# 35TH Annual Report

1964

DEPARTMENT OF FISHERIES

CANADA

*Being the Ninety-Eighth Annual Fisheries*

*Report of the Government of Canada*



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*To His Excellency Major-General Georges P. Vanier, D.S.O., M.C., C.D., Governor General and Commander-in-Chief of Canada*

May it Please Your Excellency:

I have the honour herewith, for the information of Your Excellency and the Parliament of Canada, to present the Annual Report of the Department of Fisheries for the year 1964, and the financial statements of the Department for the fiscal year 1964-65.

Respectfully submitted,

*Minister of Fisheries.*

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*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 1964 and the financial statements of the Department for the fiscal year 1964-65.

I have the honour to be, Sir,

Your obedient servant,

*Deputy Minister.*

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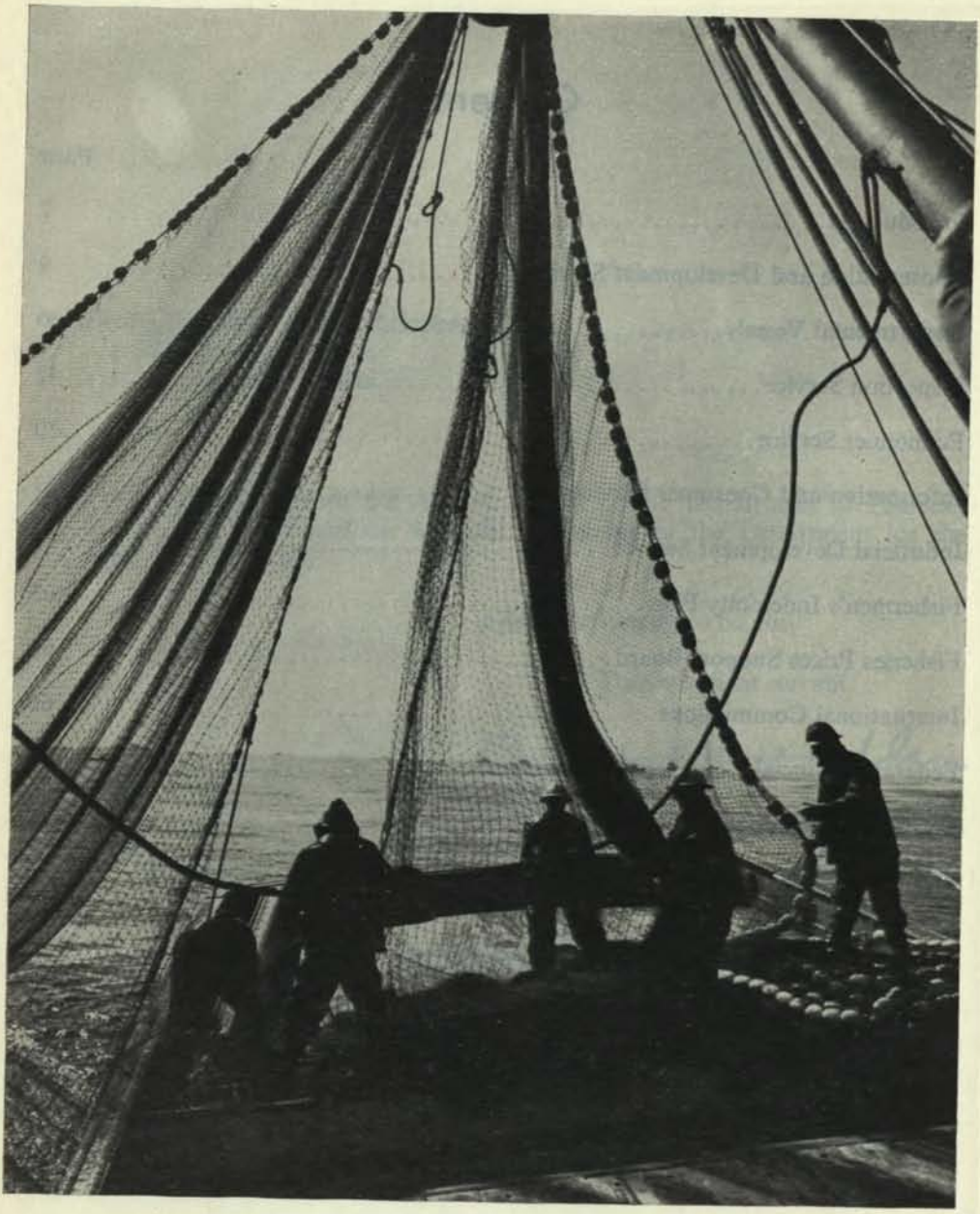

*Pacific coast salmon fishermen hoist their purse seine net aboard off San Juan, British Columbia.*

# INTRODUCTION

CANADA'S commercial fisheries, always an important source of food for domestic consumption and of export products valuable to the economy, are under steadily increasing pressure, as is the sport fishery, which in recent years has undergone tremendous expansion. As a result sound management of the freshwater resource as well as both inshore and deep-sea stocks of fish and shellfish is imperative if the various resources are to be wisely utilized.

In 1964 Canada's commercial landings of fish and shellfish were in the neighbourhood of 2.2 billion pounds, slightly less than in the previous year. This catch brought $147.5 million to the fishermen, about 13 per cent more than the 1963 return. The catch is dealt with in detail towards the end of this report.

An event of much importance to the future of Canada's fisheries was the first Federal-Provincial ministerial conference on fisheries, which was held in Ottawa in January 1964. The basis for a national fisheries development program was laid at this conference, at which a spirit of enthusiasm and co-operation was evinced by representatives of all 10 provinces and the federal Government.

The conclusion reached during the discussions was that the fisheries resources of Canada's inland waters and the seas around her can support a great, long-term expansion of the fishing industry. A progressive program of education, modernization and economic management was mapped out. The federal and provincial ministers responsible for fisheries agreed that this program would be founded on principles parallel to those in effect and to be put into effect for Canadian agriculture. It includes measures to expand the available resource, to improve catching and processing techniques, and to expand markets and reduce price uncertainty. Responsibilities of federal and provincial governments in various phases of administration and development were clarified.

Legislative jurisdiction over coastal and inland fisheries rests with the federal Government, but some provinces have accepted administrative responsibilities in varying degrees. Thus Ontario, Manitoba, Saskatchewan and Alberta assume responsibility for the freshwater species, but the Provincial Government of British Columbia is responsible for the purely freshwater species in that province, while the Government of Canada is responsible for marine and anadromous fish. Elsewhere the federal Government has complete administrative and legislative control of all species, marine and freshwater, in Nova Scotia, New Brunswick, Newfoundland, Prince Edward Island and the Northwest Territories; in Quebec alone the provincial Government administers all its fisheries, both marine and freshwater, although the federal Government is responsible for fish inspection in Quebec Province.

The Department of Fisheries, in addition to its headquarters staff at Ottawa, has a field force of Protection Officers ashore and on its fleet of patrol vessels; Inspection Officers, also ashore and afloat; biologists; engineers; technicians and other specialized employees whose activities cover a wide range, including fish culture development, protection of the fisheries, economic research, industrial development projects, instructional and informational work, and consumer education.

These activities, as well as the role played by the Department in dealing with fishery problems which have international aspects, are covered in some detail in this report. The over-all program is directed from Ottawa through regional headquarters in Vancouver, for the Pacific Area; Winnipeg, for the Central Area; Quebec, for the Province of Quebec; Halifax, for the Maritimes Area, and St. John's, for the Newfoundland Area.

The report also deals with the operations of the Fisheries Indemnity Plan and the Fisheries Prices Support Board (the latter body issues a separate report covering its activities in greater detail).

The Fisheries Research Board of Canada, which in addition to providing a scientific basis for much of the Department's work, also fulfills many of Canada's commitments in the scientific programs of the international commissions on which the Canadian Government is represented.

The Research Board's biological, technological and oceanographic activities, carried out at stations across Canada and on its fleet of research vessels, are dealt with in the Board's own Annual Report, published separately.

# CONSERVATION AND DEVELOPMENT SERVICE

THE YEAR 1964 must be considered as one of favourable progress for the Conservation and Development Service. Speaking generally, fish stocks were maintained and with higher prices gave satisfying returns to the fishermen. This suggested that the Service's efforts and programs were having the desired effect.

The brief summary of activities which follows clearly shows that the organization has developed to assume increased responsibilities as the pressures become heavier. Anticipation of future trends is most evident in the reorganization of the Pacific Area Protection Branch, which is now designed to meet modern conditions and in the continuing development and application of techniques by the Fish Culture Branch to expand fisheries stocks.

Once again it is striking that the report of the Protection Branch appears limited and factual while that of the Fish Culture Development Branch shows expansion. This should not be taken to indicate that one branch is assuming less or more importance than the other. It reflects a protection effort of much longer standing which is gradually stabilizing while Fish Culture, a younger group, is now in a position to tackle and solve problems which of necessity were neglected previously. There is a clear indication of a melding of the technical and administrative skills required to meet present and future emergencies.

## PACIFIC AREA

### *Protection Branch*

Management and control of the salmon fisheries still remain the major concern of the Department of Fisheries in the Pacific Area and except for the sockeye and pink of the Fraser and Skeena Rivers, it is the complete responsibility of the Protection Branch. To enable the Branch to carry out these responsibilities more efficiently, a major reorganization was carried out in 1964. Ten administrative districts were formed, nine in British Columbia and the other in the Yukon Territory. The three former District Offices at Prince Rupert, Nanaimo and New Westminster have been disbanded and the District Supervisors taken on strength at Area Headquarters. To carry out the broad range of activities involved in regulation and management of the fisheries, which have greatly increased with the modernization of the fishing industry, it became necessary to reduce the size of the administrative areas to permit closer liaison with field supervisors and with Area Headquarters (of the major salmon production areas).

