



33RD

Annual Report

1962

DEPARTMENT OF FISHERIES

CANADA

*Being the Ninety-Sixth Annual Fisheries
Report of the Government of Canada*

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1963

*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 1962, and the financial statements of the Department for the fiscal year 1962-1963.

Respectfully submitted,

A handwritten signature in black ink, reading "H.J. Robichaud". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

Minister of Fisheries.

*To the Honourable H. J. Robichaud, M.P.,
Minister of Fisheries,
Ottawa, Canada.*

Sir:

I submit herewith the Annual Report of the Department of Fisheries for the year 1962, and the financial statements of the Department for the fiscal year 1962-1963.

I have the honour to be, Sir,

Your obedient servant

A handwritten signature in cursive script, appearing to read 'C. S. Meade'.

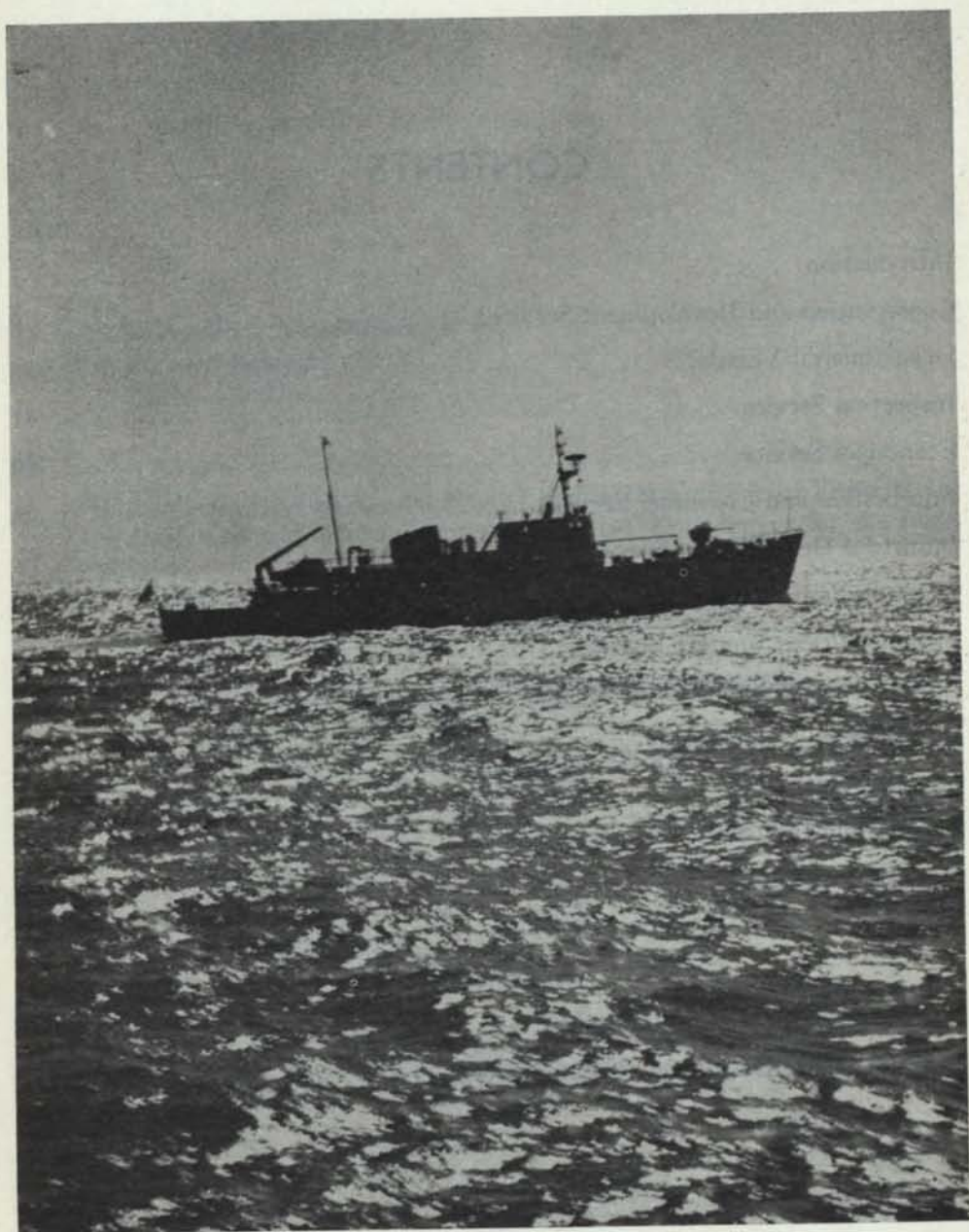
Deputy Minister.

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Fisheries Patrol Vessel Cape Freels off the Newfoundland coast.

INTRODUCTION

CANADIAN fishermen caught more than a million tons of fish and shellfish in 1962, with a landed value of nearly \$130 million, about 16 per cent more than in 1961. The marketed value was close to \$250 million. The fishery resources, an important factor in the economy since the nation's beginnings, have made Canada one of the world's leading producers of fishery products.

Exports continued to rise; at \$156.6 million, their value was nine per cent greater than in 1961 and maintained Canada as one of the three foremost countries providing fishery products for world markets.

The federal Department of Fisheries is charged with responsibility for the protection and development of the primary fishery resources, in the sea and in the vast freshwater areas. In addition to the complex management program which this demands, to conserve the stocks of fish and at the same time allow maximum exploitation, the Department has other obligations to both producers and consumers. It must encourage the former to catch and process fish and shellfish as efficiently and economically as possible and help in other ways by providing such things as economic services and by trying to increase the consumption of fish, and it must protect the latter by seeing that they obtain a high quality product.

The federal Government has full responsibility for the regulation of both the coastal and inland fisheries. However, the provinces have property rights in the non-tidal fisheries and provincial authorities have certain administrative responsibilities. All sea fisheries, except those of Quebec, are administered by the federal Department, but the freshwater or non-tidal fisheries are administered by the provincial Departments except in Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland, the Yukon and the Northwest Territories, where the freshwater fisheries are federally administered. Fish inspection in Quebec also is a federal responsibility.

The Department's working force throughout Canada is directed from the Ottawa headquarters through area offices in Vancouver, Winnipeg, Quebec, Halifax and St. John's, where regional headquarters are established for the Pacific, Central, Quebec, Maritimes and Newfoundland Areas. The field workers are mostly Protection Officers, both ashore and on the Department's fleet of 78 vessels; Inspection Officers; a fish culture staff of biologists, engineers and technicians, and a number of specialized employees in several fields, including economic research, instructional work among fishermen, information, consumer education, and industrial development.

The Fisheries Prices Support Board and the Fishermen's Indemnity Plan are administered from Ottawa. The former, which is concerned with reduced prices to fishermen, was not required to provide active support to any fishery products during 1962 because of generally satisfactory conditions; the latter provides fishermen with low cost protection from loss of and damage to fishing boats, within certain limits, and lobster traps, which are vulnerable to storms.

The coverage provided by the Plan was further extended during the year as more fishermen took advantage of the insurance provided. The Prices Support Board staff continued to administer the Salt Assistance Program and the headquarters activities of the Indemnity Plan.

The work of the Fisheries Research Board of Canada during 1962 is summarized in a chapter of this report, but the Board also issues a separate Annual Report covering, in greater detail, its biological, technological and oceanographic activities connected with the marine and freshwater fisheries.

With many fishing nations expanding their fleets and fishing farther and farther afield, the importance of international co-operation in conservation has become increasingly evident in recent years. This is particularly so in the North-west Atlantic and North Pacific where competition for fish has become intense, but some form of management to protect the resource is needed also in other areas, including fresh water. Canada takes an active part in the work of seven international fisheries commissions which are dealt with briefly in a chapter of this report. More extensive accounts of international activities in the major fishing areas are obtainable in reports issued annually by the Commissions themselves.

CONSERVATION AND DEVELOPMENT SERVICE

THE HISTORY of the Canadian fishery in 1962 has served to demonstrate rather clearly the wisdom of the adjustment of the roles of the branches of the Conservation and Development Service. Certain unique occurrences in widely separated areas have shown the benefit of close co-ordination between Protection and Fish Culture Development, of the selection of reliable technical personnel and their expanded training and of the improvement in mobile and other equipment. A closer association with the scientists of the Fisheries Research Board has been invaluable. Although much remains to be done in some areas, the results of any such effort have become clear.

In the Pacific Area, 1962 will be known as the "Pink Salmon Year." Over 23,000,000 pinks were captured, of which over 12,000,000 came from the Bella Coola sub-district. More could have been taken but daily quotas had to be imposed to allow proper processing. This occurrence not only indicates wide protection previously but also shows present efficiency in being able to handle the situation. The failure of the Adams River sockeye run necessitated close day to day control of fishing in Johnstone Strait and other approaches to the Fraser. With the establishment of a control room in charge of a maintenance biologist and with the co-operation of other services, such regulation was possible.

The Fish Culture Development Branch has been able to adjust numerous water use problems resulting from industrial expansion and to maintain control over pollutants. Results from propagation experiments at Robertson Creek and Nanika River, and progress at Qualicum have been outstanding. The agreement of the Angus Royal Commission to the Department's recommendation for the Puntledge River (see page 19) was most encouraging.

In the Northwest Territories and the Yukon, expanded lake fisheries were established after basic surveys by the Fisheries Research Board of Canada. Interest has gradually developed and is continually increasing. In 1962, more than 385,000 pounds of fish were taken from small lakes in the Northwest Territories, while production at Great Slave increased slightly. At the same time the domestic fisheries were maintained and the Eskimo co-operative efforts under the Department of Northern Affairs and National Resources continued to expand. Control also was exercised over the seismic surveys.

In the Maritimes Area, the year showed a good production of lobsters, which are at least maintaining themselves under rigid protection. The Atlantic salmon catch increased, especially in Nova Scotia, due undoubtedly to control of fishing and pollution, and to stream improvement. It is a bitter disappointment to see the salmon runs in the Saint John River decreasing as a result of power development, water pollution and the spraying of forests.

A constant vigil was maintained in northern New Brunswick's mining area, where effluent disposal poses a continuing threat to a number of the province's major salmon rivers. As a result of negotiations with mining company officials and provincial agencies, some degree of progress was made in 1962 in developing solutions to some of these complex pollution problems.

Of particular importance is the success achieved in the rehabilitation of oyster areas in New Brunswick and Nova Scotia by the transplantation of disease resistant oysters from Prince Edward Island. Almost complete success has been attained in all areas except at Shippegan, where there are still difficulties, although these are not as great as they were. It is fortunate that the necessary information and co-operation were available to carry out such a project.

The Conservation and Development Service in Newfoundland has proceeded beyond the organizational stage. Field personnel of both the Protection and Fish Culture Branches have attacked long-standing problems and have shown considerable gains. Steady progress has been made by the latter branch in its long range stream improvement and river assessment program. Selected staff members have been assigned the task of dealing with a number of outstanding industrial pollution problems in various parts of insular Newfoundland. Successful negotiations were completed with a major forest products company and a satisfactory solution to a salmon river diversion problem was reached. The immeasurable benefits of inter-area senior staff conferences were demonstrated with the installation of the first Atlantic salmon controlled flow spawning channel, basically a Pacific Area design.

The efficiency and mobility of Protection Officers in all Areas are increasing steadily to meet modernization of fishing fleets and methods. Multi-purpose patrol vessels, motor vehicles transporting fast outboard motor rigs, and chartered aircraft are some of the tools used to meet the challenge. Special courses have been conducted for Fishery Officers in administrative and enforcement procedures so that solutions can be found for problems that may arise, as well as in the principles of resource management and other pertinent subjects.

PROTECTION BRANCH

Pacific Area

Regulation and management of the salmon fisheries are major concerns of the Department of Fisheries in the Pacific Area, and except for management of the sockeye and pink salmons of the Fraser and Skeena rivers, these are the responsibilities of the Protection Branch.

To carry out the broad range of activities involved in regulation and management of the fisheries, the Protection Branch has a complement of 440 men, 298 of whom are full-time employees. The remainder are hired on a seasonal basis. The Protection Branch is essentially a field force, operating along the heavily fished coastline, in interior regions where salmon rivers find their origin, and in the Yukon Territory where the fishery resource grows in importance.

Regulatory measures in the interest of production and conservation varied considerably throughout the season. While extended fishing periods were provided

in District No. 2 to harvest the bumper pink returns, drastic closures were required in Districts No. 1 and No. 3 in an effort to provide chum spawning stocks.

Landings of salmon totalled 32,792,700 fish, well above the average, comparing with 18,091,000 in 1961 and 11,590,100 in 1960. Landings of pink salmon totalled 23,428,700 or nearly 60 per cent of the total salmon catch.

The pink salmon pack of 1.2 million cases was the largest on record, exceeding the 1.1 million cases packed in 1930. Although many sub-districts in District No. 2 produced well, particularly in the central portion of the north coast, the outstanding area was the Bella Coola sub-district.

The increased returns of pink salmon to the north coast were most gratifying to the Department since drastic conservation measures had to be instituted in 1956 to rebuild depressed runs. In the Bella Coola and Butedale sub-districts the even year cycle had so declined that in 1954 the total catch in those areas was less than 1½ million pinks, whereas the combined take this year was just over 16 million in these areas. Pink salmon also migrated to the southeast coast of the Queen Charlotte Islands in large numbers; however, the once productive areas in the north and west coasts of Queen Charlotte Islands had such poor pink runs that no fishing was permitted. In District No. 3 the Alert Bay and Quathiaski sub-districts received larger runs of pinks than expected. The even-numbered years do not produce pink salmon in District No. 1 and the Fraser River.

The returns of chum salmon along the British Columbia coast were again disappointing. In District No. 2, the catch of 1,088,400, while the best since 1958, reflected the very heavy fishing effort conducted for pink salmon rather than a marked increase in chum abundance. A hopeful indication was the distinct improvement in chum salmon runs to the east coast of Moresby Island. In District No. 1, including the Fraser River, and in District No. 3, chum landings were the poorest on record and, notwithstanding severe regulatory control, escapements were well below average. The only exception was in Cowichan River on the east coast of Vancouver Island, where an excellent escapement was obtained.

There was a good run of coho salmon with a total catch of 3,625,600 fish, the largest return since 1951. Both District No. 2 and the west coast of Vancouver Island produced well, especially in the troll fishery.

In the Gulf of Georgia the take of blueback (small coho) was below average. In general, escapements of this species throughout the province were good.

Spring salmon catches were down for the third consecutive year and this was reflected in the less than average escapements.

The sockeye catch, as a result of the depressed Adams River run to the Fraser system and a less than expected return to the Skeena River, was only 29 per cent of the record take of 1958; however, in both areas near-adequate escapements were obtained through restriction of the commercial fishery. Rivers and Smith Inlets produced well, providing a catch of approximately 1½ million sockeye and good escapements to Owikeno and Long Lakes.

Mobility is one of the prime requisites of an efficient protection operation. In the Pacific Area, coastal regions are patrolled by a total of 36 departmental vessels. Another two patrol boats are assigned to large interior lakes. The Depart-

ment's protection fleet is augmented throughout the fishing season by a number of chartered craft. In 1962, over 100 boats of various sizes were chartered by the Department.

Two new vessels were under construction for the Department as the year ended. These were a 95-foot steel vessel designed to cruise at 15 knots with a 20-knot maximum, and a 36-foot fibreglass launch. One will replace a vessel to be assigned to less arduous service, due to age, and the other will replace a vessel lost by fire. The policy of providing Fishery Officers and patrol vessels with auxiliary speedboats was continued in 1962. Well equipped 25-knot speedboats have been supplied to the two Fishery Officers assigned to sport fishing patrols in the Gulf of Georgia area.

Improvements to the Department's patrol fleet in 1962 included re-engining of the 60-foot *Comox Post*, assigned to the Barkley Sound sub-district, and the installation of small radar units on the Patrol Vessels *Falcon Rock* and *Pillar Rock* to ease enforcement problems in offshore waters. Radio communication between the Department's shore stations and the patrol vessels was improved by the installation of a number of new and replacement radio-telephones. The Department also requires that the majority of vessels chartered for seasonal operations be equipped with radio-telephones.

Ashore, the Protection Branch operates 31 motor vehicles in carrying out patrols in British Columbia and the Yukon. Replacement vehicles were purchased for 11 sub-districts during the year.

The Protection Branch takes to the air too, in solving management problems requiring speedy attention. Two Beaver aircraft are chartered by the Branch during the fishing season, July 1 to October 31. In addition, scheduled aircraft and "as required" chartered planes are used.

Fishery Officers issued 21,408 commercial fishing licenses during the year as well as 2103 Indian permits. In addition, 939 angling permits were issued to sport fishermen in tidal areas where such permits are required by regulation, i.e. Rivers Inlet, Phillips Arm and Muchalat Inlet.

The two Fishery Officers assigned to the Yukon Territory were very active in 1962 with the inauguration of the commercial freshwater export fishery. Commercial export quotas were placed on 32 lakes, permitting a total catch of 223,000 pounds of whitefish and lake trout. These officers, in addition to their many other duties, issued 6407 licenses during the year, 6357 of them being angling licenses issued to sport fishermen.

During the year there were 280 prosecutions for violations of the various acts and regulations which it is the responsibility of the Department to administer. Revenue amounted to \$12,715.00 from fines and \$26,711.14 from sales of confiscated articles and fish.

Other duties of Fishery Officers include predator control, stream clearance work and fry salvage. One hundred and twelve sea lions and 351 hair seals were destroyed by departmental personnel in 1962. Some 375,000 salmon fry were salvaged through efforts of Fishery Officers, chiefly along the lower east coast of Vancouver Island.

Central Area

The commercial fisheries of the Northwest Territories were beset by weather conditions not conducive to extensive exploitation of the resource. However, in spite of these adverse conditions, production was maintained at a high level. In fact, an increase of more than 650,000 pounds over the previous year's production was recorded.

Although fishermen received different prices for the same species from different lakes, the average earnings of the primary producer were comparable to earnings in 1961.

Five companies, employing about 400 fishermen and shoreworkers, participated in the commercial operation during the year. In addition to Great Slave, fishing took place on Keller, Thekulthili, Ste. Therese, Faber, Gagnon, Nonacho and Thuban Lakes, with varying degrees of success.

The fisheries of the Western and Eastern Arctic, under the sponsorship and guidance of the Department of Northern Affairs and National Resources, were again undertaken in 1962. Reports indicated that the operations were comparable to the previous year's efforts.

Landings from Great Slave Lake during the calendar year 1962 totalled 6,254,004 pounds compared to 5,585,981 pounds in 1961. The breakdown of production is as follows with 1961 figures in brackets: whitefish 4,486,860 pounds (4,070,627); lake trout 1,156,122 (1,039,608); inconnu 287,128 (213,728); pike 312,587 (229,915); pickerel 11,254 (20,305); others 53 (11,808).

Catches from the other lakes fished this year amounted to 385,270 pounds, made up as follows: whitefish 181,095, lake trout 194,407, pike 235, pickerel 9,533 pounds.

Revenue returns from the sale of commercial and angling licenses totalled \$4,105.

Because of ice conditions on the lakes and rivers, angling activities were light until early June. The lodges at Great Bear Lake reported an excellent year with full bookings for the entire summer. Lake trout appeared to be plentiful in all waters, with angling better than average. The biggest trout taken during the season weighed 51 pounds 2 ounces. Trout between 30 to 40 pounds in weight were commonplace. Considerable interest is developing in angling for arctic char, and rivers along the arctic coast in the Coppermine area were fished for this species during the summer. Statistics on sport fishing in the Northwest Territories for 1962 were not complete at the end of the year. However, indications were that it was the most successful season yet.

The domestic fishery, which extends from Fort Smith in the south to Tuktoyaktuk in the north, was reported by the participants to have been a satisfactory operation. Although it is a year-round enterprise, the fall fishery accounts for most of the catch.

As in the past, aircraft, bombardiers and vessels were used in fisheries protection and enforcement work throughout the vast sport and commercial fishing areas of the Northwest Territories. Many of the areas now being fished are accessible only by air. As there appears to be no let-up in the trend towards fishing

these isolated waters, aircraft will have to be used more and more by the Department to provide adequate resource management and control programs for the orderly exploitation of the fishery.

Seventeen infractions of the Fishery Act and Regulations were committed in 1962, nine of which were by persons unknown. Fines totalling \$220 were levied against the known offenders. In addition, 120 gill nets, 15 net anchors, one skiff and one outboard motor were confiscated.

After a full year of operations under the Fisheries Expansion Program, companies and fishermen alike have expressed confidence in the workability and success of this controlled fishery. It is expected that more than one million pounds of fish will be landed in 1963 from lakes under this plan.

Maritimes Area

The year 1962 was cold and wet. As a result, inland waters were high and at times reached flood levels. While the wet weather during the summer and fall months created hardships for the farming and tourist industries, it was a good year for inland fisheries. The high-water conditions provided a good escapement for fish and there were no serious poaching problems to contend with as compared to low-water years. The weather in 1962 was also considered fairly good for commercial fishing. While the Maritimes felt the effects of "Hurricane Daisy" and a few heavy gales during the winter months, there were no major storms to disrupt fishing operations to any great extent.

The Maritimes fishery ended 1962 at a higher level than it had the year before. There was an over-all increase in groundfish landings, with better catches of cod, pollock and hake than in 1961. The total landings of pelagic and estuarial fish showed an over-all increase. In these classes, herring was the most important species in landed quality and value. Species showing slight increases were mackerel, alewives and salmon. The main fishing effort for herring was by means of weirs, purse seines and drag seines. Weir fishermen were generally more successful in their operations than they had been in the previous season. Purse and drag seine activities also were generally successful.

Swordfishermen also had a good year. Prior to 1962, the chief method of catching swordfish was with harpoons. In 1962, however, fishing for swordfish with baited longlines met with much success. Before the season ended, there were at least 35 vessels engaged in longlining for swordfish and records show that approximately 1800 fish were caught by this method. It is anticipated that next season practically every swordfisherman will be using longlines in conjunction with the old method of harpooning.

The total catch of molluscs and crustaceans was about the same as the previous year.

Lobster landings constituted about $5\frac{1}{2}$ per cent of the total weight of all fish caught, but accounted for over 38 per cent of the total landed value. The decrease of $2\frac{1}{4}$ million pounds, when compared with the previous year, is reflected in the landings of Fishing Districts Nos. 4, 7B and 8. One interesting note is in Fishing District No. 5 (Eastern Shore) where the total catch more than doubled, in the amount of over $1\frac{1}{4}$ million pounds. Heavy drift ice in the Gulf of St. Law-

rence, Northumberland Strait and eastern Nova Scotia prevailed until the latter part of May and curtailed fishing operations. This was the second consecutive year that drift ice was late in leaving the coast.

The scallop fishery again had a record year in 1962. About 90 per cent of the catch was taken by the offshore fleet fishing on Georges Bank. Thirty-nine draggers engaged in scallop fishing on the offshore banks, as compared with 28 in 1961.

Clam production declined, mainly because of the closure of flats due to contamination and toxicity.

Commercial fishermen landed 1,035,522 pounds of Atlantic salmon in 1962. The landed value amounted to \$619,000, the highest recorded since 1930.

The 1962 sealing operations met with fair success, with 76,122 seals being taken. Nine ships, seven helicopters and two airplanes were licensed for sealing, and land-based helicopters took part in the seal fishery for the first time.

During the year, 241 otter trawl nets were surveyed by Fishery Officers aboard 194 trawlers and draggers. Three of these vessels were found to be using nets in violation of the regulations of the International Commission for the Northwest Atlantic Fisheries, and prosecutions followed. In addition to these surveys, local officers carried out many spot checks.

In the course of offshore patrols, the Fisheries Patrol Vessel *Cygnus* checked 164 Canadian and 426 foreign fishing vessels. While patrolling Newfoundland waters during March, the *Cygnus* intercepted the Spanish trawler *Santa Amelia*, which was fishing inside the three-mile limit. Prosecution followed and the ship was convicted and fined in a Newfoundland court.

With favourable water levels on most rivers during the fishing season, anglers in the Maritimes enjoyed good sport. A total catch of 31,925 Atlantic salmon was recorded as having been taken by rod and line, an increase of 5438 fish over the previous year's catch. All the principal salmon rivers shared in the increase. The greatest producers were the Miramichi and Restigouche systems in New Brunswick, the St. Mary's, Medway, LeHave and Margaree rivers in Nova Scotia, and the Morell River on Prince Edward Island.

The total catch of speckled trout was the highest ever recorded, amounting to more than 900,000 fish.

Salt water angling is becoming very popular in Nova Scotia, and in this sport 71 tuna were boated during the year. There were substantial catches also of cod, pollock and mackerel.

Officers of the Protection Branch dealt with 607 prosecutions during the year, at the end of which an additional 28 had been made but not completed. Convictions were obtained in 585 cases and fines totalling \$13,008 were imposed by the courts. Five people served time in jail. Protection Officers and patrol boat crews made 1483 seizures of which a considerable number, including 41 different articles, were forfeited to the Crown. The majority of the seizures were directly concerned with illegal lobster fishing, which resulted in the liberation of 132,148 live lobsters and the destruction of 16,957 illegally set lobster traps.

The Protection Branch operated a fleet of 28 government-owned vessels and five chartered boats in the year's patrol duties. Only 12 of these were em-

ployed full time; the rest were operated on a seasonal basis in the Gulf of St. Lawrence area. Aerial patrols by chartered aircraft also were carried out.

Late in the year, construction was started at Pictou, N.S., on a new patrol boat to replace the *Rossia*, which operated in Northumberland Strait. This new boat will be named the *Buctouche Light*. Total patrols by all vessels in the Maritimes Area covered a distance of 181,000 miles.

During the year, Protection Officers issued 37,697 licenses and permits. Of these 22,946 were lobster fishing licenses and 7750 were non-revenue permits. Of the latter 5502 were for black salmon angling.

The estimated loss of and damage to fishing vessels and gear during 1961 amounted to approximately \$1,100,000. Six draggers, 12 longliners and 54 lobster fishing boats accounted for about \$450,000 of this, with weirs, trap-nets, gill-nets and lobster traps making up the balance.

Thirty-three people lost their lives while engaged in fishing during the year. Twenty-five were commercial fishermen and eight were anglers.

Protection Officers addressed many fish and game clubs, youth clubs and school groups throughout the Maritimes during the year on the subject of conservation. They also attended a number of sportsmen's shows and exhibitions, where they made departmental literature available to the public. Assistance was given to search and rescue personnel in arranging meetings to improve efficiency in marine search for vessels in distress, and officers also assisted provincial authorities in establishing fishermen's courses.

The payment of bounties on harbour seals was continued in 1962 at the rate of \$10 for an adult and \$5 for a pup. To claim the bounty, fishermen must send the lower jaws of the seals to Halifax. During the year, 687 jaws were found eligible, and bounty payments amounting to \$4270 were made.

Newfoundland Area

The need for conservation measures was emphasized in a continuing educational program throughout 1962, with the principal means being discussions with fishermen and lectures in schools.

In the commercial salmon fishery, Protection Officers maintained surface and aerial patrols of the fishing areas to ensure compliance with conservation regulations governing mesh size and weekly closures. Infractions were detected and prosecutions followed. The commercial salmon catch amounted to 2.2 million pounds, a seven per cent improvement over the previous season and nine per cent better than the eight-year average.

Co-operation from lobster fishermen in observing regulations governing this branch of the fishery was encouraging. Possession of undersize lobsters constituted the majority of prosecutions.

Trawlers engaged in dragging operations subject to ICNAF regulations with respect to cod and haddock fishing were checked to ensure adherence to the use of legal size trawl mesh.

There were 150 prosecutions for breaches of the Newfoundland Fishery Regulations. In the main, court hearings resulted in fines ranging from \$20 to \$50. Violations of more serious nature brought much heavier fines.

Two foreign draggers and one Canadian dragger were apprehended fishing in territorial waters, contrary to the Coastal Fisheries Protection Act and the Fisheries Act respectively. All the skippers involved were prosecuted, convicted and fined.

During the sealing season flights were made over the Gulf and Front areas for the purpose of enforcing regulations, particularly with respect to territorial limits and opening and closing dates.

With favourable water levels on most rivers throughout the fishing season, anglers enjoyed good fishing, with a record catch of more than 26,000 salmon. This represents an increase of 9000 over 1961 and exceeds the previous record catch established in 1958 by some 4000. The average weight of the fish caught was 4.3 pounds, and three rivers—the Lower Humber, Crabbs and Grand Codroy—yielded the heaviest salmon. A 27-pounder was landed on each of these rivers. Runs were heavy in all rivers and, despite the record catch, the escapement to headwaters spawning areas was good.

Bounty payments amounting to approximately \$6000 were made to fishermen who submitted evidence of bay seal destruction.

A fleet of 12 vessels was maintained in operation, including the new C.G.S. *Cape Freels*. This 179-foot, multi-purpose offshore patrol vessel, built in Halifax, was commissioned in July 1962. To the end of the year, the *Cape Freels* logged approximately 10,000 miles on patrol and transported considerable quantities of frozen bait to areas of shortage, in conjunction with patrol activities.

FISH CULTURE BRANCH

(See also Appendix 2)

Pacific Area

The Pacific Area Fish Culture Development Branch, comprising a staff of 12 engineers, 13 biologists and 25 supporting personnel directs a great deal of attention to the study of pollution, hydroelectric and other industrial problems affecting the fishery. The Branch has also been engaged since its reorganization and expansion in 1949 in a program which entails the construction of projects designed for the maintenance and improvement of the fisheries resource. Initially, this mainly involved the removal of obstructions and the construction of fishways at natural barriers which were limiting the spawning and rearing capabilities of the various streams. More recently, however, the program has been expanded to include stream improvement projects which have been constructed for the purpose of controlling the salmon's environment.

The program reached a new high in 1959 when authority was granted to proceed with the Big Qualicum River Project which will provide controlled flow and temperature conditions throughout the year as well as improved spawning areas. Other significant development projects undertaken in recent years include the construction of a new type salmon hatchery for the purpose of rehabilitating the sockeye salmon run and a massive transplantation of pink salmon eggs to a foreign area in an effort to establish a new run of this species.

Continuing with the practice established in 1961, a staff biologist of the Branch was employed on the Area Director's Salmon Management Committee in order to facilitate the committee's direction of certain technical studies pertaining to salmon management.

The following review of the projects being carried out in the Pacific Area serves to illustrate the scope and complexity of the 1962 fish culture program.

Hydroelectric Developments

As in previous years, the Department has maintained surveillance over all operating hydro developments on salmon-producing rivers to ensure that fisheries losses are being held to a minimum. With the exception of the Puntledge project no major problems were detected, although an unusually large number of dead and injured sockeye fry and smolts were observed in the tailrace of the Seton Creek power plant in May 1962. The Department's subsequent investigations, in co-operation with the International Pacific Salmon Fisheries Commission, attributed this to the part-load operation of the plant. As a result, the British Columbia Hydro and Power Authority was requested to operate the plant at either full load or no load during future downstream migrations in order to avoid a repetition of this incident.



Gate house for regulation of high, intermediate and low-level intake gates and main tunnel headgate at Big Qualicum project, Vancouver Island. The base of the gate shaft is 75 feet below the water surface shown.

Hydroelectric Investigations

Investigations were continued in connection with proposed hydro developments on the Bulkley-Morice system and at Fulton River, tributary to Babine

Lake. While the B.C. Hydro and Power Authority apparently does not regard these proposed projects with the same degree of urgency as did the B.C. Power Commission, the Department's surveys and investigation of the possible fisheries problems associated therewith are continuing unabated, as the data so obtained will be extremely valuable whether or not the power projects are proceeded with.



Confluence of Hunt's Creek flood channel with Big Qualicum River near tidewater. Note barrier structure in flood channel (right) to prevent salmon migration above this point, also bridge behind drop structure.

During 1962, the Department maintained a close liaison with U.S. fisheries agencies involved in the study of the fisheries problems posed by the mammoth hydroelectric development under consideration for the Rampart Canyon, on the Yukon River in Alaska. Construction of this dam would alienate all of the Yukon Territory, and loss of these runs would eliminate a substantial native food fishery in the Yukon Territory.

Puntledge River Commission

In 1958, the Department submitted a comprehensive report outlining the means by which the fisheries losses at the Puntledge River power development of the B.C. Power Commission could be eliminated, or at least alleviated. The recommendations set forth in this report were not accepted by the B.C. Power Commission, which contended that the cost of the recommended protective measures was not consistent with the value of the fish which would be protected. When several years of negotiations between the Department and the power agency had developed into an impasse, the provincial Government, in December 1961, announced the appointment of Dr. H. F. Angus as a one-man Commission of Inquiry to investigate the fish-power controversy on the Puntledge.

Dr. Angus convened public hearings in Vancouver and Courtenay in February and March 1962, at which times the Department and B.C. Hydro, as principal parties, submitted detailed briefs and rebuttals outlining their respective positions in the matter. The Department's position was strengthened considerably by the support it received from the various commercial and sport fishing interests.

The Department's efforts in connection with the Inquiry were fully justified by Dr. Angus' recommendation, released in September 1962, "that the works suggested by the Department of Fisheries be constructed as expeditiously and economically as possible; and that the entire cost of these works be paid by the Power Commission (or its successor)."

This recommendation has not yet been accepted by the provincial Government, and until such time as it is, the B.C. Hydro and Power Authority, the successor to the B.C. Power Commission, can do nothing by way of implementing Dr. Angus' recommendations.

Fraser River Basin

Under direction of the Department, a biologist and two technicians continued to obtain basic data in connection with the fisheries problems associated with the Fisheries Research Board's system studies in the Fraser River basin. Extensive air and ground surveys and the operation of fishwheels, downstream migrant traps, and other devices have provided information concerning the numbers, timing, and distribution of the runs which could be affected by the



Concrete flume for Hunt's Creek flood channel under railroad bridge. Big Qualicum River at right.

system now under study. System "E", now under review, contemplates five dams on the Clearwater River, one on the Cariboo River, one on the Fraser River at Grand Canyon, and one on the McGregor River.



Valve house at foot of Second Falls for regulation of discharge. Big Qualicum project.

With completion of the fisheries surveys in the fall of 1962, detailed office studies were initiated to determine the fisheries requirements at each of these proposed damsites. These studies are continuing, and it is expected that they, along with the rest of the Board's studies, will be completed in time to report to the two governments by September, 1963 as contemplated by the Board's terms of reference.

Water Use Problems

The liaison established a number of years ago with the Provincial Comptroller of Water Rights, whereby this Department is advised of all water license applications in the province, was continued in 1962. Approximately 1000 such applications were reviewed during the year and while many could be dismissed immediately as having no effect on fisheries, a substantial number required that certain specifications for the protection of the fisheries interests be incorporated into the conditions of the water license; and a few major developments involved detailed studies, and negotiations with the applicant, looking to the implementation of suitable fish-protective measures. In the latter category were three pulp mill expansions on Vancouver Island, the water supply for the village of North Kamloops, and a water diversion from the Toquart River for a Noranda Mines development on the west coast of Vancouver Island.

The water supply problems associated with the expansions of Crown-Zelberbach's mill at Campbell River, and MacMillan, Bloedel and Powell River's mill at Alberni were resolved satisfactorily when the companies agreed to install acceptable type travelling screens at their water intakes. Similar arrangements were made in connection with all other major diversions including MacMillan, Bloedel, and Powell River's mill near Nanaimo, although in the latter case, negotiations are still continuing with respect to the provision of an adequate residual flow for fisheries purposes in the Nanaimo River downstream from the plant intake. These negotiations are progressing well and it is expected that an interim agreement, pending collection of further basic data, will be reached in the near future.

In 1962, the Branch continued with its comprehensive program of investigations and assessments of various watersheds, looking to determining the efficiency of measures undertaken to date, what further improvements can be made, and what the maximum potential of the individual river systems might be.

Field Investigations

During the year, investigations were continued in connection with the efficiency of the recently constructed fishways at Indian River, Princess Royal Island; the smolt production from Owikeno Lake and the escapement to that system; the enumeration of adults and estimates of the present production of the Big Qualicum River, as a basis for comparative studies in future to measure the effectiveness of the Big Qualicum project; and the potential sites for creation of additional spawning areas adjacent to the upper basin of Babine Lake, looking to developing the full potential of this rearing area.

Full-scale investigations were undertaken during the year to assess the advisability of initiating stream improvement measures at Goldstream River near Victoria, Cold Creek near Campbell River, Tsolum River near Courtenay, Kakweiken River near Port Hardy, Tzoonie River near Sechelt, and others. Stream improvement work, in the form of rock blasting at obstructions was completed during the year at the Quatse and Embley Rivers near Port Hardy, and preliminary planning continued with respect to the future construction of a fishway and access road at Meziadin Falls on the Nass River system.

A special investigation of a proposal to convert Seymour-Belize Inlet into a sockeye-producing freshwater lake was completed in 1962, when it was concluded that while the proposal has some merit the project would be so expensive and its benefits so uncertain that it could not be justified, at least until other more promising sites have been developed.

The stream inventory program initiated in 1961 to assess the present and potential salmon-supporting streams in the province was continued in 1962, when special attention was paid to the streams on Queen Charlotte Island. As a result of these preliminary surveys, five streams on the islands have been selected for more detailed studies, to determine whether or not stream improvement measures could be justified on these streams by an increase in salmon production.

Nanika River Rehabilitation

The severe decline of the Nanika River sockeye run in the years following 1953 resulted, in 1960, in the Department's decision to construct a hatchery on this river to restore the run to its former levels.

Eggs for the hatchery are obtained by seining and stripping ripe sockeye at Fifteen-Mile Creek, tributary to Babine Lake. After fertilization, they are flown to the hatchery, where they are placed in the modern vertical stack-type incubators. Transfers from the hatchery to a fry release tank are effected at the advanced alevin stage. They subsequently leave the tank through a system of overflows and pipes and migrate down the Nanika River in a natural manner to Morice Lake.

Full-scale operation of the hatchery was effected for the first time in 1962 when 11,400,000 sockeye eggs were placed in the incubator trays. It is expected that egg-to-fry survival will be in the same order as that in 1962 when a survival of 74 per cent was recorded.

