—1,500 S4.
- Grand River—
  - Big Forks Brook—10,000 S1.
  - Black Brook—29,700 S1.
  - Violette Brook—10,000 S1.
- Jardine Brook—4,000 S3.
- Ring Brook—5,000 S1.
- St. John River—126,000 A1, 107,120 A2, 5,700 A3, 3,352 Af, 38,400 S2, 200 S3, 400 Sf, 806 Sg.
  - Bishop Brook—5,000 S1.
  - Boutard Brook—4,000 S1, 2,000 S4.
  - Brown Brook—5,000 S1.
  - Cochrane or Huds Brook—5,000 S1.
  - Cold Brook Pond—4,000 Sc.
  - Curry Brook—7,500 S1.
  - Donald Pond—4,000 S2.
  - Falls Brook—8,000 S2.
  - Gallagher Brook—4,000 S3.
  - Grant Brook—5,000 S1.
  - Jamer Brook—5,000 S1.
  - Johnson Brook—4,000 S1.
  - Little River—60,000 A1, 54,720 A2, 3,000 Af, 85,400 S2, 6,000 S3, 400 Sf.
    - Bakerhouse Brook—10,000 S1.
    - Basley Brook—10,000 S1.
    - Beaverdam Brook—47,300 S1.
    - McCluskey Brook—10,000 S1.
    - Perkins Brook—10,000 S1.
    - Ryan Brook—40,000 S1, 8,000 S3.
  - Lovelly or Jawbone Brook—5,000 S1.
  - Lunn Pond—8,000 Sc.
  - McCarthy Brook—14,000 S1.
  - Mill Brook—12,000 S1.
  - Miller Brook—5,000 S1.
  - Millicatte Brook—5,000 S1.
  - Morrell Brook—10,000 S1, 2,000 S3.
  - Muniac River—60,000 A1, 5,000 S1, 4,000 S3, 3,600 S4.
    - Inman Brook—5,000 S1.
    - Watt Brook—4,000 Sc.
  - Rapide de Femme Brook—16,000 S1, 4,000 S2, 2,000 S4.
  - Salmon River—230,000 A1, 218,880 A2, 22,800 A3, 12,000 Af, 55,000 S2, 6,000 S3, 2,020 S4, 329 Sf, 650 Sg.
    - Barney Brook—10,000 S1, 1,000 S3.
    - Bogan Brook—10,000 S1.
    - Cedar Brook—3,000 S4.
    - Club Brook—2,000 S4.
    - Little Salmon River—60,000 A1, 59,360 A2, 2,000 Af.
    - Mooney Brook—10,000 S1.
    - Outlet Brook—35,000 S1.
    - Sutherland Brook—20,000 S1.
  - Scott Brook—5,000 S1.
  - Tibbitts Brook—5,000 S1.
  - Tobique River—64,000 S2, 561 Sf, 650 Sg.
    - Big Flat Brook—5,000 S1.
    - Caldwell Brook, East—5,000 S1.
    - Caldwell Brook, West—5,000 S1.
    - Indian Brook—5,000 S1.
    - Narrows or Hudson Brook—5,000 S1.
    - Odellach River—4,500 S4.

Grand Falls Fish Culture Station—*Conc.*

Victoria County—Conc.
St. John River—*Conc.*
Tobique River—*Conc.*
Pokiok River—5,000 S3.
Left Branch Pokiok River—2,500 S3.
Quaker Brook—3,600 S4.
Shea Brook—2,500 S3.
Three Brooks—35,000 S1.
Trout River—5,100 S4.
Wolverton Brook—1,500 S4.
Wark Brook—2,500 S1.
Watson's Pond—5,000 Sc.

Atlantic Salmon	1,024,932
Speckled Trout	1,815,655
Total	2,840,587

Haley Brook Fish Culture Station

Carleton County—
St. John River—19,800 Af.