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, particularly from a sports standpoint, grows in importance. The branch has a complement of 380 men, 237 of whom are full-time employees; the remainder are hired on a seasonal basis.

The 1964 season did not produce any exceptionally large individual runs of salmon. However, the total catch of 20,639,000 fish was slightly better than the 10-year average yielding to fishermen $30,244,000 which has only been exceeded in the past 10 years by 1962 ($30,559,000) and 1958 ($37,129,000).



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The 1964 forecast for sockeye runs was not too hopeful but the catch of 3,619,000 fish was greater than expected and was only exceeded in the past 10 years by 1961 and 1958.

With the exception of the large catch in 1962, the 1964 pink take of 9,628,000 salmon was greater than in any cycle in the past 10 years. It was an "off year" for the Fraser River. The North Central Area again produced well above average.

The 1964 chum salmon catch of two and one-quarter million was the largest since 1958. One of the features of the year was the strength of the chum salmon return to the Queen Charlotte Islands following a lengthy period of necessary conservation action. The catch on the Islands totalled 750,000 of this species, the highest since 1951. The early chum runs to the northern mainland also showed signs of rehabilitation following a number of years of severe restrictions in the fishery. The runs to the Johnstone Strait-Fraser River Area and the west coast of Vancouver Island have not responded to management measures to the same extent as the northern areas.

The strength of the coho salmon return was the highlight of 1964. In addition to producing more revenue to the fishermen than any other individual species, the catch of 4,149,000 fish was the largest since 1951, when detailed records were initiated. The troll fishery landed 65 per cent of the catch, mainly from the west coast of Vancouver Island and North Coast Areas.

The catch of just under one million spring salmon compared favourably with the 10-year average and was up over the catch of the past five years.

Regulatory measures involving shortened fishing weeks and partial or complete closures were again stringent in most salmon fisheries, especially in the chum fishery in Johnstone Strait, Fraser River and the west coast of Vancouver Island, due to the ever-increasing efficiency and mobility of the fleet.

In 1964, 907 whales were taken by a fleet of five whale catcher boats operating from the whaling plant situated on the north end of Vancouver Island. The catch was 329 more than in 1963. Shipments of whale meat for human consumption to Japan increased over 1963. Market conditions improved because of additional quality control and a reduction in the Japanese catch in the Antarctic. For the second year, Russian and Japanese whale catchers were observed off the British Columbia Coast. Enforcement of territorial rights was ensured by continuous surveillance of the international fleet by air and surface craft patrol.

Exploratory Japanese and Russian trawlers were again seen off the B.C. Coast. However, their activities were generally sporadic and conducted well offshore, chiefly along and outside the 100-fathom contour.

Fishery Officers issued 21,071 commercial fishing licenses during the year as well as 2,179 Indian fishing permits. In addition 1,497 angling permits were issued for sport fishing in tidal waters, where such permits are required by regulation, i.e. Rivers Inlet, Phillips Arm and Muchalat Inlet.

Tidal sport fisheries, especially for salmon, continue to grow in importance and two Fishery Officers are now employed full time and others part time in this fishery. A number of developments during the year reflected the importance attached to the sport fishery, the most significant being the establishment of the Advisory Committee on Salt Water Sport Fishing which makes recommendations to the Department on matters pertaining to the tidal sport fishery. In 1964 a total of 253,000 salmon were landed by sport fishermen, the bulk of the catch being coho and chinook salmon taken in the Strait of Georgia area.

During the year there were 339 prosecutions for violations of the various acts and regulations. Revenue amounted to $12,525 from fines and $14,485 from sale of confiscated articles and fish. Other duties of Fishery Officers include predator control, stream clearance work and fry salvage. Department personnel destroyed 42 hair seals and 47 sea lions in 1964, even though the control measures for these species were purposely greatly reduced that year because of a marked decrease in the sea lion populations and a sharp increase in the value of hair seal skins which were fetching up to $50 each for prime pelts. Approximately 183,000 salmon fry were salvaged through efforts of Fishery Officers, chiefly along the lower east coast of Vancouver Island.

The control program on sea lions was discontinued during 1964 due to the reduction in total stocks. A complete aerial census was carried out by helicopter in conjunction with the Fisheries Research Board of Canada. Aerial photographs of all known haul-out and breeding grounds indicate that the population has been reduced from around 12,000 animals to a total of less than 5,000, lessening the need for controlling this marine mammal's predation on salmon and damage to fishing gear.

Fishery Officers assigned to the Yukon Territory were again active in 1964. Commercial export quotas on the 32 lakes permitted a total catch of 215,741 pounds of whitefish and lake trout. The officers, in addition to other duties, issued 6,727 licenses during the year, 6,690 of them being angling licenses issued to sport fishermen.

The number of Department vessels on patrol duty in the Pacific Area was maintained at 40. Four new high-speed launches were constructed as replacements. Two 25-foot aluminum vessels, the *Alouette River* and *Babine River,* replaced the *Rissa* at Mission and the *Branta* at Babine Lake. The vessels are powered by 150 hp inboard-outboard engines and have top speeds in excess of 20 knots. Both carry radio-telephones and sounders and have accommodation for two men. Two 30-foot fibre glass vessels, the *Warrior Rock* and *Crescent Rock* were launched to replace the *Bonila Rock* and *Statistic.* They will see service in the Fraser River and the Cowichan sub-district. They are propelled by 280 hp gasoline engines and can cruise easily at 17 knots with top speed just over 20 knots.

To accommodate the increased sport fishing operations, the policy of equipping Fishery Officers with fast small speedboats was continued in 1964. Efforts were also continued to increase the Department's coastwise radio-telephone network by replacing obsolete units in a number of patrol boats and office-residences and installing single side band sets in the F.P.C. *Laurier* and at Vancouver headquarters. Improved fish-finding equipment was added to a number of vessels employed in the management of the herring stocks.

For the first time the Department sent a patrol vessel to the Bering Sea, some 1,800 miles north of Vancouver, to ensure that no pre-season halibut fishery occurred in the Area 3B North Triangle and in Area 3B South, to provide search and rescue service and to give any other assistance necessary to the fishermen.

The number of motor vehicles operated by the Protection Branch remained at 32. Replacement vehicles were purchased for five sub-districts in British Columbia. The number of office-residences operated by the Department remained at 18.



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### *Fish Culture Development*

The principal responsibilities of the Fish Culture Development Branch are: (1) to protect the fisheries resource from the harmful effects of industrial and other water-use projects, (2) to expand the resource by the application of techniques developed through research, and (3) to undertake scientific studies and assessments, as required, to ascertain the status of various salmon stocks with a view to advancing recommendations for their effective management. In 1964 the activities of the branch continued to expand in all three fields.

A tremendous expansion was evident during 1964 in the British Columbia forest industry and this resulted in a large number of complex fisheries problems. The construction of new pulp mills and the expansion of existing ones required considerable attention by the staff to develop acceptable methods for control of the effluent, and to resolve the problems related to the diversion of large quantities of water from salmon-supporting watersheds. Several of the many new pulp mills to be established in the interior of the province are now under construction at Prince George and Kamloops. The companies have agreed to incorporate the most modern facilities to reduce the BOD (biological oxygen demand) and toxicity of the effluent to safe levels for salmon. Considerable attention was directed also to problems associated with logging practices, log transportation and gravel removal for road construction.

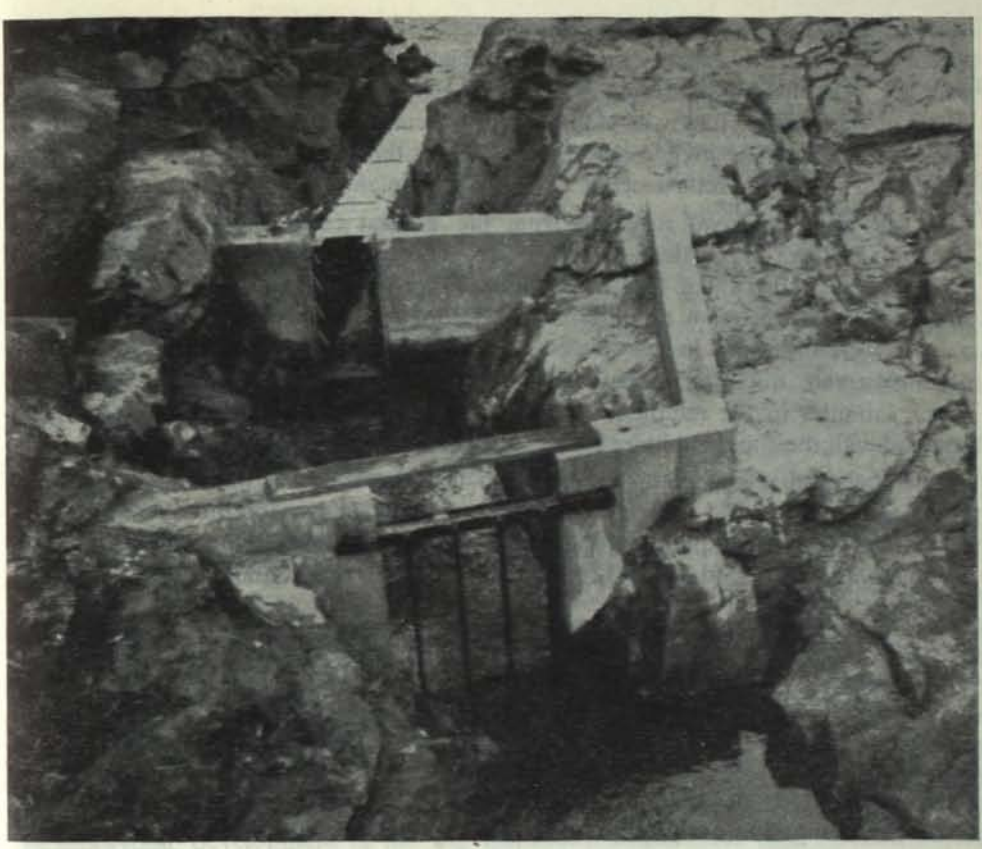
Mining activities continued at an accelerated rate during the year and this led to serious problems in connection with water diversions and waste disposal. Investigations were conducted also in resolving problems arising from projects in other fields, such as irrigation and flood control.