Robertson Creek

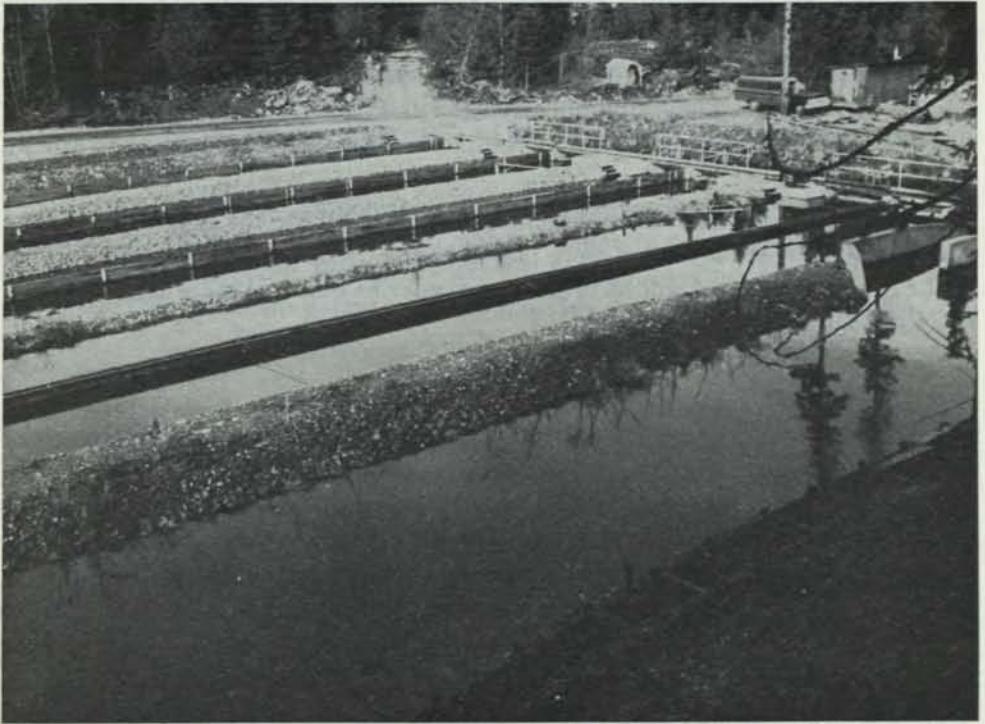
The Robertson Creek channel was designed by the Fish Culture Development Branch personnel to serve as a production and experimental area for Pacific salmon. The basic construction of the facilities has been completed for over a year and a full program is in progress. This program includes a pink salmon egg transplant, a study of coho rearing, a study on the use of spawning channels by coho and chinook salmon and a study of methods for guiding juvenile salmon.

To date the Department has carried out two minor transplants and two major transplants of pink salmon eggs. The program has shown excellent success in producing fry. In 1960, 1961, and 1962 approximately 90 per cent survival was recorded. Adults from the initial small transplants did return to the spawning channel and spawned successfully. The returns of 150 and 240 fish, however, were too small to establish a natural run. The returns from the first major transplant are due this fall.

A coho rearing study is now being carried out at Robertson Creek in order to compare the value of riffle or shallow areas and pool or deep areas for rearing young coho. Results to date indicate that using the same flow of water, more coho can be reared in deep slow pool areas; however, growth and production of food is greater in shallow riffle areas.

Adult chinook and coho salmon were transplanted from the Stamp River into the spawning channel to gain a wide range of fish culture information. Important information was collected on pre-spawning behaviour, distribution, space requirements, timing and mortality as well as incubation survival and fry migration data. This information is useful for design or modification of channels for these species. The major problems with these species appear to be in pre-spawning mortality and efficient utilization of space. These problems will be considered further in 1963.

Tests on guiding sockeye and coho smolts out of power water intakes were completed in the Robertson Creek test flume last spring. The results of the tests were very good and showed that 95 per cent of coho and sockeye can be deflected into a bypass by a system of louvers. The most critical of the several factors tested was the width of the bypass.



Rearing channels at Robertson Creek, B.C.

Great Central Lake Studies

The Great Central Lake beach spawning studies were initiated in 1958 as a result of a power development proposal to raise the elevation of this lake. The major spawning of sockeye in this system occurs on the beaches at three locations where alluvial fans exist. Most of this spawning occurs at depths between 30 and 70 feet.

A complex program carried out by SCUBA diving biologists and engineers found that the choice of spawning sites was governed by presence of groundwater which was detected by oxygen concentration.

This groundwater, which percolates into the lake at various locations, was stopped by a dam at its inshore source and redirected into another area where an artificial beach was constructed. Sockeye moved over to the new area and some began spawning on and around the artificial beach. When heavy rains topped the dam and started groundwater movement again, sockeye again moved toward their normal spawning beach and spawned.

The Big Qualicum River Project

Except for the Horne Lake storage dam and the high-level intake, the first, or flow-control phase of the Big Qualicum River project was completed in December 1962. The lake control works had to be deferred when it was contended that lowering the lake level reduced the shoreline stability, which could have caused a slide, and resulted in the loss of a hydro transmission tower. Subsequent investigations have revealed that it will be necessary to relocate part or all of the transmission line in order to eliminate this hazard, and as it is expected that this work can be done by next September, the entire flow-control works probably will be completed in time for the 1963 spawning migrations. It is to be noted, however, that in spite of this setback of the scheduled part of the flow-control project, the Hunt's Creek diversion was in operation in time to benefit the 1962 spawning escapements.

Fraser River Chums

In 1962, the Branch continued the study, initiated in 1960, of the Fraser River chum salmon runs with a view to defining the condition of the stocks, the factors responsible for their decline, and to develop an effective method by which these stocks can be rehabilitated and regulated in future. The most important result of this study to date is the determination that the Fraser River main-stem spawning population is the major contributor to the Johnstone Strait Area 29 commercial fishery, and that this stock is now at an extremely low level. In 1962, the studies of the chum salmon were extended to include pink salmon, when a comprehensive survey was undertaken in the Johnstone Strait area.

Pollution Problems

The control of pollution in salmon-supporting waters continues to be one of the Department's major concerns. In 1962, the Department investigated, and made certain recommendations, in connection with three pulp mill expansions, a cement plant, a chemical plant, several mines, a number of packing-houses, canneries, and other manufacturing and processing plants. Considerable attention was also given during the year to ten sewage disposal systems inaugurated recently by various cities and plants.

The Department also collaborated with the International Pacific Salmon Fisheries Commission and the Fish and Game Branch in the preparation of a joint report on the fisheries problems associated with a proposal to construct a pulp mill at Prince George, where the effluent would be discharged into the Fraser River.

Considerable time was spent during the year in maintaining a surveillance over the increasing number of industrial applications of pesticides. In 1962, the Department was involved with the treatment of lakes with copper salts for control of swimmer's itch; application of sodium arsenite for control of marine borers in logs; aerial spraying of log booms with benzene hexachloride for control of Ambrosia beetles; and spraying of brush with 2-4D.

Particular note should again be made of the excellent co-operation which the engineering and biological staff received from other technical groups and agencies. These included the Fisheries Research Board of Canada, the International Pacific

Salmon Fisheries Commission, the Fish and Game Branch of the British Columbia Department of Recreation and Conservation and various other agencies in Canada and the United States.

Maritimes Area

The task of the Fish Culture Branch in 1962 continued to be the maintenance, or increase, of the stocks of valuable anadromous fish, resident freshwater fish and oysters. Its accomplishments were to continue to hold the line, rather well, against continued deterioration of the environment and to make some gains, but insufficient ones, in the field of positive management. This latter situation is due to a complex of factors which are being re-examined, but until the *ad hoc* problems are overcome, little progress can be made in the field of real management of any given species. A notable exception might be the general field of oyster culture, where both rehabilitation attempts in diseased areas and the proposed testing of the hatchery technique could yield spectacular advances.

BIOLOGY

As in previous years, most of the staff and time were concentrated on pollution investigations and salmon studies. Monitoring of base metal mining effluents, assessing damage from DDT and phosphamidon spraying, plus caged fish tests on the St. Croix River were the major pollution tasks. Most of the salmon studies were involved with hydro development on the Saint John River. These included an exploratory salmon tagging operation in the Saint John Harbour area as the first step in determining the distribution of adult salmon to the Saint John River system and the testing of an electronic fish counter at the Beechwood fishway.

Projects continued from previous years included the Annapolis River Aboideau studies and the Tusket River survey. As most of the staff's time was allotted to the above projects, there was little opportunity for trout management work.

Listed below are summaries of the various investigations carried out during 1962.

Field Investigations—Saint John River

Salmon investigation in the Beechwood area was concerned with fishway assessment study, salmon fallback investigation, and testing of an electronic fish counter, with the object of placing the hoist on automatic operation.

The Beechwood fishway was operated from June 2 to November 15 but at times it was flooded over when tailrace flows exceeded 26,000 c.f.s. (cubic feet per second). A third turbine unit was put into operation early in 1962 and when all three units operated at full load, water would lap over the fishway walls. To overcome this and other problems of flooding in the fishway, the collection gallery walls were raised four feet. Another improvement was the installation of a new auxiliary water supply pump which doubles the water supply to the fishway.

Decline in the upriver salmon run continued during 1962 and only 501 salmon were counted over Beechwood. This reduced run reflected not only earlier damage

by DDT spraying in the Tobique watershed but the escapement of only 1127 salmon that occurred during the 1957 construction year at Beechwood.

Salmon fallback tests were conducted to determine if release location in the headpond was associated with the salmon return to the river below the dam. Although returns were small, there is some indication that fallback is less likely to occur if fish are held in a surface holding box at the dumping site before final release to the headpond.

Testing of the Rockwell counter coupled to an underwater camera showed that electronic fish counting is possible but there are still many problems to overcome, both technical and natural.

The Tobique fishway counting trap was operated from May 24 to November 20. Two hundred and sixty-four Atlantic salmon were reported passing through the fishway. A survey of the Tobique River in 1961 indicated that 5000 salmon would be required to fully utilize the river.

Saint John Harbour Area—Salmon Tagging

In order to gather information on the timing, movement and distribution of salmon to the Saint John tributaries, an exploratory tagging operation was started in the Saint John Harbour area. Salmon were tagged from both the weir fishery near the harbour and in the drift net fishery working out of Chance Harbour. Returns were reported upriver and most of these were from the weir fishery.

The tagging operation will be expanded in 1963 and counting fences will be established on two of the lower Saint John tributaries to check on tagged fish.

Annapolis Aboideau Fish Passage Studies

Assessment of the fish passes at the Annapolis River aboideau was continued in 1962 from April until July. From the tagged fish studies carried out during the past three years, it was concluded that the anadromous species prefer to ascend the primary fish pass and in most cases reach their spawning areas with little or no delay. However, there is indication from recent angling statistics that some salmon are being diverted to the tributary immediately below the aboideau. During the past two years, the salmon angling catch has increased on the lower tributary and there was a corresponding decrease in catch on the tributary immediately above the aboideau.

Tusket River Survey

A survey to determine the salmon and gaspereau potential of the Tusket River system was completed in 1962. The Carleton section of the system was surveyed in 1960.

Early-Late Run Experiment

Checks for tagged salmon from early or late run stocks were continued at the counting trap on Big Salmon River. The total count of salmon through the fishway in 1962 was 1774, a record for the river. Only nine tagged salmon were

reported; four of these entered the river before July 31 and were of the early run stock; five were recorded through the fishway during the period of September 1 to November 30 and were of late run stock.

Following is a list of smaller projects on which some time was expended:

- (a) Four lake examinations in Nova Scotia and three in New Brunswick.
- (b) Checks at various Fish Culture Stations to determine causes of fish mortalities and establish, where possible, measures to correct the situation.
- (c) Spawning surveys on Big Salmon River, Kennebecasis River, Salmon River, and Canaan River.
- (d) Surveyed counting fence sites on several branches of the Saint John River and Big Salmon River.
- (e) Re-check of the Comeauville River system to assess success of poisoning with toxaphene.
- (f) Surveyed Habitant River, N.S., concerning an irrigation site.
- (g) Surveyed proposed flowage area on Waugh River and Rankin Brook in N.B.
- (h) Examined Pleasant River, N.S. with regard to a Department of Agriculture project for reclaiming marshland bordering the river.
- (i) Survey and removal of several beaver dams on Clinch Brook, York County, N.B.
- (j) Tagging 3150 salmon yearlings with a modified Carlin smolt tag at the Nova Scotia Department of Lands and Forests' rearing ponds located at Charleston on the Medway River.

Pollution

(a) *Mine Pollution*

Monitoring of base metal pollution from the mines area in Northern New Brunswick was continued and expanded in 1962. Since early spring, weekly water samples have been taken in the Tomogonops River below Heath Steele; in the Nepisiguit River below the Wedge (Consolidated) mine; and in Little River below the Brunswick Mine. These samples were sent to the Department of Mines and Technical Surveys at Ottawa for analysis. Bio-assay tests, using caged juvenile salmon, were carried out in the rivers below the mine from April until December. Caged fish died frequently in the waters immediately below the mines. However, with few exceptions, no damage was observed in the caged fish held a few miles farther down the streams.

Monitoring will be continued in 1963 so that we may be in a position to bring any irregularities to the companies' attention before serious damage occurs.

(b) *DDT Spraying*

Caged fish located on the Cains River were used to monitor the effects of the 1962 DDT spraying. Spraying commenced on June 4 and within two weeks 100 per cent mortality had occurred in all caged fish. Mortality at the control cages on the Northwest Miramichi was less than six per cent during the same period. This mortality in the spray area was much higher than found with single

dosage in 1960 and is attributed to the method of spraying used in 1962. Random observations on the main stream of the Cains River indicated that mortalities in native underyearling salmon were very high.

(c) *Phosphamidon Spraying*

In 1962 an experimental plot on Hughes Brook, a tributary to the Taxis River, was sprayed with the systemic insecticide, Phosphamidon, at the rate of 1 lb/acre. The insecticide had no serious effect on caged salmon fry and trout held in the brook from June 9 to June 23. Mortality in the caged salmon parr was higher than in the control group at an unsprayed stream but condition of the test parr was poor. These tests indicate that fish survival would be high in an area sprayed with Phosphamidon.

(d) *St. Croix River*

To assess septic conditions on the St. Croix River, caged fish tests were carried out in conjunction with water sampling by the Public Health Engineering Division of the Department of Health and Welfare.

In 1962 stream conditions proved lethal to young salmon in cages at Woodland on the American side and at Baring, both on the American side and at midstream. No mortalities were found in any cages on the Canadian side of the stream. Cages held at midstream at Woodland and Milltown as well as on the American side were likewise free of mortalities. The 1962 mortalities were 100 per cent in 22-50 hours.

ENGINEERING

Engineering projects in 1962 were many and varied for the Area's staff of three engineers, one technician and one draftsman. An unusually wet construction season throughout the Area hampered operations, with the result that work did not progress as scheduled and ran later into the fall than was anticipated.

Discussions between the New Brunswick Electric Power Commission and the Department resulted in the raising of the fishway walls on the Beechwood Dam by four feet, thus allowing the fish facilities to operate at higher tailwater elevations. This was necessary to compensate for the extra discharge into the tailrace by the third turbine unit which went on line in June.

The Power Commission was most co-operative in assisting the Department with a trial installation of electronic fish counting and photographing equipment in the Beechwood fish facilities. Results of this installation were gratifying and it is considered that a large step forward has been made in fish enumeration and identification techniques.

The active construction season saw the completion of many projects at the fish culture stations. At Antigonish the downstream side of the concrete intake dam was completely refaced and repairs made to the fishway. A new freezer room was built and a well was drilled at Mersey. A new 48-trough hatchery was completed at Florenceville. At New Mills Ponds a low concrete water supply dam and pipeline was constructed to supply water to the spawning shed. One circular and

two long ponds were built at Grand Falls and nine concrete long ponds were rebuilt at the Saint John station. A new 30-trough hatchery and double garage and workshop were constructed at Cardigan.

Routine maintenance work connected with the fish culture stations was undertaken and included repairs to the water supply lines at Margaree and Lindloff.

The Engineering staff took in hand the design, specification and inspection of construction of the new patrol boat storage building at Newcastle for the Protection Branch. Construction will be complete early in 1963.

Fishways were designed for two low dams in New Brunswick. One dam was proposed by the Nashwaaksis Recreation Council to provide a swimming hole on the Nashwaaksis River, and the second dam is to be constructed by the Canadian Army to create a wet bridging training area on the Nerepis River.

Counting fences were designed for construction on two tributaries to the lower Saint John River for use in the program to determine the distribution and timing of the salmon spawning in this section of the river. A third fence has been designed for construction on the Big Salmon River, Saint John County, New Brunswick, to replace the Big Salmon River Dam and fishway which was used as an enumeration point in past seasons. Negotiations with the Pejepscot Paper Company resulted in an agreement to remove this dam and Walton Dam, on the same river, at the end of the fall salmon spawning run because the dams are no longer required for the logging operation.

A preliminary engineering study was carried out on East River Chester, Lunenburg County, Nova Scotia, to determine the feasibility of restoring the stream to its former potential as a salmon producing stream by the alteration of man-made obstructions which are in the form of logging splash-dams, and the possibility of instituting a small measure of flow control using the storage created by these dams. Maximum discharges would not be affected significantly but low flows would be augmented from stored water to keep the stream alive during critical low flow periods.

Following discussions with the Fisheries Research Board concerning requirements, design work was started on the first experimental oyster hatchery to be constructed in Canada. The proposed hatchery is to be built at Ellerslie on Prince Edward Island. It is expected that construction will be completed during 1963.

FISH CULTURE STATIONS

The following number and classes of Fish Culture Stations were operated in the Maritimes during 1962: 14 hatcheries, three rearing ponds, and three Atlantic salmon retaining ponds.

Atlantic salmon egg collections from wild stock were made on the Restigouche River, New Brunswick, and on the Margaree River in Nova Scotia. The new retaining pond at Hales Brook on the Restigouche River was used for the first time this year and proved generally satisfactory. A small collection of Atlantic salmon was made on the Northwest Miramichi River in New Brunswick by the biological division. Eggs from this collection were laid down at Miramichi

and Charlo hatcheries and the resultant fish from this collection are to be used in connection with the early-late run experiment. Landlocked salmon collections were again made at Palfrey and Chamcook Lakes in New Brunswick. All wild egg collections were satisfactory in spite of high water conditions that prevailed throughout the collection period. Collections of speckled, brown and rainbow trout, and pond reared Atlantic salmon at all establishments were successful, and the eggs to date appear to be of good quality. Lake trout eggs received from the U.S.A. in exchange for Atlantic salmon eggs were of far better quality than those received for the past number of years.

Two transfers of eyed eggs were made to foreign countries in 1962. Speckled trout eggs were shipped by air to Tasmania and 300,000 rainbow trout eggs were flown to Sardinia. The last report received from Sardinia stated that they had had a good hatch and over 80 per cent had reached the fingerling stage.

The growth rate and survival of hatchery stock at most establishments was far above normal. This was due to excellent water conditions throughout the growing season and the use of more and possibly better dry feed. The excellent growth obtained in Atlantic salmon, held to be liberated as yearlings, will no doubt give a much higher percentage of smolts at time of distribution.

Distributions were carried out by the hatchery trucks in the normal manner but in many cases two tank trucks were used to assist with this work. It has been found, in transferring large numbers of fry, fingerlings, and older fish, that tank trucks accomplish great savings in time as well as cost.

Three different kinds of dry feed, combined with meat products and fish, were used at a number of the Department's establishments this year. Tests were set up to discover if there were any significant differences between three makes of dry feed. Results will not be available until 1963. One side result already available indicates that none of these products are suitable for early fry which must be carried for some time on 100 per cent meat diet.

There was a marked improvement in the quality of the water supply at Grand Lake station this year. Small numbers of fish were carried through the summer and the pH of the water rarely went below 5.5. For a number of years, the brood stock at the Margaree Station has from time to time been affected by a kidney disease. The disease appeared to be getting progressively worse from year to year. After an extensive investigation, it was agreed that all stock from the Margaree Hatchery should be liberated and the whole plant, including buildings, ponds, grounds, etc. be thoroughly disinfected.

Newfoundland Area

Exploits River Investigation

The program of investigation begun on the Exploits River in 1958, to determine the feasibility of making large unused areas available for salmon production continued in 1962, as did the pollution survey of the lower section of this river. It has been determined that no dangerous pollution exists in most of the river, although unfavourable conditions in some small localities may inhibit maximum utilization by salmon and trout.

Artificial Spawning Channel—Indian River

An artificial spawning channel on Indian River will be operative in 1963. The channel, necessitated by diversion of part of the headwaters to augment the water supply available for hydroelectric production at Deer Lake, was designed to offset reduction of the available spawning area for Atlantic salmon. Completion of these controlled flow spawning facilities will provide approximately 10,000 square feet of area for a run of up to 750 spawning pairs of salmon. A low weir at the upper end of the channel, built across the main river bed, will divert a flow of up to 50 cfs. through a 42-inch pipe which is provided with a control valve. The channel should enable the river to support a salmon run as large as in former years. A proportion of the cost of the project has been borne by the company concerned.

Adult Salmon Transfer

The transfer of adult salmon from Rattling Brook (Norris Arm) to Great Rattling Brook, a tributary of the Exploits River, begun in 1957, was continued. Due to removal of spawning stock in earlier years the 1962 transfer involved a considerably reduced run. A total of 150 salmon were transferred in 1962 as compared to an average of 700 fish in the previous four years. The transfer should be completed in 1963.

To determine the success of the operation in past years, a smolt enumeration program was carried out on a tributary of Great Rattling Brook in the spring of the year. It was estimated that about 7000 smolt moved out of the tributary in question to Great Rattling Brook. The count showed an increase of approximately four times the maximum run previously recorded.

General Pollution Surveys

Investigations relating to alleged pollution problems associated with mining operation, and especially ore concentrators, were made at Tilt Cove, Little Bay, Red Indian Lake, and in Labrador. Detailed analysis of water samples from the Exploits River below Grand Falls were carried out to determine the seriousness of the pulp mill pollution in that area.

Lake Investigations

Gander Lake and Red Indian Lake were examined to determine depth distribution. This information is necessary for an understanding of existing and potential fish populations. Both lakes are quite deep for their size—Red Indian Lake having a maximum depth of 450 feet, and Gander Lake 873 feet in the deepest area examined.

Engineering River Surveys

General topographic surveys of river obstructions were carried out on Torrent River and a tributary of Portland Creek. Both had received a preliminary physical and biological survey in 1961.

Biological River Surveys

In the past several years generalized biological surveys have been carried out on one or more streams each season. In 1962, Come by Chance River and North Harbour River (both flowing into Placentia Bay) were surveyed. These streams may be involved in Newfoundland's proposed third pulp and paper mill, should this new industry materialize.

Construction Projects

Repairs to fishways are required annually in various parts of Newfoundland as a result of ice and log damage which occur during periods of heavy spring run-off. Major damage caused during the high water of the spring of 1962 was repaired at the recently constructed Camp One fishway on Great Rattling Brook. Construction of the Indian River spawning facilities required the greater part of the engineering section's attention during 1962.

OYSTER CULTURE

The Department of Fisheries and the Fisheries Research Board of Canada continued co-operative investigations during 1962 to improve the position of the oyster industry in the Maritime Provinces.

The Department of Fisheries' efforts were under the jurisdiction of the Area Director, Maritimes Area, and the Fisheries Research Board's efforts under the supervision of the Director of the St. Andrews, N.B., Biological Station.

Mortalities in the New Brunswick and Nova Scotia adult Oyster Populations

The epidemic disease, which for the last few years has devastated the mainland oyster population, spread no further in 1962. It is still confined to an area from Cape George, in Nova Scotia, north to the Bay Chaleur coast in New Brunswick. Within this area some oysters were taken. For example, North Branch Wallace River and Pugwash River in Nova Scotia, produced approximately 400 barrels of good market grade oysters, and 1,200 barrels were recorded from Kent and Westmorland Counties in New Brunswick.

Disturbingly high mortalities have occurred in North and South Harbours (Aspy Bay) and in parts of Bras d'Or Lakes in the past few years, but these have now receded. Mortalities in these areas were not characteristic of epidemic disease and they remain unexplained.

Rehabilitation of Depleted Areas

Rehabilitation of depleted areas which began in 1957 was completed in 1962 when the last two areas to be transplanted, Miscou Harbour and Shediac Bay, N.B., were stocked with 700 and 300 barrels respectively of resistant Prince Edward Island oysters.

seed from contaminated areas which were relayed to their "pure" water leases. Different types of collector stock were tried again this year by the oyster farmers to collect spat, but due to the cold season results from those collectors were negative.

Following is a table showing monthly average surface temperatures taken at Ellerslie during 1961, a fair year, and 1962, a failure for spat collection:

| 1961 | Degrees | 1962 | Degrees |
|--------|---------|--------|---------|
| June | 15.6 C. | June | 16.6 C. |
| July | 20.5 C. | July | 16.9 C. |
| August | 20.1 C. | August | 19.2 C. |

This table shows a critical difference in temperature especially during the two most important months for oyster spawning and survival, namely July and August.

The Department of Fisheries placed 20,000 concrete-coated cardboard fillers in the water this year, but due to the backward season a very light set occurred, out of which survival was very poor.

Spatfall was practically non-existent in all areas tested in the Maritimes.

A total of 91 barrels of disease-resistant seed oysters was fished from the Conway Narrows Seed Farm in the fall of 1962 and sold to the lessees in the Maritimes at \$10 per barrel plus the cost of transportation and containers, as follows:

- 48 bbls. to lessees in New Brunswick,
- 38 bbls. to lessees in Prince Edward Island,
- 5 bbls. to lessees in Nova Scotia.

Due to a massive bloom of the filamentous green alga, *Chaetomorpha*, it was impossible to use the escalator harvester at the Conway Narrows Seed Farm and recovery of seed oysters had to be by hand rakes, which was a very slow and difficult operation. Difficulty is also being experienced with resurgence of eel-grass and with silting. Growth of seed oysters has been slow and their condition poor. It appears that the high hopes for this area must be abandoned.

Oyster Leasing

As of December 31, 1962 a total of 1533 oyster leases were in effect in the Maritime Provinces, with a total of 4150.11 acres under lease. This is an increase of 135 leases and 555 acres over the same date last year.

The number of active leases and the acreage for each province is as follows:

| Province | No. of leases | Acreages |
|---------------------------|---------------|----------|
| Prince Edward Island..... | 813 | 2397.52 |
| New Brunswick..... | 544 | 1345.72 |
| Nova Scotia..... | 176 | 406.87 |

During the year 1962, 230 leases were cancelled for non-payment of rental. However, 140 of these leases have since been reinstated. Applications for oyster leases continue to be received in numbers greater than can be dealt with by the two survey parties.

During the year ending December 31, 1962 two survey parties were in the field carrying out lease surveys and other related survey work. These surveys are shown in detail as follows:

Prince Edward Island

| | |
|-----------------------------|-----|
| New areas surveyed..... | 136 |
| Old leases resurveyed..... | 11 |
| Land and other surveys..... | 4 |

Nova Scotia

| | |
|-------------------------|----|
| New areas surveyed..... | 20 |
|-------------------------|----|

New Brunswick

| | |
|---------------------------------------|-----|
| New areas surveyed..... | 107 |
| Old leases resurveyed..... | 15 |
| Oyster transplant areas surveyed..... | 3 |
| Quahog areas surveyed..... | 2 |
| Salmon stands surveyed..... | 6 |

The total of 263 new areas surveyed during 1962 is an increase of 47 over the 1961 total.

Boundaries of areas closed to the taking of shellfish for direct marketing were marked with permanent monuments at Cheticamp Harbour, Chezzetcook Inlet and Musquodoboit Harbour in Nova Scotia. Examinations were carried out at Shediac and Oak Bay in New Brunswick and Souris River in Prince Edward Island to ascertain the amount of suitable ground available for oyster cultivation. The necessary new map sheets were drawn up and existing map sheets, together with oyster lease records, were maintained at both the Ellerslie and Newcastle offices.

New Construction

During 1962 a new marine railway was completed at Ellerslie, Prince Edward Island, with storage space for four boats of from 10 to 12 tons and, with little more construction, further storage space could be made for two or three more boats. A new shelter warehouse was also constructed at Conway Narrows.

The staff co-operated with the Chief Engineer and with the Fisheries Research Board in the planning for construction and staffing of an experimental oyster hatchery.

The Position of the Industry

Complete figures of production are not yet available, but those at the end of November (2,870,493 lb or 14,350 bbls. for \$326,976) suggest that landings will be down sharply and landed value not so sharply. These figures reflect decrease in landings in Prince Edward Island, the only sizeable producer, but strengthening of grades and prices. Actually landings may not reflect natural production accurately since bad fishing weather curtailed harvesting severely.

The effects of the disease epidemic continued to be felt on the mainland. Although New Brunswick landings doubled in 1962, the production was only something in excess of 1200 barrels, as against a pre-epidemic level of 35,000 barrels.

The first encouraging signs of recovery by production of disease-resistant spat have been noted at Malagash. It has also been noted that this process slows down as one proceeds north along the Gulf Coast. This may be only a simple time lag and populations may now recover slowly to their former level.

DEPARTMENTAL VESSELS

THE PROTECTION BRANCH operated a fleet of 78 vessels during 1962, including the newly built *Cape Freels*, which went into service in the Newfoundland Area during the year (see page 17), and in addition chartered a number of boats from time to time to augment the regular patrol service.

In addition to this fleet, the Department maintains a large refrigerated vessel, the *Arctica*; another craft equipped with laboratory facilities for fish inspection, the *Belle Bay*, in Newfoundland waters, and two smaller boats for shellfish culture work in the Maritimes. Plans were made during the year to replace the *Arctica*, which has been in the Newfoundland bait service for a quarter of a century, with a modern, 165-foot cargo and freezer vessel which will bear the same name. Construction was started on a Coast Guard cutter type vessel, the *Hunter Point*, for service in the Pacific Area.

The fleet consisted of the following in 1962:

Protection Service

| Name | Tonnage | Length | Crew |
|------------------------|---------|--------|------|
| <i>Maritimes Area—</i> | | | |
| Acartia..... | 7 | 37' | 2 |
| Cardita..... | 15 | 45' | 3 |
| Cheval Point..... | 12 | 39' | 3 |
| Cratena..... | 56 | 65' | 5 |
| Cumella..... | 65 | 65' | 6 |
| Cygnus..... | 524 | 146.3' | 29 |
| Fabia..... | 12 | 32' | 2 |
| Gull Light..... | 12 | 39.4' | 2 |
| Hyperia..... | 11 | 40' | 2 |
| Kildare Point..... | 10 | 41' | 3 |
| Lacuna..... | 61 | 64.5' | 5 |
| Limanda..... | 61 | 64.5' | 5 |
| Maces Bay..... | 50 | 60' | 5 |
| Marcia..... | 15 | 45' | 3 |
| Modiolus II..... | 13 | 38.7' | 2 |
| Mya II..... | 13 | 38.7' | 2 |
| Neguac Light..... | 15 | 42' | 3 |
| Obelia..... | 8 | 36' | 2 |
| Paphia..... | 15 | 45' | 3 |
| Prim Light..... | 12 | 39.5' | 3 |
| Rossia..... | 12 | 38' | 2 |
| Sabella..... | 56 | 65' | 5 |
| Scatari Light..... | 15 | 42' | 2 |
| Serpula..... | 13 | 42' | 2 |
| Shediac Bay..... | 50 | 65' | 5 |
| Tegula..... | 15 | 45' | 3 |
| Yorke Point..... | — | 26' | 1 |

| Name | Tonnage | Length | Crew |
|--------------------------------|---------|--------|------|
| <i>Newfoundland Area—</i> | | | |
| Aurelia..... | 29 | 48' | 3 |
| Badger Bay..... | 48 | 57' | 3 |
| Boltenia..... | 29 | 48' | 3 |
| Cape Freels..... | 696 | 179' | 28 |
| Cinderella..... | 28 | 56.5' | 3 |
| Eastern Explorer..... | 58 | 73.5' | 8 |
| Garia Bay..... | 54 | 65' | 5 |
| Lomond..... | 17 | 46.6' | 2 |
| Louise Ruth..... | 20 | 41.8' | 2 |
| Nebalia..... | 29 | 48' | 3 |
| Pecten..... | 16 | 36' | 2 |
| Porella..... | 20 | 48' | 3 |
| Sabinea..... | 15 | 40' | 2 |
| <i>Central Area—</i> | | | |
| Mareca (Great Slave Lake)..... | 15 | 32.7' | 2 |
| Marila (Great Slave Lake)..... | 15 | 45' | 2 |
| <i>Pacific Area—</i> | | | |
| 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 |
| Beaver Rock..... | 26 | 51' | 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. 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..... | 20 | 45' | 1 |
| Onerka II..... | 25 | 46.5' | 3 |
| Pholis..... | 16 | 37.3' | 1 |
| Pillar Rock..... | 26 | 51' | 3 |
| Rissa..... | 10 | 36' | 1 |
| Sarda..... | 8 | 31.9' | 1 |
| Seal Rock..... | 24 | 43.5' | 2 |
| Sooke Post..... | 52 | 55.7' | 4 |
| Star Rock..... | 18 | 39.9' | 2 |
| Statistic..... | 10 | 30' | 2 |
| Stuart Post..... | 44 | 54.6' | 4 |
| Temple Rock..... | 16 | 45' | 2 |
| Takla Rock..... | 6 | 26' | 1 |

| Name | Tonnage | Length | Crew |
|------------------------------------|---------|--------|-------------------|
| Bait Service | | | |
| <i>Newfoundland Area—</i> | | | |
| Arctica..... | 313 | 135.6' | 15 |
| Inspection Service | | | |
| <i>Newfoundland Area—</i> | | | |
| Belle Bay (laboratory vessel)..... | 39 | 63.5' | 4 |
| Fish Culture Service | | | |
| <i>Maritimes Area—</i> | | | |
| Ostrea..... | 8 | 35' | 2 (when required) |
| Cyprina..... | 10 | 34.8' | 2 |

INSPECTION SERVICE

DURING 1962 the Fish Inspection Regulations were amended to provide for compulsory inspection of frozen and of breaded scallops with a standard being adopted for percentage of breading.

More precise controls over the unrestricted sale of stale or unwholesome fish were also introduced during the year.

Identical size classifications and methods of measurement for light salted and heavy salted cod were instituted in 1962.

Drafts of regulations proposing that frozen fish be transported and held at specified product temperatures were prepared and referred to industry.

There was a continued increase in the acceptance of voluntary inspection under Canadian Government Specifications Board standards, both by industry and by buyers.

A new fish inspection laboratory was built in Halifax. A voluntary inspection of fishing boats began at Prince Rupert early in the summer and quickly met with the approval of the fishermen and was well received by the industry.

Maritimes Area

During the year the Inspection Service in the Maritimes Area continued to work closely with the fishing industry with measures designed to assist in the orderly marketing of fishery products and in maintaining uniform standards for fish quality, plant construction, equipment and operation. Courses in fish preservation and plant sanitation were held for industry personnel in the three Maritime Provinces during the year.

One of the important milestones of the laboratory services was marked in 1962 in that one of the most modern laboratories to be found anywhere was opened in August in Halifax, N.S. The improved facilities provided by this new laboratory enabled the Department to increase the work program and, in conjunction with regional laboratories at Charlottetown, P.E.I., Shediac, N.B., St. Andrews, N.B., together with three mobile units, to include not only routine analytical work, but also to undertake a more intensive program including investigations of problems directly applicable to quality control.

Laboratory investigation work during the year included:

1. An extensive study to determine post mortem changes in scallops.
2. Quality evaluation of phosphate treated fillets and comparison with untreated fillets.
3. Correlating the per cent protein and moisture in "jellied" flounder fillets to taste panel studies and establishing standards for each quality level.

4. Showing the effectiveness of various chlorination treatments in reducing concentrations of coliform bacteria, of various initial levels, in seawater.
5. Summary of bacterial counts obtained in recent years from fresh and frozen fish products for use in formulating bacteriological standards for these products and in evaluating the effectiveness of plant sanitation programs.
6. Determining the efficiency of mechanical lobster meat washers.
7. Conducting a study of commercial bactericides.
8. The classification of bacteria isolated from ice-storage scallops.
9. Determining the influence of temperature on the drained weight of fresh and frozen lobster meat.
10. The successful completion of a project started in 1961 to develop a standard recipe for lobster paste.

As a result of extensive studies, the laboratory and field staff developed standards of quality for scallops and Inspection Officers were trained to apply uniformly these standards in the dockside inspection program.

Laboratory inspections during the year consisted in part in the examination of 5419 sample lots of domestic canned fish and 2913 sample lots of other products such as fillets, breaded fish products, scallops and imported frozen fish. Such routine sampling effectively prevented "unfit" fish from reaching the consumer.



Crab trap and catch.

Two thousand, six hundred and two sample lots of imported canned fish were submitted to the inspection laboratories, representing 9,092,144 lb. Following reinspection of a number of parcels, 41 lots, representing 56,573 lb, were

found unsuitable for entry into Canada. The rejections were mainly due to poor quality or because of the use of non-permitted chemical preservatives or colouring agents.

Laboratory personnel carried out some 20,500 bacteriological analyses. Although the majority of these resulted from routine product control programs, an increased number of analyses resulted from plant survey work. The 20,616 chemical analyses performed during the year were made up mainly of Trimethylamine tests. The total figure also includes 8950 examinations of breaded fish sticks and portions.

The Halifax laboratory conducted detailed organoleptic quality examinations of experimentally canned lake whitefish processed by the Fisheries Research Board, Technological Unit, London, Ontario. The Charlottetown laboratory commenced a project in September to investigate the cause of smut (black formation of ferric sulphide) on the interior of cans containing chicken haddie.

Personnel of the field service in the Maritimes Area inspected 96,591,000 lb of groundfish in 1962. This was an 18 per cent increase over 1961. In addition, 1,443,000 lb of smelts were inspected.

Continuous inspection was given to all certified plants under C.G.S.B. inspection, as well as to some of the larger non-C.G.S.B. plants. Uniformity of grading was maintained in all plants. C.G.S.B. production of fresh and frozen fillets, as well as breaded portions amounted to 28,450,000 lb.

The workload of the inspection staff was increased considerably with respect to the inspection of scallops. This was because of increased landings in 1962 which rose to approximately $13\frac{1}{2}$ million pounds, an increase of over three million pounds, and because of compulsory inspection of all scallops intended for export.

In the 12-month period, 3,505,000 lb of fresh and frozen lobster meat were inspected— this representing a slight decrease from the poundage inspected in the previous year.

Inspections of oysters (in shell) during the year totalled 3,261,000 lb which is 430,000 lb less than was inspected in 1961. There were 260 gallons only of oysters shucked for export. Shucked clam production amounted to 43,500 lb.