Victoria County—
St. John River—1,500 Af.
Tobique River—18,750 A2, 53,416 Af.
Beaver Brook—1,000 S2, 2,000 S4.
Big Gulquac River, S.B.—5,000 S3.
Burnt Land Brook—5,000 S2.
Haley Brook—3,000 S2.
Johnston Brook—1,000 S2.
Little Burnt Land Brook—1,000 S5.
Little Gulquac Brook—4,000 S4.
Little Tobique River—12,500 A1, 10,788 A3.
Mamozekel River—12,500 A2, 10,787 A3, 5,404 Af.
Everett Brook—2,000 S4.
Nary Brook Lake—1,000 S3.
North Branch Gulquac River—1,000 S4.
Odell River—2,400 Af.
Portage Lake—1,000 S3.
Ralston Lake—10,000 S3.
Riley Brook—5,000 S3.
Serpentine River—12,500 A1.
Sisson Brook—6,000 S2.
Two Brooks—3,000 S2.
Two Brooks, Left Branch—4,000 S2.
Wapskegan River—5,000 S3.
Little Wapskegan Brook—1,000 S4.
Oven Rock Brook—3,000 S4.

Atlantic Salmon	160,345
Speckled Trout	64,000
Total	224,345

Miramichi Fish Culture Station

Kent County—
Miramichi River—
Bass River—9,200 S2.
Buctouche River—12,500 S1, 5,000 S2.
Cocagne River—12,500 S1, 5,000 S2.
Grand Alduane River—3,000 S2.
Kouchibouguac River—12,500 S1, 5,000 S2.
Kouchibouguassis River—12,500 S1, 5,000 S2.
Richibucto River—14,200 S2.
Salmon River—152,000 A1.

Northumberland County—
Miramichi River—
Bartibog River—22,500 S1, 5,000 S2.
Eskedelloc River—22,500 S1, 5,000 S2.
Goodfellow Brook—15,000 S1.
Gordon Brook—7,500 S1.
Green Brook—15,000 S1.
Little Bartibog River—7,500 S1.
Bay Du Vin River—22,500 S1.
Black River—15,000 S1, 6,000 S2.
Black Brook—15,000 S1, 8,000 S2.
East Branch Black River—8,000 S2.
Buckley's Pond—3,000 S2.
Burnt Church River—15,000 S1, 5,000 S2.
Burnt Land Brook—6,000 S2.
Horton's Creek—4,000 S2.
Little River—22,500 S1.
Little S.W. Miramichi River—240,000 Ad, 160,000 A1, 45,000 A2, 7,200 Af.
Mill Brook—6,000 S2.
Moores Brook—6,000 S2.
Napan River—15,000 S1, 6,000 S2.
Northwest Miramichi River—330,000 Ad, 80,000 A1, 48,000 A2.
Castori Brook—10,000 S1.
Millstream River—60,000 Ad, 80,000 A1.
Mullin Stream—15,000 S1.
Sevogle River—90,000 Ad, 80,000 A1.
North Branch Sevogle River—80,000 A1.
River DeCashe—10,000 S1.
Southwest Miramichi River—144,000 A1.
Barnaby River—90,000 Ad, 80,000 A1.
Bartholmew River—160,000 A1, 7,200 Af.
Cains River—324,000 A1, 7,200 Af.
Clear Water River—16,000 Af.
Dungarvon River—257,050 A1, 3,600 Af.
Renous River—228,000 A1, 7,200 Af.
Rockey Brook—18,400 Af.
Five Lakes—8,000 S2.

Miramichi Fish Culture Station—*Conc.*

Northumberland County—Conc.
Miramichi River—*Conc.*
Southwest Miramichi River—*Conc.*
Taxis River—74,700 A1.
Stewart Brook—3,000 S2.
Tabusintac River—44,000 A1, 7,200 Af, 12,600 S2.
Nepisiquit Brook—10,000 S2.
Trout River—12,000 S1.
Wild Cat Brook—10,500 S1.
Wine River—4,400 S2.

York County—
Southwest Miramichi River—208,000 A2.