The salmon development program was highlighted in 1964 by the completion of the $1.5 million Big Qualicum River flow control project. This is the largest single salmon development project undertaken by the Department to produce substantial benefits for the commercial and sport fishery. It was encouraging to record that a relatively stable flow maintained during the winter of 1963-64 increased egg-to-fry survival of all salmon species in this river over the highest recorded under natural conditions.

The preliminary engineering and biological studies being conducted at Babine Lake to determine the feasibility of a large-scale sockeye salmon development program were completed in 1964. The feasibility of development schemes at Fulton River and Pinkut Creek was established and detailed planning was commenced with a view to constructing a large spawning channel on the Fulton Fiver in 1965. This would be the first stage in a $5 million program designed to achieve the full sockeye salmon rearing potential of Babine Lake.

The large-scale egg-transplant programs at Robertson Creek, Big Qualicum River, and the Nanika River were continued in 1964, and the effectiveness of the earlier transplants was measured.

A steep-pass fishway was installed in 1964 at the Kakweiken River to facilitate fish passage at a natural falls. The operation of this fishway will be assessed to determine whether or not this type of installation can be regarded as a remedial measure for salmon obstructions at locations where access and high costs preclude installation of conventional-type fishways. Detailed plans for a major fishway installation at an obstruction on the Meziadin River, tributary to the Nass, were prepared in 1964 so that construction could be initiated in 1965.



*A "steep pass" fishway installed at the falls in Kakwiekan River, B.C.*

Intensive surveys of salmon spawning streams were continued with a view to establishing a long-range salmon development program. Surveys were directed principally in 1964 to streams in the lower Fraser River and Queen Charlotte Islands.

During 1964, the salmon management activities of the branch included studies on the Nass River sockeye; Rivers Inlet sockeye, Smith Inlet sockeye; Johnstone Strait pink and chum salmon; Strait of Georgia chinook and coho salmon; and on Fraser River chum and chinook salmon stocks. Additionally, participation has continued on the International Chinook and Coho Committee. One of the most significant items in 1964 was the preparation by the Branch to assume the 1965 regulatory responsibilities on the Skeena River Management Committee.

*Robertson Creek Experimental and Development Project*

The 1964 pink salmon return from the 1962 transplant of 4.6 million eggs was approximately 100 fish, of which 86 returned to and spawned in the channel. No pink salmon were reported taken in the commercial or tidal sport fisheries and no straying to other streams emptying into Alberni Inlet was observed. The fry-to-adult return is thus lower than that recorded for any previous transplant.

In 1964, 6.5 million pink salmon eggs were transplanted from the Atnarko (Bella Coola) stock. This will provide a repeat of the 1962 plant which produced such low returns. An additional 3.6 million eggs from the late spawning Bear River (Vancouver Island) stock was planted in an attempt to determine if early timing or some factor such as high temperatures during the early incubation period contributed to the poor return of the Atnarko transplant.

Egg-to-fry survival resulting from the natural escapement of 4200 to the channel in 1963 was calculated to be 37 per cent. Average survival of the 9.6 million eggs transplanted from the Indian River in 1963 was 91.2 per cent, thus producing a downstream migration in excess of ten million fry. Temperature and salinity were measured in the donor and recipient stream estuaries during the peak of downstream migration. They revealed similar temperature regimes but much lower salinities in the recipient stream estuary. Returns from this first generation coupled with the supplementary transplant will be measured this fall (1965).

Experimental egg plants designed to test the effect of planting density and gravel size on survival and fry quality were made in two of the subchannels at Robertson Creek. The planting densities were 5000 and 2500 eggs per lineal yard. The gravel sizes tested were 3/4 - 4 inches, 2 - 4 inches and 1/4 - 2 inches in diameter.

Since completion of the major works more than three years ago the engineering program on this project has consisted essentially of maintaining the existing facilities and effecting alterations, improvements, and extensions as required. In 1964 the staff residence was enlarged to accommodate more persons and to provide suitable office space; and the rearing channels were converted to experimental spawning channels to facilitate comparative studies of production occurring within channels having different physical characteristics. An elevated walkway was erected across the experimental spawning channels so that the behaviour of the fish, under the various conditions, can be observed. Supplementary cold water was delivered to the eyeing station for the first time from a 50-foot well located near the lower end of the channel. Studies were initiated in the region upstream of the control dam with a view to dredging a channel to improve the water supply during the low-flow period. An improved false-weir trap was designed and installed in the Stamp Falls fishway to obtain adult chinook salmon for transplants to the Robertson Creek channel.

*Big Qualicum River Project*

By late summer of 1964 the high-level intake and the storage dam at the outlet of Horne Lake had been constructed, thus completing the major works of this flow-control project.

Studies designed to assess the effects of flow control on the freshwater production of salmon and steelhead trout were continued in 1964. The relatively stable flow maintained during the winter of 1963-64 increased egg-to-fry survival of all salmon species over the highest observed under natural conditions. Chum salmon survival was 26.1 per cent compared to the maximum of 19.8 per cent and an average of 13.4 per cent during the four-year pre-control study. The migrations of emergent chinook and coho fry were six to seven times larger than those measured under the best natural conditions.

The 1964 escapement was 35,000 chum, 5200 coho and 790 chinook salmon. The coho salmon run was the largest in the six years of record. Average escapements during the previous five years have been 64,000 chum, 3400 coho, and 1300 chinook salmon.

A one-half mile long spawning channel, which commenced operation in the fall of 1963, was used to incubate transplanted pink salmon eggs and to carry out studies of chum and chinook salmon production from an artificial channel. Chum salmon populations of 2300 and 1500 spawned in the channel in 1963 and 1964, respectively. The percentage egg deposition in 1963 was 92 per cent compared with 50-75 per cent in 1964. This low success was attributed to pre-spawning mortality. Egg-to-fry survival of the 1963 population was 49 per cent, almost twice that of the survival in the natural river. Studies compared the quality of fry produced in the channel with those produced in the river with respect to timing, both seasonal and diel, and length and weight.

In the fall of 1964, 101 chinook salmon were introduced into one section of the channel. One of the objectives of the study was to determine the degree of success which could be expected in holding fall chinook to maturity under artificial conditions. No problems were experienced during the one-month holding period and success of egg deposition approximated 90 per cent.

An attempt to transplant a run of pink salmon to the Big Qualicum started in 1963 when 6.3 million eggs from Cheakamus River stock were planted in the artificial channel. A plant of 6.4 million was made in 1964, using donor stock from Bear River, located in Johnstone Strait 30 miles north of Campbell River. The two donor streams provide an interesting comparison in that the natural spawning times of the two races are greatly different. Peak spawning in the Bear River occurs during the latter half of October, about one month later than in the Cheakamus River. The differences in time of spawning have had considerable effect on the rate of embryonic development in the Big Qualicum. Cheakamus eggs hatched during late October and early November in contrast to those from Bear River, which hatched in January.

*Biological studies of Morice Lake, B.C., to evaluate the Nanika River Rehabilitation Program.*

**Nanika River Rehabilitation Program**

The Nanika River hatchery, which was constructed by the Department to rebuild the severely depleted Nanika River sockeye run, is now in the fourth year of production.

In 1964, 6.6 million sockeye fry were released from the hatchery and these comprised approximately two-thirds of the total sockeye fry input to Morice Lake. Early survival of these fry in Morice Lake, as indicated by sampling, has been comparable to that recorded in 1962 and 1963 when natural fry predominated.

During the fall of 1964, 13.6 million sockeye eggs were transferred to the hatchery from the donor stream on Babine Lake, and survival to the early alevin stage to date has been exceptionally good.

Although four-year-old adults may be expected to return in 1965 from the first year of production, returns of the predominant five- and six-year-olds cannot be expected until 1966 and 1967. A continuing biological program is being carried out to assess the contribution of the hatchery to the sockeye population.

During the year a small experimental incubation channel was constructed adjacent to the hatchery for the purpose of assessing the problems arising from operating spawning channels under severe climatic conditions. Approximately two million sockeye eggs were planted last fall in the channel. The results of this winter's operation will be of great value in connection with future operations on the Nanika itself, Babine Lake, and possibly other locations in the northern interior.

*Babine Lake Development*

Detailed planning for a large-scale sockeye salmon development project at Babine Lake was greatly accelerated in 1964. As a result of the intensive field studies undertaken in the preceding years by the technical staffs of the branch and the Fisheries Research Board, the Department has decided to initiate this large-scale development program which will cost a total of five million dollars and will be carried out over the next five years. The first stage of the project, a major spawning channel on the Fulton river to accommodate 24,000 adults, will start in April. The initial five-year program is designed to add about 150 million sockeye fry to the underutilized main basin of Babine Lake.

An intensive biological assessment program will be carried out by scientists of the Department of Fisheries and the Fisheries Research Board in order to fully evaluate the development project. This evaluation will also determine the need and value of additional development work beyond the initial five-year program.