Fifty-four million, seven hundred and fifty-one thousand pounds of cured fish (salted, boneless, pickled and smoked) were inspected, and 1,819,000 lb of cured fish were re-inspected. The amount of heavy salted dry cod decreased from 22.9 million pounds in 1961 to 16.7 million pounds in 1962. The amount of dry pollock and hake inspected remained about the same as for 1961. Over 7.5 million pounds of boneless cod were inspected in 1962, an increase of almost two million pounds from the previous year. Miscellaneous boneless of all species, including bits, trimmings and scraps and fibred fish amounted to 869,000 pounds, a decrease from the 1,439,000 pounds inspected in 1961. There was an increase of 12 per cent in the quantity of pickled alewives inspected in 1962 compared to 1961. This year's production was 3,308,000 pounds. The inspections of mackerel in 1962 were almost four times those of 1961 when fishermen experienced a poor catch.

A total of 1,412,720 cases of domestic canned fish products were inspected. The sardine production was up to over one million cases (100 cans per case) which represents a doubling of the 1961 production. Production of canned lobster, lobster paste, clams and herring in tomato sauce decreased when compared to figures for 1961. A total of 810 cases of canned fish were confiscated because of unsatisfactory quality.

There were no prosecutions under the Meat and Canned Foods Act in 1962.

In the Maritimes Area, there are 697 plants at which fish is inspected for export—made up of 73 fresh and frozen groundfish plants, 18 scallop plants, 144 registered salt fish plants, 69 registered canneries, 283 pickled fish plants, 19 marinated herring plants and 91 bloater and boneless herring plants. Thirteen new plants were constructed in 1962. In addition many plants made important improvements in their facilities.

Senior members of the Department's Inspection Service attended a number of technical meetings and conventions in 1962.

Newfoundland Area

There was an over-all improvement in the quality of both light and heavy salted cod and, as in 1961, there were no serious complaints from the markets. Export grades were essentially unchanged but, to meet market requirements, standards were amended providing for moisture contents for the light salted cure, as well as new sizes for both light and heavy salted. The inspection of shipments of salted cod to the U.S. market was made compulsory for the first time.

Inspections for the year totalled 2905 covering 387,549 quintals (178,329 quintals light salted and 208,222 quintals heavy salted). Included were two shipments of Labrador salt bulk (40,000 quintals) by direct carrier to European markets from the Labrador coast. In comparison with 1961, there was a slight increase in the light salted cure. Sixty-one plants were registered, two less than in 1961.

Inspection was carried out mainly on shipments to Puerto Rico and Jamaica (which together take about 50 per cent of the total production), Spain, Italy, Portugal and the United States. Shipments of salt bulk to the Canadian mainland, for which inspection is not required, totalled approximately 150,000 quintals. This was somewhat in excess of the 1961 quantity.

Competition among local buyers for light salted cod was brisk. While this resulted in better prices to fishermen, there was a tendency to purchase fish that was not fully cured. Such fish had to be further dried, mainly by artificial means, prior to shipment.

Buyer requirements in some instances were such that there was difficulty in providing the types of fish requested, which were not always in accordance with the prescribed export grades. Buyers in some of the traditional markets relaxed their requirements for moisture content of the product and this resulted in some difficulty in grading and inspection but every effort was made to accommodate the buyer.

Adjustment was made in the system of inspection to permit the exporter to proceed with grading and packing without the continuous presence of an inspector. It is intended to extend this new system, thus releasing inspectors from lengthy postings to individual premises when their services are required elsewhere.

The salt fish plant at Harbour Breton, built by the provincial government, was acquired by a mainland firm, and is being converted to a fresh and frozen fish operation. Two salt fish plants were considerably extended to increase production.

Twenty-six premises were licensed to process fresh filleted fish; of these, 24 also carried on freezing operations. All 26 premises were provided with the services of qualified Fishery Officers. Four of these plants were certified under Canadian Government Specifications Board standards. Production reached a record high, and field staff was increased by the addition of several new members. Plant and quality standards were maintained.

One operator carried out experiments with the di-electric thawing of frozen blocks of head-off, gutted fish. Indications are that the experiments thus far have been successful.

The freezing of turbot for sale in European markets was further carried out on an experimental basis. The results of this project will be watched with considerable interest.

Frozen herring was shipped to the Caribbean area and to the United States market, but there is no information yet as to the success of this venture.

Two new filleting and freezing plants went into production, and plans are well advanced to bring an additional five plants into operation in 1963. An innovation was the acquisition of a former ferry which was subsequently converted into a floating filleting and freezing plant by one of the larger producers.

The quantity of pickled fish inspected was 10,970 barrels of herring; 2330 barrels of turbot; and 2403 barrels of mackerel. Quality was generally satisfactory. In volume, there was no appreciable change in comparison with the 1961 production.

Compulsory inspection of Atlantic salmon and trout (arctic char) was introduced. A total of 1000 barrels was inspected prior to export.

The work of checking on the acceptability of products being marketed by fish processing firms was continued both by testing daily frozen samples received from the various plants at the laboratory and by on-the-spot sampling of end-of-line production through facilities of the M/V *Belle Bay*. The *Belle Bay* also carried out a special assignment at La Tabatiere, Quebec.

Six thousand, two hundred and fifty-two samples were examined by the laboratory staff. All processing plants were visited at least once by the floating laboratory and in all cases special attention was given to fresh and salt water supplies.

In the chemical section, analyses of by-products included the determination of the protein content of fish meals and the vitamin A potency content of fish oils. Imported salts used in the fishery were analyzed to ensure conformity with provincial requirements.

The Department's program of providing technical advice was continued during 1962. Of particular interest in this connection was technical assistance provided to industry in an effort to improve the protein content of fish meal. Technical advice was made available in the processing of cod oil, lobster canning, and the production of boneless cod.

Laboratory facilities, as well as the assistance of personnel, were provided for the St. John's Technological Unit of the Fisheries Research Board of Canada in the taste panel assessment of quality in connection with the Unit's project on possible fuller utilization of trap fish.

Pacific Area

The Fish Inspection Laboratory at Vancouver inspected 3230 parcels of British Columbia canned salmon during 1962, totalling the equivalent of 1,816,607 cases (48 lb). This represents an increase of 146 parcels and 408,010 cases over 1961.

Fees collected for the inspection of canned salmon at the rate of $\frac{1}{2}$ ¢ per case amounted to \$9,162.56 in 1962.

There were 14 inspections of canned herring during 1962, covering 5038 cases, of which 4737 were in tomato sauce and 301 in natural oil. Inspection fees at $\frac{1}{2}$ ¢ per case totalled \$25.13.

During the year, 2179 parcels of imported canned fish and shellfish were inspected, representing importations of approximately $5\frac{1}{2}$ million pounds, which is the equivalent of 116,300 cases (48 lb). These included nearly 14,000 cases of canned salmon. Sixteen lots consisting of 1500 cases were refused entry because of poor quality and 33 lots of approximately 8300 cases were detained until labelling had been amended to comply with provisions of the Meat and Canned Foods Act.

Approximately 1260 inspections were made covering 8,578,825 lb of fresh, frozen or cured fish and shellfish imported into Canada through the lower mainland area in British Columbia. Twenty shipments representing 122,100 lb were refused entry because of unsound or unsanitary condition. In addition 40 lots totalling 42,300 lb were held for amendment of labelling to comply with provisions of the Fish Inspection Act.

During the year, 813 boxes or approximately 160 tons of dried salt herring produced for shipment to the Orient were inspected.

Two additional plants came under the C.G.S.B. inspection program during 1962, making a total of 11 approved plants in British Columbia. Three of these plants are located in Prince Rupert, one each at Butedale and Steveston, two in Victoria and four in Vancouver. A total of 15,292,700 lb of fresh and frozen (dressed and processed) fish were approved under C.G.S.B. Specification during 1962.

Work has continued on the development of colour reference standards for classification of canned tuna into "White Meat", "Light Meat" and "Dark Meat" colour classes. A tentative demerit grading plan, for separating canned salmon into two classes within the present "Approved Quality" classification,

was tested during the 1962 canning season and, as a result of this study, further modifications of the grading plan have been made.

A considerable amount of work was done during the year in co-operation with the Consumer Branch of the Information and Consumer Service in testing the storage life of fish and shellfish products under home freezer conditions. Work was begun on the development of grade standards for canned Dungeness crab. During the year, the heat processing facilities and techniques used in each cannery were carefully examined by a survey team. Routine samples of each canned product from each plant were tested for sterility.

A program of voluntary inspection of sanitation and ice supply on halibut vessels leaving for the fishing grounds was commenced in the port of Prince Rupert in 1962. The program was well received by vessel captains, owners and processors and, it is generally conceded, resulted in a general improvement in the cleanliness of fishing vessels in the area. It is planned to extend the program to other ports in 1963.

Quebec Area

In the Quebec Area, the Inspection Service administers both the federal and provincial Acts and Regulations pertaining to the inspection of fish and shellfish and to establishments where the processing of fish and shellfish is carried out.

In 1962, the inspection staff issued a total of 120 federal and provincial permits for plants and canneries in the Area. Two plants, both located in Montreal, are approved under C.G.S.B. Specification for fresh, frozen and prepared fish.

Officers of the Quebec Area field staff inspected 27,694,125 lb of fresh, frozen, smoked and salted fish which is an increase of almost 3,000,000 lb over 1961. A total of 29,063 cases of domestic canned fish were inspected—a decrease of 5501 cases from the previous year. During the year, 66,491 gallons of oil were inspected, over double the quantity inspected in 1961. The poundage of fresh water whitefish inspected this year was 1,175,116 lb—an increase of over 350,000 lb when compared with 1961.

The number of cases of imported canned fish and shellfish products entered through ports in the Quebec Area in 1962 was 245,963—down 42,759 cases from the 1961 total. The poundage of imported fresh, frozen and processed fish inspected also declined this year—260,720 lb being inspected in 1962, compared with 367,863 lb the previous year.

In addition to daily checks carried out in plants and canneries, the field staff completed 714 product inspections and 27 reinspections. Totals of 360 federal inspection certificates and 331 provincial certificates were issued during the year.

Due to a staff shortage, the activities of the laboratory were limited in 1962 to bacteriological analysis of finished products, bacteriological surveys in several plants on the Gaspé coast and one in Montreal, and water supply analysis and limited research work during the winter months, which included a comparative study of culture media.

A one-week course in plant sanitation was conducted in March for the benefit of fresh and frozen fish plant foremen. The course was conducted at the Apprentice Fisheries School, Grande Riviere, Quebec.

Senior members of the Inspection Staff attended several technical meetings and conferences during the year.

Central Area

The number of pounds of whitefish inspected in 1962 dropped slightly below the record set in 1961. During the year, 21,401,630 lb of whitefish were examined in the Central and Quebec Areas. This compares to 21,916,000 lb last year.

Total rejections in Canada were 1,170,285 lb of whitefish compared to 1,375,000 lb in 1961.

The United States Food and Drug Administration refused entry to 267,657 lb of whitefish. In 1961, that agency rejected 444,360 lb of whitefish.

More than 7,490,000 lb of freshwater species other than whitefish were inspected for quality at the request of the industry. Last year, 5,600,000 lb were examined. The increased poundage resulted mainly from an increased volume of voluntary inspections in Ontario.

There were 430,837 cases of canned fish imported into Canada which were sampled by the inspection staff of the Central Area. This was approximately 9,000 cases less than the number sampled in the previous year.

All shipments of fresh, frozen and processed fish imported into Canada are subject to inspection to ensure that the quality of the product and the labelling on the containers comply with regulations. During the year under review 5,815,167 lb were inspected before entry into Canada was granted. This represents an increase of nearly 700,000 lb over the previous year.

The number of processing plants in the Central Area approved under Canadian Government Specifications Board Specification 32-GP-141A increased from nine to twelve in the past year. There are seven in Saskatchewan, three in Manitoba and two in Ontario. In addition, five other plants are undergoing modifications to meet C.G.S.B. standards and it is expected that they will be approved before summer operations start in 1963.

More than 4,500,000 lb of C.G.S.B. quality fish was produced in the approved plants during the year. This was double the production of 1961.

The Central Area laboratories continued to provide industry with an invaluable service. Technical and analytical assistance was made available to all those wishing to produce better quality fish and to have their establishments and equipment meet C.G.S.B. requirements. Bacteriological analyses of product and plant water were carried out during the year as well as numerous plant surveys.

Other projects were also undertaken by the laboratory staffs such as investigations regarding vacuum packed fish fillets to determine shelf-life under various holding temperatures; research to determine density of whitefish press juice as an indication to fish spoilage and the incidence of *Cl. botulinum* in freshwater fish.

Laboratory personnel also participated in a Fishery Officers' Training Course, attended meetings, performed routine sampling analyses of domestic and imported fish products; maintained a close working liaison with other agencies on matters of mutual concern and worked on problems associated with laboratory operations. The Mobile Laboratory spent the entire summer doing field work at such places as La Ronge in Saskatchewan; Gimli, Selkirk, Riverton and Good Harbour in Manitoba; Edmonton, Alberta and Hay River, N.W.T.

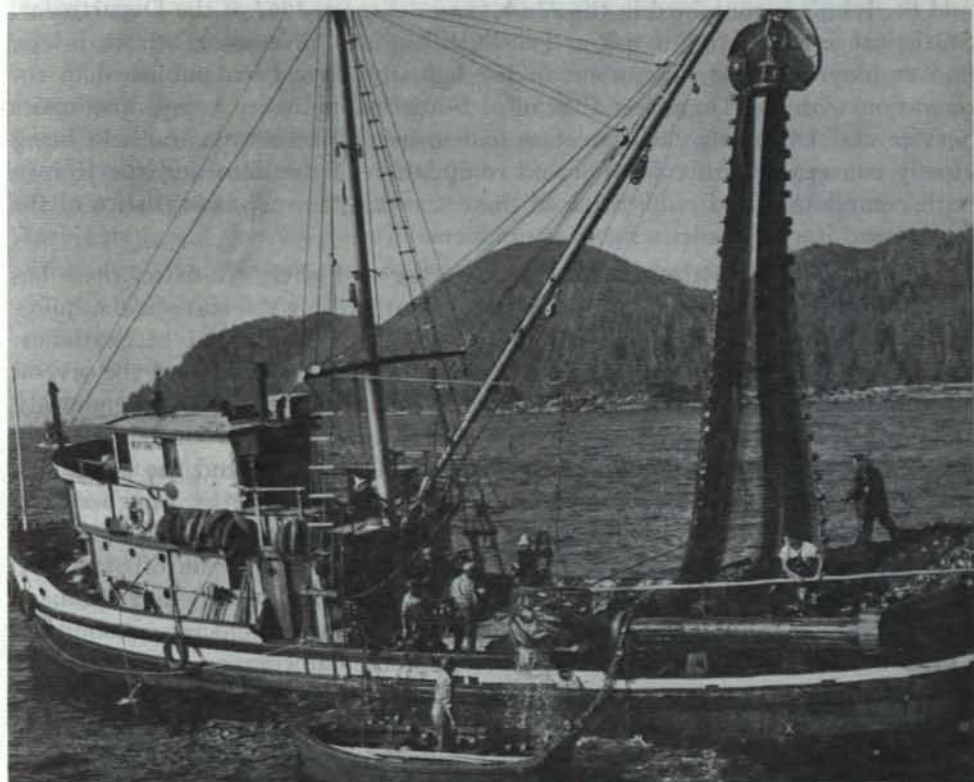
ECONOMICS SERVICE

THE WORK of the Economics Service is carried out in two main fields of activity: economic research and economic intelligence. The latter includes a wide variety of activities, from the provision of statistical and other information on fisheries production and trade on a regular or continuing basis, to short-term investigations of specific matters and contributions to international fisheries commissions, federal-provincial or provincial committees and industry conferences dealing with fisheries problems and concerned with the formulation of government policy for the fisheries. Although the Economics Service in Ottawa has two sections, the Economic Intelligence branch and the Economic Research branch, the professional staff in the Ottawa and Area headquarters offices is not fully specialized in research or intelligence duties, it being necessary to assign work according to departmental priorities. The borderline between research and intelligence activities is, in fact, not clearly defined at present and many work assignments require both types of activity. Inability to fill some vacancies in staff establishments required some readjustments in staff and occasioned delay in some projects during the year under review.

Among the economic research projects, the operations of assisted fishing enterprises in the Atlantic region are the subject of continuing study, the field work generally being carried out by officials of the various provincial governments, under the supervision of a senior economist of the Service. The main objective of the study is to measure and compare the economic performances of different types and sizes of fishing craft built with government assistance and operated in a variety of conditions. In 1962, the tenth volume of a series of annual reports on this study, *Primary Industry Studies, No. 1*, was published, reporting on the 1960 operations of 139 fishing enterprises in the five Atlantic provinces. This report analyzed the relationship of engine horsepower, size of dragnet and size of vessel and their effects on production and profit, and it also indicated success in the equipment of certain types of boats with Danish-seine gear. An eleventh volume of the study, on 1961 operations, was in preparation at the close of the year.

During the year, work on another research project, an economic study of the Atlantic lobster fishery, was carried forward. The exigencies of the Service required some dispersal of staff to Area headquarters, with resultant delay in completion of the project. A draft report of another investigation, that of the economics of the Ontario Great Lakes fisheries, was completed at year-end and the work of editing and revision of the material preliminary to publication was in progress. The report will contain chapters on the fishery resources of the Great Lakes, a history of the development of the industry, the markets for freshwater fish, the distribution system, processing, the primary industry in Ontario, and the role of government in regulating and assisting the industry.

During the year, field work was undertaken on an economic survey of sports fishing on the Margaree River in Nova Scotia and at Crecy Lake in New Brunswick. Economic research work in the past has been concentrated on the commercial fisheries; because of the difficulties in the economic evaluation of sports fishing, these first surveys have been conducted as pilot-type investigations. Through the use of a mailed questionnaire, information was obtained from a sample of the anglers fishing the Margaree River and from most of those who fished Crecy Lake. The questionnaires, besides requesting information on how much money the angler spent in connection with his fishing, were designed to elicit information useful for several experimental methods of measuring the value or benefit the angler received over and above his costs. Although the questionnaire at first glance appeared formidable, a surprisingly large number of those sent out were completed and returned, and many respondents indicated their interest by enclosing letters of comment.



Pink salmon being brailled into large British Columbia purse seiner.

During 1962, the increasingly important sports fishery for salmon in British Columbia tidal waters required additional attention from the economist in charge of this phase of the Service's activities in the Pacific Area. The Area headquarters has for several years published salmon catch records for this fishery and, each year, weekly bulletins are issued during the sports fishing season of about four months beginning in late May. These bulletins contain

notes on the weather, fishing effort and catch results in the principal salmon sports fishing localities. During the year a report was prepared on the problems of the marine sports fishery. A report of a second survey of United States pleasure craft registered for marine sports fishing in British Columbia was also issued, the survey being carried out during a registration period of nine consecutive days at Bedwell Harbour. A total of 177 voluntary returns was received from 184 record sheets distributed to skippers at the time of registration, yielding information on size of boat, number and sex of persons aboard, number of small-boats and of fishing-rods carried, duration of stay, boat ownership, port of origin, fishing activity and fish catch.

Statistical services are a major responsibility of the Service staff at both national and Area headquarters. A list of the weekly, monthly and annual statistical reports prepared and issued by the Economic Intelligence Branch of the Service in Ottawa and by the regional branches at Vancouver, Halifax, and St. John's is contained in the *32nd Annual Report, 1961* of the Department. Statistical series relating to fish and shellfish landings, processing, stocks, prices, and employment and investment in the industry have been published in co-operation with the Dominion Bureau of Statistics for many years, Economics Service and Departmental protection and inspection officers in the field being chiefly concerned with collection and compilation of the data and the Bureau with compilation and publication of these statistics as well as statistics of the export and import trade in fisheries products.

Through an Interdepartmental Committee on Fishery Statistics there has been substantial progress in co-ordinating and integrating the statistical requirements of the Department of Fisheries, the Dominion Bureau of Statistics, the Fisheries Research Board, the Department of Public Works, and the several international fishery commissions. Changes in the methods of collecting monthly and annual fishery-product statistics in the Maritimes, introduced in 1962, were designed to simplify and reduce the work of collection and the possibility of "double counting" in some series. The availability of the punched-card system of machine tabulation of catch statistics in the Halifax and Vancouver headquarters, through the co-operation of the Dominion Bureau of Statistics, has assisted the work of compilation for regular statistical reports and has made possible special tabulations to serve the requirements of biologists, economists and administrators for more detailed and specific information. For example, after the 1961 catch statistics for British Columbia were completed, the punched cards were sorted by license number and a special analysis completed of the gross earnings of fishermen from salmon gillnetting, trolling and seining and from long-line fishing. The report showed the number of fishermen in different income groups and examined the range in incomes in different areas of the province.

Special short-term investigations undertaken by the Economics Branch in the Maritimes and Newfoundland Areas included studies on sealing and on Irish moss, a survey of vessels of 50 gross tons or more for the International Commission for the North Atlantic Fisheries, the annual survey of investment in new vessels for the Department of Trade and Commerce, investigations

concerning the need for bait freezers, public cold storage warehouses and wharves in various places, and many reports for the Department of Public Works on fish landings, the number of fishermen and number and types of vessels in particular communities.

A large amount of staff time is devoted to the discharge of advisory or consultative functions relating to the economics or statistics of the fisheries. This involves the writing of reports, articles and memoranda on various subjects as well as attendance at meetings of international agencies, federal-provincial, provincial and interdepartmental bodies and trade associations. For example, representatives of the Service in this capacity attended meetings of the Federal-Provincial Atlantic Fisheries Committee and the Federal-Provincial Committee on the Ontario Fisheries; the Service was represented by the Director at meetings of the Newfoundland Conference on Fisheries Development, and by the Assistant Director at the Canadian Co-operative Congress. Information relating to the freshwater fisheries was contributed to the fishery investigations of the Committee on Manitoba's Economic Future.

The Service has been associated with international efforts toward greater uniformity and other improvements in the collecting and reporting of fishery statistics. Two members of the Economic Intelligence Branch attended the second session of the Continuing Working Party on Fishery Statistics in the North Atlantic Area, Food and Agriculture Organization of the United Nations, in Washington, and the Assistant Director of the Service attended and was elected chairman of the third session, in Rome. The Economics Branch at Area headquarters in Vancouver acted as host to the Pacific Coast Fisheries Statistical Conference in June, 1962, at which representatives of various international fishery organizations and of Alaska, Washington, Oregon and California were present. The chief economist of the Branch was chairman of the Conference and another staff member served as secretary.

An extensive contribution is also made in the field of trade promotion, for example, in collaboration with the Fisheries Division and the Trade Commissioner Service of the Department of Trade and Commerce. An officer of the Economic Intelligence Branch was a member of the Canadian salt fish trade mission to Latin American and Caribbean countries in February, 1962, and of the frozen-fish trade mission to Europe in October of the same year, both sponsored by the Department of Trade and Commerce.

INFORMATION AND CONSUMER SERVICE

INFORMATION BRANCH

THE DISSEMINATION of information is recognized as a fundamental function of government. The planning and effectuating of this and related responsibilities vary widely among governmental departments and agencies; in the case of the Department of Fisheries there are certain unique aspects in the nature of the resource with which the Department is concerned and which is, in the main, a basic and self-perpetuating one.

In addition to the need for informing the public in general, and the fishing industry in particular, of day to day developments, there is also a need to make available, in an interpretive manner, the results of investigations to fishermen and others in the industry who, thus alerted, may benefit from the findings of such research. The need for such interpretive material is recognized as being of vital concern also to the National Productivity Council in seeking to stimulate increased production in Canadian industry and business.

Working closely with other services of the Department, the Fisheries Research Board of Canada and the fishing industry itself, the Information and Consumer Service continued during 1962 the integrated program begun the previous year to combine its public informational and educational activities on behalf of the fisheries generally with those directed at consumers, dietitians, home economists and home economics teachers.

All available media, including press, radio, television, information sheets, pamphlets, booklets, films and filmstrips are utilized by the staff at headquarters and in the field to disseminate information, and in addition, thousands of direct enquiries are dealt with by mail. During the year about 76,112 pieces of printed matter were sent out by the headquarters unit of the Information Branch. In the field, Information Officers are located in Vancouver, Halifax and St. John's, and home economists, in addition to those operating in and from the main test kitchen in Ottawa, are stationed in Vancouver, Edmonton, Winnipeg, Toronto, Montreal and Halifax. Cooking demonstrations are given both in the test kitchens and at public meetings throughout the country, as well as at conventions and exhibitions which are concerned wholly or in part with food products. The Information Branch also provides general displays for those conventions and exhibitions which provide a suitable background for fisheries presentations.

A noteworthy aspect of the fishing industry in recent years has been the rapid evolvement of both its primary and secondary branches. New designs in vessels and gear have led to improved techniques and a diversification of fishing effort, and similar modernization and development in processing plants, transport, and marketing, have made it more important than ever that there should be a dependable means of keeping both industry and the public informed of the

progress being made. The same holds true for the management of the fisheries, which is the concern of the Department, and in which conservation measures and fish culture development are constantly improving.

To meet these needs, in addition to its use of other media, the Information Branch publishes a monthly magazine, *Trade News*, which is distributed on a request basis to the industry and others interested in the fisheries. Articles for this publication are prepared by the information staff at headquarters and in the field and occasionally by officials of other services within the Department and the Fisheries Research Board. These provide a continuing progressive picture of activities in the industry and outline the Department's management policies for current use. The branch also publishes *The Canadian Fish Culturist* and *Canadian Fisheries Reports*. The former, circulated to those concerned with fish culture practices, contains papers by Canadian scientists, many of them on the staff of the Department, dealing with many phases of fish cultural procedure and has achieved a wide reputation for the excellence of its content. The latter provides an outlet for specialized information on inspection, conservation, development, economics and related subjects and is designed to provide an alternative for such information between purely scientific and more general magazines.

All three of the foregoing publications are circulated not only in Canada but in most of the United States and in many foreign countries.

Radio and television are utilized extensively for special interviews, talks and general news, as well as for instructing consumers in tested and approved methods of preparing fish dishes, thus promoting the sales of fish and fish products.

The Service maintains close liaison with the Canadian Broadcasting Corporation, and private stations, both radio and TV, are becoming more aware of the material available. Requests for broadcasts and guest appearances of fisheries personnel are increasing. The three regular Fishermen's Broadcasts which the CBC originates in Vancouver, Halifax and St. John's are outlets for radio tapes produced both in the headquarters unit of the Service and in the commercial fishing areas by the Information Officers in the field.

During 1962, the headquarters unit taped 173 broadcasts of various lengths, many of which were made in response to requests from the CBC and from private stations. The series of Ottawa Radio Reports for all three Fishermen's Broadcasts, begun the previous year, was continued.

As in previous years, releases of consumer interest were supplied regularly to daily and weekly newspapers, also radio and television stations. These were published in French as well as in English.

A monthly press release, "Featuring Fish", consisting of sets of recently tested recipes with suitable introductions, plus timely hints to the homemaker on the purchasing and handling of fish, was supplied to 67 daily newspapers and 134 weekly newspapers. In connection with it illustrations of fish dishes in the form of glossy prints and mats were supplied to editors who had indicated they could use them. Supplementary to it, special recipe articles and/or food photographs with attached recipes, were supplied to newspaper and magazine editors

who asked for them. This material received wide coverage as evidenced by returns from a press clipping service. This coverage amounted to about 17,000 column inches, or nearly 100 pages of newspaper space.

The radio-television release, "Fisheries Flashes", consisting of sets of timed, short scripts on the purchasing and preparation of fish, was supplied monthly to 105 radio stations and 16 television stations which had requested it. In addition, two special slide sequences with commentaries on "How To Take Care of Your Catch" and "How to Tell When Fish Is Cooked" were distributed to 70 TV stations in Canada and one in Seattle, Washington. Commentaries for these slides, which were produced as a public service feature for *Fish 'n' Seafood Week*, were provided in French and English.

The use of visual aids to provide an effective way to educate the public was continued in 1962 and two new ones were produced by the Information Branch. A film, "Fundamentals of Fish Spoilage," was made in co-operation with the Inspection Service, and a filmstrip, "The Story of Atlantic Salmon," with the Conservation and Development Service. A French version of the filmstrip "Let's Serve Canned Salmon," was also produced. During the year a filmstrip produced earlier, titled "Let's Serve Freshwater Fish", won the Blue Ribbon Award of the 1962 American Film Festival for the best in the Home Economics Class, in competition with more than 50 other entries from Europe and the United States.

Three wallhangers were produced as educational aids and made available to provincial Departments of Education. These wallhangers, with line drawings in white on a green background, 25 inches by 41 inches in size, provide clear illustrations of commercial fishing activities on the Pacific and Atlantic coasts and in Canada's inland areas. They are on sale through the Queen's Printer at 50 cents per copy. Three new posters also were printed, in colour, emphasizing, for the benefit of anglers and commercial fishermen, the great need for conservation measures to protect Atlantic salmon.

In its exhibition work, the Information Branch was responsible for the Department's participation at annual events at Lunenburg and Yarmouth in Nova Scotia, Summerside, P.E.I., Shediac, N.B., and, in co-operation with the Newfoundland Government, at St. John's. A semi-permanent exhibit incorporating a number of ship models owned by the Department, as well as an illuminated consumer display, was made available on loan to the Vancouver Maritime Museum. The exhibit provided by the Department for the Victoria Centennial Exhibition, also in Vancouver, in May 1962, told the story of the fisheries of British Columbia and the work of fisheries administrators and scientists in conserving and developing them. The Department also participated in the 1962 "Salute to the Sockeye" program at Adams River, B.C., which is the spawning area for the famous Adams River run of sockeye salmon. Displays also were provided for conventions and exhibitions in which the Consumer Branch participated.

The planning and execution of special publicity projects continues to be an important phase of the work of the Information Branch. Organizations for which such projects are conducted include the various international fisheries commissions of which Canada is a member, when they hold meetings in Canada, federal-provincial committees on fisheries, and the Fisheries Research Board. Instances

of such projects were those arranged and carried out during the year under review for the Fisheries Research Board's annual meeting, for the annual meeting of the North Pacific Fur Seal Commission, and for the Federal-Provincial Atlantic Fisheries Committee.

In April 1962 the Director of the Information and Consumer Service was the Canadian delegate to a conference held in Paris, on methods of promoting the consumption of fish, which was sponsored by the Organization for Economic Co-operation and Development. At this meeting delegates from 12 countries discussed a variety of subjects having a direct link with fish consumption. Among these were the action being taken to encourage the proper handling of fish by dealers and others, the efforts being made to promote fish through the technical press and other media, as well as the promotion being carried out by individuals and groups. It was decided that a continuing exchange of information and documents would be profitable in keeping interested countries in touch with each other's promotional activities and their results.

Preliminary work was carried out, in co-operation with biologists of the Royal Ontario Museum, for the publication of a comprehensive book authored by them to be titled *Fishes Occurring in the Fresh Waters of Insular Newfoundland*, which the Department will publish and which will be sold through the Queen's Printer.

In the field, Area Information Officers worked closely with the industry and with all news media in complementing and supplementing the work at headquarters. Fisheries Fact Sheets and other educational material were distributed in increasing numbers, indicative of the growing interest in the fisheries resource, particularly among school teachers and students.

In British Columbia educational materials were made available for such school events as Career Days and Science Expositions. In the Maritimes the Area Information Officer continued a program of illustrated lectures on fisheries conservation, in junior and senior high schools, appearing before about 10,000 students. His counterpart in Newfoundland continued to serve as a member of a committee established to direct the operation of 4-H Clubs, and he also co-operated with the Extension Service of the Memorial University of Newfoundland in the production of the TV series "Decks Awash", an educational program for Newfoundland fishermen. Another assignment was to assist in the production, by the National Film Board of Poland, of a documentary film on St. John's and the Grand Bank fishery. The Polish film crew arrived in Newfoundland on the Polish factory trawler *Kastor*.

CONSUMER BRANCH

The educational program of the Consumer Branch is conducted to promote the use of domestic fish and fishery products in Canada. During the year under review the Branch lost two home economists; in spite of this, the number of fish cooking demonstrations given was only slightly lower than in the previous year: 414 in 1962 as compared to 434 in 1961. The number of television performances increased to 69 over 67, as more use was made by the television

stations of the services of the Home Economists. Private television stations are particularly interested because the home economists are able to present sound educational material to the consumer in an interesting manner. From the Department's point of view, a television appearance is extremely valuable because of the wide coverage. In one instance, when viewers were given the office phone number at headquarters, 80 phone calls were received within approximately one and one-half hours.

Radio also was used extensively, and as in other years proved to be a potent medium. When mention is made on the airwaves of a free booklet by a home economist or a regular radio commentator, headquarters is usually deluged with requests. Thirty-six radio broadcasts were made, both live and taped. The home economists give talks to audiences of various kinds when requested, 16 of these being delivered during the year.

Wherever possible filmstrips have been used and circulated to home economics teachers.

The regional home economists continued with the experimental work on freezing of fish in the home. Some of this work has been completed. Several of the regional home economists conducted recipe development of fishery products for industry.

The home economists in Halifax and Montreal moved into new test kitchens, which greatly facilitated their work. A special demonstration was given at Area headquarters in Winnipeg to local home economists following the re-modelling of the kitchen.

The Halifax test kitchen in the new quarters of the Fish Inspection Laboratory is large enough to accommodate groups of 50. By bringing the city school students to this kitchen, the home economist has been able to give more demonstrations than was possible previously.

The majority of fish cooking demonstrations throughout Canada were given to secondary school students and the home economists covered most types of fish and methods of cooking. Information on purchasing, preparation, storage and nutritive value, were given for fresh, frozen, smoked and canned fish. Demonstrations were also given to University home economics students and a leadership school for women was conducted in co-operation with a provincial Department of Agriculture. This is a particularly valuable training school because information is passed on by leaders at the meeting to others in various communities. Other interesting groups that were contacted were army cooks, lumber camp cooks, nursing home cooks, diabetic groups, food technologist groups, women's groups, federal penitentiary dietitians, hospital dietitians, purchasing agents and cooks, restaurateurs, anglers, and embassy personnel.

At headquarters, after a visit from the Soviet Union's embassy wives, the chef from the embassy of the U.S.S.R. visited the test kitchen and showed how to make typical Russian fish dishes.

In the Ottawa test kitchen, new and improved recipes were developed for fish and shellfish, and food was prepared for food photographers. Workshops

were held for home economics teachers when, because of a staff shortage, it became impossible to give demonstrations in secondary schools in the headquarters area.



Chef Gkigokyi Alexeen of the U.S.S.R. Embassy in Ottawa shown during a visit to the Ottawa test kitchen of the Department of Fisheries, at which he demonstrated the preparation of several Russian fish dishes for the benefit of departmental home economists. He is shown working on a dish called "Pickerel Moscow Style".

The Consumer Branch co-operated closely with other services in several projects. Experimental taste panel work was undertaken with the Fisheries Research Board, and to help the Inspection Service determine standards for lobster paste, a series of taste panels was conducted. Recipe development using fish and potato flakes was carried out with the co-operation of the Industrial Development Service and with the federal Department of Agriculture. Also with the Industrial Development Service, taste panels were held in connection with storage tests carried out in Newfoundland.

The existence of the test kitchen and service for restaurants and institutions has become more widely known and advice and information has been sought by various food service operators such as those responsible for government catering, federal penitentiaries, hospital and restaurant operations.

As in past years, exhibits staffed by home economists were displayed at various conventions to maintain and make new contacts with consumers. The following conventions were attended: Canadian Dietetic Association Convention, Canadian Home Economics Association Convention, Western Restaurant Suppliers Association Convention, Canadian Restaurant Association Convention, Lakehead Exhibition, Nova Scotia Home Economics Association Convention, New Brunswick Home Economics and Dietetic Association Convention, Hotel and Restaurant Suppliers Association Exhibition, Food Industry Salon, Maritime Nutrition Conference.



Departmental home economist basting a pickerel during demonstration of outdoor cooking methods at the Salon d'Agriculture, Montreal.

A few events of special interest are singled out. The regional home economist at Edmonton made a trip to Yellowknife and Discovery Gold Mine, N.W.T., where she gave demonstrations and talks to the community. At the Nova Scotia Fisheries Exhibition and the Salon de l'Agriculture a series of demonstra-

tions was presented. A display of fish dishes was prepared for the International Food Fair held at Ottawa. The Edmonton home economist entertained a total of 450 visitors to the Edmonton kitchen to acquaint them with the work of the Consumer Branch. A seminar on fish cookery was held at the New Brunswick Technical Institute in Moncton. One television demonstration was done on location aboard the *St. Roch*, anchored in Vancouver Harbour.

INDUSTRIAL DEVELOPMENT SERVICE

IN 1962, the Industrial Development Service continued directing its efforts and resources to modernizing and improving the efficiency of the Canadian fishing industry.

To achieve its objectives the Service endeavoured, in a practical way, to apply to the Canadian fishing industry knowledge obtained from various scientific and technical sources in the catching, processing and distributive phases of the industry. The Service continued to work in close co-operation with provincial governments, fish processors, manufacturers and other interested parties.

The Service is organized into three sections: Vessel and Gear, Engineering, and Special Services. It also has responsibility for the programming, administration and operation of the Department's Fish Processing Experimental Plant located at Valleyfield, Newfoundland.

VESSELS AND GEAR

This section has as its primary responsibility developments related to catching operations. Its activities are largely directed to assisting fishermen in the operation of boats, equipment and fish finding and catching gear, and the development of improved fishing vessels. The staff members are technical specialists with wide experience in fishing operations. The services of these men, as well as part-time specialists, were made available to and used extensively by provincial authorities and the industry.

Among the more important developments in which the Service participated were the introduction to the Atlantic region of new fishing vessels of the trawling type and other fishing vessels of steel construction incorporating recent engineering developments in hydraulics, fish handling, and electronic devices for the detection of fish and to aid navigation.

Of particular interest was the first commercial fishing craft to be built on Canada's east coast completely fabricated in reinforced fibreglass plastic. This prototype was constructed to conform generally to the Cape Island type of vessel widely used in the Atlantic provinces, so that comparative studies with wooden design will be effectively undertaken.

The fishing gear technologists worked closely with the various provincial authorities in the development of fish catching gear. They provided advice, gave instruction in the fabrication of various types of gill nets and tangle nets, midwater trawls and pair trawls, purse seines and traps, and assisted in carrying out demonstrations in their use in actual fishing conditions.