Atlantic Salmon.....	3,128,750
Speckled Trout.....	454,900
Total.....	3,583,650

Saint John Fish Culture Station

Albert County—
Crooked Creek—255,000 Rd, 85,000 R1, 391 Rh.
McFadden Lake—4,000 S2.
Demoiselle River—58,280 Sd.
Fundy Park Lakes—2,000 R3, 2,000 Rf, 4,000 S4.
Petitcodiac River—
Pollett River—10,750 A4.
Turtle Creek—33,280 Sd, 15,000 S1.
Weldon Creek—66,600 Sd.
Sawmill Creek—66,600 Sd.

Charlotte County—
Blenmortier Brook—100 S4.
Blueberry Experimental Station—2,000 S2.
Bradbury Brook—100 S4.
Branfords Cove Pond—300 S4.
Causeway, Bay of Fundy—300 Sf.
Chamcook Lake—86,119 L1.
Cranberry Lake—1,400 S4.
Crecy Lake—13,000 R3, 1,300 Rf.
David Watt Pond—300 S4.
Digdeguash River—266,000 Bd, 55,000 B1, 77,056 B2.
Bog Brook—10,000 S1, 30,000 S2, 150 Sf, 160 Sg.
Campbell Brook—15,000 S1.
Craig Brook—10,000 S1.
Fall Brook—10,000 S1.
North West Branch—70,000 S2.
Orange Cove Brook—5,000 S1.
Dwelly's Pond—600 S4.
Eel Lake—500 S4.
Gallop Lake—10,500 S4, 600 Sf.
Gallop Stream—40,000 S1.
Grand Brook—200 S4.
Lepreau River—25,000 A3.
Mosquito Lake—10,000 S2.
Little Lake—300 S4.
Little Pond—300 S4.
Long Pond—400 S4.
Magaguadavic River—20,000 A1, 25,000 A3.
Clarence Stream—10,000 S1.
Black Brook—10,000 S1.
Cranberry or Harvey Lake—25,000 A1.
Millstream Brook—5,000 S1.
Red Rock Lake—60,720 Sd.
Sparks Lake—53,130 Sd.
Trout Brook—20,000 S1.
Meadow Brook—5,000 S1.
Moose Lake—10,000 S1.
New River—20,000 A1, 20,000 A3, 30,360 Sd.
New River (Little)—5,180 Sd.
Ohio Pond—400 S4.
Pocologan River—20,000 A1, 20,000 A3, 30,360 Sd.
Pocologan River (Little)—22,770 Sd.
Rich Pond—100 S4.
St. Croix River—2,463 Af.
Billy Weston Stream—10,000 S1.
Canoose River—3,900 S5, 700 Sf.
Big Goat Brook—10,000 S1.
Bonaparte Lake—10,000 S1.
Doodle Brook—10,000 S1.
Goat Brook—700 Sf.
Goat Brook (Little)—10,000 S1.
Green Brown Brook—10,000 S1.
Sandy Brook—25,000 S1.
Sawyer Brook—10,000 S1.
Cranberry Brook—20,000 S2.
Denny Stream—100,000 S2, 850 Sf, 160 Sg.
Bush Brook—10,000 S1.
Max Crossing—10,000 S1.
Moore's Mill Stream—36,000 S2.
Jimmy Rolman Brook—10,000 S1.
King Brook—20,000 S1.
Mohannas Stream—2,443 Af, 3,900 S5, 600 Sf.
Annis Brook—5,000 S1.
Ash Brook—5,000 S1.
Dickenson Brook—10,000 S1.
Little Ridge Brook—5,000 S1.
Snipe Brook—10,000 S1.
Soap Brook—10,000 S1.
Stewart Brook—10,000 S1.
St. Patrick Lake—10,500 S4, 250 Sf, 260 Sg.
Sandy Cove Pond—100 S4.
South Branch Oromocto Lake—5,000 S2.
Stein Brook—10,000 S1.
Waweig River—
Bartlette Lake—10,500 S4.
Berry Brook—10,000 S1.
Erskine Brook—5,000 S1.
McCarlies Brook—25,000 S1.
McGuire Brook—10,000 S1.
Twin Lakes—10,500 S4, 250 Sf, 260 Sg.
Wilson Pond—300 S4.