Feasibility studies concluded that Fulton River and Pinkut (15-Mile) Creek had the greatest potential for increasing the input of fry to the main basin. Biological studies were increased on these streams to provide information required for design of the proposed projects and to provide pre-development information required for future evaluation of the completed work.

The third year of measuring egg-to-fry survival in the Fulton River was completed in the spring. Enumeration of juveniles was made under conditions of excessive high water which greatly complicated the operation and reduced the reliability of results. The best estimate obtained suggests a migration of 46.5 million fry (plus or minus five million) and indicates a survival equal to the highest of the previous two years which were 11 per cent and 31 per cent. The spawning stock has ranged from 86,000 to 190,000 in the four years of study.

Fry survival at Pinkut Creek was estimated by a newly developed hydraulic sampling method. Since this technique is new the results for the present can only be

considered indicative. However, it was estimated that an egg-to-fry survival of 18 per cent was achieved. The 1964 sockeye spawning escapement to Pinkut Creek was estimated to be 146,000 by the tower count method. This is the largest escapement to this stream on record and a relatively low egg deposition was measured.

*Investigations and Assessment*

The Department continued its comprehensive program of investigation and assessment of salmon streams to determine the efficiency of measures taken to date, what further improvements might be effected and the maximum potential of the individual systems for salmon production.

Wolf Lake, tributary to the Tsolum River, was transformed into a storage reservoir by the construction of a dam and outlet works. Subsequently water was released to supplement the normal discharge in the river during the migration and spawning of pink salmon. As a result of favorable flows, three-quarters of the estimated 1,100 pink salmon escapement spawned in the relatively stable upstream areas of the watershed. This is a reversal of former years when the majority of the pink salmon spawned in the unstable downstream areas. It is expected that a higher egg-to-fry survival will result. Assessment will determine whether further stream improvements are required to rebuild this depleted run.

A 40-foot long steep-pass fishway, of a type which is being used with success at remote locations in Alaska, was prefabricated in Vancouver and transported in sections by helicopter to the Kakweiken River, tributary to Thompson Sound, where it was installed to facilitate fish passage beyond a natural falls. The Kakweiken River has all five species of salmon and in addition steelhead trout. The pink salmon are most abundant with spawning populations ranging from 5000 to 100,000 with an average of 35,000 fish. Inclement weather and high discharges delayed installation until the migration was nearly completed, so its effectiveness has yet to be assessed. If it measures up to expectations, however, this might prove to be an effective answer to some of the salmon obstructions where access and resultant high costs preclude installation of more conventional types of fishways.

Construction of an 11-mile road to provide vehicular access from the Stewart-Cassiar highway to the site of an obstruction of the Meziadin River, in the Nass system, was carried forward in 1964 with a view to initiating construction of a major fishway at this site in the fall of 1965.

Intensive surveys of the lower Fraser River tributaries were initiated in 1964 in an effort to determine the feasibility of increasing chum salmon production. These surveys included an assessment of environmental factors limiting production and an examination of possible schemes designed to increase the abundance of chum salmon to the Fraser River system.

Surveys of Queen Charlotte Island streams were directed to the examination of the following eight rivers for potential stream improvement: Naden, Ain, Mamin, Yakoun, Deena, Copper, Pallant and Mathers. A study of the Yakoun River system was started for the purpose of estimating the numbers, timing and distribution of the pink salmon escapement and will continue with estimation of the number of downstream migrants to determine egg-to-fry survival. The adult enumeration was carried out by tower counting and the pink salmon escapement in 1964 was estimated to be 325,000.

**Industrial Projects**

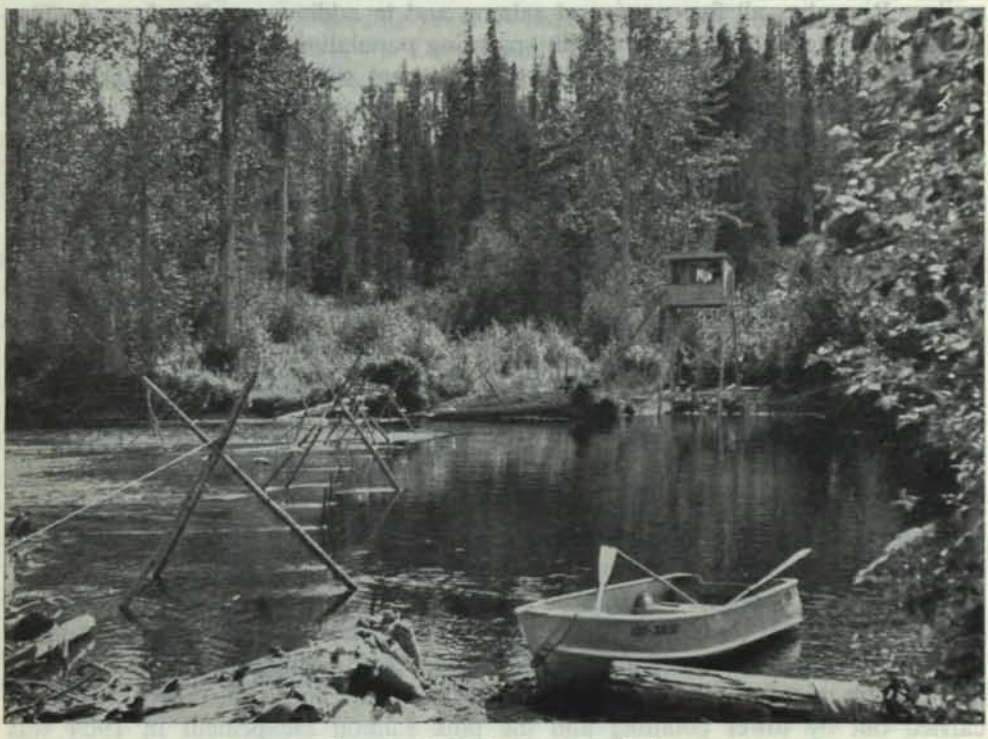
*Hydroelectric*

No new hydroelectric developments were announced in 1964 so the Branch's efforts in this field were confined to operating problems at existing plants such as Seton, Jones, and Cheakamus. The Puntledge power plant was again closed down at night in the spring to protect the fry migrations, and during the day in the summer for adult protection. It was found, however, that while these closures were effective for their intended purposes the widely fluctuating flows downstream of the powerhouse introduced additional problems affecting large numbers of fish in the lower river. As a result it was recommended that the plant be shut down entirely for the March-June period in future years.

During the year representatives of B.C. Hydro re-opened discussions looking to possible alternative solutions to the Puntledge fisheries problems, and these were being continued at the end of the year. A problem of inadequate flows for pink salmon downstream of the Jordan River power plant was resolved when B.C. Hydro agreed to a continuous operation of one generating unit, instead of a complete plant closure on a 12-hour cycle as it previously planned.

*Water Supply*

The water supply systems for pulp mills continued to receive careful study by the Branch in 1964. Rule curves for operation of storage reservoirs on the Nanaimo and Somass Rivers were developed, and were subsequently accepted by MacMillan, Bloedel and Powell River Ltd. for use at its mills near Nanaimo and



***Salmon counting tower. The tripods hold electric light line used for night counts.***

Alberni. Adoption of these curves ensures that the minimum flows in the two rivers will be maintained at a higher level than heretofore. A new improved fishway was designed for the dam at the outlet of Cowichan Lake which B.C. Forest Products Ltd. will be rebuilding in 1965. Two additional self-cleaning screens were installed in the intake to the Crofton pulp mill to protect downstream migrants.

*Marine Seismic Exploration*

Shell Canada Ltd. carried out a marine seismic oil exploration from mid-April to mid-August. Both gas-exploder and conventional seismic techniques were employed in offshore waters ranging in depth from six to 600 fathoms and extending from Barkley Sound northerly to north-central Hecate Strait. Preliminary technical meetings resulted in acceptance by the company of a number of conditions designed to afford maximum protection to the fishery and adequate supervision of the operation. Despite a 40 per cent increase in the total number of detonations, the observed mortality to fish of all species decreased 21 per cent compared with 1963. During the operations over seven per cent of the company's 18,000 shot points were suspended due to the presence of fish within lethal range of the explosive.

*Logging*

An amendment to Section 64 of the British Columbia Fishery Regulations, gazetted in May 1964, permitted regulation or elimination of gravel removal in the Pallant, Yakoun, Mamin, Datlamen, Hanna, Nass, Kitimat, Toon and Lakelse Rivers. In addition control of log driving or log towing in the Whannock, Homathko and Nass Rivers was assured. The insertion of stream protection clauses in all timber sale contracts in which the sale embraces or borders salmon-producing streams in the Vancouver, Prince Rupert and Prince George Forest Districts is continuing, and a number of Tree Farm cutting permits have been similarly processed. A recently awarded Tree Farm License in the Upper Skeena and Nass River watersheds has stream protection clauses included in the agreement between the company and the provincial Government.

*Pollution*

An increasing number of water pollution problems confronted the Department in 1964.

Expanded production at the Crofton pulp mill of B.C. Forest Products has necessitated the provision of expanded and improved facilities by the company to dilute and disperse the effluent. Companies planning to build mills on the Fraser-Thompson River watershed have agreed to provide modern in-plant facilities and biological treatment facilities to render the effluent non-toxic to fish. A considerable body of information has been acquired relating to methods of treatment and toxicity of kraft mill effluent before and after biological treatment.

Development of mining properties continued at an increased pace in 1964, necessitating that arrangements be made with the companies for disposal of tailings and retention of toxic chemicals used in the flotation process.

Another caustic and chlorine manufacturing plant will be built at Squamish, B.C. Discussions with the company for the provision of sludge settling facilities and the removal of toxic compounds from the effluent were progressing satisfactorily toward the end of the year.