Net hauler on Atlantic coast fishing boat.

Among these projects for which technical advice and assistance was provided in 1962 were the following:

1. Mid-water trawl development.
2. Introduction of gill nets, their construction and use.
3. Demonstration and instruction in stern trawling techniques.
4. Danish seining techniques.
5. Development of equipment and techniques for purse seining and trawling for herring.
6. Development of a crab trap.
7. Development of hauling equipment for gill nets.

ENGINEERING

Refrigerated Road Transportation

Work in co-operation with the National Research Council, a trailer manufacturer and a manufacturer of transportation refrigeration systems begun in 1961, was continued during 1962. The experimental work culminated in the design and testing of a refrigerated trailer employing a jacketed system to ensure positive air distribution to maintain optimum load temperatures.

The design was most successful and the desired temperature conditions were obtained with no increase in the capacity of the refrigeration system and with little significant change in load carrying space. Some 25 units built to this design were in operation by the end of the year in transporting frozen food products and are performing most satisfactorily.

Salt Fish Drying

Studies relating to the operation of the experimental salt fish dryer installed at Catalina, Newfoundland, in 1957 terminated at the end of the year. Design work was undertaken for a large salt fish plant.

Fresh and Frozen Fish Plants

Preliminary designs, layouts and cost estimates for fresh and frozen fish processing plants were prepared for projects in both inland and coastal regions. Recommendations were made in respect of processing procedures, refrigerated storage and freezing facilities.

Development and Demonstration of Equipment and Techniques

Four Pacific Coast tuna seiners were equipped with refrigerated holding facilities employing a brine spray cooling system. The systems have performed well mechanically and the tuna landed has been of good quality.

The Service is co-operating with industry in the introduction of electronic thawing of frozen fish for subsequent processing. Preliminary indications are that this equipment may have considerable merit for operations of this kind.

Plans and specifications for the Department's new refrigerated bait vessel under construction for operation in Newfoundland were completed. The vessel will be capable of both freezing and transporting frozen bait under optimum conditions.



Setting a purse seine.

Design and supervision services were provided for the construction of eight refrigerated pre-fabricated bait holding units for the Newfoundland Bait Service.

New Products

Equipment for the pilot production of instant fish-potato mixes in co-operation with the Department of Agriculture was installed in the Department's Valleyfield plant. It is expected that the products will hold considerable interest for food manufacturers.

Salt cod blocks, previously developed at the Valleyfield plant, are gaining popularity, and in the salt fish industry three plants are producing on a commercial basis. Plans are in hand for increased commercial production.

Community Processing Facilities for Fishermen

Construction work was completed on several small community processing plants. The Valleyfield plant staff instructed personnel in some of the plants in the processing and handling of fish and provided maintenance services for the mechanical equipment in a number of the plants.

Fish Processing Experimental Plant

There is a continuing flow of information on the practical aspects of fish processing from the plant to industry through correspondence and visits to the plant by members of fishing companies. Plant personnel have also visited and given guidance to commercial processing establishments. New products and new techniques in processing, handling and packing are demonstrated on a continuing basis.

Work was continued in co-operation with the Memorial University of Newfoundland on various aspects of research in the processing and storage of both light and heavy salted fish products. The practical and economic limits of the use of relatively high velocity air movement were assessed, as was its use in combination with very low velocities for final drying.

Storage and drying tests of various products including the development of a process for drying caplin were undertaken.

Experimentation in brine salting processes was continued and included the use of a brine pressure curing system, which appears to offer considerable promise in accelerating the salting process.

British Columbia

An Industrial Development Service engineer was appointed during the year to the Department's office in Vancouver.

Other projects, some of which were carried out in co-operation with the Fisheries Research Board, included design and installation of brine spray system of refrigeration for the holds of tuna and halibut vessels; pneumatic and hydraulic systems for the unloading of fish holds; design work on systems for the cooling of large fish such as tuna after cooking and prior to canning.

SPECIAL SERVICES

The work of this section includes the Department's program of financial assistance to the fishing industry such as the administration of the Fishing Vessel Assistance Regulations P.C. 1961-1333 and the Frozen Bait Storage Assistance Regulations under P.C. 1959-904. The Section also has responsibilities with respect to consultation and advising on marine works and aids to navigation.

In the fiscal year 1962-63, a total of 49 fishing vessels qualified for grants amounting to \$500,000.

FISHERMEN'S INDEMNITY PLAN

ACCCEPTANCE of the Fishermen's Indemnity Plan continued to expand through 1962. The Plan, which came into operation in 1953, offers fishermen owning and operating fishing vessels valued between \$250 and \$10,000, the opportunity to secure insurance against total or partial loss for a nominal premium of one per cent of the appraised value per annum. The Plan also provides a measure of low cost insurance to lobster fishermen on their lobster traps, an item which frequently suffers widespread damage from unexpected storms.

At the close of 1962 a total of 6468 fishing vessels were covered under this voluntary insurance plan. The Plan has been most widely availed of in British Columbia where 2652 policies were in effect at the end of the year. In Newfoundland vessels owned by 1234 fishermen were covered; in the Maritimes 2008 vessels and in Quebec 574 vessels. It is estimated that about one-third of the eligible fishermen have taken advantage of the Plan. Because of the wide dispersion of small fishing vessels in many hundreds of small fishing settlements, commercial marine insurance companies have found it impossible to offer insurance to such fishermen at rates within fishermen's capacity to pay.

TABLE—FISHERMEN'S INDEMNITY PLAN

NET PREMIUMS COLLECTED AND INDEMNITIES PAID FROM
INCEPTION OF PLAN (JULY 1953) TO DECEMBER 31, 1962

| Province | Vessels | | Lobster Traps | |
|---------------------------|--------------|-----------|---------------|-----------|
| | Net Premiums | Indemnity | Net Premiums | Indemnity |
| | \$ | \$ | \$ | \$ |
| Newfoundland..... | 134,331 | 258,634 | 17,626 | 83,285 |
| Nova Scotia..... | 176,468 | 180,212 | 170,160 | 668,909 |
| New Brunswick..... | 53,698 | 40,544 | 628 | 1,070 |
| Prince Edward Island..... | 23,627 | 9,170 | 21,009 | 65,103 |
| Maritimes..... | 253,793 | 229,926 | 191,797 | 735,082 |
| Quebec..... | 39,343 | 70,045 | 12,788 | 31,448 |
| Atlantic Coast..... | 427,467 | 558,605 | 222,211 | 849,815 |
| British Columbia..... | 783,898 | 679,172 | — | — |
| Total..... | 1,211,365 | 1,237,777 | 222,211 | 849,815 |

Under the Plan fishermen pay a premium of one per cent of the appraised value and in the event of total loss of the vessel an indemnity of 60 per cent of the value is paid in the Atlantic provinces and 70 per cent in British Columbia where the loss experience has been less severe. In cases of partial loss, indemnity against the cost of repairing the vessel, in excess of 30 per cent of the appraised value, is paid on the Atlantic Coast and in excess of 15 per cent of the appraised value on the Pacific Coast. Since the Plan was introduced in July 1953 a total of 1183 claims have been adjusted with total indemnity payments of \$1,237,777.

In the case of lobster trap coverage provided under the Plan, acceptance by fishermen has been limited largely to those areas where weather and other conditions lead to heavy losses of traps almost every year. Thus indemnity payments have been relatively high in relation to premium revenue. At the same time lobster fishermen in other areas have occasionally suffered quite severe losses but unfortunately, having failed to come under the Plan by paying the small premium, were not eligible to receive indemnity.

FISHERIES PRICES SUPPORT BOARD

UNDER the Fisheries Prices Support Act, the Board is responsible for investigating and, where appropriate, recommending action under the Act to support prices of fishery products where declines have been experienced. The basic principle of the legislation is to protect fishermen against sharp declines in prices and consequent loss of income due to causes beyond the control of the fishermen or the industry. Under conditions of reduced prices and income to fishermen the Board, subject to approval of the Governor in Council, is empowered to purchase fishery products at prescribed prices or to pay deficiency payments to producers of fishery products equal to the difference between the prescribed price and the average price at which such products are sold.

Throughout 1962 the Canadian fishing industry generally enjoyed a substantial increase in its value of production both at the fisherman and the market level. The improvement was well distributed both as to geographic areas and by species. As a consequence, there were no areas of serious concern respecting incomes in 1962 relative to previous years.

Improvement in prices of most fishery products at all levels reflects a gradual improvement in quality, increased consumer demand and in part a general increase in food prices in North America. In view of the generally satisfactory situation, there were no fishery products under active support in 1962.

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 of their laid down cost of salt. On the basis of 1962 production of these items, payments were made to 6301 fishermen totalling \$402,498. Payments were also made to 397 processors amounting to \$197,502. Total payments were \$600,000.

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; Members: W. R. Ritcey, Riverport, N.S.; C. E. Desourdy, Montreal, P.Q.; K. F. Harding, Prince Rupert, B.C.; H. I. Mifflin, Catalina, Nfld.; Francis Milerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.

FISHERIES RESEARCH BOARD OF CANADA

THE WORLD'S oceans and their resources continued to command increasing attention. Canada has kept in step with these worldwide activities and the Fisheries Research Board of Canada has participated actively in practically all aspects of these developments, both national and international.

Nationally, the progressive transfer of oceanographic survey work and research in physical oceanography from the Fisheries Research Board to the new Marine Sciences Branch of the Department of Mines and Technical Surveys of Canada was highlighted during the year by the official opening of the Bedford Institute of Oceanography in Dartmouth, N.S. on October 26, 1962. This large modern research and survey facility is now jointly occupied by the Department of Mines and Technical Surveys and personnel of the Board, and joint programming and integrating of researches are well advanced. Internationally, the Intergovernmental Oceanographic Commission sponsored by the United Nations Educational Scientific and Cultural Organization held its first substantive meeting in Paris at which extensive regional international oceanographic projects were planned. Canada was represented at a high scientific level.

The Board, as required by the Fisheries Research Board Act, continued its researches on a broad front with a view to providing guide-lines for the orderly harvest of Canada's extensive living marine and freshwater resources and for the increase of the resource base. The latter aim was advanced through scientific research leading to effective cultural and management practices, and through basic research to add to the practical knowledge concerning aquatic organisms, their environment and the uses to which they might be placed.

Board membership in 1962, excluding the Chairman, numbered sixteen. Included in the membership were nine noted scientists drawn from universities and research foundations across Canada, six leading businessmen with an intimate knowledge of fishing and the fishing industry and one senior officer from the Department of Fisheries of Canada. The Board Chairman is appointed by Governor-in-Council and is a member of the Public Service of Canada. The Chairman is also the Board's Chief Executive Officer. All other members hold honorary 5-year appointments from the Minister of Fisheries.

The Board held its annual meeting with its station directors and unit chiefs in Ottawa in early January. At this time the Board's research policy and scientific programs were reviewed, and reports and recommendations from the standing regional Advisory Committees were heard. The Executive Committee met three times during the year to consider personnel and financial matters and each of the three regional Advisory Committees sat twice.

Research activities of the Board are by design completely centralized. Day to day administration and supervision of over-all operations are carried out by the full-time Chairman and his headquarters associates in Ottawa.

The Board's staff (establishment of 801 during the year of which 189 were scientists) has passed an active and productive year in all three areas of its scientific interests, namely aquatic biology with emphasis on fisheries biology, fisheries technology and oceanography. Sixteen research vessels were operated for its biological studies. These vary from small inshore and lake craft to large seagoing ships specially built for the purpose. In spite of increased attention during the year to integration of programming and to establishment of strict priorities for best use of man-power resources, the Board is still unable to satisfy reasonable demands for additional researches.

Co-operative oceanographic programs were continued with the Royal Canadian Navy, the Department of Mines and Technical Surveys, and the Department of Transport, and close liaison was maintained with the Institute of Oceanography at the University of British Columbia, Vancouver, B.C., the Great Lakes Institute of the University of Toronto, and the Institute of Oceanography at Dalhousie University, Halifax, N.S. Co-operative programs were also carried out with provincial Governments and with the International Pacific Salmon Fisheries Commission, New Westminster, B.C. The National Research Council continues to administer in a most satisfactory way the post-graduate scholarships sponsored by the Board.



Hauling the cod end.

A large proportion of the Board's biological and oceanographic effort in research continues to be taken up by work carried out for international fishery and sea mammal commissions to which Canada belongs and which do not have scientific staffs of their own. These include the International Commission for the Northwest Atlantic Fisheries, the Great Lakes Fishery Commission, the International Whaling Commission, the North Pacific Fur Seal Commission and the International North Pacific Fisheries Commission.

New facilities were added during the year but replacements or new ones are further required, some quite urgently. The new research vessel *G. B. Reed* (177 feet) was launched in June for service on the Pacific Ocean. Design plans for an additional research vessel, *E. E. Prince* for service on the Atlantic Ocean were well advanced during the year. Construction of a portable camp scow to provide a moveable base for research workers was started in February and is scheduled for use along the British Columbia Coast in early May, 1963. A new Technical Services Building was completed and occupied at Nanaimo, B.C. and a salmon weir, holding pens and egg-eyeing troughs were completed on the Glendale River, B.C.

The Board's widespread researches are carried out from four biological stations, two of which include oceanographic groups, an Arctic Unit, and two technological laboratories, which have various units attached to them.

BIOLOGICAL AND OCEANOGRAPHIC INVESTIGATIONS

The Board's main biological stations are situated at Nanaimo, B.C., London, Ont., St. Andrews, N.B., and St. John's, Nfld., with an Arctic Unit in Montreal, Que. The Nanaimo and St. Andrews stations maintain associated oceanographic groups. A number of field stations and port observers stationed at key points are also maintained in the interests of operational efficiency.

Atlantic Fisheries—Newfoundland Area

Total landings of *groundfish* were 14 per cent above those of 1961. Of these landings 79 per cent were cod, 8 per cent haddock, 6 per cent redfish, 5 per cent plaice, 1 per cent greyscale and 1 per cent halibut, wolffish and pollock. Cod landings were 15 per cent higher, haddock 5 per cent lower, redfish 40 per cent higher and plaice landings 15 per cent higher than in 1961. Cod landings would have been still higher if squid which only appeared in small numbers had been available for bait.

Increased attention was paid to studying the inshore Newfoundland and Labrador *cod fisheries*. In cod samples from the important trap fishery, 80–95 per cent of the fish were 4–7 years old with cod of increasing ages and sizes progressively more common in the handline and longline catches. The east coast of Newfoundland shore survey for baby cod showed the 1959 year-class to be plentiful in their first year of life and this year-class is now showing signs of abundance in the commercial catches. Thus it may be possible to develop these surveys to give useful predictions. From these surveys it is indicated that the 1962 year-class of cod is also a strong one.

In the Labrador inshore fishery the average size of cod has increased since 1959 because there has been no significant entry of new year-classes to this fishery since that of 1953. On the other hand, surveys on Hamilton Inlet Bank showed a great reduction in numbers, age and size of the cod and this may be due to the great European winter and spring deep-water cod fishery which has developed in this area in recent years.

About 10,000 cod were tagged, mainly to study the interrelationships of the inshore and offshore fish.

The *haddock fishery* on the Grand Bank is at present almost entirely dependent on the 1955 and 1956 year-classes, the former being about four times as abundant as the latter. No new successful year-classes are in sight and a declining fishery is to be expected over the next few years. Due to the lack of young fish the landed sizes of haddock have increased.

Redfish surveys were continued and a survey by the *A. T. Cameron* of the redfish populations between 100 and 400 fathoms in the whole Canadian area has now been completed.

The average catch of American *plaice* per hour for Newfoundland trawlers fishing in the three major commercial plaice-fishing areas of the Grand Bank was between 1500 and 1800 pounds. The size of plaice landed by these trawlers has decreased very little from 1954 to 1961.

Lobster research in Port au Port Bay and Atlantic *salmon* research on the Little Codroy River were continued. About 2.5 million *pink salmon* eggs from the Glendale River, B.C. were planted in North Harbour River, St. Mary's Bay, between November 22 and December 3. First hatching of these eggs occurred about the middle of February 1963 and 93 per cent had hatched by March 22.

Atlantic Fisheries—Southern Area

Biological research in St. Andrews, N.B., is undertaken to provide a background for comprehension and application. *Oyster* spatfall is studied to predict and to study survival. A method of culturing newly spawned *scallops* is sought to aid in forecasting and in understanding fluctuations in the stock. *Lobster* larvae are studied to explore the relationships among spawners, larvae at different stages, and recruitment. The migrations of *cod* and *plaice* are investigated to define stocks and to estimate their discreteness. *Salmon* have been tagged and marked to study migrations and to evaluate contributions made to various fisheries by the Miramichi River. The effect of predation on young salmon by fish-eating ducks on the numbers of returning adults is under critical examination. The value of stream improvement in increasing the *trout* producing capacity of streams is being tested. Work on *pollution* considers both the lethal levels of various poisons and the avoidance of fish by sub-lethal concentrations of heavy metal ions. Recoveries after epidemics among oyster and herring populations are being carefully followed. A *herring* population in the Gulf of St. Lawrence estimated from the amount of spawn was shown to be under-utilized.

Mathematical studies on fish populations and fisheries, and *oceanographic investigations* on the waters in which marine fish live, provide a framework and a basis for other investigations. These include the relation of catches to the distribution of fish, the effects of food consumption on growth of fish, and studies of fishing power, as well as investigations of temperatures and of surface and deep currents, submarine geology and geochemistry, and the biology of bottom organisms. The oceanographic studies are largely carried out by the Atlantic Oceanographic Group at Dartmouth, N.S., a section of the St. Andrews Biological Station.

In addition to the foregoing several studies are aimed particularly at improving utilization of fisheries resources. Studies of the factors controlling the incidence of paralytic *shellfish* poison have been carried out. Better understanding should permit fullest possible use of shellfish stocks without jeopardizing public health. A cheap efficient hydraulic clam rake that is not harmful to the clam stock has been developed and tested. Forecasts of *cod* and *haddock* stock sizes are available as guidance to fishermen. Diurnal migrations of groundfish are under study to provide a basis for improved exploitation. The growth of speckled *trout* and rainbow trout under controlled conditions are being compared.

Considerable effort by the staff at the St. Andrews Station is directed to following and explaining the course of important fisheries. This frequently involves collecting and interpreting catch *statistics*. Work by biologists complements data obtained by the Department of Fisheries of Canada and the Dominion Bureau of Statistics and is used in discharging part of the national obligation to the International Commission for the Northwest Atlantic Fisheries. For lobsters, studies of commercial statistics are supplemented by tagging and marking to examine the value of size regulations. In scallops increased landings were produced by greater effort although catch per day declined by 70 per cent from 1960 to 1962. Floating-line trawls increased the effectiveness of the swordfish fishery and the length of the season. Except in the Bay of Fundy area, salmon catches were up following the trend throughout the North Atlantic basin. Commercial catch data for groundfish and herring were collected and related to fishing effort. Reliance of the groundfish fishery on an increasing number of species has improved its value and the trend toward diversification is expected to continue.

Pacific Fisheries

The acquisition of C.G.S. *G. B. Reed* in December, 1962, extended the range of the Nanaimo Station's area of operation to include all of the Gulf of Alaska. Her initial cruises in January and February, 1963, were undertaken to discover the midwinter distribution of salmon, particularly pinks, west and south of British Columbia.

Research on the distribution of *salmon* stocks on the high seas was commenced in 1955 to carry out Canada's share of a joint program designed by the International North Pacific Fisheries Commission to answer questions regarding the intermingling of Asian and North American salmon in the North Pacific. In 1962, four chartered vessels from early April until late July made seven cruises within a region extending from the eastern coastline of the Gulf of Alaska to Longitude 160°W and from Latitude 45°N to Latitude 57°N. The vessels fished with surface long-lines under supervision of Japanese experts. Total catches were 6795 sockeye, 3007 chum, 8911 pink, 457 coho, 29 chinook and 258 steelhead. Most were tagged and 7.7 per cent of the tags were recovered, mainly from coastal fisheries. Tagged sockeye were recovered from Bristol Bay to the Fraser River; chum salmon from the Japan Sea and the Gulf of Anadyr to British Columbia; pink salmon from all the main coastal areas of the Gulf of Alaska; and coho from the Gulf of Alaska to Puget Sound.



Research vessel G. B. Reed off the coast of British Columbia.

The Nanaimo Station, in co-operation with the Pacific Area office of the Department of Fisheries, carries out a large-scale research program to aid in the management of British Columbia's second most important salmon-producing area, the *Skeena River*. It was expected that the 1962 sockeye run would be between 1,000,000 and 3,000,000 fish; the actual return of 1,097,000, though close to the average, was at the bottom of the predicted range because of the poorer than expected return of five-year-olds. The pink run of about 1,700,000 represented an excellent return from the small spawning of 300,000 in 1960. Important advances are being made toward understanding the productivity of individual sockeye sub-stocks of Babine Lake, the major producing lake of the Skeena River.

Reviews of available information regarding the movements of *salmon* in the vicinity of the northern British Columbia-southeastern Alaska border have been prepared by Canadian and United States agencies. Interception of large numbers of British Columbia-bound pinks and sockeye by United States fishermen has been shown for some years. Lesser numbers of Alaska-bound salmon are caught by Canadian fishermen in some years.

The highlight of the 1962 salmon fishing season was a record pink catch of 93,590,000 pounds. Over 80 per cent of these came from the central British

Columbia coast, where the Bella Coola area alone produced 46,500,000 pounds. The sockeye catch was lower than average, mainly due to the small Adams River run to the Fraser.

Intensive studies of young pink and chum salmon in the coastal environment have been made in 1961 and 1962 in the central British Columbia coast, mainly on the Bella Coola pink stock. The growth, mortality, distribution and method of dispersal of young are being revealed.

Efforts to determine the energy required for swimming at an average migration rate have been completed. It is apparent that the normal adult sockeye migrant on its spawning migration is working close to a daily maximum capacity, leaving little leeway to meet any adverse changes in its environment.

Pollution surveys were continued in 1962, providing a valuable record of actual and potential areas of damage to fish stocks. Research on identification and possible amelioration of toxic fractions of kraft-mill effluent is providing useful information to the Area Director's office.

Groundfish investigations continued to provide the necessary background for management of cod, lingcod, lemon sole, petrale sole, rock sole and others. An important step toward compiling the inventory of groundfish was made through preparation of statistics of eastern North Pacific catches in co-operation with United States agencies. United States fishermen catch significant amounts of groundfish off British Columbia's coastline.

Although the 1962 Queen Charlotte Islands *crab* catch was low, return per unit effort was high. Prediction of the greater stock available, based on the relation between catch and sea-water temperature, indicates that forecasting crab abundance may be possible.

Shellfish toxicity remained low during 1962, and several non-toxic red water blooms were investigated. Efforts to determine the tolerance of oysters to pulp-mill pollution were extended.

Whaling at the Coal Harbour Station was resumed in 1962. Approximately 80 per cent of the whales caught were examined for age, reproduction, and food studies. The 1962 season was unique in the abundance of sei and female sperm whales in contrast to the scarcity of finback and male sperm whales which normally provide the bulk of the catch.

Primary productivity studies have shown that the phytoplankton concentration in the open North Pacific Ocean is governed almost entirely by grazing by zooplankton in spite of relatively high nutrient levels, and that overgrazing occurs. Phytoplankton are the primary element upon which the food chain, which culminates in fishable organisms, is based.

The *Pacific Oceanographic Group* is a section of the Nanaimo Biological Station of the Fisheries Research Board of Canada. The Group carries out research and co-ordinates all possible resources to fulfil national fisheries and military requirements for oceanography in the Pacific area.

The recently-completed behaviour model of the growth and decay of the seasonal thermocline in the Subarctic Pacific Ocean is the culmination of five years of research on heating and cooling, and wind-mixing and convection

processes. It allows assessment and forecasting of temperature structure in the seasonal zone (0-100 m depth). On the basis of this model an oceanographic information service has been created, similar in concept and operation to the Meteorological Service. This oceanographic service is housed in the Naval Weather Service. The forecasters collate and interpret the incoming data according to the thermocline model and provide frequent regular assessments and forecasts.

Studies of the inland seaways are nearing fruition. With the aid of the hydraulic model of the Hecate region the data accumulated since 1937 are being assessed. The oceanography of Dixon Entrance has been solved and is being prepared for publication. It is a complex estuarine system in which the oceanographic structures and domains are primarily determined by the tidal mechanisms.

Inland Fisheries

The second year of the *population study* at Heming Lake produced evidence that coloured tags make small fish more vulnerable to predation than transparent tags, although they make little difference to large fish. The *Great Slave Lake* study of the effect of a commercial fishery on an unexploited fish population was continued; analysis of accumulated data has recently demonstrated that individual commercial fish wander very little, and that in comparison with the commercial catch only negligible quantities of fish are taken by angling or by nets for local use. Average size, catch per net, and amount of gear fished show that the 1962 Canadian catch of *Lake Superior* lake trout was appreciably greater than in 1961. This improvement is attributed to a reduction in predation by sea lampreys.

The Board again acted as Canadian agent for the Great Lakes Fishery Commission and continued studies aimed at controlling *sea lampreys*. The Commission's 1962 program required application of lampricide to 13 Lake Superior streams and surveys of a total of 285 tributaries of Lakes Superior, Huron and Simcoe. Spawning-run sea lampreys appeared to be much less abundant than in any recent year. The decrease in abundance is attributed to recent efforts to control them.

Arctic Fisheries

An aquatic *biological survey*, mainly on fishes, limnology and biological oceanography, was carried out in the Canadian arctic islands. A co-ordinating base was established at Cambridge Bay, Victoria Island. From a supply depot laid down at Résolute (Cornwallis Island) in 1961, stationary camps were established at Eureka (Ellesmere Island), Assistance Bay (southeastern Cornwallis Island), Creswell Bay (east coast of Somerset Island) and Castel Bay (northern Banks Island). From these camps visits were made to various points in the islands. Valuable collections of fishes, bottom fauna, plankton and other oceanographic data were made. The survey affords for the first time a good basis for the assessment of species distribution throughout the Arctic.

Studies for a developing commercial fishery for *lake trout* and *char* were continued at Wellington Bay and Ferguson Lake, Victoria Island. An intensive program on Keller Lake in Mackenzie District was carried out to study effects of commercial fishing on small lake stocks of the Northwest Territories. Western coastal arctic exploratory fishing continued to indicate sea herring as the most abundant fish.

Studies on *harp seals* confirm a decline in stocks because of over-utilization. Marking of grey seals was carried out to study seasonal movements. Information is being compiled on the seasonal distribution and abundance of *whales* off the Atlantic coast. White whales were studied in relation to a new net fishery in Hudson Bay. Studies on plankton and bottom fauna in conjunction with oceanographic programs of the Department of Mines and Technical Surveys were carried out.

TECHNOLOGICAL INVESTIGATIONS

The Board's integrated technological research program for the Atlantic coast is carried out in laboratories located at Halifax, N.S., Grande-Rivière, Que., and St. John's, Nfld. Technological investigations on freshwater fish are centered at London, Ont. Corresponding studies pertaining to Pacific coast fisheries are conducted at the Board's research laboratory in Vancouver, B.C.

Atlantic Coast

Studies on the utilization of Newfoundland inshore *cod* have defined effects of live holding, polyphosphate treatment, water temperature, fish size, water thawing, dielectric and microwave thawing and refreezing on frozen quality and shelf life of the frozen product.

The major hormones of *Atlantic salmon* have been identified and studies have begun to artificially induce spawning of spent adult females with pure hormones. Extreme variability has been noted in the fertility of sperm from end-of-the-season males and progress has been made in defining the conditions which influence low temperature storage of sperm. These are integral parts of a study designed to understand and learn how to control reproduction and other processes under hormone control with a view to increasing the resource.

Gaffkaemia; a *lobster* disease, is responsible for heavy losses during pounding and marketing. The disease interferes with normal blood clotting and progress has been made toward understanding the mechanism of clotting. Treatment to prevent the disease is based on the assumption that the disease originates in lobster pounds. However, it has now been established that a high percentage of lobsters carry the *Gaffkya* organism in their natural environment. The importance of this observation is under investigation and present studies are designed to determine the feasibility of immunizing lobsters against the disease.

As bacterial *spoilage* of lean groundfish such as cod has been minimized, non-bacterial spoilage has become of increasing commercial importance. Studies at Halifax have centered around metal-catalysed rancidity and excellent

correlation has been found between organoleptic and chemical assessment of the problem. The effects of several substances normally present in fish muscle have been assessed for their ability to retard or promote rancidity. Studies on non-bacterial spoilage of fresh fish are complementing those on salt fish at Grande-Rivière. This modification of program is in keeping with the changing nature of the fishing industry on the Gaspé coast and the results will be of particular value in assessing quality changes brought about by high water temperatures and heavy feeding, which can be particularly important in the gill net and trap fishery.



Newfoundland cod trap fishermen preparing to land catch.

Protein-splitting enzymes have been isolated from *cod* muscle and some of their characteristics determined. The distribution of fats has been investigated in cod fillets with a view to studying the action of natural fat-splitting enzymes on these substances. Studies on salt fish have centered around an assessment of chemical changes occurring in light- and heavy-salted fish for the purpose of aiding in the scientific control of the two processes.

Pasteurization of *scallops* and *haddock* with a radioactive cobalt source has produced products with excellent shelf life, when stored in ice, which exhibit no undesirable odours or flavours as a result of the process. Recent developments indicate that it will not be long before pasteurized foods will be approved for general consumption.

Interest in *fish protein concentrate* has increased rapidly. Concentrates from numerous raw materials, prepared at the Halifax Laboratory, have been evaluated nutritionally and some are being assessed by food manufacturers and formulators of specialty food products.

Marine oils are a rich source of unique fatty acids which are known to alleviate conditions relating to arteriosclerosis. Gas chromatography has been employed to determine the distribution of fatty acids in several oils of marine origin and it has been established that the unique acids are distributed in a very interesting pattern. The significance of this observation is under investigation. Research on more efficient utilization of marine oils has been concentrated on caplin, whale and cod oils.

Several species of fish can now be identified by the types of *proteins* contained in the muscle, blood and eye fluids, but it is not yet possible to distinguish individual populations of pelagic fish and groundfish.

Tissues of several commercially important marine species can now be maintained alive and growing in nutrient solutions. Wound healing of fish and Malpeque disease of *oysters* are now being investigated in tissue culture. One means of accelerating wound healing shows particular promise.

Inland

The London Technological Unit has continued to study the micro-organisms responsible for spoilage in *freshwater fish* and the composition of a number of the commercially important species of fish has been determined. In addition, considerable effort has been devoted to demonstrating methods of utilizing the large quantities of commercially undesirable fish in our Canadian fresh waters. It has been shown that these fish can be processed into a number of very tasty and acceptable products such as fish sausages, wieners, and canned fish products. Investigations have recently been directed toward problems associated with quality deterioration in freshwater fishery products and methods of prevention.

Pacific Coast

Refrigeration equipment for brine-spray freezing of tuna was installed on three vessels. All three installations performed satisfactorily and frozen albacore, bluefin and skipjack tuna from distant waters were landed in Vancouver in good condition. The use of refrigerated sea water for chilling and transporting salmon is increasing. Thus, mechanically operated systems were installed on three fish packers and circulating ice-salt water systems on two barges. Salmon were unloaded successfully using a special pressured device in conjunction with refrigerated sea water tanks on a fish packing vessel. The success of this *unloading system*, which has a rather restricted field of application, prompted further investigations as a result of which considerable progress has been made in the design of a much more versatile system that could have wide application in diverse fisheries.

The salt uptake by *tuna* frozen on vessels employing the brine-spray system was studied and found to be largely superficial. Weight changes and various chemical changes were measured in fish held in refrigerated sea water. Using a specially designed apparatus, development of toughness in thawed frozen

fish was determined under different storage conditions in both raw and cooked flesh. It was found that an increase in both toughness and in development of free fatty acids proceeds equally rapidly in frozen fish stored in nitrogen gas or in air, while, as in previous work oxidative rancidity was practically eliminated by nitrogen storage.

The means by which migrating *salmon* utilize their flesh fats for energy during their spawning migration were further elucidated. Studies on the important sex hormones of the salmon pituitary gland were continued. Sufficient pituitary glands were collected to permit a preliminary separation of the gonadotropic hormone and methods for its assay were worked out. Some progress was made with respect to identification of home stream odour attractants for adult sockeye salmon migrants and the food attractants for juvenile salmon. It was demonstrated for the first time that adult sockeye salmon can survive advanced gonad development and live for well over a year past their normal spawning period. Successful separation of the very numerous salmon muscle protein and blood hemoglobins was achieved and the results showed that the technique used permits positive identification of the different species of salmonoid fishes.

Attempts to improve the flavour of certain *canned marine products* continued. Thus, a bacterial enzyme capable of removing the sugars glucose and ribose, which are largely responsible for undesirable browning reactions in fish muscles was studied in detail. The possible value of addition of certain antibiotics as a means of shortening the canning procedures was a subject of some preliminary experimental work. Various preservative treatments for fish were studied. It was found that, although circulating refrigerated sea water could easily be rendered almost free from living bacteria by passage through an ultraviolet light unit, the treatment had a very adverse effect on fish quality. Several tests were made in attempts to assess the value of "polyphosphate" treatments for frozen fillets, and early results indicated that development of thaw drip and of oxidative rancidity may be inhibited somewhat by such treatment.

Nutritional studies on British Columbia *herring meal* continued. Whole herring meal was found to be a comparatively uniform product of high nutritional quality. Other work indicated that the fat fraction, which accounts for some 15 per cent of the weight of the meal, can be protected during prolonged storage by antioxidant treatment so that it possesses a fairly high nutritive value for poultry.

Progress was made in a study of the means by which *salmon* form deoxyribonucleic acid in their milts during spawning. *Crabs* were shown to have very unique deoxyribonucleic acids which are of general chemical interest.

Further details of the above and other investigations by the Board's various establishments during the fiscal year 1962-63 are given in the Board's annual report, published separately.

RESEARCH VESSELS

A fleet of 17 vessels of various sizes was maintained by the Board during 1962 for its investigations off both east and west coasts as well as on inland and arctic waters. Its makeup was as follows:

| Name | Tonnage | Length | Crew |
|-------------------------------------|---------|--------|------|
| <i>St. John's, Nfld.—</i> | | | |
| A. T. Cameron..... | 330 | 177.5' | 25 |
| Investigator II..... | 52 | 78.4' | 9 |
| Marinus..... | 35 | 58.5' | 6 |
| Parr..... | 18 | 44.4' | 2 |
| <i>St. Andrews, N.B.—</i> | | | |
| Harengus..... | 48 | 77.6' | 9 |
| Mallotus..... | 13 | 53.8' | 4 |
| Pandalus II..... | 20 | 46.3' | 3 |
| Clupea..... | 11 | 30.2' | 1 |
| <i>Montreal, P.Q. (Arctic Unit)</i> | | | |
| Calanus..... | 5 | 47' | 2 |
| Salvelinus..... | 13 | 35' | — |
| <i>London, Ont.—</i> | | | |
| Cottus (Great Lakes)..... | 10 | 41.9' | 2 |
| Stenodus (Great Slave Lake)..... | 10 | 42.8' | 2 |
| <i>Nanaimo, B.C.—</i> | | | |
| G. B. Reed..... | 363 | 177' | 25 |
| A. P. Knight..... | 78 | 72.5' | 6 |
| Investigator I..... | 36 | 54.3' | 4 |
| Alta..... | 13 | 38.9' | 2 |
| Noctiluca..... | 8 | 30.1' | 1 |

INTERNATIONAL COMMISSIONS

CONSERVATION of fishery resources cannot be fully successful if it is confined to national boundaries. The Department of Fisheries has a main responsibility, of course, in protecting Canadian resources and allowing the maximum possible exploitation of them under sound principles of management based on scientific findings. Some fisheries, however, off both coasts and in the Great Lakes, are shared with other countries, and their regulation depends on co-operation among the fishing nations which benefit from them.

Canada has always recognized this need, and is a member of seven international commissions, the 1962 programs of which are outlined in the following pages. These commissions co-ordinate scientific investigations and recommend management procedures to governments interested in areas of common concern. Four of the conventions under which the commissions were established are multilateral agreements, dealing with the fisheries of the North-west Atlantic Ocean, the fisheries of the North Pacific, fur seals, and whales. The other three are bilateral, with the United States as the second member, and deal with Pacific sockeye and pink salmon of the Fraser River system, halibut of the North Pacific Ocean, and the fisheries of the Great Lakes.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The International Pacific Salmon Fisheries Commission established in 1937 as a result of a Convention between Canada and the United States is responsible for the preservation, protection and extension of the sockeye and pink salmon of the Fraser River in British Columbia. The Commission regulates the fisheries in the Convention area to provide an equal division of the sockeye and pink salmon catch between the two countries and to insure escapements adequate for the preservation of these stocks.

The sockeye run to the Fraser consists of a number of individual races spawning in separate tributary areas and ascending the river at characteristic times during the summer and autumn. Thus the total Fraser run is made up of a series of racial components overlapping to various degrees in timing as they pass through the fishery. These racial components vary in abundance from year to year, some of the more important races displaying very large variations in regular four-year cycles. In 1962 the large Adams River race was at the peak of its four-year abundance cycle. In its years of peak production the Adams race dominates the run to the Fraser.

Due to extremely poor marine survival, as was predicted by the Commission staff in December 1961, the 1962 sockeye run was very low in abundance and it was necessary to place severe restrictions on the fishery to insure a reasonably

satisfactory escapement of spawners. The catch of 1,595,000 was the lowest for this cycle since 1926. Canadian fishermen took 52.4 per cent and United States fishermen 47.6 per cent of this total.

To control exploitation effectively the abundance of the incoming runs to the Fraser must be estimated quickly and accurately from the catch per unit of fishing gear. In recent years the great increase in the fishing power of the fleet has rendered it a dangerous tool for gauging the size of the run when the run is small, since in these circumstances the spawning escapement can be jeopardized by even one day of excessive fishing. In 1962 in spite of some reduction in the units of fishing gear as the result of an anticipated small run, the United States fleet was able to catch almost 10 per cent of the total Adams run in one day of fishing during the peak of the run. When runs are small and the fishery severely restricted the Commission during the past decade has found it necessary to employ single units of gear and other methods to augment the information on the size of incoming runs during periods closed to fishing.