Kent County—
Cocagne River—312 Sf, 86 Sg, 82 Sh.

Kings County—
Bellisle Creek—60,000 S1, 16,000 S2.
Camp Gagetown—130,000 S2.
Days Lake—3,000 S4.
Earle's Pond—2,000 S1.

Kings County—Conc.
- Mechanic Lake—600 Sf, 210 Sg.
- St. John River—
  - Glenwood Pond—300 S1.
  - Kennebecasis River—31,000 A1, 77,500 A2, 10,000 S1, 6,000 S5, 1,100 Sf 420 Sg.
    - Cassidy Lake—21,000 S1, 3,000 S5, 1,800 Sf.
    - Dee Brook—14,000 S1.
    - Hammond River—40,000 S1.
    - Jefferies Brook—10,000 S1.
    - Millstream—49,000 S1, 32,000 S2, 700 Sf.
      - Harry Brook—32,000 S2.
    - Mitchell Brook—21,000 S1.
    - Moosehorn Brook—28,000 S1.
    - Pikwaket Brook—21,000 S1, 12,000 S2.
    - Smith Creek—21,000 S1, 21,000 S2.
      - Chestnut Brook—14,000 S1.
      - Foley Brook—10,000 S1.
      - McGregor Brook—14,000 S1.
      - Sally Brook—15,000 S1.
      - Windgap Brook—14,000 S1.
    - Trout Creek—15,500 A1, 50,000 S1, 200 Sf.
      - Cedar Camp—16,640 Sd.
      - Mill Brook—16,640 Sd.
      - Parlee Brook—16,640 Sd, 4,000 S5.
      - Wards Creek—20,000 S1, 2,000 S5.
  - Round Lake—10,000 S3.

Queens County—
- Cumberland Bay Creek—80,000 S1.
- Euleptic Brook Pond—2,000 S1.
- Grand Lake—
  - Newcastle Creek—25,000 S1, 1,000 Sf.
  - Young Cove Stream—20,000 S1.
- McDonald Point Pond—200 S2.
- Nerepis River—24,960 Sd.
- Salmon River—40,000 S1, 1,000 Sf.
  - Big Forks—25,000 S1.
  - Castaway Brook—25,000 S1.
  - Friel Brook—30,000 S1.
  - Gaspereaux River—25,000 S1, 1,300 Sf, 210 Sg.
  - Gray Brook—6,250 S1.
  - Little Forks—6,250 S1.
  - Little River—25,000 S1.
  - North Forks—12,500 S1.
  - Salmon Creek—25,000 S1.
- Storkey Brook—15,000 S1.
- Tilly Lake—15,000 S1.