Phosphamidon was used with success in controlling a relatively small infestation of Western Hemlock Looper, strengthening indications that it may be used as a substitute for DDT in forest spraying, particularly in critical areas of high hazard to fisheries resources. Baytex was used successfully as a larvicide in mosquito control in the lower Fraser Valley and in the Kamloops area. The use of herbicides consisting principally of salts and esters of 2,4-D and 2,4,5-T were used on a larger scale by the forest industry than in past years to accelerate the succession of commercially valuable coniferous trees. The widely varying toxicity reported in the literature for some if the esters prompted conducting bioassays with juvenile salmon on all esters which had been used in British Columbia with a view to being able to endorse the use of the least toxic chemical compound. In addition to these tests, field studies were carried out to assess the effects of programs which took place during the year. Added was the necessity to review proposals for the application of pesticides for control of marine borers, ambrosia beetles, biting flies and mosquitoes and snails acting as vector hosts in the transmission of swimmer's itch. Proposals in the latter category were more numerous than in past years.

Domestic sewage proposals of the kind and number encountered in past years were reviewed and protective measures were prescribed when it was necessary.

*Miscellaneous*

During the year the Branch continued to keep abreast with developments in other fields to ensure that there would be no conflict with fisheries. To this end more than 1,000 water license applications were reviewed and those requiring special fisheries protective measures were developed with the owners. Similar procedures were employed in connection with 36 applications for placer-mining leases and a number of forestry permits. Gravel removal operations and dredging for marine transportation continued to come under careful scrutiny by the Branch in 1964 and a number of positive steps had to be taken to protect fisheries during the year.

Two slides which occurred on salmon migration routes received immediate attention. A rock slide in Capilano Canyon was removed by the Greater Vancouver Water District. The major slide on the Chilcotin River near Farwell Canyon was the subject of a co-operative study with the International Pacific Salmon Fisheries Commission and engineering consultants to determine a course of action. As the natural erosion processes of the river appeared to be effective no special remedial measures were required, but the site will be carefully watched to ensure that no obstructions develop to delay or block the 1965 migrations.

**Salmon Management**

*The Strait of Georgia Chinook and Coho Investigation*

The Branch initiated a biological investigation of the chinook and coho stocks of the Strait of Georgia during the spring of 1963 and since that time, four tagging studies have been conducted and over 11,000 chinook and coho salmon have been tagged. The combined results of this tagging and of a very extensive analysis of sport and commercial catch statistics have shown that a serious trend to the harvest of both chinook and coho at a younger age and therefore smaller size has developed in the Strait of Georgia region in recent years. In order to correct this situation, several regulation changes have been proposed for implementation during the 1965 season.

*Sampling young chum salmon on their seaward migration, using specially designed traps set in the Fraser River.*

*Johnstone Strait*

The main problem associated with regulation of the even-year pink salmon stock in the Johnstone Strait fishery is that of overcoming the differentially greater exploitation rate imposed on the southern stocks of the area. The 1964 pink salmon escapement to the area totalled 600,000 and as a result of the fishing pattern applied, a relatively well-balanced escapement was achieved. The chum salmon stocks of the region are also affected by this differential in exploitation rate but the major problem in rebuilding the regional stocks has resulted from the extremely low production per unit of brood spawners which has occurred in all but two years since 1955. The 1964 escapement to the Johnstone Strait-Fraser River study area totalled 720,000; an optimum escapement for the region would exceed two million.

*Fraser River Chum Salmon Investigation*

An investigation of the Fraser River chum salmon stocks was initiated in 1960 to determine the reason for a decline in the strength of the stock and to acquire the additional information required for management and rehabilitation of the stock. The studies conducted to date have indicated that the main problem associated with rehabilitation is one of rebuilding the main-stem spawning population. With the acquisition of additional information on timing, speed of migration and exploitation rate of the commercial net fishery both in Johnstone Strait and in the Fraser River, it has been possible to develop fishing patterns designed to provide maximum protection to this specific population. During the period 1961 to 1963, the mainstem escapement level ranged between 20,000 and 50,000. It was encouraging to note that the 1964 escapement increased to 75,000.

Further studies associated with this investigation include test-fishing in the lower river; tagging for adult enumeration both near the upper limit of the commercial fishing area and on the major spawning tributaries; and enumeration of the total system chum salmon fry output. The latter involves a rather extensive sampling technique at Mission which was developed in collaboration with the International Pacific Salmon Fisheries Commission to fulfill a multi-species sampling requirement.

*Fraser River Chinook Salmon*

A chinook salmon test-fishing program was initiated in 1964 on the Fraser River at Silverdale near the upper limit of the commercial fishing area. This program, which extended from mid-April to late September, was implemented as the first step in a proposed biological study of the Fraser River chinook salmon population.

*Nass River*

A test-fishing program was initiated on the Nass River sockeye salmon stocks in 1963. In addition to test-fishing, the 1964 program included enumeration of the sockeye escapement to the Meziadin system, sampling of the Bowser Lake escapement, and analysis of scale characteristics for identification of the Meziadin and Bowser stocks in the commercial fishing area.

*Owikeno Lake*

In 1960 the Branch initiated a combined limnological and juvenile sockeye enumeration program on Owikeno Lake and this program was continued in 1964. The juvenile studies are based on an extensive sampling program aimed at providing both a measure of pre-smolt abundance as well as a measure of density, distribution and survival rate in each of the four lake basins throughout the freshwater period of the sockeye life cycle.

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

## CENTRAL AREA

*Northwest Territories*

Commercial production of fish, all species, for the Northwest Territories during the calendar year 1964 totalled 6,708,743 pounds. Great Slave Lake produced 5,336,169 pounds and other lakes in the "Expansion Program" accounted for 1,372,574 pounds. This was an increase of 480,000 pounds over 1963. The value of this catch to the fishermen was $931,200. The market value was estimated at $1,711,500. Landings from Great Slave Lake were about 220,000 pounds smaller than in 1963 but the value to both fishermen and secondary producers was up slightly. Catches from the other lakes fished were doubled those of the previous year. Because of higher transportation costs from these lakes to the packing houses, prices received by the fishermen were less than those received for Great Slave Lake fish.

As in the past, gill-nets were used exclusively on all lakes. Experiments with trap-nets on Great Slave Lake during the summer were not successful. It is unlikely that this type of catching gear will ever replace or compete with the traditional gill-net on Great Slave Lake.

To ensure compliance with conservation regulations governing mesh size, quotas and closures of fisheries, Protection Officers used boats, aircraft and Bombardier snowmobiles to maintain surveillance over the fisheries in the Northwest Territories.

Nueltin and Windy Lakes in the Keewatin District were fished commercially during 1964. Three companies, with headquarters at Winnipeg, Manitoba, operated on these two lakes. They employed 24 fishermen for this operation. In the Mackenzie District, four companies employing 356 fishermen set nets in 16 lakes, including Great Slave, during 1964.

Five protection officers and two guardians assisted by inspection personnel when available carried out extensive surface and air patrols to maintain control over the expanding fisheries of the Northwest Territories. During the year there were 44 infractions of the regulations. Eleven persons were found guilty and paid fines totalling $257.50. One offender was found guilty and sentenced to jail. Three court cases were dismissed and 29 infractions were by persons unknown.

Approximately 3,000,000 pounds of fish were taken by the Indians, Metis, Eskimos, R.C.M.P. and others in the Northwest Territories during the 1964 domestic fishery. Reports indicate that the poundage adequately met the domestic requirements for all those involved in this operation.

Sport fishing, although not limited to seasons by legislation, usually starts in early June and is over by mid-September.

One new lodge with accommodation for 40 guests was built on Hogarth Island in Great Bear Lake, bringing the total number of lodges on this lake to four. Three lodges were in operation on Great Slave Lake and a number of fly-in tent accommodations were available on some smaller lakes in the Yellowknife area. Chantrey Inlet in the Eastern Arctic attracted a number of sport fishermen during the summer. It is likely that angling activities will be greatly increased in this area.

A small cannery to process Arctic char was established at Winchester Inlet south of Daly Bay in the Eastern Arctic. The operators had hoped to can the entire quota of 20,000 pounds of char but the catch was disappointingly light, resulting in a pack of only 2,000 pounds.

The whaling season at Churchill, Manitoba got underway July 17 and ended September 4. The total catch for the season was 460 beluga. Forty-one hunters took part in this fishery.

Approximately 200,000 pounds of meat and 1,300 gallons of oil were produced from the processed animals. The oil was sold for 7½ cents per pound. The meat sold at seven cents per pound, f.o.b. Churchill. A United States manufacturing firm bought 202 beluga hides for processing into leather. Apparently this leather is stronger than cowhide and has other qualities that make it attractive for the manufacture of belts.

## MARITIMES AREA

### *Protection Branch*

During 1964 the Protection Branch conducted an intensive campaign to combat illegal lobster fishing in the Maritimes, and a special force of officers was again utilized. A large run of salmon in New Brunswick rivers with low-water levels

added to enforcement problems, which required many long hours of patrol duty. There was an extra effort to check more anglers' catches and licenses. Early in the summer aerial patrols were started to check on all vessels fishing inside the 12-mile limit. Extra work was performed in cooperation with the Water Authority, concerning gravel removal.

*Weather*

Generally, the weather in 1964 was unsettled and commercial fishing was curtailed a good part of the time due to heavy gales during the months of January, February, March and August. There was a major storm on December 1, with recorded winds over 100 knots.