The escapement of 1,623,000 spawners (49 per cent of the total run) was below that of the preceding cycle years of 1958 and 1954. Although 60 per cent of the Adams run was allowed to reach the spawning grounds the escapement of this race was below that of previous cycle years. However spawning and early incubation conditions were excellent and in general while escapement was below a maximum it was well distributed and given continued favorable conditions it is capable of producing a substantial run in 1966.

Several studies were in progress during 1962 which were aimed at increasing the production of sockeye of the Fraser River. A blockade in the Fraser Canyon was isolated which historically has caused intermittent but extensive damage to the Early Stuart race and remedial measures were recommended. The elimination of this blockade to migration could add many millions of dollars to the economic value of this sockeye race in ensuing years while at the same time protecting existing gains resulting from the fishways at Hell's Gate. A study of an unstable spawning stream tributary to Harrison Lake indicated that a substantial increase in productivity could be attained by the construction of an artificial spawning area having a stable gradient and a controlled flow. A heavy mortality of unspawned sockeye occurred on the Horsefly River in 1961 due to unusually high water temperatures. Engineering studies have shown that sufficient cold water could be diverted from adjacent lakes to prevent the loss of unspawned fish in future years.

Although pink salmon do not run to the Fraser River in the even-numbered years, the progeny of the previous year's run emerge from the spawning grounds in the spring and migrate immediately to sea. The artificial spawning channel at Seton Creek which accommodated 6700 spawners in 1961 produced 3,592,000 fry in the spring of 1962, equal to 52.4 per cent of the eggs deposited. The increased value of this single brood, when it returns in 1963, could well repay more than the cost of \$34,000 for this facility. In the spring of 1962 methods were established for sampling the entire Fraser output of pink salmon fry by means of mobile traps operated near the upper limit of tidal influence in the

river. This work provides a useful index of freshwater production. Further exploratory field work was also conducted on the distribution, growth and relationships with temperature and salinity of young pink salmon in inland waters adjacent to the Fraser mouth.

The Sweltzer Creek Experimental Station at Cultus Lake was completed and went into operation during 1962. Among the studies being actively pursued at this station was a carefully controlled examination of the effects of abnormal temperatures on the overwinter survival of sockeye eggs in two important Fraser River spawning areas. Another major segment of the work at this station was concerned with reaching an understanding of the differences in viability of hatchery and naturally produced fry.

Protection of Fraser River sockeye and pink salmon from possible deleterious effects that could be created by other water use developments continues to be an important phase of the Commission's activities. In dealing with these developments, the Commission works in close co-operation with the Department of Fisheries and its staff acts as technical advisers to the Department whenever appropriate. A major concern during 1962 was with disposal of wastes from bleached kraft pulp mills proposed for Kamloops and Prince George. Intensive studies were made by the Department and the Commission on means of preventing effects harmful to fish of pulp mill wastes through in-plant control and waste treatment. A co-operative study was also made of a proposal by the Federal-Provincial Fraser River Board to place a dam on Stuart Lake as part of an over-all flood control plan. Since the site of this dam is on the migration route of the important sockeye run to Stuart Lake, the proposal posed serious fishery problems. As a result of these and similar studies by the fisheries agencies, the Board is now concentrating its studies on a system of dams which would not obstruct the migration of sockeye and pink salmon.

The Commission held 12 formal meetings during 1962. Canadian members 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 the International Fisheries Commission, in 1923 by treaty between Canada and the United States to investigate the declining Pacific halibut fishery, and to recommend measures for its rehabilitation. Investigations begun by the Commission in 1925 proved that the halibut had been overfished, and that an appropriate reduction in the amount of fishing would be required to restore the fishery.

Subsequent treaties of 1930, 1937 and 1953 continued the Commission and provided authority to apply specific types of remedial measures, chief of which was the limiting of catches by areas. The present treaty, 1953, requires that the stocks shall be developed to levels permitting maximum sustained yield and be maintained at those levels, also that the regulations shall be based on scientific investigations.

As a result of controlled fishing which began in 1932, the stocks have trebled in size and the permitted annual catch in 1962 was 75 per cent above that taken by the uncontrolled fishery immediately prior to regulation. The present level of catch is estimated to be close to the sustainable maximum.

The 38th annual meeting of the Commission was held at Seattle from February 13 to 16, 1962. The results of the investigations and the condition of the fishery were reviewed and proposals of the industry and of the staff for regulation in 1962 were discussed in open meeting.

In executive sessions the Commission approved a research program and budget, and dealt with other fiscal and administrative matters. It also formulated the regulations for the 1962 fishing season, which became effective on March 27 on approval of both the Governor General of Canada and the President of the United States.

The 1962 regulations were substantially the same as in 1961. There were five management regions: Area 1—south of Willapa Bay, Washington; Area 2—Willapa Bay to Cape Spencer, Alaska, which includes the grounds off British Columbia and Southeastern Alaska; Area 3A—Cape Spencer to Shumagin Islands; Area 3B South—Shumagin Islands to Cape Sagak; and Area 3B North—the Bering Sea. The catch limits for Areas 2 and 3A were 28,000,000 pounds and 33,000,000 pounds respectively, the same as in 1961.

During the 1962 fishing season in Area 2, which commenced on May 9 and terminated on September 8, the catch was 28.4 million pounds including 192,000 pounds caught incidentally to other setline fishing after closure. This total was about equally divided between the United States and Canadian fleets and slightly under the 28.8 million pounds of 1961. In Area 3A the season commenced on May 9 and terminated August 11 with a catch of 34.7 million pounds, of which 14.8 million were taken by Canadian vessels. In Area 3B South, which was opened April 19 and closed September 30, a catch of 4.1 million pounds was taken, 2.3 million by Canadian vessels. The combined catch from Areas 3A and 3B South was equal to the amount which has been calculated to be the present maximum sustainable yield for the two areas.

For Area 3B North, the Bering Sea, which opened March 28 and closed October 15, the catch amounted to 7.3 million pounds of which 3.4 million were caught by the Canadian fleet.

The Pacific coast catch was 74.9 million pounds, exceeding the previous all-time high of 71.9 million. The Canadian fleet took 34.8 million pounds, over four times the amounts taken in the years immediately preceding regulation.

The catch per unit effort in Area 2 in 1962 again declined, indicating that annual catches might require some further reduction if the downward trend continues. Some decline also occurred in Areas 3A and 3B South, but catches should be maintained at current levels to verify present estimates of maximum sustainable yield. In Area 3B North, the Bering Sea, the catch per unit effort was about the same level as in 1961, and the catches should be held at present levels to test the productivity of this segment of the halibut population west of Cape Spencer.

To investigate the composition of the stocks, about 104,000 measurements with 35,000 otoliths and 19,500 sex determinations were obtained by sampling the landed catches and the catches of commercial and chartered vessels at sea.

In Area 2 off British Columbia nine-year-old or younger fish largely supported the fishery and the formerly strong 1951 year class had diminished greatly. Off Southeastern Alaska the 1951 and 1954 year classes continued to be important though they were declining. In Area 3A the 1951 class remained very prominent but some younger classes that entered the fishery quite strongly were declining more rapidly than expected. In Area 3B South the fish were younger than in Area 3A.

In the Bering Sea, 11-year-olds accounted for 35 per cent of the weight of the catches. Older groups were contributing little. The deficiency of the latter is a reflection of the intensive fishing that has been conducted on these grounds in recent years.

In 1962 tagging was again conducted on the vessels engaged in the trawl survey. A total of 5733 fish, mostly fish under commercial size, were released on grounds between Cape Scott and Unimak Pass.

A total of 772 recoveries were made in 1962 of which 25 had been released during the trawl survey in 1961. Seven tags were returned by Japanese trawlers from the eastern Bering Sea. Also, United States vessels recovered seven tags released by Japanese exploratory vessels off British Columbia and in the Gulf of Alaska.

The chartered vessel *Astronaut* made 130 otter trawl hauls in 1962 between Dixon Entrance and Kodiak Island during August and September in continuing investigation of the abundance of halibut below commercial size. Consistencies observed in the changes in year-to-year catches at a number of key locations suggest that these investigations may be used to indicate the relative strength of the various brood years, and possibly to predict their subsequent contribution to the fishable stock and to determine at what stage of life the greatest mortalities occur.

The Commission continued the trawl survey of the demersal fish stock on grounds west of Cape Spencer, Alaska. The survey was commenced in 1961 on behalf of the two governments to estimate the potentialities of the region for bottom trawling and the effect such fishing might have upon the supply of adult and juvenile halibut.

In 1962 a third round of sampling was completed west of Kodiak Island and two rounds on grounds east of Kodiak Island. In the latter region, as in the former, halibut were taken at about three-quarters of the trawlable stations and were mostly under legal size. They represented about five per cent of the total weight of fish caught.

A general report upon the regulation of the fishery and investigations during 1961 was published, also a scientific report entitled "Utilization of Pacific Halibut Stocks: Estimation of Maximum Sustainable Yield, 1960". Several other scientific reports dealing with various features of the investigations were prepared for early publication, including one of the halibut fishery in Bering Sea.

The Commission held its 39th annual meeting at Petersburg, Alaska, January 28 to 31, 1963. At the conclusion of a number of sessions with the representatives of the industry and with the staff, regulations were formulated for the 1963 fishing season. They were substantially the same as in 1962 except that the catch limit in Area 3A was increased from 33.0 to 34.0 million pounds. They became effective on March 21, 1963 upon approval of the Governor General of Canada and the President of the United States. It was recognized that the foregoing regulations would require some revision in the event Canada, the United States and Japan all approved certain joint conservation measures for the halibut of the eastern Bering Sea as recommended by the International North Pacific Fisheries Commission.

The Commission approved the continuation of the basic research program including two major tagging studies, one on the flats in the Bering Sea using both trawl and setline fishing, and another off Kodiak Island using setline fishing only. It also decided that the special trawl survey being conducted for the two governments would be terminated at the end of March 1963.

The Canadian Commissioners in 1962 were Dr. William M. Sprules, Vice Chairman, Ottawa; Harold S. Helland, Prince Rupert; and Richard Nelson, Vancouver. At the 1963 annual meeting, Dr. Sprules was elected Chairman and Harold E. Crowther, of the United States, Vice Chairman for the ensuing year.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

The International North Pacific Fisheries Commission was established by treaty between Canada, Japan and the United States for the conservation of the fisheries resources of the North Pacific Ocean. The treaty came into effect on June 12, 1953, and has a guaranteed minimum life of ten years and thereafter until one year from the date on which any member country gives notice of termination. Each member country is represented by four commissioners. The headquarters of the Commission are located in offices in the Technological Laboratory of the Fisheries Research Board of Canada on the campus of the University of British Columbia in Vancouver.

Although the Commission's terms of reference include any species of fish of joint interest in the North Pacific Ocean, its principal attention has been focused on the salmon, halibut, herring and king crab resources of the region. The North Pacific treaty contains provisions embodying what has become known as the "abstention" principle. Under these provisions one or more member nations will abstain from fishing for stocks of fish of particular species in particular areas provided it can be determined that:

1. Scientific evidence indicates that the stock is fished so heavily that more fishing would not provide a substantial additional catch which could be sustained year after year,
2. The stock is subject to conservation measures based upon scientific research, for the purpose of maintaining or increasing its maximum sustained productivity, and

3. The stock is subject to an extensive research program to discover whether it is being fully utilized and to find how its productivity may be maintained at a maximum.

At the time the treaty was negotiated it was agreed that the salmon, halibut and herring stocks along the Pacific coast of North America met these requirements. The treaty provided that after five years the Commission should make an annual review of each stock to determine if it still met the conditions for abstention. These annual reviews began in 1958 and have continued each year thereafter.

The salmon abstention question is complicated enormously by the fact that large numbers of salmon originate in Asian streams and that, in so far as the tripartite convention is concerned, Japan is under no obligation to refrain from fishing for salmon originating outside of North America. The framers of the treaty realized that salmon from Asia might intermingle in the ocean with salmon from North America. Therefore, the Commission was assigned the task of determining if there were areas in which salmon originating in the rivers of North America intermingled with salmon originating in the rivers of Asia. Research on this question began on an intensive scale in 1955 and has been continued each year thereafter. The Commission's research program is executed by previously-established research agencies in each of the three countries. The Fisheries Research Board of Canada is responsible for conduct of Canada's share of the Commission's investigations. A provisional line at 175° West longitude, still in force, limits the eastward movement of Japanese salmon fishing vessels.

As a result of the co-operative international fisheries research fostered by the Commission, the northern part of the North Pacific Ocean—the marine home of the salmon—has now become one of the best known of the world's oceans. Salmon of all species (and steelhead) have been proved to spend their ocean life across the full width of the Pacific. During the winter their southern limit of distribution lies roughly at 40° North latitude—close to the latitude of San Francisco. In summer, salmon are found as far north into the Bering Sea as research vessels have been able to operate. In winter, their northern limit coincides roughly with the region of the Aleutian Islands. Each year's investigations have confirmed the existence of a great intermingling zone for salmon in the ocean. Stocks of salmon from certain parts of Asia and from portions of the United States west of Kodiak mix in a broad area south of the Aleutian Islands, approximately 2,000 miles wide, extending from about 167° East longitude to about 145° West longitude.

In 1962, the Commission continued its large-scale investigations of the distribution, origin, abundance and intermingling of salmon on the high seas. Study of the oceanography of the region was also continued, in order to understand causes of variations in salmon distribution. A highlight of the 1962 investigations was the undertaking by Canada of a large-scale program of tagging salmon on the high seas in the Gulf of Alaska. This venture has provided immensely valuable information on the origin of salmon found in that region and gives promise of even more useful results if it can be continued in the future.

In 1962, the Commission gave emphasis to reporting of the results of its research programs. Teams of scientists from the three countries are engaged in the preparation of a large number of reports which will incorporate all that is known about the subject of the ocean life of salmon.

At its 1962 annual meeting, the Commission, after years of study, determined that the halibut stock of the eastern Bering Sea and the herring stock off the west coast of the Queen Charlotte Islands no longer met the abstention requirements of the treaty. Accordingly, it was mandatory under the treaty for the Commission to recommend to the member governments that these stocks of fish be removed from the list under abstention and thus made accessible to Japanese fishermen. At the same time, the Commission established research groups to provide information from which conservation programs for these stocks could be developed by the Commission for recommendation to the member governments. The Commission decided to hold a special interim meeting in Tokyo in February 1963, for the purpose of working out details of the conservation measures that would be required for the halibut of the eastern Bering Sea when this stock was no longer under abstention by Japan.

The Commission plans to continue its extensive program of high seas salmon research in 1963. Increased emphasis will be given to research in areas and at times of the year where coverage has been least. Preliminary plans indicate that a total of about 25 research vessels of various types will be engaged in high seas investigations under the Commission's program during various parts of 1963 in the northern half of the North Pacific Ocean. Groundfish investigations of substantial magnitude will also be part of the research program.

In 1962, the Chairman of the Commission was Edward W. Allen of the United States, the Vice-Chairman was George R. Clark of Canada, and the Secretary was Iwao Fujita of Japan. The other Canadian members of the Commission were John M. Buchanan of Vancouver, James C. Cameron of Pender Harbour, and Roger T. Hager of Vancouver. The Executive Director of the Commission's staff was Roy I. Jackson and the Assistant Director was Dr. Hiroshi Kasahara.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

In 1949, ten interested nations, recognizing the problem of reduced abundance and potential depletion of the more than 300-year-old fisheries in the Northwest Atlantic, resolved to conclude a Convention for their investigation, protection and conservation.

In 1951, the International Commission for the Northwest Atlantic Fisheries (ICNAF), was established under the terms of the Convention. At the present time, the Governments of Canada, Denmark, France, Federal Republic of West Germany, Iceland, Italy, Norway, Poland, Portugal, Spain, U.S.S.R., U.K. and U.S. are members. The main purpose of the Commission is "to make possible the maintenance of a maximum sustained catch from the fisheries of the Northwest Atlantic area".

For more than 10 years, the Commission has, through continued research efforts, gained a considerable knowledge of the fishery resource. With such knowledge, the Commission has been able to propose beneficial international regulations of the trawl fisheries in the Convention Area. In ICNAF subareas 4 (Gulf of St. Lawrence and off Nova Scotia) and 5 (off New England) a 4½-inch minimum mesh size is in force for cod and haddock and a 4-inch minimum mesh size is in force for the same species in subarea 3 (off Newfoundland). In addition, proposals have been made to member governments to adopt a minimum mesh size of 4½ inches for these species for the whole Convention Area (including subarea 1 (off Greenland) and subarea 2 (off Labrador). Studies are being conducted on the possible need for regulation of the fisheries for other groundfish species and the scallop. Efforts are being made to have the harp and hood seal fisheries included under ICNAF for study.

In 1962, the Commission published the report of a working group of scientists on fishery assessment in relation to regulation problems and has continued to assess the state of the fish stocks and the effects of fishing upon them. Gains were made in the assessment of transitional effects following the introduction of mesh size changes and on the effects of changes in fishing effort.

Emphasis on environmental studies in the Commission has produced plans for an Environmental Symposium to be held in Rome with the assistance of FAO during January 1964. In addition, plans were completed for a joint survey to be known as NORWESTLANT 1-3. The survey is to establish the distribution and drift of cod eggs and larvæ and redfish larvæ in relation to environmental conditions during April-July, 1963, in the waters from the west, east and south of Greenland to the Grand Banks of Newfoundland. Eight member nations are supplying ships, personnel and equipment.

Efforts were again concentrated on improving the Commission's statistics of the fisheries. Co-ordination of ICNAF statistics with those of ICES and FAO in the North Atlantic area were given special study.

The problems of identification and resolution of discrepancies in age readings from otoliths of cod were met, with considerable success, at the Commission's Workshop on Ageing Techniques held in Bergen, Norway in November, 1962.

Scientific papers presented at the 1961 ICNAF Fish Marking Symposium and at the 1957 ICNAF/ICES/FAO joint scientific meeting on the Selectivity of Fishing Gear are in press as ICNAF special publications numbers 4 and 5 respectively. Preliminary plans were made to initiate the "Research Bulletin of ICNAF", a publication in which results of scientific works of direct importance to the Commission can be published.

The Twelfth Annual Meeting of the Commission was convened in Moscow, U.S.S.R., June 4-8, 1962, and was preceded by nine days of meetings of the scientific advisory bodies. Consideration was given to the possibility of introducing an international enforcement system and to the possibility of increased activity by the Commission to ensure an adequate conservation of the fisheries in the Convention Area. Canadian Commissioners during 1962 were G. R. Clark,

Deputy Minister, Department of Fisheries, Ottawa, and Chairman of ICNAF; H. R. Earle, Earle Sons & Co. Ltd., St. John's, Newfoundland, and J. H. MacKichan, General Manager, United Maritime Fishermen Ltd., Halifax, N.S.

GREAT LAKES FISHERY COMMISSION

The fish populations of the Great Lakes have undergone major changes which have been most marked in the past 20 years. Some abundant species have dwindled and practically disappeared while others have increased explosively. Intensification of fishery problems caused by the spread of the parasitic sea lamprey led to ratification of the Convention on Great Lakes Fisheries by Canada and the United States in 1955 and the establishment of the Great Lakes Fishery Commission. The Commission was given the responsibility of formulating and recommending measures to improve the harvest of fish stocks of common concern and eradicating or minimizing populations of sea lamprey.

The program to control sea lamprey is carried out by Commission contracts with the Fisheries Research Board of Canada and the U.S. Bureau of Commercial Fisheries. Since 1958, a chemical selectively toxic to sea lamprey has been added to streams to destroy young sea lamprey during the initial non-parasitic stage of their life cycle. The program has been concentrated in Lake Superior where 85 streams have been treated, 17 during 1962. Second treatments have also been carried out in 22 streams to destroy re-established populations. Eleven additional lamprey-producing streams were discovered in 1962 and will be treated in 1963.

Results of the chemical program were first observed in the fall of 1961 when the incidence of wounds on lake trout dropped sharply from levels recorded for previous years. Subsequently, the 1962 catch of lamprey at 37 electrical barriers, operated during the spawning runs to follow changes in lamprey abundance, also dropped sharply in 1962 to approximately 10,000 compared with an average annual catch of 55,000 for the preceding five years.

The lake trout population appears to be responding to the reduction in lamprey. The average weight of trout taken in the commercial fishery has increased by almost 30 per cent in some areas. Large trout (over 25 inches) which were extremely scarce in 1960 and 1961 were taken in greater numbers in 1962. In Wisconsin waters the catch per unit of effort of these large fish increased sevenfold over 1961 and was higher than in 1959. The increasing abundance of large fish may herald the recovery of natural reproduction in inshore areas, which has been negligible since 1959.

The growing scarcity of mature trout in 1958 led to the development of a lake trout rehabilitation program, which has been carried out by federal, state and provincial agencies and co-ordinated by the Commission. In addition to the rearing and planting of 1.8 million distinctively marked yearling trout in 1962, agencies have continued routine examination of the commercial catch and

sampling of the lake trout stocks with trawls and gillnets. This program is providing information on the rates of recovery of lake trout populations and the success of plantings made by different methods and in different areas.

The Commission has recognized the need for a limitation on fishing to hasten recovery of the lake trout in Lake Superior and recommended that the catch in 1962 be limited to that required for biological studies. The states concerned have accordingly closed their commercial fishery but have issued permits to a limited number of fishermen carrying out assessment fishing under contract. The Province of Ontario established district quotas permitting a limited catch which has been sampled by a staff of the Fisheries Research Board of Canada.

Although the programs of sea lamprey control and lake trout rehabilitation have been concentrated on Lake Superior, surveys and treatments have been carried out on Lake Michigan and Lake Huron. Surveys, which were completed on Lake Michigan during 1962, have located young lampreys in 96 streams. Forty-five of these streams have been treated, eight during 1962. On Lake Huron 23 streams have been treated in the North Channel and Georgian Bay, two during 1962.

In the summer of 1962, the Commission's attention was drawn to the abundance in Lake Erie of young walleye hatched that spring and to the fact that a series of year class failures had contributed to the failure of the fishery for this species. The Commission was asked to review all pertinent information on the walleye fishery and determine if special measures should be taken to protect the 1962 year class. Information on changes in the walleye fishery and environmental condition was presented at the Commission's Interim Meeting by agencies engaged in fishery research on the lake, and referred to the Scientific Advisory Committee for study and comment.

The Commission has also been concerned with the formulation of a program of investigations including economic, technological, and biological studies of the Great Lakes fishery. Meetings were held during 1962 for each lake at which major problems were outlined by the agencies responsible for the management of the fishery. These discussions are playing a major role in developing the program and assigning of priorities. The program will be reviewed by the Commission at its 1963 Annual Meeting.

Canadian members of the Commission during 1962 were Dr. A. O. Blackhurst, Port Dover, Ontario, Dr. J. R. Dymond, Toronto, and Dr. A. L. Pritchard, Ottawa. Dr. Pritchard, who is Director of the Conservation and Development Service of the Department of Fisheries, was elected Chairman of the Commission at the 1962 Annual Meeting.

NORTH PACIFIC FUR SEAL COMMISSION

The success of the North Pacific Fur Seal Commission in developing stocks of the fur seals of the North Pacific Ocean was reflected in the decision, made at its Sixth Annual Meeting held in Washington in November-December 1962, to allow a somewhat higher harvest of seals in 1963 than before.

The Commission, made up of representatives of Canada, Japan, the U.S.A. and the U.S.S.R., was established under the 1957 Interim Convention on the Conservation of the North Pacific Fur Seals. Scientists of the four participating countries carry out research at sea, conducting investigations into the dynamics of fur seal populations, distribution and migration of the seals in the ocean, feeding habits and harvesting methods.

Research and management programs on the northern breeding grounds, as well as catching operations, are carried out by two member countries—the United States on the Pribilof Islands in the eastern Bering Sea, and the Soviet Union on the Commander Islands in the western Bering Sea and on Robben Island in the Sea of Okhotsk.

The Canadian Commissioner in 1962 was George R. Clark, Deputy Minister of Fisheries, who was elected chairman at the Sixth Annual Meeting. At the meeting Dr. W. M. Sprules, Special Assistant to the Deputy Minister and Alternate Commissioner for Canada, acted for Mr. Clark, who was unable to attend.

Pelagic sealing (the killing of seals at sea) is forbidden under the terms of the Convention except for certain specific numbers that may be taken pelagically by scientists for research programs and by aborigines using primitive weapons.

During 1962 the commercial land take of seals on the Pribilofs was 77,929, and on the Commander Islands and Robben Island, 12,427. The Convention contains a provision whereby Canada and Japan each receive 15 per cent of the seal skins taken in commercial operations on the breeding grounds under U.S. control and, subject to certain stipulations, Canada and Japan are entitled to a like percentage of the commercial take on the breeding grounds under control of the U.S.S.R. Canada's share of the North Pacific fur seal skins sold during the fiscal year 1962-63 produced a net revenue of \$488,854, from 9654 skins.

The Commission's major responsibility is to determine measures which will make possible the maximum yield from the fur seal resources, with due regard for their relationship to the productivity of the other living marine resources of the sea. The Convention required that the Commission recommend to the four Governments at the end of the fifth Convention year (October 13, 1962) the methods of sealing best suited to achieve this objective.

To aid it in determining the best methods of sealing, the Commission reviewed two reports prepared by its Standing Scientific Committee. One reflected the results of research conducted from 1958 through 1961 by scientists of the four countries, and the other reported on research conducted during the 1962 season.

The Commission took into account the current scientific knowledge of fur seals and the present technology of land and pelagic sealing, and recommended to its member governments that land sealing when carried out under strict government control and in accordance with appropriate measures regarding the size, sex and age composition of the seasonal kill from a herd, is the method best suited to achieve the objectives of the Convention. The

Commission also recommended that research be continued on methods of sealing as well as on other measures necessary to achieve the objectives of the Convention.

During 1962, scientists of the four member countries conducted extensive researches at sea and the results of these operations, together with those of the U.S.A. and the U.S.S.R. on the breeding grounds, were reviewed by the Commission. Recoveries of tags from seals taken in research collections at sea and in harvests on the breeding grounds indicated that the seal herds of the eastern and western regions of the North Pacific Ocean intermingle to some extent both at sea and on the breeding islands.

It was planned to obtain additional information during 1963 on the intermingling, distribution, abundance and food habits of the herds. On land, the scientists planned to concentrate on studies of sizes, changes and trends in fur seal populations. Invitations were extended by the Soviet Union to the scientists of the other member countries to visit the Robben Island seal rookeries during harvesting operations in 1963. It was decided that the Seventh Annual Meeting of the Commission would be held in Moscow, probably in February 1964.

INTERNATIONAL WHALING COMMISSION

The whale stocks of the world, threatened by the pressure of whaling expeditions from countries in both hemispheres, have been the concern since 1946 of the International Whaling Commission, formed under the International Whaling Convention signed that year in Washington. Canada has been a member country since the Commission's inception. The function of the Commission is to recommend catch quotas, closed seasons, minimum size limits and methods of catching whales to the member governments, and one of its main responsibilities is the establishment of a total quota for Antarctic pelagic whaling. Recommendations are based on scientific investigations which are under the direction of a special committee.

The Fourteenth Annual Meeting of the Commission was held in London in July 1962 under the chairmanship of G. R. Clark, Deputy Minister of Fisheries of Canada. Representatives of Contracting Governments were present from Argentina, Australia, Canada, Denmark, France, Iceland, Japan, Mexico, the Netherlands, New Zealand, Norway, South Africa, Sweden, the United Kingdom, the United States of America and the Union of Soviet Socialist Republics. Brazil and Panama were not represented. The Food and Agriculture Organization of the United Nations, the International Council for the Exploration of the Sea, Chile and Italy all sent observers.

The Netherlands, which had withdrawn from the Convention because of a previous disagreement, outside the Commission, on the division of the Antarctic quota, had returned to the Convention two months before the Fourteenth Meeting took place.

The Commission discussed the condition of the stocks of whales, the subject of a report by the Scientific Committee, and agreed that the stocks of the most

commercially valuable species should be a cause of great concern. Methods of protection and an international observer scheme, to see that catch quotas were not exceeded, were considered.

A suspension of the Antarctic blue whale unit catch limit, decided upon at the Twelfth Annual Meeting, ended with the 1961-62 season. The limit therefore returned to 15,000 blue whale units for the total catch by all countries. (One blue whale unit is one blue whale or two fin whales or two and one-half humpback whales or six sei whales.)

It was decided that the blue whale unit limit should remain as it was but that the situation should be re-examined at the next meeting in the light of findings made by the scientific investigators, who were instructed to extend stock assessments, formerly limited to baleen whales, to sperm whales in all regions and eventually to all other species of economic importance.

On the advice of the Scientific Committee, the Commission agreed that, as the condition of baleen whale stocks was so poor, no extension of the open season was permissible, and that it should therefore remain from December 12 to April 7 for the forthcoming season.

SPECIAL COMMITTEES

FEDERAL-PROVINCIAL COMMITTEE FOR ONTARIO FISHERIES

THE DEPARTMENT of Fisheries of Canada and the Ontario Department of Lands and Forests have a mutual interest in research programs and management practices affecting fisheries within the province, and the Federal-Provincial Committee for Ontario Fisheries meets annually to review the progress made and plan the forthcoming year's programs.

During 1962 federal officials on the Committee were Deputy Minister of Fisheries George R. Clark and the Special Assistant to the Deputy Minister, Dr. W. M. Sprules, chairman and secretary of the Committee, 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. Ontario members were F. A. MacDougall, Deputy Minister of the Department of Lands and Forests; Dr. C. H. D. Clarke, Chief, Fish and Wildlife Branch, Department of Lands and Forests; R. N. Johnston, Chief of the Research Branch, and Dr. F. E. J. Fry of the Department of Biology, University of Toronto.

Under the Committee's terms of reference each of the contracting governments has clearly defined responsibilities. For the federal Government these are: lamprey research and control in Lake Superior, and lamprey investigations in the other Great Lakes as required; general fisheries research on Lake Superior; economic studies on all the Great Lakes after consultation with the Ontario Department of Lands and Forests; and technical studies, including gear research and demonstration, also after consultation with the Department of Lands and Forests. The provincial Government has responsibility for: general fisheries research on Lakes Huron, Erie and Ontario; collection of routine statistics of the commercial and sport fish catches on each of the Great Lakes; and hydrographic surveys of a broad general nature on each of the Great Lakes concerned.

Research programs on Lakes Ontario, Erie, St. Clair, Huron and Superior are designed and directed by a "lake co-ordinator" appointed for each lake. The co-ordinators report on the investigations conducted by the two governments as well as, in a general way, on researches carried out by other agencies. Their reports to the annual meeting of the Committee, held in October, showed that a wide range of studies on various species had been conducted during the year.

On lamprey work, the Committee was told that the return of lampreys to check streams on both sides of Lake Superior had shown a marked reduction in the spring of 1962, when compared with the average return during the preceding five-year period. The Great Lakes Fishery Commission reported its conviction that experimental control on Lake Superior was producing favourable

results based on the significant reduction in lamprey abundance, the decrease in the number of new scars on fish caught and the increase in the size of lake trout taken in the commercial catch.

It was estimated that the annual cost of lamprey control in the future on Lake Superior would approximate \$300,000 to \$500,000 once a selected poison was proved effective.

The Committee agreed that the results obtained to date were encouraging and expressed the opinion once again that the main lamprey control program should be confined to Lake Superior until the control methods had been proved and refined.

The lake trout rehabilitation program on Lake Superior was reviewed, and it was reported that there had been an increased return of planted hatchery stock in the fisheries each year. The hybrid trout program also showed progress and it was decided that the experiments begun in 1954 should be continued.

The Committee also heard a report on the gear development program on Lake Erie, which had been directed mainly at the efficient capture of smelt and perch. As a result of experiments, effective regulations for smelt fishing had been devised. Work on perch is continuing.

Another report to the Committee stated that an economic survey of the Great Lakes fisheries had been completed and a draft report of the findings should be ready by the end of the year.

FEDERAL-PROVINCIAL ATLANTIC FISHERIES COMMITTEE

A close liaison has developed in recent years between federal and provincial fisheries authorities. Co-ordination of programs in fisheries matters of mutual concern has resulted from the activities of the Federal-Provincial Atlantic Fisheries Committee, members of which in 1962 were George R. Clark, Deputy Minister of Fisheries of Canada, Chairman, and the Deputy Minister of Fisheries, or an official of equivalent level, from each of the provinces of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland.

The Committee, formed in 1958, considers proposals and recommendations with regard to fisheries matters of joint and common interest, and makes recommendations to the various governments for the implementation of programs and projects. It also encourages the exchange of information to assure co-operation and co-ordination of efforts.

At the fourth annual meeting, held in May 1962, particular attention was paid to the problem of maintaining Canada's position in the northwest Atlantic in the face of increasing competition there from the fishing fleets of Europe. The matter of fishing efficiency also was discussed. Under this over-all term the basic interests involved concern the following: fish concentrations and behaviour; underwater gear research; the utilization of species not now taken by Canadian fishermen or discarded as waste; vessels, equipment and gear performance studies; studies of vessels and composition of the fishing fleet; the economic effects of fisheries regulations and price determination, and crew earnings as they affect efficiency.

Other items considered at the meeting were educational and vocational training, a review of the programs of the Fisheries Research Board of Canada, the economic outlook for Atlantic coast fisheries, reports on industrial development, inspection of fish products, and consumer work. There were also reports and reviews by provinces.

Included in the latter subjects were accounts of the progress being made in stern trawler design, community processing facilities, refrigerated trailers, drum dried products, reports from the salmon and trout and oyster sections of the main committee, studies of vessel design, and provincial legislation with regard to inspection of fish products.

THE FISHING INDUSTRY, 1962

ON THE BASIS of past production values, the year 1962 was the most successful season in the history of the Canadian fisheries. Preliminary figures place the total landed value of fish and shellfish at close to \$130 million, a rise of about 16 per cent from the level of 1961. The estimated marketed value of all fishery products—representing an approximation to the value of processed fishery products at the plant plus the wholesale value or export value of unprocessed products—was in the neighbourhood of \$250 million (being usually a little less than double the landed value). The volume of landings in 1962, at 2,131,000,000 pounds, fell a little short of the record 1956 figure of 2,197,000,000.

The 1962 landings for the two coastal regions—totalling 1,320,000,000 pounds valued at \$67.9 million for the Atlantic Coast provinces and 687,000,000 pounds worth \$49.0 million for the Pacific Coast—represent volume increases from 1961 of nine per cent and seven per cent, respectively, and value increases of 15 per cent and 24 per cent. The increased landed values for both regions resulted from somewhat higher average prices as well as from the increase in quantities landed: the 1962 average landed value for the Atlantic Coast was about 5.2 cents a pound compared with 4.9 cents in 1961 and for British Columbia about 7.1 cents compared with 6.2 cents for the previous year. The estimates for the freshwater fisheries—at 125,000,000 pounds worth \$12.5 million in 1962—indicate some increase in poundage landed but little change in the total value from 1961 or in the average value of about ten cents a pound.

The value of all fishery products exported from Canada during 1962 was \$156.6 million, compared with \$143.3 million in 1961—a rise of about nine per cent. Imports of fishery products, at \$14.2 million, were valued at about one million dollars more than in the previous year, but one-and-a-half millions below the average for the last five years. Among the categories of products contributing substantially to the increase in export value for 1961 were “Fresh and frozen fillets” (\$3.6 million higher), “Molluscs and crustaceans” (up \$2.6 million), “Fresh and frozen fish, whole or dressed” (up \$2.2 million) and “Canned fish” (higher by \$1.8 million). Exports to the United States in 1962, which included the greater part of the fresh and frozen fish and shellfish items, had an aggregate value of \$114.3 million—73 per cent of the value of all Canadian fishery exports. Shipments to the United Kingdom were valued at \$14.1 million, to continental Europe at \$8.6 million and to the Caribbean area at \$16.5 million.

The Atlantic Area

The lobster, produced seasonally by an inshore, small-boat fishery, is the leading species in the Atlantic fisheries in terms of unit value and total value. The products are lobsters alive or cooked and frozen in the shell and lobster

meat, cooked and chilled or frozen or hermetically sealed in cans. The principal markets are in the United States, but 1962 brought some further development of European markets for live lobsters shipped by air.

Codfish is second in landed value among the Atlantic fisheries, about one-half of the total quantity landed being processed into frozen fillets and blocks for sale chiefly in North American markets and the other half utilized for the production of salted fish products, mainly for sale in Mediterranean and



Halibut boat in Hecate Strait, B.C.

Caribbean countries. Newfoundland accounted for about two-thirds of the Atlantic landings of cod in 1962, the total for the province, 377,000,000 pounds, being somewhat above the 1961 figure but near to the average of the last seven years. A decreasing proportion of Newfoundland cod is going into the production of salted fish—about 61 per cent in 1962 compared with 84 per cent in 1953—because of the increasing demand for frozen groundfish products and the development of freezing and filleting capacity in Newfoundland to supply this demand. The Atlantic production of fresh and frozen fillets, frozen blocks of fillets and frozen fish sticks and portions from other groundfish species, such as haddock, redfish and the small flatfishes also increased in 1962.

In the Maritime provinces, additional vessels entered the scallop fishery in 1962 and landings were more than three million pounds above those of 1961. Swordfishing also drew additional fishing effort, and the prices realized were somewhat higher in both fisheries. Herring fishing brought unusually good results in September, contributing to the increased catch (see page 105, *Statistics of the Fisheries*). Among the miscellaneous products, the seal fishery was more successful than in the previous year, and gatherers of Irish moss realized a higher value for their product in spite of a reduction in the amount harvested. The Newfoundland summer cod-trap fishery was much better than in 1961, but scarcity of squid for bait and rough weather adversely affected the autumn inshore fishery.

A number of new fishing craft were added to the Atlantic fleets in 1962, including trawlers, longliners and smaller boats (a large number). There was an increase in the numbers of both inshore and offshore fishermen in Newfoundland, although it is probable that the total for the Atlantic fisheries was not greatly changed.