Saint John County—
- Balls Lake—5,000 S2.
- Big Salmon River—108,220 A1, 22,000 A2, 9,760 A4, 9,779 Af, 132 Ak.
  - Anderson Brook—15,000 A1.
  - Chisholm Lake—2,000 S2.
  - Crow Brook—25,000 A1.
  - Donnelly Lake—20,000 S1.
  - Falls Brook—10,000 A1.
  - Four Mile Lake—20,000 S1.
  - Pats Lake—10,000 S1.
  - Rody Lake—10,000 S1.
  - Tufts Lake—10,000 S1.
- Black River—27,000 A1, 25,000 S1.
  - Black River (East)—25,000 S1.
  - Grassy Lake—42,000 S1.
- Blindman Lake—250 Sf.
- Duck Lake—8,000 S1.
- Hammond River—50,000 S1.
  - Barnesville Brook—25,000 S1.
  - Germaine Brook—41,600 Sd.
  - Hanford Brook—41,600 Sd, 6,000 S3.
- Hanson Brook—30,360 Sd.
- Henry Lake—26,400 Sd.
- Kennebecasis River—
  - Cherry Lake—3,000 S1.
  - Dolan Lake—4,500 S3.
    - Adams Lake—18,320 Sd, 4,500 S3.
      - McCormac Lake—26,400 Sd, 4,500 S3.
- Little River—38,000 A2, 100,000 Rd, 45,760 Sd.
  - Blackall Lake—42,000 S1, 250 Sf.
  - Boaz Lake—3,000 S1.
  - Douglas Lake—81,000 Bd, 23,160 B2.
  - Elderly Brook—8,320 Sd.
  - Graham Lake—42,000 S1.
  - Hatchery Dam—276 Bk.
  - Treadwell Lake—26,400 Sd, 4,500 S3, 400 Sf.
- Macken Lake—5,000 S1.
- Marsh Creek—
  - Ashburn Lake—10,000 S2.
  - Lilly Lake—6,000 S1.
- McDonald Lake—2,000 S2.
- McLaughlin Lake—1,000 S2.
- Mispec River—17,000 A1, 25,000 S1.
  - Brandy Brook—12,000 S1.
  - Loch Lomond—71,000 S1, 36,550 S3.
  - McCracken Lake—6,500 S3, 600 Sf.
  - Second Lake—54,000 S1, 6,000 S3.
  - Wilmot Stream—43,280 Sd, 15,000 S1.
- Musquash River—
  - Anderson's Lake—10,000 S2.
  - Clear Lake—10,000 S2.
  - Loch Alva—20,000 S1, 1,000 S4.
  - Musquash River (East)—30,360 Sd, 65,000 S2.
  - Musquash River (West)—30,360 Sd, 65,000 S2.
- Saint John River—
  - Back Dam—400 S3.
  - Kelly's Lake—1,500 S3.
  - Mary Ann Hole—400 S3.
  - Mayflower or Dark Lake—1,500 S3.
- Tynemouth Creek—12,000 A1.

Sunbury County—
- Oromocto River—36,458 A2, 40,000 A3.
  - Don Brook—10,000 S1.
  - Mill Brook—10,000 S1.
  - Monday Brook—10,000 S1.
  - Morance Brook (Big)—24,960 Sd.
  - Morance Brook (Little)—16,640 Sd.
  - Peltoma Lake—41,600 Sd, 1,250 Sf, 150 Sh.
  - Peltoma Stream—24,960 Sd.
  - Pete Brook—10,000 S1.
  - Porcupine Brook—16,640 Sd.
  - Scribner Brook—10,000 S1.
  - Three Tree Creek—24,960 Sd.
    - Boone Brook—16,640 Sd, 5,000 S1.

Saint John Fish Culture Station—*Conc.*

Sunbury County—Conc.
Oromocto River—*Conc.*
Yoho Brook (Little)—16,640 Sd.
Yoho Lake—3,000 S5.
Piskahegan Stream—33,280 Sd.

Westmorland County—
Aboushagan River—1,200 Sf.
Anagance River—
Hayward Brook—12,000 S1.
Holmes Brook—8,000 S1.
Petitcodiac River—
Chapman Brook—8,000 S1.
Killam Brook—8,000 S1.
North River—92,000 S1, 12,000 S4, 4,560 S5.
Blakney Brook—12,000 S1.
Cameron River—20,000 S1.
Shediac River—20,000 S4, 1,370 Sf, 150 Sh.
Scoudouc River—8,000 S4, 1,200 Sf.
Trites Pond—2,000 S2.

York County—
Magaguadavic River—1,935 Sf, 492 Sg.
Cranberry Brook—450 S5.
Davis Brook—1,350 S5, 400 Sf.
Deadwater Brook—200 Sf.
Harvey Lake—61,000 A3, 800 Sf.
Kedron Lake (Big)—1,100 Sf.
Kedron Lake (Little)—1,250 Sf, 150 Sg.
McAdam Reservoir—470 Sf, 84 Sg.
South Brook—450 S5.
Stony Brook—900 S5.
Trout Brook—400 Sf.
Trout Brook (Lower)—1,350 S5.
Trout Brook (Upper)—900 S5.
Queens Lake—1,200 S4.