*Water Conditions*

Inland water levels were low in Nova Scotia during the month of May. They returned to normal in June and frequent rains along the Atlantic coast maintained them at that level during the summer and fall months. In New Brunswick, light rains resulted in a gradual spring run-off and there was no flooding along any of the rivers as usually happens during the early spring. Throughout the entire summer and fall months, New Brunswick received only light rains at irregular intervals and water levels were low. However, the summer temperatures were cool and there were no extreme conditions that would affect fish life. On Prince Edward Island, water levels were normal during the first half of the year and slightly below normal for the latter half. Summing up temperatures and water levels during the fall months, spawning conditions were considered to be fairly good.

*Commercial Fishing*

Increased landings occurred principally in herring, flatfishes, haddock, cod, mackerel and cusk. It is significant to note that in those species where the landings were not as heavy as in the previous year, there were substantial increases in the landed values. This was especially true in the lobster fishery where the catch dropped approximately $1\frac{3}{4}$ million pounds and the landed value showed an increase of more than $2\frac{1}{2}$ million over that of the previous year.

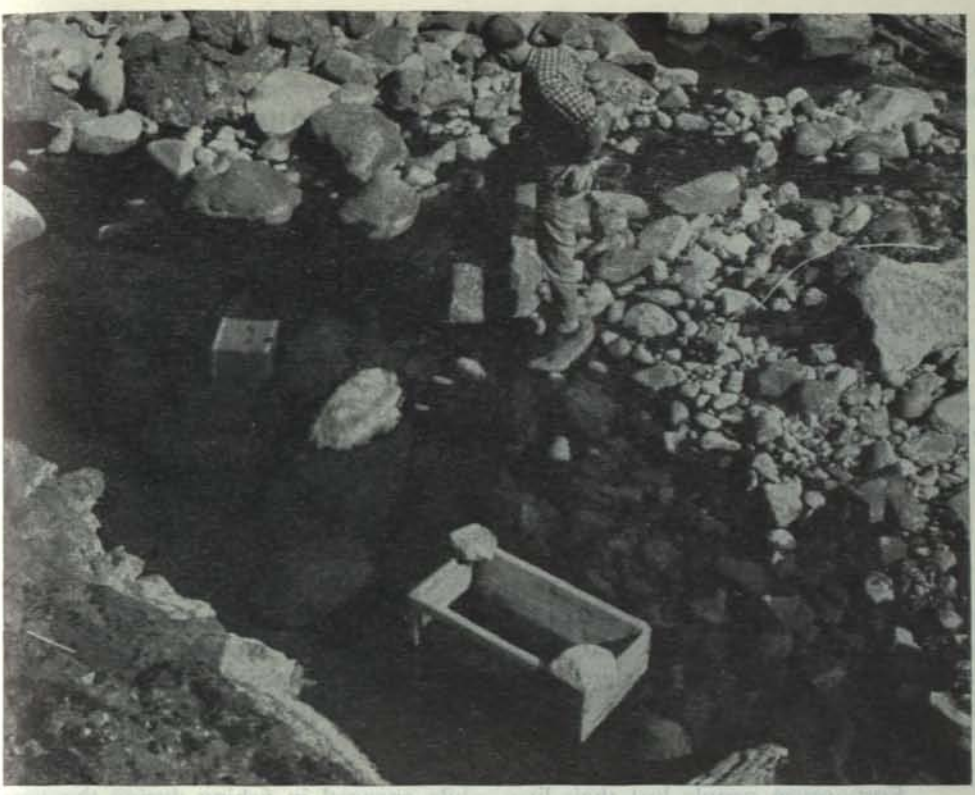
There is a continuous buildup of the fleet engaging in offshore longlining for swordfish and the incidental catching of tuna. This fleet consists of modern, well-equipped vessels and in addition there are regular longliners, trawlers, draggers and scallop draggers which participate on a part-time basis. Their field of operation extends from the north coast of Florida to the eastern section of the Grand Banks.

This has become a year-round operation for some vessels. During 1964, 116 units took part in this fishery and it is expected that the number will increase. There is also a possibility that longlining for sharks may become profitable in the future.

Two vessels in the 90-foot class are engaged in part-time purse seining for tuna, and one 175-foot ship was expected to be fishing for tuna in waters of South America during 1965.

There has been no increase in the fleet of Danish seiners in the Atlantic area but a modest expansion is occurring in the Gulf of St. Lawrence.

Eighty-one vessels of over 25 tons engaged in scallop dragging, with most fishing Georges and Browns Banks. Some vessels made a few trips to the small beds on St. Pierre Bank.



*Caged fish in stream determine toxic effect of forest spray program.*

Experimental whale fishing was again carried out from June to October; approximately 75 whales were taken. This experiment was mainly carried out by a Norwegian vessel under special permit. The results indicate that this fishery will be further explored in the coming years. The commercial salmon fishermen in the Gulf of St. Lawrence and Bay of Fundy area had a good year, but the fishery was not up to expectations.

*Sport Fishery*

While water conditions were not ideal in 1964, salmon anglers had a very good season in New Brunswick and Nova Scotia; in New Brunswick, a total of 54,046 fish were reported, an above-average year although 19,000 fish below the record of 1963. As usual, the Miramichi was the top river system with 40,352 fish. Good catches were also made on the Restigouche and Saint John. A total of 7,695 salmon passed over Beechwood Fishway and a record number of these (5,301) also arrived and proceeded through the Tobique Narrows Fishway.

In Nova Scotia, the catch 4,801 fish was 691 over the average for the last 15 years. It may be noted that the angling season was extended in some Nova Scotia counties and during this extension, 586 fish were taken.

Trout fishermen had a very good season with all three provinces showing a marked increase in the catch of speckled trout. This is believed to be due to the cool season which kept water temperatures down and provided good results from the stocking of hatchery raised fish. Brown trout angling was also good in Nova

Scotia. Catches of rainbow trout, grey trout, sebago salmon, black bass and pickerel were only fair. Striped bass fishing was good in both Nova Scotia and New Brunswick.

Salt water angling continues to increase with the favourite species being pollock and mackerel. Fifty-three tuna were taken. One of these weighed more than 800 lb.

*ICNAF*

Regulations of the International Commission for the Northwest Atlantic Fisheries were enforced during the year through the carrying out of 342 surveys on the nets used by the Canadian trawler and dragger fleets. There were successful prosecutions of five operators of vessels for infractions of the regulations, and four other prosecutions are pending.

*Prosecutions*

Prosecutions by Protection Officers in the Maritimes Area totalled 682 during the year. This was an increase of 149 over the previous year. Fines totalled $14,872.25, also an increase of about $1,900.

*Patrol Boats*

During the year, two new Patrol Boats were commissioned, the *Howe Point*, which replaced the *Fabia*, and the *Brule Point*, which replaced the *Hyperia*. Government-owned and chartered boats patrolled a distance of 176,404 miles in 1964.

*Loss of Life*

Forty-seven people lost their lives while engaged in fishing during the year 1964. Of these, 39 were commercial fishermen and eight were sport fishermen. The big storm on December 1 alone claimed the lives of 16 commercial fishermen—two in Shelburne County and 14 on the trawler *Acadia Sea Hawk* out of Mulgrave, N.S.

*Loss of Boats and Gear*

The total loss in vessels, boats and gear for 1964 was estimated to be $1,782,090, over a half-million dollars more than in the previous year. Nine draggers, two trawlers, two longliners and 49 small boats accounted for about $1¼ million of the total loss, while loss and damage to fishing gear accounted for the balance, which amounted to more than $581,000. There was also some severe damage to shore installations, for which no figures are available.

*Seal Bounty*

The total bounty payments for the destruction of seals in the Maritimes Area were $3,175. This is a decrease of $510 from the previous year. The bounty is payable on harbour or hair seals anywhere and on grey seals killed in the Miramichi Estuary only. It amounts to $10 for each adult seal and $5 for each pup. In all, payments covered 115 adults and 405 pups; four of the adults were grey seals.

## Fish Culture Development

*Fish Culture Stations*

In spite of a variety of difficulties, the 14 full-time and two seasonal stations of the Fish Culture Station Section had a satisfactory year. (See Appendix 2.)

*Egg Collections*

A 10 per cent increase in Atlantic salmon egg collections resulted in a total of 11,396,661 eggs being taken from Charlo, Miramichi, Florenceville, Margaree and River Philip stations.

The total eggs of other species collected were 29,936,146 speckled trout, 3,802,524 brown trout, 931,134 rainbow trout and 40,000 landlocked salmon.

*Distributions*

The total distributions from all stations to Maritimes waters was 6,057,757 Atlantic salmon, 116,850 landlocked salmon, 15,671,316 speckled trout, 2,186,372 brown trout and 237,480 rainbow trout. Also, 36,528 fish and 1,341,900 eggs were sent to agencies other than Maritimes Area Fish Culture Stations.

Fish were supplied to the Fisheries Research Board, several universities and the Nova Scotia Museum of Science. Eggs were supplied to the Jasper National Parks Hatchery, several Canadian universities and hatcheries in New York, Vermont and Maine in the U.S.A., and to a hatchery in Australia.

*Maintenance*

At several stations, unserviceable ponds, buildings and pipe lines were replaced or repaired, cribs and concrete retaining walls were constructed, dams were replaced or repaired and a new domestic water supply was completed at Lindloff. Although the bulk of this work was arranged and completed by the Engineering Section, a significant part was completed by the regular station staff in many instances.

*Future Plans*

Each year, demands for live fish displays are increasing throughout the Maritimes. Future demands will necessitate more time and effort being spent on arranging and controlling this "show business".

To experiment with controlling pH with hydrated lime, the Grand Lake Station, which has experienced water quality problems, was operated, and the success achieved indicates a future production role for this station.

As an imperative step in an improved distribution program, some fish culturists participated in field surveys under biologists. To obtain further training and experience this work is to be increased in 1965.