The Inland Area

About three-quarters of the Canadian freshwater fish production is marketed in the United States, and the proportion is somewhat greater for higher-valued species such as walleye (pickerel), whitefish and lake trout. The declining trend in the production of these species from the Ontario (Great Lakes) fisheries is accompanied by a shifting in demand from whole or dressed lake fish to filleted or otherwise processed products for which whitefish, lake trout and yellow walleyes are available in quantity from lakes in western Ontario, the Prairie Provinces and the Northwest Territories. The remaining dependence of Ontario fishermen is on lower-valued species such as yellow perch and smelt and landings of these from Lake Erie, the most productive of the Great Lakes, was so great in 1962 that very low prices were realized and the economic difficulties of fishing enterprises were intensified. Experimental trawling with fishing tugs on Lake Erie has established the dragnet as an economic method of harvesting smelt and Ontario smelt landings of about 20,000,000 pounds in 1962 were caught chiefly by this method, principally in the eastern half of Lake Erie. Further utilization of the species depends upon an expansion of the market for smelt, which has been tripled since 1959, and in any case trawling for smelt does not represent an economic solution for all of the fishing-tug enterprises. Gillnet

fishing for perch has not been profitable for many fishermen when the price dropped as low as four or five cents a pound. During the summer of 1962, Lake Erie gillnet fishermen took strike action, set a voluntary daily catch quota of 1,500 lb. of perch per boat, and were successful in establishing a landed price of eight cents a pound.

Experimental trawl fishing was also carried out on Lake Winnipeg during the summer of 1962, and trapnets, introduced the previous year, were used extensively. Modernization of boats and gear continued on Great Slave Lake during 1962, wooden hulls being replaced by steel ones and, at a somewhat slower rate, gasoline engines by diesel engines. Two-way radios, depth sounders and other electronic equipment are being gradually accepted as standard equipment.

The Pacific Area

Total landings of fish in British Columbia increased sharply in 1962. Salmon landings, as a result of tremendous runs of pinks to the central areas of the province, were 35 per cent higher than in 1961. Halibut landings by Canadian fishermen, including ten million pounds landed at United States ports, were the highest on record and prices averaged ten cents a pound higher than in 1961. Despite a two-month stoppage of the herring seine fleet, the total landings of herring amounted to 222,600 tons—only 1,600 tons less than in 1961.

Landings of pink salmon were 93,600,000 pounds with a landed value of \$10.9 million, representing about 56 per cent by volume and 36 per cent by value of the salmon catch of all species. Seine gear produced about 45 per cent of the salmon catch of all species, gillnet gear 40 per cent and troll gear 15 per cent. The 1962 pack of canned salmon of all species was 1.8 million cases, as follows:

| <i>Species</i> | <i>Pack Cases</i> | <i>Per Cent of Total</i> |
|----------------|-------------------|--------------------------|
| Pink..... | 1,187,000 | 65.5 |
| Sockeye..... | 298,000 | 16.5 |
| Coho..... | 176,000 | 9.7 |
| Chum..... | 131,000 | 7.2 |
| Other..... | 20,000 | 1.1 |
| | <u>1,811,000</u> | <u>100.0</u> |

Landings of crabs declined to the lowest level since 1953 and amounted to only 2,800,000 pounds, compared with 4,600,000 pounds in 1961. Shrimp production increased about 35 per cent to 1,700,000 pounds—about the 1960 level. Value of crab and shrimp products was \$1.4 million. Oyster production rose in 1962; the amount was 101,165 shucked gallons valued at \$466,000. Trawl landings of such species as lingcod, soles and flounders and grey cod increased in value terms in 1962, although the quantity of lingcod was somewhat lower.

The estimate of about 15,000 licensed fishermen in British Columbia in 1962 is somewhat lower than the 1961 figure. Comparison is difficult because a large number of persons who take out commercial fishing licenses in the province do not engage in commercial fishing. A total of 9,143 commercial fishing craft operated in the British Columbia industry in 1962, with a year-end value of \$57.9 million. The inventory of other fishing equipment was valued at \$9.9 million.

STATISTICS OF THE FISHERIES

FISH AND SHELLFISH—LANDINGS AND LANDED VALUES 1961 AND 1962 (Principal species)

| | Landings | | Landed Values | |
|----------------------------|----------|-------------------|---------------|-------------------|
| | 1961 | 1962 ¹ | 1961 | 1962 ¹ |
| | 000 lb. | | \$ 000 | |
| <i>Pacific Coast</i> | | | | |
| Salmon..... | 121,633 | 163,908 | 26,152 | 30,559 |
| Halibut ² | 29,481 | 34,575 | 6,204 | 10,912 |
| Herring..... | 448,433 | 445,275 | 4,589 | 4,752 |
| Ling Cod..... | 4,518 | 4,308 | 424 | 469 |
| Oysters..... | 6,387 | 7,587 | 369 | 466 |
| Soles and Flounders..... | 6,080 | 6,286 | 356 | 395 |
| Crabs..... | 4,601 | 2,771 | 470 | 302 |
| Shrimps and Prawns..... | 1,207 | 1,663 | 194 | 268 |
| Grey Cod..... | 3,439 | 4,488 | 170 | 254 |
| <i>Atlantic Coast</i> | | | | |
| Lobsters..... | 47,547 | 45,975 | 18,054 | 19,581 |
| Cod..... | 516,861 | 585,643 | 15,646 | 18,607 |
| Haddock..... | 118,395 | 114,243 | 4,647 | 4,846 |
| Scallops..... | 10,516 | 13,933 | 3,082 | 4,681 |
| Herring..... | 193,369 | 235,245 | 2,756 | 3,398 |
| Small flatfishes..... | 108,671 | 104,400 | 3,389 | 3,325 |
| Halibut..... | 6,143 | 6,118 | 1,668 | 1,763 |
| Pollock..... | 49,655 | 60,936 | 1,067 | 1,655 |
| Salmon..... | 3,466 | 3,703 | 1,417 | 1,601 |
| Redfish..... | 56,216 | 60,079 | 1,458 | 1,571 |
| Swordfish..... | 3,196 | 3,461 | 1,238 | 1,570 |

¹Preliminary figures.

²Including halibut landed in United States ports by Canadian fishermen.

FISH AND SHELLFISH—LANDINGS AND VALUES BY PROVINCES AND AREAS, 1961 AND 1962

| | Landings | | Landed Values | |
|---------------------------------|-----------|----------------------|---------------|---------------------|
| | 1961 | 1962 ¹ | 1961 | 1962 ¹ |
| | '000 lb. | | \$ '000 | |
| Sea fisheries—TOTAL..... | 1,850,298 | 2,006,389 | 98,671 | 116,968 |
| Atlantic Coast—TOTAL..... | 1,210,221 | 1,319,641 | 59,005 | 67,921 |
| Nova Scotia..... | 438,298 | 424,125 | 27,741 | 32,060 |
| Newfoundland..... | 484,615 | 527,716 | 14,922 | 16,983 |
| New Brunswick..... | 143,965 | 199,207 | 7,625 | 9,031 |
| Prince Edward Island..... | 36,664 | 37,633 | 4,489 | 4,649 |
| Quebec..... | 106,679 | 130,960 | 4,228 | 5,198 |
| Pacific Coast—TOTAL..... | 640,077 | 686,748 | 39,666 | 49,047 |
| Freshwater fisheries—TOTAL..... | 123,073 | 125,000 ² | 12,451 | 12,500 ² |
| Ontario..... | 54,951 | 57,000 ² | 5,746 | 5,600 ² |
| Manitoba..... | 30,658 | 30,000 ² | 3,174 | 3,100 ² |
| Saskatchewan..... | 14,515 | 14,000 ² | 1,385 | 1,400 ² |
| Alberta..... | 11,317 | 12,000 ² | 883 | 900 ² |
| Northwest Territories..... | 5,676 | 5,500 ² | 675 | 800 ² |
| Quebec..... | 2,495 | 2,500 ² | 483 | 500 ² |
| New Brunswick..... | 3,461 | 4,000 ² | 105 | 200 ² |
| GRAND TOTAL..... | 1,973,371 | 2,131,389 | 111,122 | 129,468 |

¹Preliminary

²Estimated

FISH AND SHELLFISH—EXPORTS BY TYPES OF PRODUCTS, 1961-1962

| | Quantity | | Value | |
|--|----------|---------|---------|---------|
| | 1961 | 1962 | 1961 | 1962 |
| | '000 lb. | | \$ '000 | |
| Fresh and Frozen Fish, whole or dressed..... | 146,169 | 154,638 | 35,526 | 37,697 |
| Fresh and Frozen Fillets..... | 151,476 | 162,268 | 37,002 | 40,591 |
| Smoked fish..... | 6,400 | 6,760 | 1,300 | 1,376 |
| Pickled fish..... | 18,408 | 19,245 | 2,313 | 2,396 |
| Salted and Dried fish..... | 99,118 | 88,394 | 17,065 | 17,574 |
| Canned fish..... | 33,397 | 35,484 | 17,454 | 19,275 |
| Molluscs and Crustaceans (fresh and canned)..... | 37,205 | 38,413 | 24,851 | 27,459 |
| Fish oils ('000 gallons)..... | 8,848 | 7,715 | 614 | 543 |
| Miscellaneous..... | — | — | 7,222 | 9,710 |
| TOTAL..... | — | — | 143,347 | 156,621 |

NUMBER OF FISHERMEN IN CANADA, BY AREAS 1960 AND 1961

| | 1960 | 1961 |
|---|--------|--------|
| SEA FISHERIES..... | 60,505 | 61,457 |
| British Columbia..... | 15,159 | 16,805 |
| Maritimes and Quebec..... | 27,055 | 25,896 |
| Newfoundland..... | 18,291 | 18,756 |
| FRESHWATER FISHERIES ¹ | 17,666 | 16,981 |
| TOTAL..... | 78,171 | 78,438 |

¹Excluding Alberta.

VALUE OF FISHING CRAFT AND GEAR IN CANADA, BY AREAS, 1960 AND 1961

| | 1960 | 1961 |
|---|---------|---------------------|
| | \$'000 | |
| SEA FISHERIES..... | 116,921 | 123,885 |
| British Columbia..... | 56,240 | 60,905 |
| Maritimes and Quebec..... | 43,533 | 45,994 ¹ |
| Newfoundland..... | 17,148 | 16,986 |
| FRESHWATER FISHERIES ² | 12,299 | 13,749 |
| TOTAL..... | 129,220 | 137,634 |

¹Partly estimated.

²Excluding Alberta.

APPENDIX I

FINANCIAL STATEMENTS 1962-63

| | PAGE |
|---|------|
| Comparative Summary of Expenditures..... | II |
| Comparative Summary of Revenues..... | III |
| Bait Service—Newfoundland..... | III |
| Fishing Bounty..... | IV |
| Distribution of Expenditure by Provinces..... | VI |
| Distribution of Revenue by Provinces..... | VI |

COMPARATIVE SUMMARY OF EXPENDITURES

| Appropriation | 1962-63 | 1961-62 | 1960-61 |
|--|-----------|-----------|-----------|
| | \$ | \$ | \$ |
| Gratuities to Families of Deceased Employees | 570 | ..... | 1,775 |
| Minister's Salary and Motor Car Allowance.. | 17,000 | 17,000 | 17,000 |
| Departmental Administration..... | 463,298 | 453,509 | 420,532 |
| Information and Consumer Service..... | 297,418 | 216,413 | 188,659 |
| Economics Service..... | 308,163 | 309,390 | 304,951 |
| Industrial Development Service..... | 665,098 | 690,126 | 660,759 |
| Fishing Bounty..... | 159,480 | 159,998 | 159,945 |
| Field Services Administration..... | 874,683 | 860,258 | 888,790 |
| Conservation and Development Service— | | | |
| Operation and Maintenance..... | 6,325,030 | 6,158,057 | 5,764,719 |
| Buildings, Works, Land and Equipment.... | 1,697,963 | 2,235,426 | 1,071,020 |
| Inspection Service..... | 2,065,793 | 2,277,244 | 1,891,644 |
| Fishermen's Indemnity Plan— | | | |
| Administration..... | 257,223 | 240,112 | 225,556 |
| SPECIAL | | | |
| Canadian share of Expenses of the International Fisheries Commissions..... | 1,092,867 | 1,070,957 | 840,135 |
| Acquisition of Land for the International Pacific Salmon Fisheries Commission..... | ..... | 106,261 | 2,356 |
| Exchequer Court..... | ..... | ..... | 7,111 |
| Newfoundland Bait Service..... | 607,693 | 449,569 | 444,406 |
| Educational Work in Fisheries Techniques, and Co-operative Producing and Selling among Fishermen..... | 114,722 | 106,482 | 89,806 |
| Fisheries Prices Support Act— | | | |
| Administration..... | 57,777 | 60,705 | 54,117 |
| Payment of Assistance to Producers of Salted Fish..... | 600,000 | 562,461 | 755,105 |
| Assistance in Construction of Fishing Vessels.. | 500,000 | 302,131 | 345,888 |
| Assistance in Construction of Bait Freezing and Storage Facilities..... | 28,313 | 3,675 | 42,992 |
| Destruction of Dogfish and Other Predators... .. | ..... | 147,715 | 118,909 |
| Contribution towards a special Newfoundland Works Program for Fishing Settlement that Experienced Income Reduction Resulting from Decreased Catches..... | ..... | 266,632 | ..... |
| Amount required in the Fishing Vessel Indemnity Account and the Lobster Trap Indemnity Account to Meet Losses incurred in the Operation of the said Accounts during the fiscal year 1962-63..... | 257,333 | 99,000 | 114,480 |
| Refunds of Amounts Credited to Revenue in Previous Year..... | 471 | ..... | 900 |
| 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 |

COMPARATIVE SUMMARY OF EXPENDITURES—conc.

| Appropriation | 1962-63 | 1961-62 | 1960-61 |
|---|-------------------|-------------------|-------------------|
| | \$ | \$ | \$ |
| FISHERIES RESEARCH BOARD OF CANADA | | | |
| Headquarters Administration..... | 218,978 | 198,904 | 188,192 |
| Operation and Maintenance..... | 5,195,332 | 4,577,822 | 4,092,185 |
| Land, Building and Equipment..... | 1,487,495 | 1,528,035 | 501,249 |
| TOTALS..... | 23,292,700 | 23,097,882 | 19,195,681 |

NOTE: Inspection Service 1960-61, expenditures included an amount of \$80,516 for Consumer Service. Inspection Service 1961-62, expenditures included an amount of \$90,177 for Consumer Service.

COMPARATIVE SUMMARY OF REVENUES

| | 1962-63 | 1961-62 | 1960-61 |
|--|----------------|----------------|----------------|
| | \$ | \$ | \$ |
| Return on Investments— | | | |
| Pelagic Sealing (Profit on sales of skins).... | 488,855 | 319,464 | 284,097 |
| Interest on Sale to Bonavista Cold Storage Co. Ltd..... | 750 | 1,000 | |
| Miscellaneous..... | | | 21 |
| | 489,605 | 320,464 | 284,118 |
| Privileges, Licenses and Permits..... | 115,671 | 116,700 | 111,150 |
| Proceeds from Sales..... | 116,824 | 116,850 | 147,485 |
| Service and Service Fees..... | 33,197 | 38,815 | 50,283 |
| Refund of Previous Years' Expenditure..... | 24,929 | 22,357 | 34,897 |
| Miscellaneous..... | 63,945 | 53,591 | 45,728 |
| TOTALS..... | 844,171 | 668,777 | 673,661 |

**BAIT SERVICE—NEWFOUNDLAND
Receipts and Payments—1962-63**

| | | | |
|--|---------|-----------|------------------|
| RECEIPTS: | | | |
| Sales of Bait..... | | \$ 94,689 | |
| Storage and Other Service Charges..... | | 4,290 | |
| Refund of Previous Years' Expenditure..... | | 4,307 | |
| Total Receipts..... | | | \$103,286 |
| PAYMENTS: | | | |
| Purchase of Bait..... | 50,334 | | |
| Other Operating Expenses..... | 329,529 | | |
| | | | 379,863 |
| CAPITAL EXPENDITURES: | | | |
| Acquisition and Construction of Buildings..... | | 74,160 | |
| Acquisition of Equipment..... | | 153,670 | |
| | | | 227,830 |
| Excess of payments over Receipts..... | | | \$504,407 |

FISHING BOUNTY PAYMENTS 1962-63

| Province and County | Boats | Men | Amount | Vessels | Tons | Men | Amount | Total Amount |
|-----------------------------|--------------|--------------|--------------------|------------|---------------|--------------|--------------------|--------------------|
| NOVA SCOTIA | | | | | | | | |
| Annapolis..... | 66 | 96 | \$ 1,011.60 | 13 | 218 | 41 | \$ 621.85 | \$ 1,633.45 |
| Antigonish..... | 48 | 75 | 786.75 | 18 | 745 | 123 | 1,956.55 | 2,743.30 |
| Cape Breton..... | 169 | 276 | 2,888.20 | 53 | 1,506 | 222 | 3,692.70 | 6,580.90 |
| Cumberland..... | 12 | 20 | 209.00 | 2 | 26 | 5 | 75.25 | 284.25 |
| Digby..... | 110 | 175 | 1,833.75 | 68 | 1,050 | 147 | 2,497.95 | 4,331.70 |
| Guysboro..... | 293 | 408 | 4,311.80 | 31 | 1,197 | 244 | 3,600.40 | 7,912.20 |
| Halifax..... | 387 | 541 | 5,715.85 | 36 | 1,721 | 414 | 5,798.90 | 11,514.75 |
| Inverness..... | 95 | 160 | 1,671.00 | 24 | 579 | 74 | 1,307.90 | 2,978.90 |
| Kings..... | 16 | 25 | 262.25 | 1 | 24 | 3 | 53.55 | 315.80 |
| Lunenburg..... | 323 | 371 | 3,977.65 | 26 | 1,582 | 308 | 4,615.80 | 8,593.45 |
| Pictou..... | 14 | 22 | 230.70 | ..... | ..... | ..... | ..... | 230.70 |
| Queens..... | 95 | 151 | 1,582.35 | 29 | 539 | 95 | 1,474.75 | 3,057.10 |
| Richmond..... | 146 | 227 | 2,381.95 | 24 | 679 | 134 | 2,003.10 | 4,385.05 |
| Shelburne..... | 346 | 515 | 5,418.75 | 262 | 4,170 | 674 | 10,809.20 | 16,227.95 |
| Victoria..... | 190 | 290 | 3,046.50 | 5 | 82 | 11 | 190.35 | 3,236.85 |
| Yarmouth..... | 39 | 70 | 728.50 | 67 | 1,120 | 203 | 3,119.55 | 3,848.05 |
| TOTAL..... | 2,349 | 3,422 | \$36,056.60 | 659 | 15,238 | 2,698 | \$41,817.80 | \$77,874.40 |
| PRINCE EDWARD ISLAND | | | | | | | | |
| Kings..... | 208 | 300 | 3,163.00 | 22 | 853 | 106 | 1,897.10 | 5,060.10 |
| Prince..... | 345 | 573 | 5,989.05 | 3 | 40 | 7 | 108.95 | 6,098.00 |
| Queens..... | 122 | 202 | 2,111.70 | 1 | 17 | 2 | 36.70 | 2,148.40 |
| TOTAL..... | 675 | 1,075 | \$11,263.75 | 26 | 910 | 115 | \$2,042.75 | \$13,306.50 |

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| | | | | | | | | |
|---------------------|-------|-------|-------------|-------|--------|-------|-------------|--------------|
| NEW BRUNSWICK | | | | | | | | |
| Charlotte..... | 55 | 86 | 902.10 | 82 | 1,723 | 262 | 4,303.70 | 5,205.80 |
| Gloucester..... | 409 | 721 | 7,511.75 | 134 | 3,634 | 488 | 8,440.80 | 15,952.55 |
| Kent..... | 89 | 150 | 1,566.50 | 78 | 906 | 153 | 2,413.05 | 3,979.55 |
| Northumberland..... | 26 | 43 | 449.55 | 101 | 1,301 | 227 | 3,536.95 | 3,986.50 |
| Restigouche..... | 10 | 15 | 157.75 | | | | | 157.75 |
| Saint John..... | 3 | 8 | 81.80 | | | | | 81.80 |
| Westmorland..... | 16 | 26 | 272.10 | | | | | 272.10 |
| TOTAL..... | 608 | 1,049 | \$10,941.55 | 395 | 7,564 | 1,130 | \$18,694.50 | \$29,636.05 |
| QUEBEC | | | | | | | | |
| Bonaventure..... | 104 | 135 | \$1,433.75 | 18 | 422 | 65 | \$1,062.25 | \$2,496.00 |
| Gaspé..... | 562 | 822 | 8,659.00 | 80 | 1,735 | 307 | 4,758.95 | 13,417.95 |
| Mag. Isl..... | 416 | 890 | 9,182.50 | 37 | 998 | 139 | 2,367.45 | 11,549.95 |
| Matane..... | 68 | 104 | 1,092.40 | | | | | 1,092.40 |
| Sag..... | 620 | 958 | 10,056.60 | 1 | 31 | 2 | 50.70 | 10,107.30 |
| TOTAL..... | 1,770 | 2,909 | \$30,424.25 | 136 | 3,186 | 513 | \$8,239.35 | \$38,663.60 |
| GRAND TOTAL..... | 5,402 | 8,455 | \$88,686.15 | 1,216 | 26,898 | 4,456 | \$70,794.40 | \$159,480.55 |

DISTRIBUTION OF EXPENDITURES

| | General | Newfound-land | Nova Scotia | Prince Edward Island | New Brunswick |
|--|-----------|---------------|-------------|----------------------|---------------|
| | \$ | \$ | \$ | \$ | \$ |
| Gratuities to Families of Deceased Employees..... | | | | | |
| Refunds of Amounts Credited to Revenue in Previous Years..... | | | | | |
| Minister of Fisheries..... | 17,000 | | | | |
| Departmental Administration..... | 463,298 | | | | |
| Information and Consumer Service: | | | | | |
| Information Service..... | 188,058 | 7,753 | 24,586 | | 5 |
| Consumer Service..... | 18,148 | | 2,464 | | |
| Economics Service..... | 129,838 | 41,429 | 55,465 | | |
| Industrial Development Service..... | 294,615 | 289,741 | 12,392 | | |
| Fishing Bounty..... | | | 77,874 | 13,306 | 29,636 |
| Field Services Administration..... | 606 | 269,313 | 204,674 | 8,929 | 27,821 |
| Conservation and Development Service: | | | | | |
| Protection..... | 119,606 | 683,112 | 1,051,941 | 188,246 | 638,661 |
| Fish Culture..... | | 86,922 | 536,661 | 68,785 | 339,382 |
| Construction or Acquisition: | | | | | |
| Protection..... | 17 | 184,109 | 23,891 | 19,642 | 34,398 |
| Fish Culture..... | | 25,154 | 46,942 | 25,639 | 45,610 |
| Inspection Service..... | 62,901 | 417,948 | 563,862 | 97,505 | 183,452 |
| Fishermen's Indemnity Plan Administration..... | 21,043 | 69,624 | 26,767 | 6,837 | 45,463 |
| Canadian Share of Expenses of the International Fisheries Commissions..... | 2,759 | | 22,976 | | |
| Newfoundland Bait Service..... | | 607,693 | | | |
| Educational Work in Fisheries Techniques and Co-operative Producing and Selling Among Fishermen..... | | 24,743 | 33,461 | 6,893 | 11,325 |
| Fisheries Prices Support Act—Administration..... | 56,129 | 382 | 901 | 13 | 311 |
| Payment of Assistance to Producers of Salted Fish..... | | 397,605 | 124,326 | 6,990 | 39,571 |
| Assistance in Construction of Fishing Vessels..... | | 36,398 | 167,659 | | 121,775 |
| Assistance in Construction of Bait Freezing and Storage Facilities..... | | 5,313 | | | 23,000 |
| Fishing Vessel and Lobster Trap Indemnity Accounts..... | 257,333 | | | | |
| Fisheries Research Board of Canada— | | | | | |
| Headquarters Administration..... | 218,978 | | | | |
| Operation and Maintenance..... | 48,794 | 774,083 | 510,993 | | 879,275 |
| Construction or Acquisition..... | | 20,900 | 62,138 | | 36,842 |
| | 1,899,123 | 3,942,222 | 3,549,973 | 442,785 | 2,456,527 |

DISTRIBUTION OF REVENUE

| | General | Newfound-land | Nova Scotia | Prince Edward Island | New Brunswick |
|--|---------|---------------|-------------|----------------------|---------------|
| | \$ | \$ | \$ | \$ | \$ |
| Return on investments..... | 488,855 | 750 | | | |
| Privileges, Licenses and Permits..... | | 14,464 | 16,600 | 5,578 | 11,248 |
| Proceeds from Sales..... | 70 | 103,448 | | 1,004 | |
| Service and Service Fees..... | | 7,684 | 162 | | |
| Refund of Previous Year's Expenditure..... | 24,929 | | | | |
| Miscellaneous..... | 658 | 4,200 | 9,102 | 7,695 | 6,439 |
| | 514,512 | 130,546 | 25,864 | 14,277 | 17,687 |

BY PROVINCES 1962-63

| Quebec | Ontario | Manitoba | Saskat- chewan | Alberta | British Columbia | Yukon Territory | Northwest Territories | Total |
|-----------|---------|----------|-------------------|---------|---------------------|--------------------|--------------------------|------------|
| \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| | | | | | 570 | | | 570 |
| | | | | | 471 | | | 471 |
| | | | | | | | | 17,000 |
| | | | | | | | | 463,298 |
| 8,783 | 10,088 | 11,418 | | 5,814 | 20,301 | | | 240,703 |
| | 4,000 | | | | 81,431 | | | 56,715 |
| 38,664 | | | | | 64,350 | | | 308,163 |
| 36,022 | 6,997 | 42,739 | 1,219 | | 253,635 | | 22,728 | 665,098 |
| | | | | | | | | 159,480 |
| 552 | | 968 | | | 1,856,604 | 26,269 | 72,167 | 874,683 |
| | | | | | 654,642 | 512 | | 4,638,126 |
| | | | | | | | | 1,686,904 |
| | | | | | 504,496 | 966 | 28,512 | 796,031 |
| 263,253 | 96,678 | 93,448 | 39,600 | 13,717 | 758,587 | | | 901,932 |
| 29,841 | | | | | 167,339 | | 66,090 | 2,065,793 |
| | 447,502 | | | | 57,648 | | | 257,223 |
| | | | | | 619,630 | | | 1,092,867 |
| | | | | | | | | 607,693 |
| | | | | | | | | |
| 27,100 | | | | | 11,200 | | | 114,722 |
| 41 | | | | | | | | 57,777 |
| 31,508 | | | | | | | | 600,000 |
| 174,168 | | | | | | | | 500,000 |
| | | | | | | | | |
| | | | | | | | | 28,313 |
| | | | | | | | | 257,333 |
| | | | | | | | | |
| 419,906 | 310,668 | | | | 2,251,613 | | | 218,978 |
| 23,058 | 7,890 | | | | 1,336,667 | | | 5,195,332 |
| | | | | | | | | 1,487,495 |
| 1,052,896 | 883,823 | 148,573 | 40,819 | 19,531 | 8,639,184 | 27,747 | 189,497 | 23,292,700 |

BY PROVINCES 1962-63

| Quebec | Ontario | Manitoba | Saskat- chewan | Alberta | British Columbia | Yukon Territory | Northwest Territories | Total |
|--------|---------|----------|-------------------|---------|---------------------|--------------------|--------------------------|---------|
| \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| | | | | | | | | 489,605 |
| 395 | | 9 | | | 45,800 | 10,545 | 11,032 | 115,671 |
| | 1,800 | | | | 10,502 | | | 116,824 |
| | 16,179 | | | | 9,172 | | | 33,197 |
| | | | | | | | | 24,929 |
| 916 | | | | | 34,640 | 20 | 275 | 63,945 |
| | | | | | | | | |
| 1,311 | 17,979 | 9 | | | 100,114 | 10,565 | 11,307 | 844,171 |

APPENDIX II

FISH CULTURE DEVELOPMENT STATEMENTS, 1962

| | PAGE |
|--|------|
| Fish Distributed by Species..... | II |
| Distributions by Provinces..... | III |
| Co-operative or Special Transfers and Stock Supplied for Scientific Investigations..... | III |
| Collection and Disposal of Eggs..... | IV |
| Distribution Statements by Fish Culture Stations..... | VI |

FISH DISTRIBUTED BY SPECIES 1962

| Species | Advanced fry | Fingerlings | Yearlings and Older | Total Distributions |
|---|--------------|-------------|---------------------|---------------------|
| Salmo salar—Atlantic salmon..... | 1,380,000 | 8,943,390 | 532,100 | 10,855,490 |
| X Salmo trutta—Brown trout..... | | 2,062,740 | 38,970 | 2,101,710 |
| Salmo gairdneri—Rainbow trout..... | | 104,000 | 11,710 | 115,710 |
| Salmo salar sebago—Sebago salmon..... | | 124,610 | | 124,610 |
| Salvelinus fontinalis—Speckled trout..... | 628,500 | 12,892,060 | 160,540 | 13,681,100 |
| Salvelinus namaycush—Lake trout..... | | 166,900 | | 166,900 |
| | 2,008,500 | 24,293,700 | 743,320 | 27,045,520 |

DISTRIBUTIONS BY PROVINCES 1962
Fry, Fingerlings, Yearlings and Older Fish

| Province | 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..... | 200,000 | 1,840,280 | 766,870 | 919,350 | 152,300 | 127,910 | 239,720 | 4,246,430 | |
| Brown trout..... | | 518,610 | 836,720 | 364,390 | 302,500 | 40,520 | 35,610 | 2,098,350 | |
| Lake trout..... | | | 19,000 | | | | | 19,000 | |
| Rainbow trout..... | | | 38,000 | | 36,360 | 8,150 | | 82,510 | |
| Speckled trout..... | | 2,485,470 | 2,145,420 | 1,551,240 | 661,790 | 477,970 | 100,590 | 7,422,480 | |
| | 200,000 | 4,844,360 | 3,806,010 | 2,834,980 | 1,152,950 | 654,550 | 375,920 | 13,868,770 | 13,868,770 |
| NEW BRUNSWICK | | | | | | | | | |
| Atlantic salmon..... | 1,180,000 | 2,692,360 | 1,407,200 | 731,450 | 143,270 | | 281,270 | 6,435,550 | |
| Brown trout..... | | | | | | | 3,360 | 3,360 | |
| Lake trout..... | | | 115,900 | 32,000 | | | | 147,900 | |
| Rainbow trout..... | | | | 18,590 | | | 2,100 | 20,690 | |
| Sebago salmon..... | | 104,360 | | 20,250 | | | | 124,610 | |
| Speckled trout..... | 628,500 | 2,470,170 | 1,556,990 | 837,450 | 220,130 | 38,400 | 35,550 | 5,787,190 | |
| | 1,808,500 | 5,266,890 | 3,080,090 | 1,639,740 | 363,400 | 38,400 | 322,280 | 12,519,300 | 12,519,300 |
| PRINCE EDWARD ISLAND | | | | | | | | | |
| Atlantic salmon..... | | | | 162,400 | | | 11,110 | 173,510 | |
| Rainbow trout..... | | | | 2,900 | | | 9,610 | 12,510 | |
| Speckled trout..... | | 5,600 | | 187,500 | 238,000 | 15,930 | 24,400 | 471,430 | |
| | | 5,600 | | 352,800 | 238,000 | 15,930 | 45,120 | 657,450 | 657,450 |
| TOTALS..... | 2,008,500 | 10,116,850 | 6,886,100 | 4,827,520 | 1,754,350 | 708,880 | 743,320 | 27,045,520 | 27,045,520 |

IX

CO-OPERATIVE OR SPECIAL TRANSFERS AND STOCK SUPPLIED FOR SCIENTIFIC INVESTIGATIONS, 1962

| Species | From | To | Number | Details | Date |
|-------------------------------------|--|---|-----------|-------------|-----------------|
| Atlantic salmon..... | Cobequid Fish Culture Station..... | Fisheries Research Board..... | 60 | Fingerlings | Nov. 28 |
| | Cobequid Fish Culture Station..... | Jasper National Park, Jasper, Alta..... | 250,000 | Eyed eggs | Mar. 20. |
| | Kejimikujik Fish Culture Station..... | Nova Scotia Department of Lands and Forests, Charleston Ponds..... | 398,320 | Fingerlings | June 7-12 |
| | River Philip Fish Culture Station..... | Fisheries Research Board..... | 10,000 | Green eggs | Nov. 15 |
| | Florenceville Fish Culture Station..... | University of New Brunswick, Fredericton..... | 500 | Fry | June 5 |
| | Florenceville Fish Culture Station..... | University of New Brunswick, Fredericton..... | 4,200 | Fingerlings | Jan. 25-Oct. 10 |
| | Florenceville Fish Culture Station..... | University of New Brunswick, Fredericton..... | 2,300 | Yearlings | May 16-Nov. 7 |
| | Miramichi Fish Culture Station..... | Fisheries Research Board..... | 500 | Fry | May 30 |
| | Miramichi Fish Culture Station..... | Fisheries Research Board..... | 3,150 | Adults | June 16-17 |
| | Miramichi Fish Culture Station..... | New York Conservation Department, Gansevoort..... | 303,750 | Eyed eggs | Mar. 6 |
| | Miramichi Fish Culture Station..... | U.S. Fish and Wildlife Service, Craig Brook, Maine..... | 223,600 | Eyed eggs | Nov. 2 |
| Miramichi Fish Culture Station..... | Vermont Fish and Game Service, Montpelier..... | 101,250 | Eyed eggs | Mar. 6 | |
| Lake trout..... | New York Conservation Department, Crown Point..... | Middleton Fish Culture Station..... | 150,090 | Eyed eggs | Nov. 7 |
| | Department of Mines and Natural Resources, Winnipeg..... | Grand Falls Fish Culture Station..... | 92,800 | Eyed eggs | Nov. 5 |
| Rainbow trout..... | Saint John Fish Culture Station..... | Lake Flumendosa Fish Culture Station, Sardinia, Italy..... | 308,000 | Eyed eggs | May 20 |
| | Cardigan Fish Culture Station..... | Fisheries Research Board..... | 4,000 | Fingerlings | Oct. 4 |
| Speckled trout..... | Cobequid Fish Culture Station..... | Inland Fisheries Commission, Hobart, Tasmania..... | 50,000 | Eyed eggs | Feb. 2 |
| | Cobequid Fish Culture Station..... | Jasper National Park, Jasper, Alta..... | 500,000 | Eyed eggs | Jan. 25 |
| | Coldbrook Fish Culture Station..... | Nova Scotia Department of Lands and Forests, Moser River Ponds..... | 268,350 | Fingerlings | June 9-Aug. 18 |
| | Grand Lake Fish Culture Station..... | Dalhousie University, Halifax, N.S..... | 10 | Fingerlings | Aug. 27 |
| | Margaree Fish Culture Station..... | Nova Scotia Department of Lands and Forests, Moser River Ponds..... | 81,000 | Fingerlings | Aug. 7-16 |
| | Florenceville Fish Culture Station..... | University of New Brunswick, Fredericton..... | 400 | Fingerlings | Jan. 25-July 12 |
| | Cardigan Fish Culture Station..... | Fisheries Research Board..... | 9,000 | Fingerlings | Oct. 4-Dec. 5 |
| | Cardigan Fish Culture Station..... | Fisheries Research Board..... | 2,020 | Yearlings | Nov. 30-Dec. 1 |

COLLECTION AND DISPOSAL OF EGGS BY SPECIES 1962

| 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. 6-16 | 232,130 | Margaree | Nov. 6-16 | 232,130 | | | |
| | | River Philip, N.S. | Nov. 5-19 | 3,295,400 | Cobequid | Nov. 5-19 | | 2,085,400 | |
| | Hales Brook Pond, N.B. | Miramichi Pond, N.B. | Oct. 23-Nov. 15 | 704,000 | Kejimikujik | Nov. 8-13 | | 1,200,000 | |
| | | | Oct. 23-Nov. 19 | 10,097,430 | Fisheries Research Board | Nov. 15 | | 10,000 | |
| | | | | | Charlo | Oct. 23-Nov. 15 | | 704,000 | |
| | | | | | Antigonish | Oct. 24 | | 700,820 | |
| | | | | | Florenceville | Oct. 24 | | 1,255,200 | |
| | | | | | Grand Falls | Oct. 26 | | 1,142,400 | |
| | | | | | Miramichi | Oct. 23-Nov. 19 | | 6,775,410 | |
| | | | | | Craig Brook, Maine | Nov. 1 | | 223,600 | |
| | New Mills Pond, N.B. | Oct. 22-Nov. 15 | 2,887,700 | Charlo | Oct. 22-Nov. 15 | 2,887,700 | | | |
| | Saint John Ponds, N.B. | Oct. 29-Nov. 8 | 433,550 | Saint John | Oct. 29-Nov. 8 | 433,550 | | 17,650,210 | |
| Brown Trout | Antigonish Ponds, N.S. | Oct. 22-Nov. 15 | 354,450 | Antigonish | Oct. 22-Nov. 15 | 354,450 | | | |
| | | Oct. 25-Nov. 21 | 833,200 | Cobequid | Oct. 25-Nov. 21 | 833,200 | | | |
| | | Oct. 31-Nov. 8 | 38,400 | Kejimikujik | Oct. 31-Nov. 8 | 38,400 | | | |
| | | Oct. 10-Nov. 15 | 2,198,600 | Lindloff | Oct. 10-Nov. 15 | 2,198,600 | | | |
| | | Oct. 16-Nov. 6 | 1,838,200 | Yarmouth | Oct. 16-Nov. 6 | 1,838,200 | | 5,262,850 | |
| Rainbow Trout | Lindloff Ponds, N.S. | Apr. 18-May 8 | 340,400 | Lindloff | Apr. 18-May 8 | 340,400 | 714,890 | | |
| | Saint John Ponds, N.B. | Apr. 22-May 1 | 374,490 | Saint John | Apr. 22-May 1 | 374,490 | | | |
| Sebago Salmon | Chamcook Lake, N.B. | Nov. 10-22 | 118,440 | Saint John | Nov. 10-22 | 118,440 | 125,500 | | |
| | Palfrey Lake, N.B. | Oct. 30-Nov. 7 | 7,060 | Florenceville | Oct. 30-Nov. 7 | 7,060 | | | |
| Speckled Trout | Antigonish Ponds, N.S. | Oct. 31-Nov. 13 | 8,513,720 | Antigonish | Oct. 31-Nov. 13 | 6,508,900 | | | |
| | | | | Coldbrook | Nov. 2-6 | 2,004,820 | | | |
| | | | | Cobequid | Oct. 31-Nov. 15 | 3,789,500 | | | |
| | | | | Coldbrook | Oct. 30-Nov. 10 | 532,280 | | | |
| | | | | Lindloff | Oct. 31-Nov. 15 | 1,865,430 | | | |
| | Florenceville Ponds, N.B. | Grand Falls Ponds, N.B. | Saint John Ponds, N.B. | Oct. 18-Nov. 12 | 2,573,120 | Margaree | | Nov. 6 | 2,030,960 |
| | | | | Oct. 22-Nov. 15 | 2,842,850 | Middleton | | Nov. 14 | 1,106,320 |
| | | | | Oct. 24-Nov. 15 | 11,884,470 | Florenceville | | Oct. 18-Nov. 12 | 2,573,120 |
| | | | | | | Grand Falls | | Oct. 22-Nov. 15 | 2,842,850 |
| | | | | | | Saint John | | Oct. 24-Nov. 15 | 11,884,470 |
| | | | | | | 35,138,650 | 58,892,100 | | |
| | | | | | | | | | |

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—3,080 S3.
Delhanty's Lake—5,380 S2.
Merland Lake—2,700 S2.
Chisholm Lake—1,000 S2.
Little Pomquet Lake—1,428 S3.
Lochaber Lake—80,000 S1, 33,000 S2, 4,918 S4, 231 Sf, 124 Sg.
MacMillan Lake—10,000 S1, 1,200 S3.
Middleton Lake—2,500 S2, 1,670 S3.
Maryvale Brook (Malignant Cove)—2,000 S2, 1,200 S3.
Monastery River tributaries—6,666 S3.
Ash Lake—15,000 S1, 1,800 S3.
Linwood Lake—15,000 S1, 3,000 S3.
North Lake—2,000 S2, 1,200 S3.
North River—2,000 S2, 1,200 S3.
Pomquet River and Tributaries—30,000 S1.
Rights River and Tributaries—2,000 S2, 4,620 S3.
South River and Tributaries—22,500 S2.
MacDonald Lake—7,500 S2, 710 S4.
Pinevale Lake—7,500 S2, 2,010 S4.
South River Lake—10,000 B2, 3,000 B4, 50,000 S1, 1,500 S4.
Copper Lake—5,000 S2, 1,670 S3.
Grants Lake—2,500 S2.
MacKinnons Lake—2,500 S2.
West River—14,620 S2, 7,500 S3.
Beaver Meadow River—2,000 S2.
Brierly Brook Lake—2,000 S2.
Cameron Lake—15,000 S1, 1,200 S3.
Gaspereaux Lake—30,000 S1, 4,000 S3.
James River—4,620 S2.
MacInnis Lake—4,620 S3.
Ohio River—5,000 S2.
St. Joseph Lake—10,000 S1, 2,000 S3.
Thompsons Lake—10,000 S1, 1,200 S3.
Chain Lake—2,310 S2.
Christie Lake—4,620 S2.
Country Harbour Lake—7,000 S2.
Davies Lake—1,670 S3.
Dummy Lake—5,000 S2.
Eight Island Lake—7,500 S2.
Goshen Lake—2,500 S2.
Grassy Lake—5,000 S2.
Horahan Lake—2,500 S2.
Jones Lake—2,000 S2, 1,428 S3.
Kells Lake—2,610 S3.
Letter "G" Lake—1,250 S3.
Mells Lake—2,500 S2.
Polson Lake—2,500 S2.
Pringle Lake—25,000 S1, 20,000 S2, 1,950 S4.
Tate Lake—2,310 S2.
Trout Lake—14,620 S2.
Dover Bay—
Boudreau Lake—2,310 S2.
Hazel Hill Lake—5,000 S2, 1,305 S3.
Mackloware Lake—2,310 S2.
Snyder Lake—2,310 S2.
Three Mile Lake—5,000 S2, 2,610 S3.
Two Bridge Lake—6,930 S2.
Watkins Lake—5,000 S2, 1,305 S3.
Whistle Lake—5,000 S2.
Ecum Secum River—30,000 A1, 4,500 Af.
Ash Lake—5,000 S2.
Spider Lake—5,000 S2.
Fishermans Harbour Lake—5,000 S2, 2,856 S3.
Gegoggin Lake—5,000 S2, 2,610 S3.
Goose Harbour Lake—16,000 S2, 7,500 S3.
Guysboro River and Tributaries—6,000 B4, 714 S3.
Cudahy Lake—4,620 S2, 1,125 S4.
Cutlers Lake—2,222 S3.
Donahue Lake—10,856 S2, 3,333 S3, 5,850 S4, 900 Sf.
Fougere Lake—6,000 S2.
Horshoe Lake—2,856 S2, 1,200 S3.
Tomes Lake—2,856 S2.
Trout Lake—3,200 S2.
Fraser's Lake—3,080 S3.
Meaghers Lake—4,508 S3.
Ross Lakes—4,620 S3.
Simpson Lake—2,310 S2, 2,142 S3.
Harbour Boucher River—
Jellow Lake—16,000 S2, 7,830 S3.
Morrison Lake—15,000 S1, 3,000 S3.
Harts Lake—2,310 S2.
Hawbolt Lake—5,000 S2, 450 Sf.
Indian Harbour Lakes—10,284 B3.
Isacs Harbour River—30,000 A1, 2,250 Af.