Atlantic Salmon	746,105
Brown Trout	502,492
Rainbow Trout	458,691
Sebago Salmon	86,119
Speckled Trout	4,021,711
Total	5,815,118

PRINCE EDWARD ISLAND

Cardigan Fish Culture Station

Kings County—
Bear River—4,000 S2.
Big Pond—3,000 S2.
Boughton River—2,000 S2.
Greystone Creek—2,000 S2.
Ross' Pond—6,000 S2.
Wigginton Stream—2,000 S2.
Brudenell River—
Jackson's Stream—2,000 S3.
Mellish's Pond—5,000 S2.
Munn's Pond—4,000 S2, 6,000 S3.
Cardigan River—3,500 S4.
Lewis Pond—2,000 S3.
East Lake—7,000 S2.
Easton's Pond—6,000 S3.
Fitzpatricks Pond—8,000 S3.
Fortune River—25,000 A3.
Big Brook—8,000 S2.
Dingwells Stream—6,000 S2.
Fox River—4,000 S2.
Grahams Pond—3,000 S3.
Greek River—5,000 S3.
Finlaysons Pond—6,000 S2.
Hay River—6,000 S2.
Kennedy Pond—1,000 S2.
Lakeside Pond—5,000 R3.
Lavandier's Pond—3,000 S3, 1,000 S4.
McCarnies Pond—3,000 S3.
MacDonald's Brook—3,000 S2.
McMillans Pond—2,000 S2.
Midgell River—25,000 A2, 49,000 A3, 8,000 S2.
McKinnon's Stream—6,000 S2.
Mitchell River—4,000 S3.
Montague River—15,000 S2.
Browns Creek—4,000 S2.
Knox's Pond—8,000 S2.
G. MacDonald's Pond—3,000 S3.
McRae's Pond—5,000 S2.
Valleyfield Stream—8,000 S2.
Morell River—50,000 A2, 71,000 A3, 3,000 S2, 9,000 S3.
Baldwin Road Brook—4,000 S2.
Crane's Pond—4,000 S3.
Crane's Stream—3,000 S3.
Leards Pond—5,000 S3.
MacAulays Pond—6,000 S2.
Mooneys Pond—4,000 S2.
Naufrage River—25,000 A3, 7,000 S2.
Larkins Pond—6,000 S2.
Nicholsons Pond—2,000 S3.
North Lake—7,000 S2.
Pine Brook—3,000 S2.
Priests Pond—5,000 S2.
Quigleys Stream—5,000 S2.
Stricklands Pond—9,000 S2.
Sturgeon River—8,000 S3.
Moore's Pond—10,000 S2.
Town Pond—2,000 S2.
Warren's Stream—8,000 S2.

Prince County—
Bain's Stream—3,000 S2.
Barbara Weit Pond—3,000 S2.
Black Brook—2,000 S3.
Black Pond—2,000 S3.
Brae River—4,000 S4.
Carr's Brook—3,000 S3.
Clarks Stream—2,000 S3.
Conroy's Pond—4,000 S3.
Dunk River—4,000 S2.
Scales Pond—6,000 R3, 12,000 S2, 5,000 S3.
Wrights Pond—6,000 S2.
Enmore River—4,000 S2, 1,000 S3.

Cardigan Fish Culture Station—*Conc.*

Prince County—Conc.
- Fergusons Pond—3,000 S3.
- Gordons Pond—2,000 S2, 4,000 S3.
- Grand River—
  - Barlow's Pond—3,000 S2.
  - Fitzgeralds Pond—5,000 S2.
- Greens Stream—5,000 S4.
- Hunters Pond—4,000 S4.
- Ira Banks Pond—6,000 S3.
- Kellys Stream—3,000 S4.
- Lockerbys Pond—2,000 S3.
- Luttrel Stream—5,000 S3.
- MacLellans Stream—2,000 S3.
- Mill River—
  - Bells Stream—4,000 S3.
  - Cains Stream—7,000 S2.
  - Gards Stream—5,000 S2.
  - Richards Pond—5,000 S3.
- Myers Stream—6,000 S3.
- Pierre Jacques River—4,000 S2.
  - McWilliams Pond—2,000 S2.
- Round Pond—3,000 S3.
- Sheep River—6,000 S2.
- Tignish River—50,000 A2, 8,000 S2.
  - Arsenaults Pond—6,000 S2.
  - Blanchards Pond—6,000 S2.
  - Harpers Stream—3,000 S2.
  - Little Tignish River—3,000 S2.
  - Myricks Pond—6,000 S2.
  - Sheas Pond—7,000 S2.
- Trout River—8,000 S2.
  - Getsons Pond—6,000 S3.
  - Leards Pond—4,000 S3.
- Tryon River—
  - Ives Pond—7,000 S3.
  - Lords Pond—2,000 S3.
- Warrens Stream—10,000 S3.