During the year a review of the administration and organization was started. Special emphasis is being given to station management, financial control, and modernization of techniques and equipment. From this review, some weaknesses became apparent and several changes were introduced. Also, it is obvious that other major changes are imperative. In the future, these changes will be incorporated into the Fish Culture Station program by regular and sustained effort to avoid undue delay in improving efficiency.

*Salmon Investigations*

The proposed construction of another hydro-electric dam on the main stem of the Saint John River at Mactaquac necessitated an expanded study of fish movements throughout the river system. An adult salmon tagging and recovery program designed to investigate the timing, movement and distribution of salmon was continued in 1964. Since the proposed Mactaquac dam would divide the river

into two sections as far as fish distribution was concerned, information on the contribution of the river above and below Mactaquac was required. A total of 570 salmon and grilse were tagged and released in the lower Saint John River area; 167 of these fish, representing 29.3 per cent, were subsequently recovered. On the basis of information collected to date, it is now established that the major portion of the Saint John River salmon stock originates in areas above Mactaquac.

A check on the time required for tagged salmon to move from the Harbour to Beechwood showed a range of 14 to 121 days, and an average elapsed time of 46 days. These figures were based on observations of 43 tagged salmon and grilse.

The salmon run at Beechwood totaled 7,695, surpassed only by the 1963 run of 8,334. During July and August, 80 per cent of this year's salmon run ascended the fishway. A record day of 447 salmon along with a record skip hoist lift of 218 salmon ascended the fishway on July 27. About 77 per cent of the run was composed of grilse. Fallback of adult salmon at the dam was believed light and holdup below the dam negligible. A total of 723 speckled trout and over 12,000 alewives were counted through the Beechwood dam fishway in 1964.

The fishway counting trap at Tobique Narrows power dam, 20 miles above Beechwood, operated from May 20 to November 20. A total of 5,301 salmon, 71 per cent of the number liberated from Beechwood, was counted through the fishway this season. This is the largest number ever recorded at this location, surpassing the previous high of 4,985 salmon in 1954.

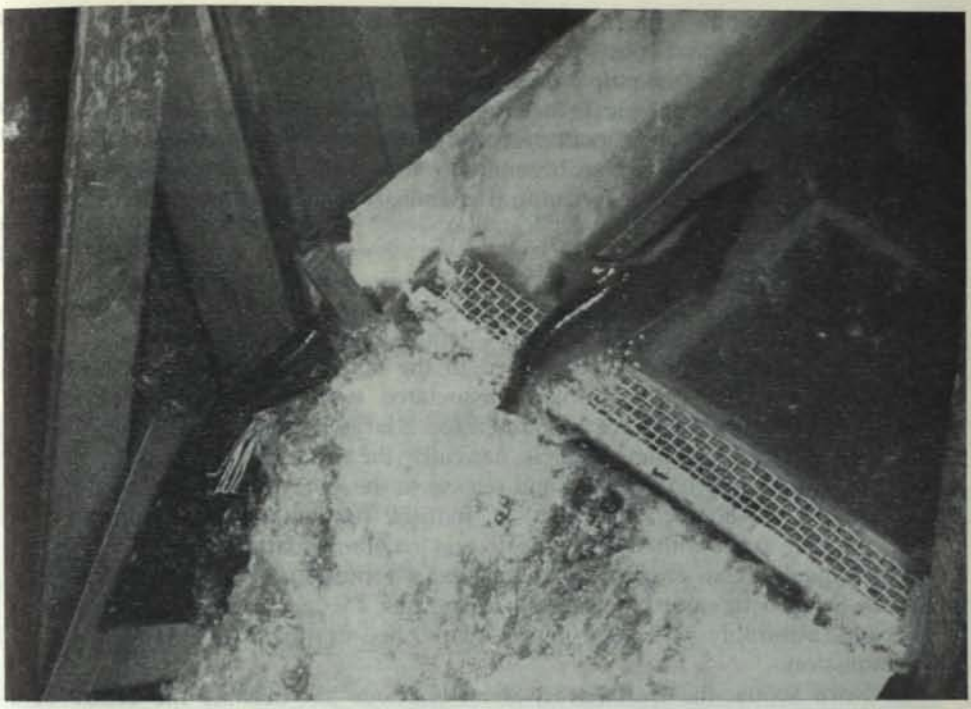
The investigation of early and late run salmon was continued in the Big Salmon River during 1964. A Carlin type smolt tag was used in place of the bead tag. It is believed that better returns will result from the use of this tag. A total of 10,000 smolts from early run stock, and 8,000 smolts from late run stock were tagged and released at the mouth of the Big Salmon River. The Big Salmon River fence will provide an opportunity to examine the returning grilse and adults from this planting. Collection of early and late run salmon was begun at Beechwood in 1964 and the progeny of these fish will be raised in the Saint John hatchery and released as smolts for further evaluation of early and late running tendencies.

*Stream Surveys*

Biological reconnaissance surveys were carried out on several Maritimes streams to assess the potential danger to fisheries of various proposed water use projects. Recommendations were made on the basis of these surveys for adequate fish protection. Preliminary investigations were carried out, in co-operation with provincial authorities, on the feasibility of water control on the Gold River, Nova Scotia. Inspection trips were made to several areas to assess the effect of gravel removal, stream dredging, and river diversions on local fish populations.

*Pollution*

Development in the base metal mining industry in New Brunswick increased greatly during 1964. The concentrator at the Brunswick Mine went on full production during the late spring and early summer. This is the largest mill in the area with a capacity of 4,500 tons per day. The Heath Steele concentrator operated at a capacity of 1,500 tons per day, processing both Heath Steele and Wedge ore. Shafts at the Key Anacon Mine (New Larder-U) and Nigadoo Mine were dewatered during the fall. It is probable that both of these mines will be reactivated in the near future. At Belledune, a smelter is under construction and plans are being finalized for the addition of a steel-chemical-fertilizer complex.



*Salmon ascending a false weir fishtrap and jumping into an anaesthetic pool.*

Activities have increased around the tin mine at Mount Pleasant, Charlotte County, during the last few months. It is possible that the first tin mine in North America will come into production in 1965. Caged fish tests and water quality monitoring indicate that mining pollution is still a serious problem in both Miramichi and Little River areas, and a close check will continue on present and future developments in this industry.

Two million acres of New Brunswick forests were sprayed in 1964. DDT was applied at the rate of one-half pound per acre and Phosphamidon was sprayed adjacent to important salmon streams at the rate of one-half pound per acre. Post spray population assessment showed serious depletion of salmon fry in sprayed streams. Parr populations were found to be high in some sprayed streams but a severe delayed mortality was observed in some streams in the fall. Short-term mortality of caged salmon parr was 96 per cent in a stream sprayed with DDT and was 63 per cent in a stream sprayed with Phosphamidon but receiving DDT from upstream tributaries. There was no mortality in caged fish or Caddis fly larvae in a stream sprayed with Phosphamidon.

Negotiations were carried on with Fraser Companies Limited, Rothesay Paper Company and South Nelson Forest Products Limited concerning acceptable effluent disposal systems for their new paper mills. The capacity of the Fraser unbleached kraft mill at Newcastle will be increased to 500 tons per day of bleached kraft. The company, in co-operation with the Fisheries Research Board and the Department of Fisheries, is conducting a series of bio-assays to investigate the effects of kraft mill bleachery wastes on Atlantic salmon. These tests were designed to determine the degree of toxicity and to isolate the source of the toxic agents. Preliminary results

suggest that the whole effluent is toxic at about 10 per cent concentration in receiving waters and that most of the toxicity comes from the chlorinated lignin materials dissolved from the pulp during chlorination.

The careless use of chemicals for crop protection was responsible for the death of many speckled trout in the potato growing areas of Prince Edward Island and New Brunswick. This problem has become serious during the last few years because of the widespread use of new agricultural chemicals that are often extremely toxic to fish.

**Engineering**

The New Brunswick Electric Power Commission's Mactaquac Power Development on the Saint John River progressed to the active construction stage during 1964. The anadromous fish problems associated with the development are of concern to the Branch and have accounted for a large proportion of staff effort in 1964. The solution recommended is basically the Swedish solution to similar problems. This is the production of and release to the river of sufficient numbers of salmon smolts to compensate for lost natural production once the dam is constructed. To assist with design details and recommendations for the proposed Mactaquac facilities an engineer accompanied a representative from the hatchery section to Sweden to study the Swedish operations. Design work on this project is progressing favourably with good liaison established between the Department and the Commission.

In Nova Scotia, the East River, Sheet Harbour has become the centre of a major fish cultural program which is intended to re-establish this river as a producer of Atlantic salmon. The river was developed many years ago for power production with little regard for the population of Atlantic salmon which it supported. The end result has been the virtual elimination of salmon from the river. Engineering surveys were started during the past year and will be continuing to gather data with which to work out a satisfactory bio-engineering solution to the problem.

An obstruction to the migration of salmon in the Big Salmon River, St. John County, N.B., was removed with very good results. A rock fall combined with a small waterfall formed a complete barrier to the upstream migration of salmon for two years. The fallen rock was removed and the charateristics of the waterfall altered so that the fish are now able to pass without delay.

Negotiations with the Maine Public Service Co. resulted in the construction of the underwater portions of fish facilities at the new powerhouse for the Tinker development on the Aroostook River, Victoria County, N.B. Completion is dependent upon assessment of the impact the Mactaquac Development will have on Aroostook runs.

The Experimental Oyster Hatchery at Ellerslie, P.E.I., which was officially opened June 27 by the Minister of Fisheries, has indicated that the spawning of oysters and subsequent rearing of larvae and spat is a commercially feasible operation. The original system used is undergoing extensive modification in an attempt to develop a commercial process. Engineers are working with Oyster Culture personnel and the Fisheries Research Board on this project.