Guysborough County—

- Bear Lake—5,000 S2.
Coddles Harbour Tributaries—5,200 S2.
Basin Lake—3,200 S2.
Goose Lake—3,200 S2.
Green Barren Lake—1,500 S2.
Long Lake—3,200 S2.
Sister Lakes (2)—3,200 S2.
Cole Harbour—
Cooee Coffre Lake—5,000 S2, 1,305 S3.
Dobson Lake—5,000 S2, 2,610 S3.
Cooper's Lake—5,000 S2, 1,428 S3.
Country Harbour River—10,000 A1, 2,250 Af.
Archibald Lake—10,000 S2.
Borneo Lake—2,000 S2.

Antigonish Fish Culture Station—Conc.

Guysborough County (cont.)—

Liscomb River and Tributaries—10,000 A1,
4,500 Af, 17,787 S3, 7,700 S4.
Bear Lake—1,428 S3.
Eastern Hill Lake—2,222 S3.
Hardwood Lake—2,000 S3.
Hoopers Lake—2,856 S3.
Kirbys Lake—4,861 S3.
Long Lake—2,610 S3.
Whidden Lake—2,000 S3.
Louse Lake—5,000 S2.
MacPherson Lake—2,310 S2.
Manassette Lake—4,620 S2, 2,142 S3.
Mattie Lake—7,960 S3.
New Harbour—
Canter Lake—2,000 S2, 1,200 S3.
Cupboard Lake—2,000 S2, 1,200 S3.
First Lake—3,200 S2.
Theopon River—1,000 S2.
Port Hilford Brook—5,000 S2.
St. Mary's River Tributaries—2,250 S4.
Archibald Lake—12,072 S3.
Black Brook Lake—1,428 S3.
Cameron Lake—2,500 S2, 450 Sf.
Cargill Lake—3,333 S3.
Chisholm Lake—6,666 S3.
Demmons Lake—3,080 S3.
East River—72,000 A1, 14,830 Af.
Cumminger Lake—5,000 S2, 3,915 S3.
Melrose Lake—5,000 S2, 3,915 S3, 450
Sf.
Murray Lake—2,500 S2.
North West Arm Lakes—1,111 S3.
Taylors Lake—2,500 S2.
Two Mile Lake—12,500 S2, 1,500 S4.
Kirk Lake—1,666 S3.
MacIntosh Lake—5,333 S3.
MacKeen Lake—2,500 S2, 1,666 S3.
MacLeod Lake—6,160 S3.
Sherbrooke Lake—5,000 S2, 1,428 S3,
450 Sf.
Square Lake—2,500 S2.
Twin Oak Lakes—2,860 S3.
West River—60,000 A1, 6,000 Af.
Three Island Lake—7,500 S3.
Salmon River—4,500 Af, 10,000 B2.
Beaver Dam Lake—2,500 S2.
Bobsled Lake—3,200 S2.
Bordens Lake—3,200 S2, 2,142 S3.
Charley Lake—2,500 S2, 1,125 S4.
Cross Lake—3,000 S3, 1,125 S4.
Gearys Lakes—9,240 S3.
Grants Lake—6,160 S3.
Grassy Lake—2,222 S3.
Hurleys Lake—5,000 S2.
Island Lake—3,000 S3.
Lawlor Lake—3,080 S3.
Long Lake—4,620 S2, 1,111 S3, 1,125 S4.
MacDonald Lake—2,310 S2, 1,125 S4.
Millers Lake—2,222 S3.
Mud Lake—1,540 S3.
Narrow Lake—10,000 S2, 1,710 S4.
Nickersons Lake—3,200 S2.
O'Neil Lake—2,222 S3.

Priests Lake—3,200 S2.
Rocky Lake—3,080 S3.
Round Lake—3,200 S2.
Square Lake—3,080 S3.
Susie Lake—2,310 S2.
Three Corner Lake—3,200 S2.
Whites Lake—1,540 S3.
Seal Harbour—
Goldbrook Lake—4,000 S2, 1,428 S3.
Seal Harbour Lake—2,000 S2, 1,428 S3.
Shepherds Lake—1,540 S3.
Smelt Lake—1,716 S4.
Sullivan Lake—2,500 S2.
Sundown Lake—2,310 S2.
Tor Bay Basin Run—2,000 S2.

Halifax County—

Musquodoboit River—50,000 Ad.
Gibraltar Lake—50,000 Ad.
Hamilton's Lake—100,000 Ad.

Pictou County—

Caribou River and Tributaries—6,720 S2,
2,610 S3.
East River and Tributaries—8,933 S2,
1,200 S3.
Battery Lake—2,000 S2.
Black Brook Lake—2,856 S2.
Burrough Lake—3,780 S2.
Calder Lake—3,750 S2, 3,915 S3.
Grant Lake—3,750 S2, 2,610 S3, 450 Sf.
Jocks Lake—2,268 S2.
Maple Lake—1,500 S2.
McKinnon Lake—3,570 S2, 2,610 S3, 450
Sf.
MacLean Lake—4,444 S3.
McPherson Lake—3,865 S2, 2,400 S3,
450 Sf.
Smith Lake—3,640 S2.
Sutherland Lake—4,620 S2.
Taylor Lake—3,640 S2.
West Branch Lake—5,000 S2.
Eden Lake—8,080 S2, 2,856 S3.
Elbow Lake—2,860 S3.
Long Lake—2,860 S3.
Merrigomish Harbour Tributaries—2,222 S3.
Barney River—6,900 B2, 1,716 B3, 3,640
S2.
Brora Lake—4,620 S2.
Indian Lake—2,142 S2.
Robertson Lake—4,620 S2.
French River—6,900 B2, 1,716 B3, 3,640
S2.
Sutherland River—6,900 B2, 1,716 B3,
3,640 S2.
Middle River—1,430 S3.
Gairloch Lake—11,434 S3.
River John Tributaries—7,480 S2, 450 Sf.
Toney River—5,220 S3.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 450,830 |
| Brown Trout..... | 65,132 |
| Speckled Trout..... | 1,276,971 |

Total..... 1,792,933

Cobequid Fish Culture Station

Colchester County—

- Bass River—10,000 S1.
- Silica Lake—7,500 S1.
- Bass River of Five Islands—11,000 S2.
- Bowers Brook (Cobequid Bay)—2,000 S2.
- Chiganois River and Tributaries—18,000 S2, 950 Sf.
- Black Lake—3,000 S2.
- Clear Lake—4,000 S2.
- Farm Lake—4,500 S2.
- Guyons Lake—5,000 S2.
- East River and Tributaries—14,000 S1.
- Economy River—27,000 A1, 45,000 A2, 40,000 A3.
- Economy Lake—16,000 S1, 14,000 S2.
- Moose Lake—5,000 S2.
- Newton Lake—25,000 S2.
- Simpson Lake—15,000 S1, 13,000 S2, 15,000 S3, 1,750 Sf.
- Folly River—2,500 S2, 7,000 S3.
- Folly Lake—15,000 S1, 15,000 S2, 9,000 S3, 2,600 Sf.
- French River—17,000 S1, 5,000 S3.
- Great Village River—10,000 S1.
- Irwin Lake—500 Sf.
- North River—20,000 A2, 8,000 S2.
- Portapique River—27,000 A1, 44,000 A3, 19,000 S1, 8,000 S3.
- Fountain Lake—8,000 S2.
- Salmon River and Tributaries—143,000 A3, 70 Sg, 30 Sh.
- Hingley Lake—4,500 S2.
- Proudfoot Lake—3,000 S3.
- Stewiacke River and Tributaries—13,000 S1.
- Deyarmonds Lake—12,000 S2.
- Twin Lake—6,000 S2.
- Moose Lake—7,000 S2.
- Trout Lake—200 Sh.
- Wallace River—
- Hart Lake—10,000 S1.
- Indian Lake—1,000 S2.
- Waugh's River—45,000 B1, 166,000 B2, 13,000 B3, 306 Bk.
- Earltown Lake—6,000 S2.
- West Lake—5,500 S2.

Cumberland County—

- Apple River—25,000 A1, 45,000 A3.
- Dewar Lake—400 Sh.
- Fox River—12,000 S1, 7,500 S3.
- Lake Killarney—417 Sh.
- LaPlanche River Tributaries—6,000 S4.
- Sand Lake—1,200 Sf.
- Maccan River and Tributaries—27,000 A1, 116,000 A2, 58,400 A3, 22,500 S1, 26,000 S3, 1,500 Sf, 345 Sh.
- Harrison Lake—30,000 B1, 35,000 B2, 662 Bg.
- Mattatall Lake—400 Sh.

Parrsboro River—

- Leaks Lake—500 Sf, 420 Sg.
- McAloney Lake—8,000 S2.
- Portapique River—
- Fountain Lake—12,000 S1.
- Isaac Lake—8,000 S1, 8,000 S2, 7,500 S3, 1,200 Sf.
- Newfound Lake—8,000 S1, 8,000 S2, 7,500 S3, 1,200 Sf.
- Little Lake—3,000 S1, 5,000 S3.
- Otter Lake—2,000 S2.
- Silica Lake—7,500 S3.
- Sutherland Lake—15,000 S1, 16,000 S2, 26,000 S3, 2,600 Sf.
- Webb Lake—4,000 S3.
- Pugwash River—9,000 S1.
- Victoria Lake—400 Sh.
- Ramshead River—10,000 S1, 3,000 S3.
- Ramshead Lake—5,000 S1.
- River Hebert—11,000 S1, 10,000 S3.
- Gilbert Lake—500 Sf.
- Halfway River Lake—400 Sh.
- River Philip and Tributaries—27,000 A1, 80,000 A2, 169,000 A3, 7,200 Af, 36,000 S1, 9,500 S2, 15,000 S3, 10,000 S5, 720 Sf.
- Black River—10,000 S1, 10,000 S3.
- Poison Lake—1,500 S1.
- Vickery Lake—4,500 S2.
- Robinson Brook (Tantramar River)—11,000 S1.
- Shinimicas River and Tributaries—23,000 A1, 20,000 A3, 18,000 S1, 6,750 S3.
- Smith Pond—100 S1.
- Tidnish River—10,000 S2.
- Wallace Quarries Pond—1,000 S2.
- Wallace River and Tributaries—27,000 A1, 80,000 A2, 90,400 A3, 68,000 S1, 48,000 S2, 14,000 S3, 10,000 S5, 1,500 Sf.
- Barbour Lake—3,000 S2.

Westmorland County—

- Bourgeois Pond—500 S2.
 - Carter Brook (Westcock Creek)—3,000 S2.
 - Mills Pond—500 S3.
 - Missaquash River Tributaries—300 S1, 2,000 S2.
 - Palmer's Pond (Ayers Brook)—3,500 S1.
 - Rayworth's Brook Pond—5,000 S2.
 - Silver Lake and Tributaries—20,000 S1, 3,000 S2, 9,000 S3, 2,000 Sf, 420 Sg.
 - Tantramar River Tributaries—10,500 S2, 10,000 S3.
 - Wards Pond—5,000 S2.
- | | |
|----------------------|-----------|
| Atlantic Salmon..... | 1,141,000 |
| Brown Trout..... | 289,968 |
| Speckled Trout..... | 1,021,872 |
| Total..... | 2,452,840 |

Coldbrook Fish Culture Station

Annapolis County—

Annapolis River—7,000 A5.
Zwicker Lake—5,000 R4.

Halifax County—

Bissets Lake—5,000 S3.
Connors Lake—2,520 S3.
Goose Lake—5,000 S3.
Hubbards River—
Dorey Lake—2,520 S3.
Quack Lake—3,500 S3.
Sawlor Lake—3,500 S3.
Ingram River—10,000 Af.
Island Lake—600 S2, 2,100 S3.
Moose Lake—5,000 S3.
Musquodoboit River—10,000 Af.
Cooks Lake—2,500 S3.
Higgins Lake—2,500 S3.
Lay Lake—4,600 S3.
Rocky Lake—10,000 S2.
Sackville River—
Lewis Lake—6,000 S2.
Williams Lake—5,000 S3.
Skinner Lake—1,000 Sf.
Vinegar Lake—500 Sf.
Brigley Lake—5,000 S4.

Hants County—

Avon River—
Armstrong Lake—3,000 S5.
Card Lake—15,000 S3.
North Canoe Lake—5,000 S4.
Otter Lake—5,000 S4.
Shey Lake—5,000 S3.
Beeswanger Lake—500 S3.
Cameron Lake—5,000 S3.
Cogmagun River—5,000 S4, 3,000 S5.
Ponhook Lake—20,000 S4.
Valley Lake—5,000 S3.

Kings County—

Annapolis River—9,200 A5.
Aylesford Lake—10,000 S3.
Lake George—20,000 S4.
Loon Lake—10,000 S3.
Bass Creek (Minas Basin)—13,000 S1.
Best's Pond—300 S1.
Blue Mountain Lake—1,500 S5.
Canard River Tributaries—20,800 S1, 5,000 S5.

Coles Pond (Minas Basin)—5,000 S5.
Cornwallis River Tributaries—18,200 S1, 5,000 S4.
McGee Lake—10,000 S3.
Tupper Lake—2,900 S5.
Ford's Pond—500 S2.
Forsyth's Ponds—500 S2.
Gaspereau River and Tributaries—15,960 A5, 62,400 S1, 5,000 S4.
Murphy Lake—5,000 S4.
Habitant River Tributaries—20,800 S1.
Harvie's Pond—500 S2.
Holt's Pond—1,500 S1.
LaHave River Tributaries—10,000 S3, 5,000 S4.
Hardwood Lake—10,000 S4.
Mill Creek (Minas Basin)—13,000 S1.
Pereau Creek (Minas Basin)—13,000 S1.
Porter's Pond—3,000 S1.
Sunken Lake—24,000 R4.
Whittier's Pond—200 S2.

Lunenburg County—

East River—10,000 Af.
Gold River—13,000 A5.
Cress Lake—5,000 S4.
Duck Lake—5,000 S4.
Horseshoe Lake—5,000 S4, 5,000 S5.
Hunts Lake—5,000 S4.
Indian Lake—5,000 S4.
Lewis Lake—5,000 S4.
Loon Lake—5,000 S4.
McGinnis Lake—5,000 S4.
Round Lake—10,000 S4.
Seffern Lake—10,000 S4.
Wallaback Lake—10,000 S3.
Whelan Lake—5,000 S4.
Gully Lake—5,000 S4.
LaHave River—
Pear Lake—5,000 S5.
Whetstone Lake—5,000 S5.
Millets Lake—5,000 S3.

| | |
|----------------------|---------|
| Atlantic Salmon..... | 75,160 |
| Rainbow Trout..... | 29,000 |
| Speckled Trout..... | 510,440 |
| Total..... | 614,600 |

Grand Lake Fish Culture Station

Halifax County—

Butler Lake—1,000 S5.
Duck Lake—500 S5.
Grand Lake—1,969 S5.
Isaacs Lake—1,000 S3.

Little Kip Hill Lake—2,000 S5.
Round Island Lake—1,000 S5.
Third Pond—2,000 S5.

Speckled Trout..... 9,469

Kejimkujik Fish Culture Station

Annapolis County—

Annapolis River and Tributaries—2,562 A5, 11,212 Af.
Eleven Mile Brook (Kejimkujik Lake)—38,400 S2.

LaHave River and Tributaries—11,323 A2, 2,385 Af.
LeQuille River—3,703 Af.
Lamb's Lake—15,900 A3.
Maitland River—22,720 B1.

Kejimkujik Fish Culture Station—Conc.

Annapolis County—cont

Mersey River—34,560 B1, 5,000 B3, 1,530 B5.
 Spur Brook (Round Hill River)—21,375 A3.

Halifax County—

Dorey Lake—6,300 A3.
 Vinegar Lake—6,600 A3.

Kings County—

Annapolis River and Tributaries—52,400 A1, 36,732 A2, 31,153 A3, 11,562 A5, 19,149 Af.
 LaHave River (West Branch)—2,562 A5.

Lunenburg County—

LaHave River and Tributaries—51,400 A1, 13,500 A2, 40,826 A3, 31,110 A5, 15,704 Af.
 Rhyno Lake—5,130 Af.
 Wentzell Lake—3,594 Af.

Queens County—

Kejimkujik Lake and Tributaries—12,096 B1, 28,346 B2, 27,257 B3, 23,960 S2.

Atlantic Salmon..... 396,182
 Brown Trout..... 131,509
 Speckled Trout..... 62,360

Total..... 590,051

Lindloff Fish Culture Station

Cape Breton County—

Bruen Ponds (Mainadieu Bay)—10,000 S3.
 Chain Lake—15,000 S2.
 Curry Lake—15,000 S3.
 East Bay—

Gillis Lake—10,000 S3.
 MacAdam Lake—10,000 S2.

Gabarus Lake—20,000 S2.
 Giant Lake—6,000 S2.

Grand Lake—15,000 S2, 25,000 S3.

Hardys Lake—5,000 S3.

Jackson Lake—5,000 S3.

Kavanaugh Pond—1,000 S3.

Kilkenny Lake—42,556 B2, 7,990 B5,

16,000 Bf, 174 Bh, 300 Bk.

Leyers Lake—38,000 R2, 7,363 R4.

MacIntyre Lake—17,000 S2.

McLeans Pond (Bras D'Or Lake)—300 Sg.

MacLeod Lake—8,000 S2.

MacMillan Lake—8,000 S2.

Mira Bay Tributaries—10,000 S3.

Catalone Lake—20,000 S2, 20,000 S3, 7,000 S5.

Loon Lake—15,000 S3.

McCormick Lake—8,000 S2.

Mira River and Tributaries—180,238 B1, 283,970 B2, 53,000 B3, 6,000 B5,

14,025 Bf, 118 Bk, 49 Bh.

Cochran Lake—6,000 S5.

Cranberry Lake—8,000 S3.

MacInnis Lake—15,000 S3.

Morrison Lake—6,000 S5.

Northwest Brook (Lingan Bay)—40,000 B2.

Pottles Lake—10,000 S3, 7,000 S5.

Power Lake—3,000 S3.

Round Lake—4,000 S3.

Scotch Lake—6,000 S3.

Silver Lake—6,000 S3.

Southwest Brook (Lingan Bay)—28,550 B2, 3,000 B4.

Stewart Lake—10,000 S2.

Sydney River Tributaries—10,000 S2, 2,000 S4, 200 Sf, 20 Sg.

Blackett Lake—20,000 S2, 6,000 S3.

Dutch Brook Lake—4,000 S3.

Front Lake—6,000 S3.

Inverness County—

Brawley Lake—5,000 S4.

Hector's Lake—5,000 S4.

Horton Lake—5,000 S4, 600 Sf.

Johnson Lake—3,000 S3.

Richmond County—

Bras River—20,000 S2.

Buchanan Lake—3,000 S2.

Bras D'Or Lake and Tributaries—8,000 S2, 2,725 Sg.

Indian Lake—5,000 S2.

MacDonald Lake—8,030 S2.

MacKenzie Lake—6,000 S2.

Mary Ann's Lake—4,000 S2.

Pringle Lake—4,000 S2.

Thompson Lake—4,000 S2.

Breens Lake—8,000 S2.

Campbell Pond (West Arichat)—6,000 S3.

Ferguson Brook (Atlantic Ocean)—10,000 S2.

Framboise River—

Bell Lake—6,000 S2.

Five Island Lake—6,000 S4.

Reid's Lake—6,000 S2.

Sterling Lake—6,000 S2.

Grand River—21,707 Af.

Barren Hill Lake—3,000 S2.

Loch Lomond Lake—15,000 S2, 7,000 S4, 3,486 Sf.

Isle Madame—

Chain Lake—4,000 S3, 3,000 S4.

Deep Lake—2,000 S2.

Forrest Lake—8,000 S2, 1,576 Sf.

Grand Lake—18,000 S2, 5,000 S3.

Latimore Lake—3,000 S2.

Mannette Lake—5,000 S2.

Potties Lake—9,000 S2.

Shaw Lake—9,000 S2, 811 Sf.

Landry Lake—4,000 S3, 3,000 S4.

MacIntyre Lake—6,000 S3.

Lindloff Fish Culture Station—Conc.

Richmond County, conc.—
 River Tillard—20,000 S2.
 Kyte's Lake—12,000 S3.
 Lindloff Lake—10,000 S5, 28,411 Sf.
 Mill Lake—5,000 S2, 911 Sf.
 Rockdale Lake—10,000 S2.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 21,707 |
| Brown Trout..... | 675,970 |
| Rainbow Trout..... | 45,363 |
| Speckled Trout..... | 707,070 |
| Total..... | 1,450,110 |

Margaree Fish Culture Station

Inverness County—
 Bras D'Or Lake Tributaries—64,642 S1,
 7,000 S3, 6,000 S4, 3,015 S5.
 Cheticamp River—200,000 A1, 3,000 Sf,
 449 Sg.
 Cheticamp Mountain Lake—1,000 Sf.
 Corney Brook (Gulf St. Lawrence)—500 Sf.
 Eustabas Pond—10,000 S1, 2,800 S3.
 French Mountain Lake—2,500 Sf.
 Grand Etang Brook (Gulf St. Lawrence)—
 20,000 S1, 2,800 S3.
 Hector Lake—15,000 S1.
 Horton Lake—15,000 S1.
 Lac Du Rosseau—25,000 S1, 5,600 S3.
 Lewis Brook (Lake Ainslie)—15,000 S1.
 MacIntyre Lake—15,000 S1.
 Margaree River Tributaries—220,000 A1,
 118 A2, 10,200 A5, 3,447 Af, 3,524 Ag,
 350,000 S1, 25,600 S3, 26,000 S4,
 28,293 S5, 3,079 Sf, 1,112 Sg, 980 Sh.
 Lake O Law Lake—30,000 S1, 5,600 S3,
 665 S5.
 Lake O Law Lake (Lower)—30,000 S1,
 7,000 S4, 1,330 S5.
 Lake O Law Lake (Upper)—30,000 S1,
 7,000 S4, 665 S5.
 Mull River—100,000 A1.
 Pembroke Lake—11,600 S3.
 Plateau Brook (Gulf St. Lawrence)—20,000
 S1.
 Red River Lake—600 S3.
 River Denys and Tributaries—26,000 S3.
 River Inhabitants Tributaries—30,000 S1,
 10,000 S3.

Strathlorne Brook (Gulf St. Lawrence)—
 8,000 S3, 7,585 S5.

Victoria County—
 Barachois River—25,000 S1, 7,200 S3.
 Baddeck River and Tributaries—65,000 S1,
 21,600 S3, 14,000 S4, 1,065 Sf, 400 Sg.
 Breton Cove Pond (Atlantic Ocean)—10,000
 S1.
 Burton Lake—7,000 S2.
 Clyburn Brook (Atlantic Ocean)—1,500 Sf.
 Dingwall Lake—7,000 S2.
 Fresh Water Lake—5,000 Sf.
 Giffin Lake—3,500 S3.
 Jigging Cove Lake—3,000 Sf.
 MacDonald Pond (Atlantic Ocean)—10,000
 S1.
 Middle River and Tributaries—100,000 A1,
 130,000 S1, 12,000 S3, 3,000 S4, 4,965 Sf,
 850 Sg.
 MacLeod Lake—10,000 S1, 3,000 S4.
 Morrison Lake—3,500 S3.
 North Aspy River—40,000 A1, 1,000 Sf.
 North River and Tributaries—240,000 A1,
 25,000 S1.
 Paquettes Lake—1,000 Sf.
 Warren Lake—1,578 Sf.
 White Point Pond (Atlantic Ocean)—7,000
 S2.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 917,289 |
| Speckled Trout..... | 1,259,573 |
| Total..... | 2,176,862 |

Mersey Fish Culture Station

Lunenburg County—
 Beaver Brook (Mahone Bay)—8,800 S1,
 2,000 S5.
 Bickle Pond (Green Bay)—1,500 S2.
 Conrad Lake—2,000 S2, 2,300 S5.
 Crab Pond (Atlantic Ocean)—1,000 S4.
 Frog Pond (Atlantic Ocean)—1,000 S4.
 Hirtle Pond (Atlantic Ocean)—1,000 S5.
 Keddys Pond (Martins Brook)—5,280 S1.
 LaHave River Tributaries—1,800 S5.
 Beck Lake—7,000 S2.
 Church Lake—3,000 S3.
 Crouse Lake—4,000 S2, 3,000 S5.
 Holbert Lake—3,000 S3.
 Rhodenizer Lake—10,500 S1.

Medway River Tributaries—4,000 S1.
 Crooked Lake—4,000 S1, 1,500 S3.
 Elizabeth Lake—7,500 S3.
 Horse Lake—5,400 S5.
 Island Lake—4,000 S1, 1,000 S4.
 Spectacle Lake—4,000 S1, 1,000 S4.
 Mike Pond (Atlantic Ocean)—1,224 S5.
 Mushamush River—25,920 A1, 10,500 A4.
 Petite River and Tributaries—26,000 A1,
 10,500 A4, 16,000 S1, 3,000 S2.
 Fitch Long Lake—4,000 S1.
 Long Lake—9,000 S1.
 Romkeys Pond (Atlantic Ocean)—1,200 S5.
 Sperry Lake—7,500 B5.
 Stage Pond (Green Bay)—1,300 S2.
 Whynot Pond (Green Bay)—1,200 S2.

Mersey Fish Culture Station—Conc.

Queens County—

Beach Meadows Brook (Liverpool Bay)—
3,000 S1.
Five Rivers—9,000 S1, 3,000 S5.
Grafton Lake—1,312 S5.
Herring Cove Lake—10,900 S1, 3,000 S5.
Louis Lake—6,000 S3.
McAlpine Brook (Atlantic Ocean)—5,400 S1.
Medway River and Tributaries—65,560 A1,
46,400 A3, 10,500 A4, 31,800 S1, 5,000
S3, 8,000 S4.
Christopher Lake—14,600 S1, 7,560 S4,
3,458 S5.
Crane Lake—2,000 S1, 6,600 S4.
Harmony Lake—4,000 S4.
Payzant Lake—3,000 S4.
Ponhook Lake—20,000 A3, 21,800 A4.
Ponhook Lake (East)—20,000 A3.
Russell Lake—5,670 S4.
Scotts Lake—2,000 S4.

Mersey River and Tributaries—12,000 B2,
23,500 B3, 1,500 B5, 7,000 S1.
Ten Mile Lake—10,500 S1.
Minard Brook (Grafton Brook)—6,300 S4.
Mitchell Brook (Port Hebert Harbour)—
9,000 S1.
Path Lake—7,000 B4.

Shelburne County—

East Brook (Green Harbour)—5,000 S2.
Green Harbour Lake and Tributary—18,000
S1, 5,000 S2, 8,000 S3.
Tom Tigney River—16,400 S1, 5,000 S2.
Wall Lake Brook (Wall Lake)—7,250 S1.

| | |
|----------------------|---------|
| Atlantic Salmon..... | 257,180 |
| Brown Trout..... | 51,500 |
| Speckled Trout..... | 359,254 |
| Total..... | 667,934 |

Middleton Fish Culture Station

Annapolis County—

Annapolis River and Tributaries—10,000 S2,
11,000 S4, 25,000 S5.
Nictaux River and Tributaries—100,000
B3, 18,000 B4, 10,000 S2, 30,000 S5.
Connell Lake—5,000 S5.
McGill Lake—20,000 B4.
Quilty Lake—5,000 S5.
Scrag Lake—5,000 S5.
Waterloo Lake—10,000 S2.
Zwicker Lake—5,650 R5.
Paradise Lake—4,000 S4.
Wrights Lake—5,000 S3.
Banks Lake—2,000 S3.
Bear River Tributaries—15,000 S3.
Baillie Lake—5,000 S3.
Beeler Lake—10,000 S3.
Katy Lake—10,000 S3.
Lake Mulgrave—4,000 S4.
Sundown Lake—5,000 S3.
Upper Mink Lake—5,000 S3.
LaHave River—
Lake Pleasant—4,000 S4.
Spectacle Lake—4,000 S4.
Thirty Lake—5,000 S5.
LeQuille River Tributaries—5,000 S3, 5,000
S5.
Gibson Lake—10,000 S3.
Grand Lake—10,000 S3.
Lake LaRose—10,000 S3.
Matthews Lake—5,000 S5.
McLelland Lake—5,000 S3.
Munroe Lake—5,000 S3.
Mersey River—
Boot Lake—5,000 S4.
Fisher Lake—5,000 S4.
Pike Lake—5,500 S4.
Twin Lakes—6,000 S4.
View Lake—2,500 S4.

Milbury Lake—10,000 S3.
Rumsey Lake—2,500 R5.
Sand Lake—10,000 S2.
Sixty Lake—5,000 S4.
Wildcat Brook (Medway River)—2,000 S4.
Young Lake—3,000 S4.

Digby County—

Comeauville River—27,000 S5.

Kings County—

Annapolis River and Tributaries—20,000 S3,
3,000 S4, 10,000 S5.
LaHave River Tributaries—5,000 S2.
Armstrong Lake—10,000 S2.
Chain Lake—5,000 S5.
Twin Lake—5,000 S5.
Lake Paul—10,000 S3.
North River—
Lake Torment—10,000 S2.
Mack Lake—4,000 S4.
South River Lake—4,000 S4.

Lunenburg County—

Birch Meadow Brook (West River)—4,000
S4.
Franey Lake—5,000 S4.
LaHave River and Tributaries—6,000 S3,
4,000 S4, 5,000 S5.
Blystone Lake—6,000 S3.
Hirtle Lake—3,000 S3.
Lake William's—3,000 S3.
New Canada Lake—3,000 S3.
Rhyno Lake—3,000 S3.
West Lake—3,000 S3.
Sherbrooke Lake—19,000 G2, 5,000 S4.

Middleton Fish Culture Station—*Conc.*

Queens County—

Beaver Head Lake—2,000 S4.
 Freemon Lake—2,000 S4.
 Grafton Lake—4,000 S4.
 Holey Lake—4,000 S4.
 Medway River—
 Collins Lake—3,000 S3.
 Harmony Lake—3,000 S3.
 Pollock Lake—3,000 S3.
 Scotts Lake—3,000 S3.

Mersey River—8,840 S4.
 Minards Lake—7,680 S4.
 Tupper Lake—3,000 S3.

| | |
|---------------------|---------|
| Brown Trout..... | 138,000 |
| Lake Trout..... | 19,000 |
| Rainbow Trout..... | 8,150 |
| Speckled Trout..... | 504,520 |

Total..... 669,670

Yarmouth Fish Culture Station

Digby County—

Allan's Lake Brook (Atlantic Ocean)—
 12,000 S1.
 Annis River—4,000 B5, 18 Bg, 365 Bh.
 Ellenwood Lake—4,500 B4.
 Hooper Lake—4,500 B4.
 Snarl Lake—4,000 B3, 17,000 B4.
 Bear River Tributaries—2,000 S4.
 Barnes Lake—2,000 S4.
 Hill Lake—3,650 S2.
 Lake Jolly—3,650 S2.
 Lake LeMarchant—3,650 S2.
 Belliveau River—1,700 S3.
 Budds or Handspiker Brook (St. Mary's
 Bay)—3,650 S2, 2,700 S4.
 Carleton River and Tributaries—41,500 S1,
 20,160 S2, 1,600 S3, 11,500 S4, 1,500 S5.
 Bear's Back Lake—1,000 S4.
 Bear Lake and Brook—4,380 S2, 1,000 S4.
 Bright's or Clearwater Lake—3,750 S2.
 Hourglass Lake—3,600 S3.
 Hunter Lake—3,900 S2, 1,000 S4.
 Oliver Lake—3,750 S2.
 Placid Lake—9,000 S1, 1,600 S3, 1,000 S4.
 Porcupine Lake—9,000 S1, 2,000 S4.
 Sprague Lake—3,750 S2, 1,000 S4.
 Sullivan Lakes—9,000 S1, 1,600 S3, 2,000
 S4.
 Wentworth Lake and Brook—1,700 S3,
 4,000 S4.
 Chegoggin Lake Brook—12,000 S1.
 Church Point Brook (St. Mary's Bay)—
 3,000 S2.
 Doctor's Lake—12,000 S1, 2,000 S3.
 Doucette's Lake—1,000 S5.
 Ellison Lake—3,650 S2.
 Franklin Pond (Annapolis Basin)—2,500 S4.
 Gaudet's Mill Pond (St. Mary's Bay)—
 9,000 S1.
 Gilbert's Brook (St. Mary's Bay)—1,600 S3.
 Grosses Coques River and Tributaries—
 7,000 S2, 12,500 S3.
 Bartlett Lake and Brook—3,500 S2.
 Thibeault Lake and Brook—3,500 S2, 2,000
 S4.
 Lint Lake—2,000 S4.
 Long Island Brook (St. Mary's Bay)—2,000
 S4.
 Loud Lake and Brook—3,000 S4.
 Marshallstown Brook (St. Mary's Bay)—
 1,600 S3.
 Mavilette River—200 S3.