Queens County—
- Brazil Pond—5,000 S2, 4,000 S3.
- Clyde River—
  - Beers Pond—5,000 S2.
  - Scotts Pond—5,000 S2.
- Comptons Pond—9,000 S3.
- Cooks Pond—6,000 S3.
- Dalvay Lake—10,000 R3.
- Flat River—
  - Beatons Mill Pond—6,000 S2.
  - McPhersons Pond—8,000 S2.
- Gurneys Stream—4,000 S2.
- Hillsboro River—
  - Cherry Hill Stream—3,000 S2.
  - East River—8,000 S2.
  - Glenfinnan Lake—13,000 R2, 19,000 R3.
- Hope River—6,000 S3.
  - Simpsons Pond—4,000 R4, 4,000 S4.
- Hunter River—
  - Bagnalls Pond (Hazel Grove)—6,000 S4.
  - Bagnalls Pond (Rae)—7,000 S2.
  - Campbells Pond—3,000 S3.
- Hydes Pond—2,000 S3.
- Jays Pond—3,000 S2.
- Long Pond—10,000 R3.
- O'Keefe Lake—10,000 R3.
- Orwell River—2,000 S2.
- Parsons Pond—6,000 S3.
- Pinette River—
  - McPhersons Pond—5,000 S2.
  - Twin Ponds—5,000 S2.
- Redmond's Pond—4,000 S2.
- Stanley River—
  - Founds Pond—3,000 S3.
  - Howetts Pond—5,000 S3.
- Stevensons Pond—10,000 S4.
- Tracadie Bay—
  - Blooming Point Pond—5,000 S2.
  - MacAulays Stream—6,000 S2.
  - Winter River—8,000 S2, 2,000 S3.
- Vernon River—
  - Lanes Brook—2,000 S2.
  - McLeans Pond—8,000 S2.
  - McMillans Pond—6,000 S3.
- Warrens Pond—6,000 S2.
- West River—8,000 S3.

Atlantic Salmon	295,000
Rainbow Trout	77,000
Speckled Trout	686,500
Total	1,058,500

Kelly's Pond Fish Culture Station

Kings County—
- MacLeod's Pond—3,715 S2.
- Midgell River—21,200 A1.
- Morell River—25,000 A1.
- St. Charles' Pond—15,000 Sd.

Prince County—
- Barlow's Pond—1,500 S2.
- Calbeck's Pond—5,000 S2.
- Ives Pond—2,000 S2.
- McNally's Stream—3,500 S2.
- Wilmot River Pond—5,000 S2.

Queens County—
- Bagnall's Pond (Rae)—2,000 S1.
- Brander's Pond—2,000 S1.
- Cousin's Pond—1,500 S1.
- Crapaud River—
  - Leard's Pond—3,000 S2.
  - Stordy's Pond—3,000 S2.
- Dixons Stream—3,000 S2.
- East River—
  - Clark's Stream—2,000 S1.
  - Glenfinnan River—3,000 S1.
- Gates' Pond—1,500 S2.
- Rackham's Pond—2,000 S1.
- Rattenbury River—
  - Howatt's Pond—3,500 S1.
  - Taylor's Pond—1,500 S1.
- West River—4,000 S2.
  - Brookvale Stream—3,500 S2.
- Wisener's Pond—2,000 S1.

Atlantic Salmon	46,200
Speckled Trout	73,215
Total	119,415