Metegan River and Tributaries—36,000 S1,
 15,750 S2, 14,100 S3.
 Anselm Lake and Brook—3,000 S2.
 Arthur Lake—1,000 S4.
 Bonaventure Lake—5,500 S2.
 Bourneuf Lake—3,750 S2, 1,000 S4.
 Bull Lake—1,600 S3.
 Comeau Lake—9,000 S1, 5,500 S2, 1,000
 S4.
 Danver's Lake—3,750 S2, 1,000 S4.
 Eel Lake—1,600 S3, 2,000 S4.
 Griffith Lake and Brook—3,750 S2, 2,000
 S4.
 Long Lake (Blackadar)—9,000 S1.
 Long Lake (Hassett)—3,750 S2.
 Long Lake (Margo Road)—3,000 S2.
 Metegan Lake—1,600 S3.
 Negro Lake—5,500 S2, 2,000 S4.
 Nowlan Lake—9,000 S1, 1,000 S4.
 Partridge Lake—1,000 S4.
 Philip Lake—3,000 S2.
 Loonfoot Lake—3,000 S2.
 Prime Lake—1,600 S3, 1,000 S4.
 Peter Lake—1,000 S5.
 Salmon River and Tributaries—64,000 A1,
 134,400 A2, 25,000 A3, 39,000 A4,
 10,500 A5, 22,038 Af, 16,000 S1, 3,900
 S2, 1,600 S3, 1,500 S5.
 Boney Lake—3,900 S2, 1,000 S4.
 Clearwater Lake—2,000 S3.
 Doucette Lake (East)—2,000 S3.
 English Lake—5,500 S2.
 Gaspereaux Lake—5,500 S2, 3,000 S4.
 Hectanooga Lake—3,900 S2, 2,000 S4.
 Moosehorn Lake—9,000 S1.
 Pierce Lake—1,600 S3.
 Tichens Lake—3,900 S2, 2,000 S4.
 Silver River—3,000 S4.
 Barrio Lake and Brook—4,380 S2.
 Carrying Road Lake—3,750 S2.
 Long Tusket Lake and Brook—4,380 S2.
 Whistler Lake—3,750 S2.
 Sissiboo River and Tributaries—7,500 S2,
 37,500 S3, 2,000 S4.
 Andrews Lake and Brook—3,750 S2, 2,000
 S3.
 Chub Lake—2,000 S4.
 Everett Lake—3,750 S2, 2,000 S3.
 Hanes Lake—3,650 S2, 5,500 S4.
 Journey Lake—3,750 S2, 2,000 S4, 1,100
 S5.
 Mallett's Lake—3,000 S4.

Yarmouth Fish Culture Station—Cont.

Digby County (cont.)—

Sissiboo River and Tributaries—(cont.)

Mistake Lake—3,750 S2, 2,500 S3.

Wright Lake—3,750 S2, 2,000 S3.

Spectacle Lake—7,000 S5.

Young's Lake—1,000 S5.

Tusket River—12,500 S3.

Wagner's Lake—3,600 S3.

Queens County—

Big Robertson Lake—1,000 Bf.

Shelburne County—

Alvin Lake—6,700 S2, 3,000 S3.

Barrington River—4,000 A1, 3,700 S2,

2,000 S3, 6,000 S4, 3,000 S5.

Great Pubnico Lake—17,000 A2.

Birchtown Brook (Shelburne Harbour)—

7,200 S2, 1,000 S5.

Black's Brook (Shelburne Harbour)—9,175

S2, 2,600 S3.

Churchover Lake Brook (Birchtown Bay)—

3,700 S2.

Clyde River and Tributaries—88,000 A1,

116,400 A2, 24,000 A4, 9,000 A5, 34,100 Af,

72,000 S1, 72,819 S2, 14,056 S3, 5,000 S4,

7,000 S5.

Dexter's Lake Brook (Shelburne Harbour)—

3,200 S2, 2,500 S5.

Doane's Brook (Gunning Cove)—3,700 S2.

Downey's Brook (Atlantic Ocean)—6,500 S2,

2,000 S4, 3,000 S5.

Oak Park Lake—10,200 S2, 2,000 S4.

Four Bridge Brook (Jordan Bay)—3,000 S2.

Fresh Brook (Atlantic Ocean)—3,000 S5.

McQuhae Meadows Brook (Shelburne

Harbour)—3,700 S2.

Meadow Brook (McKay Lakes)—3,700 S2.

Purney's Brook (Jordan Bay)—8,475 S2,

2,500 S5.

Roseway River and Tributaries—48,050 S2,

19,000 S3, 13,000 S4, 7,650 S5.

Back (John) Lake—2,500 S5.

Clam Lake—3,200 S3.

Courtenay Lake—13,500 S2.

Deception Lake—12,175 S2, 3,500 S4, 2,100

S5.

McKay Lakes—7,200 S2, 3,500 S4, 4,500

S5.

Phillip's Lake—3,500 S2, 3,200 S3, 1,000

S5.

Round Bay River—12,175 S2.

Beaver Dam Lake and Brook—17,650 S2,

2,000 S3, 1,000 S4.

Sandy Point Brook (Shelburne Harbour)—

3,000 S2.

Shag Harbour Brook (Atlantic Ocean)—

3,700 S2, 2,000 S3, 3,000 S5.

Annis Lake and Brook—17,000 B1, 11,300

B2, 8,000 B3, 18,000 B4, 1,050 Bf,

3,000 S4, 3,000 S5.

Big Brazil Lake—7,000 B1, 18,300 B2,

4,000 B3, 16,500 B4, 3,000 S5.

Harris Lake and Brook—10,300 B2,

4,000 B3, 15,000 B4, 3,000 S5.

Hooper Lake—7,000 B1, 11,300 B2,

4,000 B3, 8,000 B4.

Lake Edward—22,000 B1, 10,900 B2,

4,000 B3, 17,500 B4.

Lake Ellenwood—7,000 B1, 4,300 B2,

7,600 B3, 15,500 B4, 4,000 B5.

Lake Jessie—7,000 B1, 11,300 B2, 4,000

B3, 7,000 B4.

Little Brazil Lake—7,000 B1, 10,300 B2,

4,000 B3, 8,000 B4.

Salmon Lake—10,300 B2, 4,000 B3,

11,000 B4.

Scott Lake and Brook—22,000 B1, 6,600

B2, 4,000 B3, 9,000 B4.

Argyle River—64,000 A1, 29,000 A2, 12,000

A4, 12,000 Af, 12,500 S3, 2,000 S4.

Frost Lake—3,700 S2.

Moses Lake—5,500 S2.

Randall Lake—5,500 S2, 3,000 S5.

Brenton Lake—3,900 S2, 2,000 S3, 6,000 S5.

Carleton River and Tributaries—36,000 S1,

3,000 S2, 15,300 S3, 2,500 S4, 9,000 S5.

Bird Lake—3,900 S2, 2,000 S3, 2,000 S4,

3,000 S5.

Fanning Lake—7,500 S1, 3,000 S2, 3,500

S4.

Hamilton Lake—3,900 S2, 2,800 S3, 2,000

S4.

Richardson's Lake and Brook—8,000 S1,

3,000 S2, 3,500 S4.

Sloan's Lake—3,750 S2, 2,000 S3, 3,000 S5.

Cedar Lake and Brook—12,000 S1, 4,900 S3,

2,000 S4.

Chebogue River—4,000 S3.

Chegoggin River—6,000 S3, 3,000 S4, 3,000

S5.

Chegoggin Lake—3,900 S2, 2,000 S3, 2,000

S4, 3,000 S5.

Wellington Lake—3,900 S2, 2,800 S3,

3,000 S5.

Churchill Lake—3,200 S2, 2,900 S3, 2,000 S4,

3,000 S5.

Coggin's Lake Brook (Atlantic Ocean)—

12,000 S1, 2,000 S4, 6,000 S5.

Corning Lake (South)—2,900 S3, 2,000 S4,

3,000 S5.

Darlings Lake—3,200 S2, 2,900 S3, 2,000 S4,

3,000 S5.

Duck Ponds (Atlantic Ocean)—2,695 S2.

Goose Lake Brook (Atlantic Ocean)—2,695

S2.

Great Pubnico Lake—40,000 A1.

Killam Lake—2,000 S3, 6,000 S5.

Lake George—6,000 S5.

Mallett Lake—3,200 S2, 2,000 S4, 3,000 S5.

Porter Lake—3,000 S5.

Pubnico Lake—2,695 S2, 4,000 S4, 4,500 S5.

Yarmouth County—

Allen Lake—3,200 S2, 2,000 S3, 6,000 S5.

Annis River and Tributaries—98,000 B1,

54,700 B2, 75,600 B3, 94,000 B4, 8,000

B5, 578 Bg, 964 Bh, 12,500 S3, 3,000 S4,

12,000 S5.

Yarmouth Fish Culture Station—*Conc.*

Yarmouth County (cont.)—

Silver River and Tributaries—11,250 S2,
17,300 S3.
Carrying Road Lake—2,000 S3.
Whistler Lake—2,000 S3.
Tedford Lake—12,000 S1, 2,000 S3, 3,000 S5.
Trefry's Lake—3,900 S2, 2,000 S3, 2,000 S4.
Tusket River and Tributaries—64,000 A1,
67,400 A2, 76,000 A3, 24,000 A4, 5,250
A5, 6,000 Af, 56,000 S1, 22,450 S2,
12,500 S3, 7,000 S4, 6,000 S5.
Beaver Lake—3,200 S2, 1,000 S4.
Butler's Lake—6,700 S2, 2,000 S4, 3,000 S5
Canoe Lake and Brook—6,750 S2.
Clearwater Lake and Brook—8,000 S1,
3,000 S2, 1,000 S4.
Harris Lake—3,200 S2, 1,000 S4.

James Lake—3,750 S2.
Kegeshook Lake—6,750 S2, 5,500 S4.
Louis Lake—3,000 S2.
Mespark Lake and Brook—3,750 S2,
8,000 S4, 1,500 S5.
Rushy Lake—3,750 S2, 1,500 S4.
Soloman's Lake—3,200 S2, 2,000 S4.
Welchard Brook (Atlantic Ocean)—2,695 S2.
Wilson Brook (Atlantic Ocean)—2,695 S2.
Winter's Lake—3,000 S2, 3,000 S5.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 987,088 |
| Brown Trout..... | 746,275 |
| Speckled Trout..... | 1,710,950 |
| Total..... | 3,444,313 |

NEW BRUNSWICK

Charlo Fish Culture Station

Gloucester County—

Belledune River—2,143 S3.
Clarniere Lake—7,000 S3.
MacIntosh Brook (Caraquet River)—3,000
S3.
Millstream River—2,143 S3.
Nigadoo Lake—2,000 S2.
Nipisiguit River and Tributaries—446,460 A1,
32,000 A3, 10,047 Af, 4,286 S3.
Harts Lake—8,000 S4.
Portage Lake—2,400 S5, 1,000 Sf.
Tetagouche Lake—8,000 S4.
North Branch Caraquet River—2,500 S4.
Pokemouche River—7,000 S3.
South Branch Caraquet River—32,000 A3,
9,000 S3, 2,500 S4.
Teagues Lake—4,000 S3.
Tracadie River—216,000 A1, 4,473 Af.

Jacquet River—150,000 A1, 14,324 Af,
6,000 S3.
Antinori Lake—5,000 S4, 750 Sf.
Black Lake—3,000 S3.
Louson River—2,000 S3.
MacKenzie Lake—3,000 S3.
Nash Creek (Chaleur Bay)—2,000 S3.
Nigadoo River—2,150 S3.
North Branch Charlo River—28,000 A4,
1,650 Sf.
Restigouche River and Tributaries—647,700
A1, 16,000 A2, 130,000 A3, 54,134 Af,
8,150 S3, 10,000 S4, 6,000 S5.
Eight Mile Lake—2,150 S3.
Pope Logan Lake—15,000 S2.
Upsalquitch River and Tributaries—
300,000 A1, 26,420 Af.
Island Lake—200 Sf.
Meadow Brook Lake—5,000 S3.
Murray Lake—5,000 S3.
Tongue Lake—300 Sf.
Twenty-One Mile Lake—3,000 S3.
South Branch Charlo River—12,000 A4, 1,476
Af, 30,000 Sd, 1,500 S4, 557 Sf.
Two Brook Lake—4,000 S3.
Walker Brook (Chaleur Bay)—30,000 S1.
Lily Lake—1,000 S2.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 2,121,034 |
| Speckled Trout..... | 239,463 |
| Total..... | 2,360,497 |

Florenceville Fish Culture Station

Carleton County—

Blowdown Brook (Debec Brook)—1,500 S3.
Bradley Brook (Lake Brook)—2,250 S3.
Dead Brook (First Eel Lake)—3,600 S4.
Donovan Brook—2,625 S3.
Eel River Tributaries—7,000 S1, 7,875 S3,
10,800 S4.
Harvey Brook (Lake Brook)—2,250 S3.
Mill Brook—2,875 S3.

Miramichi River Tributaries—39,000 Sd,
31,200 S1, 17,850 S2, 9,000 S3, 1,800 Sf,
421 Sg.
Reid's Lake—3,000 S3.
Saint John River and Tributaries—100,000
Ad, 18,000 Af, 45,500 Sd, 100,750 S1,
25,500 S3, 26,100 S4, 415 Sf, 144 Sg.
Becaguimac River Tributaries—107,250
Sd, 27,750 S3, 7,200 S4, 255 Sf.

Florenceville Fish Culture Station—*Conc.*

Carleton County (cont.)—

Saint John River and Tributaries—(cont.)
 Long Lake—85 Sf, 100 Sh.
 Meduxnekeag River Tributaries—16,250 Sd, 9,750 S3, 7,200 S4.
 Monquart River and Tributaries—39,000 Sd, 12,000 S3, 1,050 Sf.
 Mud Lake—375 Sf.
 Presquille River Tributaries—26,000 S1, 31,500 S3, 3,600 S4.
 Davenport Lake—3,000 S3.
 Gowan Lake—5,200 S1.
 Ketch Lake—625 Sf, 50 Sg, 215 Sh.
 Williamstown Lake—750 Sf, 180 Sg, 121 Sh.
 River de Chute—5,200 S1, 9,000 S3, 210 Sf.
 Rosamond Lake—3,000 S3.
 Shikatahawk River and Tributaries—13,000 Sd, 40,950 S1, 13,500 S3, 16,200 S4, 500 Sf.

Northumberland County—

Everett Brook (Mamozekel River)—5,000 S2.

Victoria County—

Tobique River and Tributaries—347,600 A2, 15,000 S2, 7,500 S3.
 Wolverton Brook (Little Tobique River)—5,000 S2.

York County—

Dead Creek (First Eel Lake)—3,430 S2.
 Eel River Tributaries—14,000 S1, 8,135 S2, 4,200 S3, 200 Sf.
 Risteen Lake—5,400 S4.
 Grahams Brook—6,825 S1.
 Indian Lake—4,500 S3, 500 Sf.
 Little Beaver Brook (Modsley Lake)—4,800 S3.
 Little Duck Lake—2,700 S3.
 Long Lake—2,250 S3.
 Magaguadavic River and Tributaries—17,700 S3, 600 Sf.
 Magaguadavic Lake—550 Sf, 60 Sg, 120 Sh.
 McAdam Lake—150 Sh.
 McKenzie Brook (Campbell Creek)—6,825 S1.

Mill Brook (Grand John Lake)—6,825 S1.
 Mistake Brook (Second Eel Lake)—4,200 S2, 3,300 S3.
 Mosquito Brook (Spednik Lake)—4,200 S2, 3,300 S3.
 Musquash Lake—3,300 S3.
 North Brook (Fifth Lake)—200 Sf.
 Palfrey Lake and Tributaries—10,125 L3, 12,600 S2, 9,000 S3, 750 Sf.
 Skiff Lake and Tributaries—10,125 L3, 12,375 S3, 1,375 Sf.
 Riley Brook (Third Eel Lake)—3,125 S3.
 Saint John River Tributaries—15,925 S1, 15,250 S3, 180 Sg.
 Keswick River and Tributaries—6,825 S1, 13,860 S2, 5,500 S3.
 Green Hill Lake—5,400 S4.
 Nackawic River Tributaries—1,500 S3.
 Carr Lake—1,000 S2, 85 Sf.
 Fiddle Lake—170 Sf.
 North East Lakes—420 Sf.
 Taffy Lake—5,400 S4.
 Bear Lake—500 Sf.
 Nashwaak River Tributaries—72,800 S1, 16,000 S2, 18,250 S3.
 Killarney Lake—6,900 S2, 210 Sf.
 Lower Nashwaak Lake—550 Sf, 83 Sg, 207 Sh.
 Nashwaak Lake—180 Sg.
 Thomas Lake—5,000 S2.
 Nashwaaksis River and Tributaries—13,800 S2, 420 Sf.
 Pokiok River Tributaries—2,000 S3.
 Davinson Lake—240 Sg.
 Shogomoc River and Tributaries—14,000 S1, 11,805 S2.
 Charlie Lake—5,400 S4.
 Sears Brook (St. Croix River)—2,100 S3.
 Spring Brook (Amelia Lake)—3,430 S2.
 Tower Brook (Third Eel Lake)—3,125 S3.
 Yoho Stream (Oromocto River)—2,000 S3.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 465,600 |
| Sebago Salmon..... | 20,250 |
| Speckled Trout..... | 1,173,031 |
| Total..... | 1,658,881 |

Grand Falls Fish Culture Station

Madawaska County—

Glazier Lake—35,000 G2, 7,000 G3.
 Mon Repos Pond (Madawaska River)—10,000 Sd.
 Saint John River Tributaries—48,500 Sd, 20,000 S1, 53,000 S2, 8,200 S3.
 Baker Lake—45,900 G2, 11,000 G3, 12,000 S2, 7,000 S3, 586 Sf.
 Caron Lake—7,000 S2, 600 Sf.
 Pichette Lake—10,000 Sd, 5,000 S1.
 Grand River—10,000 S2, 350 Sf.
 Green River—20,000 S2, 9,000 S3.
 Green Lake—14,000 G3.

Third Green Lake—35,000 G2.
 Twin Lakes—1,000 S3.
 Iroquois' River Tributaries—20,000 S2, 8,000 S3.
 Mazerolle Lake—5,000 Sd.
 Quisibis Lake—7,000 S2, 7,000 S3, 600 Sf.
 Siegas River Tributaries—5,000 S2.
 Siegas Lake—7,000 S2, 600 Sf.
 Thompson Lake—7,000 S2.
 Trout River and Tributaries—40,000 Sd, 12,000 S2, 8,000 S3.
 Saint John Lake—20,000 Sd.
 Unique Lake—12,000 S2, 8,000 S3, 600 Sf.

Grand Falls Fish Culture Station—*Conc.*

Northumberland County—

Five Mile Brook (Tobique River)—56,000 A2.
Mamozekel River—48,000 A2.
Serpentine River—50,000 A2.

Restigouche County—

Little Tobique River Tributaries—25,000 A1, 50,000 A2.
Miller Lake—3,000 S3.

Victoria County—

East Limestone River and Tributaries—8,000 S2, 4,000 S3.
Jardine Brook (Restigouche River)—20,000 S1.
Saint John River and Tributaries—14,944 Af, 5,000 Sd, 21,500 S2, 6,738 S3, 340 Sg.
Grand River Tributaries—45,000 S1.
Little River and Tributaries—5,000 Sd, 102,000 S1, 26,000 S2, 4,000 S3, 1,124 Sf.

Muniac River and Tributaries—1,500 S2, 4,500 S3.
Salmon River and Tributaries—110,000 A2, 45,000 S1, 17,000 S2, 17,195 S3, 600 Sf.
Back Lake—20,000 Sd.
Tobique River and Tributaries—12,500 A1, 92,000 A2, 27,000 S1, 37,000 S2, 31,000 S3, 1,100 Sf, 300 Sg.
Mamozekel River and Tributaries—37,500 A1, 48,000 A2.
Pokiok River and Tributaries—7,500 S3.
Rolston Lake—5,000 S2.
Serpentine River and Tributaries—49,200 A1, 110,000 A2.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 703,144 |
| Lake Trout..... | 147,900 |
| Speckled Trout..... | 856,433 |
| Total..... | 1,707,477 |

Haley Brook Fish Culture Station

Carleton County—

Saint John River—34,350 Af.

Northumberland County—

Mamozekel River—14,400 A3.
Serpentine River—21,600 A3.

Restigouche County—

Little Tobique River—21,600 A3.

Victoria County—

Tobique River and Tributaries—25,330 Af.

Atlantic Salmon..... 117,280

Miramichi Fish Culture Station

Gloucester County—

North Brook (Tabusintac River)—3,600 S3.
Pisiguit Brook (Tabusintac River)—6,200 S3.

Inverness County (Nova Scotia)—

Margaree River—1,000 Ag.

Kent County—

Buctouche River—10,000 S2, 5,900 S3.
Cocagne River—10,000 S2, 5,900 S3.
Grand Alduane River—4,500 S1, 3,500 S3.
Kouchibouguac River—23,000 S1, 9,500 S3.
Kouchibouguassis River—12,000 S1, 9,500 S3.
Richibucto River—10,000 S2, 8,000 S3.
Bass River—4,500 S2, 1,600 S3.
St. Nicholas River—3,500 S2, 1,600 S3.
Salmon River—81,000 A1, 41,000 A2.

Northumberland County—

Hells Gate Lake—3,000 S2.
Hovey Pond (Longs Creek)—500 S2.
Kennedy Lake—4,250 S2.
McKendrick Lake—4,250 S2.
Miramichi River and Tributaries—2,000 Ag, 24,750 S2.
Bartibog River and Tributaries—26,000 S1, 11,250 S2, 11,600 S3.
Bay Du Vin River—15,000 S1, 5,000 S3.

Black River—6,500 S1, 2,100 S3.
Burnt Church River—7,000 S2.
Eel River—3,500 S2.
Little S.W. Miramichi River and Tributaries—180,000 Ad, 60,000 A1, 41,000 A3, 3,900 Af.
Napan River—11,000 S1, 2,100 S3.
N.W. Miramichi River and Tributaries—375,000 Ad, 129,000 A1, 98,700 A3, 3,450 Af, 14,800 S2, 4,500 S3, 1,200 S4.
Little Sevogle River—14,000 A1, 17,000 A2, 14,000 A3.
Millstream River—30,000 Ad.
Mullin Stream Lake—9,000 S3.
Sevogle River—60,000 A2, 31,500 A3.
North Sevogle River—45,000 Ad, 60,000 A2.
Shaddock Lake—2,200 S3.
South Sevogle River—30,000 A1, 28,000 A3.
River De Cashe—3,250 S2.
S.W. Miramichi River and Tributaries—90,000 Ad, 60,000 A1, 30,000 A2, 16,900 A3, 16,000 S2, 15,200 S3.
Barnaby River—37,500 A1, 22,500 A2, 33,000 S1, 4,200 S3.
Bartholmew River—30,000 Ad, 22,500 A2.

Miramichi Fish Culture Station—*Conc.*

Northumberland County (cont.)—

Miramachi River (cont.)—

Cains River—150,000 Ad, 45,000 A2,
16,900 A3.

Renous River and Tributaries—90,000
Ad, 81,000 A1, 37,600 A3, 4,200 S3.

Dungarvon River—90,000 Ad, 45,000
A2.

Tabusintac River—65,000 A1, 18,250 A3,
3,700 Af, 550 Ag.

Eskedelloc River—6,500 S1, 3,250 S2,
1,750 S4.

York County—

S.W. Miramichi River and Tributaries—
164,750 A1, 48,600 A2, 77,000 A3,
5,800 Af, 1,750 Ag, 3,000 S2, 10,800 S3,
2,800 S4.

North Cains River—3,700 S2, 1,400 S4.
Taxis River and Tributaries—85,750 A1,
15,000 A2, 2,000 S2.

Atlantic Salmon..... 2,696,600
Speckled Trout..... 413,350

Total..... 3,109,950

Saint John Fish Culture Station

Albert County—

Bennett Lake—2,500 R3, 600 Rf, 2,800 S4,
1,200 Sf.

Chambers Lake—1,000 R3.

Demoiselle Creek (Shepody River)—15,000
S1, 15,000 S2.

Lakeview (Fundy National Park)—500 R3,
1,500 Rf, 800 S4, 1,200 Sf.

Laverty Lake—1,000 Sf.

Marven Lake—1,000 R3.

Petitcodiac River Tributaries—70,000 S1,
40,000 S2.

Pollett River—100,000 A3, 30,000 A4,
2,050 Af.

Sawmill Creek (Shepody River)—15,000 S1,
10,000 S2.

Dobson Pond—500 S2.

New River and Tributaries—15,000 A2,
30,000 S1, 1,500 S5.

Pocologan River and Tributaries—15,000 A2,
30,000 S1, 1,500 S5.

Porter Brook (Oak Bay)—5,000 S1.

Rocky Lake—7,000 S1.

St. Croix River and Tributaries—16,134 Af,
135,400 S1, 16,000 S3, 300 Sf.

Canose River and Tributaries—75,000 S1,
6,000 S3, 300 Sf.

Bonaparte Lake—30,000 S1.

Waveig River and Tributaries—40,000 S1.
Twin Lakes—10,000 S1.

Shaw Lake—4,000 S1.

South Branch Oromocto Lake—5,000 S2.

Spear Brook (Lake Utopia)—4,000 S1.

Woodwards Lake—8,000 S1.

Charlotte County—

Chamcook Lake—104,364 L1.

Gibson Lake—10,000 S1.

Limeburner Lake—30,000 S1.

Cranberry Lake—3,000 S2.

Crey Lake—13,590 R3.

Digdeguash River and Tributaries—4,000
Af, 3,363 Bf, 80,848 S1, 25,000 S2.

Bernie Lake—4,000 S1.

East Long Lake—6,600 S1.

Gallop Lake—20,000 S1.

Gallop Stream (Oak Bay)—5,000 S1.

Glen Severn (Campobello Island)—2,050 S4.

Goose Lake—7,500 S4.

Grand Manan Island—3,000 S4.

Eel Lake—400 S4.

Little Lake—400 S4.

Ohio Pond 400 S4.

Stanley Brook—430 S4.

Wilson Pond—400 S4.

Hopper Pond (Deer Island)—300 S4.

Kellys Brook (Maces Bay)—200 S2.

Knights Pond—4,000 S1.

Leonards Lake—700 S4.

Little Meadow Lake—1,000 S4.

Magaguadavic River Tributaries—15,000 S1,
45,000 S2, 10,000 S5.

LeLands Lake—4,000 S1.

Red Rock Lake—40,000 S1.

Sparks Lake—32,000 S1.

Meadow Brook (Oak Bay)—5,000 S1.

Moore Lake—10,000 S1.

Inverness County (Nova Scotia)—

Margaree River—2,000 Af.

Kings County—

Chisholm Lake—1,000 S2.

Crawford Lake—3,000 S2.

Dickson Pond—500 S2.

Harvey Lake—500 S2.

McLeod Brook (Penobscus River)—14,000
S2.

Mechanic Lake—15,000 S2.

Nature Best Pond (Bellisle Bay)—2,000 S1.

Patterson Brook (Bay Fundy)—1,000 S2.

Pleasant Lake—5,000 S2.

St. John River Tributaries—100,000 S2 1,000
S4.

Fresh Water Lake—2,000 S3.

Grassy Lake—1,000 S2.

Kennebecasis River and Tributaries—
10,000 Sd, 255,000 S1, 89,000 S2.

Cassidy Lake—10,000 S2, 200 Sf.

Hammond River—25,000 Sd.

Smiths Lake—1,000 S3.

Morgan Lake—50 Sf, 275 Sg, 75 Sh.

Queens County—

Brittain Brook (Robin Hood Lake)—100 Sf.

Croft Pond—2,000 S2.

Cumberland Bay Creek (Cumberland Bay)
—20,000 S2, 5,000 S3.

Saint John Fish Culture Station—*Conc.*

Queens County (cont.)—

Grand Lake—800 Sf.
 Little Brook—8,000 S3.
 Little River—15,000 S2.
 Newcastle Creek—20,000 S2, 7,000 S3,
 150 Sf.
 Young Cove Stream—10,000 S2.
 McDonalds Pond (Washadamoak Creek)—
 200 S2.
 Queens Lake—5,000 S2.
 Salmon River and Tributaries—75,000 S2,
 29,000 S3.
 Gaspereaux River—25,000 S2, 6,000 S3,
 150 Sf.
 West Long Lake—1,000 S3.

St. John County—

Anglin Pond—100 S2.
 Balls Lake—7,000 S2.
 Big Salmon River—37,932 A4, 8,565 Af.
 Cardigan Lake—1,000 S4.
 Donnelly Lake—10,000 S2.
 Four Mile Lake—10,000 S2.
 Pats Lake—10,000 S2.
 Rody Lake—10,000 S2.
 Tufts Lake—10,000 S2.
 Black River—25,000 A2, 6,704 Af, 15,000 Sd.
 Black River (East)—20,000 Sd.
 Grassy Lake—40,000 S1.
 Blindman Lake—5,000 S2, 150 Sf, 200 Sg.
 Driscolls Pond—200 S2.
 Ferguson Lake—10,000 S2.
 Hanson Brook (Bay of Fundy)—12,000 S1,
 1,000 S5.
 Henry Lake—10,000 Sd, 1,000 S2.
 Kennebecasis River—
 Adams Lake—10,000 S1, 2,000 S2.
 Cherry Lake—2,500 S1.
 Dolan Lake—10,000 S1, 2,000 S2.
 Hammond River and Tributaries—40,000
 Sd, 17,000 S2.
 McCormac Lake—10,000 S1, 2,000 S2.
 Little John Lake—10,000 S2.
 Little River and Tributaries—5,000 Sd,
 4,000 S1, 201 S2, 12,000 S5, 100 Sf.
 Blackall Lake—15,000 S1.
 Boaz Lake—2,500 S1.
 Douglas Lake—5,000 S1.
 Graham Lake—40,000 S1.
 Treadwell Lake—10,000 Sd, 5,000 S2,
 150 Sf, 100 Sh.
 Milligan Lake—1,000 S2.
 Mispic River and Tributaries—18,000 A2,
 15,000 Sd, 30,000 S1, 18,875 S2, 5,000
 S4.

Beaver Lake—5,000 S2.
 Loch Lomond Lake—25,000 Sd, 22,000 S2,
 5,000 S4, 2,000 S5, 230 Sf, 71 Sh.
 McCracken Lake—15,000 S1, 3,000 S2,
 350 Sf.
 Taylor Lake—5,000 S4.
 Second Lake—18,000 S2, 5,000 S4, 20 Sh.
 Terrio Lake—15,000 S1, 3,000 S2.
 Musquash River Tributaries—65,000 S1.
 Round Lake—10,000 S4.
 Seven Mile Lake—10,000 S2.
 St. John River Tributaries—10,000 S1.
 Mayflower or Dark Lake—5,000 S1.
 Youngs Cove Stream (Grand Lake)—5,000
 S3.

Sunbury County—

Gilberts Pond (St. John River)—1,000 S2.
 Oromocto Lake—10,050 Af, 300 Sf.
 Oromocto River Tributaries—115,000 S1,
 43,000 S3.
 Peltoma Lake—20,000 S1, 150 Sf.
 Yoho Lake—5,000 S1, 4,000 S3.

Westmorland County—

Abouggan River—15,000 S1, 7,000 S3.
 Bullman Pond—1,000 S1.
 Petitcodiac River Tributaries—32,000 S1,
 16,000 S3.
 Anagance River—10,000 S1, 5,000 S2.
 Little River Tributaries—37,500 S1, 2,000
 S4.
 North River—40,000 S1, 12,000 S3.
 Scoudouc River—15,000 S1, 6,000 S3.
 Shediac River—35,000 S1, 10,000 S3.

York County—

Bull Creek (St. John River)—1,280 Sf.
 Magaguadavic River Tributaries—155,000
 S2, 20,000 S4, 1,000 S5, 100 Sf, 85 Sg,
 25Sh.
 Cranberry or Harvey Lake—6,116 Af.
 Digdeguash River—35,337 A4, 40,000 S2.
 Kedron Lake (Big)—30,000 S1.
 Kedron Lake (Little)—30,000 S1.
 Second or McAdam Lake—1,000 S5.
 Trout Brook (St. Croix River)—5,000 S2.

| | |
|----------------------|-----------|
| Atlantic Salmon..... | 331,888 |
| Brown Trout..... | 3,363 |
| Rainbow Trout..... | 20,690 |
| Sebago Salmon..... | 104,364 |
| Speckled Trout..... | 3,104,915 |
| Total..... | 3,565,220 |

PRINCE EDWARD ISLAND

Cardigan Fish Culture Station

Kings County—

Bear River—2,000 S3.
 Big Pond (Gulf St. Lawrence)—4,000 S3.
 Bonnell Pond (Georgetown Harbour)—600
 S1.
 Boughton River and Tributaries—6,000 S4.

Cardigan River and Tributaries—5,162 Af,
 1,980 R3, 6,987 Rf, 6,000 S4, 935 S5.
 Cherry Hill Stream (Hillsboro River)—
 6,000 S4.
 East Lake—4,000 S3.
 Easton's Pond (Cardigan Bay)—3,000 S4.

Cardigan Fish Culture Station—Conc.

Kings County (cont.)—

Fitzpatrick's Pond (Seal River)—6,000 S4.
 Fortune River and Tributaries—16,000 A3,
 4,000 S3, 6,000 S4.
 Fox River—4,000 S3.
 Grahams Pond (Northumberland Strait)—
 2,000 S4.
 Greek River and Tributaries—2,000 S3,
 6,000 S4.
 Hay River—3,000 S3.
 Lakeside Pond—920 R3.
 Lavandier's Pond (Cardigan Bay)—3,000 S4.
 MacCarnies Pond (Northumberland Strait)
 —2,000 S4.
 MacGinnis Pond (Gulf St. Lawrence)—
 2,016 Sf.
 MacKenzie's Pond (Mitchell River)—4,000
 S4.
 MacKinnon's Pond (Brown's Creek)—2,016
 Sf.
 MacLaughlan's Pond—3,000 S1.
 McMillans Pond (St. Peters Bay)—2,000 S4.
 Middell River and Tributaries—50,400 A3,
 8,000 S4, 2,016 Sf.
 Montague River and Tributaries—16,000 S4.
 Morell River and Tributaries—48,000 A3,
 5,950 Af, 6,000 S4, 9,000 S5.
 Morrison's Pond (Boughton Bay)—1,200 Sf.
 Munn's Pond (Brudenell River)—6,000 S4.
 Naufrage River and Tributaries—24,000 A3,
 8,000 S3.
 North Lake—5,000 S3.
 Dicksons Pond—3,000 S3.
 Pine Brook (St. Peters Bay)—2,000 S4.
 Priests Pond (Gulf St. Lawrence)—2,000 S3.
 Stricklands Pond (Murray River)—6,000 S3,
 2,000 S4.
 Surgeon River and Tributaries—8,000 S4.
 Town Pond (Northumberland Strait)—
 2,000 S3.

Prince County—

Auld's Brook (Northumberland Strait)—
 2,000 S3.
 Barbara Weit River—3,000 S3.
 Barlow's Pond (Grand River)—3,000 S3.
 Black Brook (Malpeque Bay)—1,000 S3.
 Black Pond (Northumberland Strait)—
 4,000 S4.
 Carr's Brook (Malpeque Bay)—1,000 S3.
 Clarks Pond (Bedeque Bay)—2,016 Sf.
 Clarks Stream (Malpeque Bay)—2,000 S3.
 Conroy's Pond (Gulf St. Lawrence)—2,000
 S3.
 Dunk River and Tributaries—7,000 S3,
 12,000 S4.
 Enmore River—3,000 S3.
 Foxley River—8,000 S4.
 Gordons Pond (Kildare River)—4,000 S3.
 Greenan's Stream—3,000 S3.
 Ira Banks Pond (Gulf St. Lawrence)—2,016
 Sf.
 Ives Pond (Tryon River)—4,000 S4.
 Kellys Stream—3,500 S3.
 Lockerbys Pond (Malpeque Bay)—2,000 S3.
 Lords Pond (Tryon River)—4,000 S4.
 Luttrell Stream—2,500 S3.

MacLellans Stream—3,500 S3.
 McNallys Pond (Jacques Creek)—5,000 S3.
 Mill River Tributaries—3,500 S3, 10,000 S4.
 Myers Stream—2,500 S3.
 Nail Pond (Gulf St. Lawrence)—1,008 Sf.
 Perry's Pond (Muddy Creek)—4,000 S4.
 Pierre Jacques River—4,000 S3.
 Round Pond (Gulf St. Lawrence)—2,000 S3.
 Sheas Pond (Gulf St. Lawrence)—6,000 S4.
 Sheep River—5,000 S3.
 Tignish River and Tributaries—24,000 A3,
 4,000 S3, 12,000 S4.
 Trout River and Tributaries—6,000 S3,
 8,000 S4, 2,016 Sf.
 Warrens Stream—3,000 S3.
 Wilmot River Pond—5,000 S3.

Queens County—

Aberdeen Lake—4,000 S4.
 Beatons Mill Pond (Flat River)—6,000 S4.
 Brander's Pond (Gulf St. Lawrence)—2,000
 S3.
 Campbell's Pond (Gulf St. Lawrence)—
 4,000 S3.
 Comptons Pond (Belle River)—4,000 S4.
 Cousins Pond (Gulf St. Lawrence)—3,000
 S3.
 Dixons Pond (DeSable River)—3,000 S3.
 Fergusons Pond (Westmorland River)—
 3,000 S3.
 Gates Pond (North River)—4,000 S4.
 Gurneys Stream (Covehead Bay)—4,000 S3.
 Hillsboro River—
 East River—4,000 S4.
 Glenfinnan River—5,000 S3.
 Glenfinnan Lake—2,625 Rf.
 Johnston River and Tributaries—10,000
 S3.
 Hope River—6,000 S4.
 Hunter Pond (Baltic River)—3,000 S3.
 Hunter River Tributaries—4,000 S4, 2,016
 Sf.
 Ing's Pond (Pownal Bay)—1,000 S5.
 Leard's Pond (Crapaud River)—3,000 S3.
 MacAulays Stream (Tracadie Bay)—3,000
 S3.
 MacGee Pond (New London Bay)—6,000
 S4.
 Matheson Pond (Northumberland Strait)—
 2,000 S4.
 Orwell River—3,000 S4.
 Paynter Pond (Long River)—4,000 S3.
 Pinette River Tributaries—4,050 Sf.
 Stanley River Tributaries—8,000 S4.
 Vernon River Tributaries—3,000 S4, 2,016 Sf.
 Warrens Pond (North River)—2,016 Sf.
 West River and Tributaries—12,000 S4.
 Clyde River—4,000 S3.
 Winter River and Tributaries—5,000 S3,
 5,000 S5.
 Wisner's Pond (Clark Brook)—2,000 S1.

| | |
|----------------------|---------|
| Atlantic Salmon..... | 173,512 |
| Rainbow Trout..... | 12,512 |
| Speckled Trout..... | 471,437 |

Total..... 657,461