An application by the St. Croix Paper Co. to rebuild its storage dam on the St. Croix River at Vanceboro was the cause of an extensive investigation by the Engineering Committee of the Engineering Board for the International Joint Commission. The Chief Engineer for the Maritimes Area is a member of the Committee. One result of these investigations was the incorporation of a fishway in

the design to provide for the passage of salmon and trout beyond the dam. With the construction of fishways at the Grand Falls and Woodland dams of the St. Croix Paper Co., the river is now cleared of physical obstructions to migrations. The major problem of pollution still remains and efforts will be made through the International Joint Commission to have this problem resolved.

Other fish cultural problems which were investigated included the storage dam and intake works for a new domestic water supply for the City of Moncton; the reconstruction of a dam on the Bartholomew River at Blackville, N.B., and the construction of a power project on the Monquart River, Carleton County, N.B.

The construction program covered routine construction and maintenance work on the Department's 16 fish culture stations. In addition, the Indian Falls fishway and access bridge on the North Branch LaHave River, Lunenburg County, N.S., were completely rebuilt.

*Small storage dam built to provide migration water for adult salmon during dry months.*

## *Oyster Culture*

The Department of Fisheries and the Fisheries Research Board of Canada continued co-operative investigations during 1964 to improve the position of the oyster industry in the Maritime Provinces.

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

### Mortalities and Observations on the Oyster

*Population in Nova Scotia and New Brunswick areas*

No new outbreaks of disease were observed or reported during the year 1964 in either Nova Scotia or New Brunswick.

Oysters taken from the disease-affected areas of Nova Scotia during 1964 amounted to approximately 143,400 pounds. This shows an increase of some 53,400 pounds over 1963. As the figures for the remainder of Nova Scotia are not available at this time, a complete comparison between the 1963-64 catch is not possible but indications were that it would be down in pounds in 1964.

Figures for New Brunswick are available at this writing only until November 30, 1964, in comparison with the same period for the year 1963. These figures show a marked increase in both value and pounds landed. It is difficult to come to any firm conclusion on the total figures at this time as the landed figures for the month of December 1963 are very high in comparison with the months of September, October and November of the same year. The 1964 figures for December could be lower due to adverse weather conditions and early ice cover.

A table comparing the oyster landings in all three Maritimes Provinces for the year 1963 and up until November 30, 1964 will appear later in this report.

*Results of Rehabilitation on Depleted Areas*

No further spread of disease was noted in 1964 and mortalities in transplanted stocks, where checked, continued to be normal.

At Malagash, N.S., indications were that native spat were resistant. At Shippegan and Caraquet, N.B, due to the fact that no spat were caught on commercial collectors in the last few years, it is difficult to come to any firm conclusion but indications, from small oysters picked along shores and held on trays, are that the degree of resistance is low. At Neguac, N.B., native spat, which were found in some quantity, showed good indications of survival.

*Oyster Seed Stock and Seed Farming*

Oyster farmers, in general, continued to depend on fishing contaminated areas and picking the inter-tidal zones as a source of seed and mature stocks for their leases. For instance, Summerside Harbour, which is a contaminated area, in Prince County, P.E.I., produced between 5,000 and 5,500 barrels of stock during the May, June and July season of 1964. This is the largest producing contaminated area in the Maritimes. There are also possibilities of contaminated areas in both Nova Scotia and New Brunswick being fished in 1965 for relaying which would help the lessees in these areas to stock their leases.

*Ellerslie, P.E.I.*—7,680 cement coated cardboard fillers were set out in 1964. Of these, 4,000 fillers caught a light set (180 spat per filler) and were held over

winter for threshing in the spring, but 3680 fillers of the 7680 set out caught no set at all and were discarded. Shell strings and veneer ring-type collectors caught little or no set.

*Orangedale, N.S.*—1000 cement coated cardboard fillers were set out at Crowdis Bridge and Gillis Cove with a very light set at Gillis Cove (20 spat per filler) and no spat at all at Crowdis Bridge.

*Malagash, N.S.*—2500 cement coated cardboard fillers were set out with a light average set (1000 spat per filler) but growth was poor. These collectors were held over winter for threshing in the spring.

*Shippegan, N.B.*—1500 fillers set out with no catch of spat.

*Neguac, N.B.*—120 cement coated cardboard fillers, 30 scallop shell string and 40 veneer rings set out, with a very light set of spat caught (15 spat per filler).

A total of 161 barrels of seed oysters was sold from the seed farm at Conway Narrows in the fall of 1964 to lessees in the Maritime Provinces at $10 per barrel plus shipping charges and containers.

The following is a breakdown of the distribution by provinces of seed oysters sold to lessees over the last four years:

| | 1961 | 1962 | 1963 | 1964 | Totals |
|---|---|---|---|---|---|
| P.E.I. | 75 bbls. | 38 bbls. | 88 bbls. | 77 bbls. | 278 bbls. |
| N.S. | 4 " | 5 " | 5 " | 15 " | 29 " |
| N.B. | 59 " | 49 " | 66 " | 69 " | 243 " |
| Total | 138 bbls. | 92 bbls. | 159 bbls. | 161 bbls. | 550 bbls. |

In addition to the above noted figures for 1964, nine barrels seed oysters were used for experimental plots in Nova Scotia and New Brunswick. Also, 20 barrels were held at Ellerslie for a planting to Newfoundland early in 1965. This makes a total of 190 barrels seed oysters recovered for the year 1964.

The seed farm at Conway Narrows continued to show improvement and should continue to improve with continuing farming with hand rakes and escalator harvester.

*Eel Grass (Trials conducted and reported by M. L. H. Thomas)*

Chemical control trials—84 test plots each of 100m$^2$ were set up at a variety of locations throughout the oyster-producing areas of the Maritimes. Forty-three of these plots were treated with herbicides, the remainder being controls. Plots treated were distributed as follows: Shippegan, N.B. 10; Tracadie, N.B. 4; Neguac, N.B. 10; Malagash, N.S. 10, and Conway Narrows, P.E.I. 50. Nine herbicides were applied to the plots at various concentrations. Six of these chemicals were used in granular form where the herbicide is absorbed in clay particles. This enables the chemical to be placed on the bottom, among the eel grass where it should be most effective. Two herbicides were applied by spray and one was applied coated on sand.

*Mechanical Control*—Experiments carried out in the past have indicated that annual cropping of eel grass by cutting just above the mud would result in improved oyster harvesting conditions. One plot at Neguac, N.B. was cut with shears in August. The quantity of eel grass on the plot was greatly reduced but new leaves quickly grew to about the mean height of uncut eel grass.



97556—3

*Biology*—Eel grass growth, abundance and biology, has been followed at all the field stations and at Bideford and Conway Narrows. Samples have also been taken at sites previously sampled to check for general changes in growth and abundance.

Little data from these studies have been analyzed so far. Samples from Bideford and Neguac had the largest plants; mean length rose well over 400 mm. in both these groups. Samples from Conway Narrows, Malagash, and Orangedale were, in general, less than 200 mm. mean maximum length, while those from Shippegan fell between the two extremes. The weight of eel grass per unit area was greatest at Neguac.

*Experimental Oyster Hatchery*

The experimental oyster hatchery recorded its first spawning April 9, 1964, and was officially opened June 27 by the Minister of Fisheries, the Honourable H. J. Robichaud.

In view of the fact that this is the first known attempt in Canada to spawn oysters and rear larvae and spat artificially in commercial quantities, it was anticipated that problems would develop. Problems did develop but the initial technique has indicated that it will be possible to refine the process into an efficient commercial process. The major problem centered on the apparently deleterious effect that certain metallic ions have on the larvae and spat in their early stages of development. Associated with this problem is galvanic corrosion of certain portions of the installed equipment.

Experience gained in the operation of the hatchery to date is leading the way to step by step improvement of the process. Indications are that relatively small quantities of sea water are required for efficient operation. The equipment and basic techniques are being modified to take advantage of this new knowledge.

*Oyster Leasing*

Oyster leasing activity continued at a high level during 1964 and despite the fact that the number of areas surveyed exceeded by twelve the number of applications received during the same period, a backlog of more than 1000 applications awaiting examination and survey were still on hand at the end of the year.

As of December 31, 1964, 1001 oyster leases containing 3034.7 acres were in effect in Prince Edward Island, an increase of 100 active leases and 283.0 acres under lease over the same date last year.

In New Brunswick, at the end of the year, 574 oyster leases containing 1393.3 acres were in effect. This represents an increase in New Brunswick of 18 active leases and 43.2 acres under lease over December 31, 1963.

In Nova Scotia, 184 oyster leases containing 441.47 acres were in effect on December 31, 1964, an increase of three active leases and 21.7 acres under lease in the province over the same date last year.

The total number of active oyster leases in the three provinces now stands at 1759 containing a combined area of 4875.49 acres. This is an increase of 121 leases and 347.8 acres under lease over December 31, 1963.

*Surveys*

During 1964, 284 new areas were surveyed in the three provinces, an increase of 93 over the number of areas surveyed in 1963. This increase was made possible

by the addition of another surveyor to the staff at Ellerslie. The boundaries of six contaminated areas in P.E.I. and ten contaminated areas in N.S. were established and marked with permanent concrete monuments.

A complete re-survey of the Maisonnette, N.B., group of leases, consisting of approximately 140 areas, was carried out and at the same time a considerable number of new areas was added to the group.

A breakdown of surveys carried out during 1964 is shown as follows:

| | P.E.I. | N.B. | N.S. | Total |
|---|---|---|---|---|
| New areas surveyed | 168 | 101 | 15 | 284 |
| Old leases resurveyed | 17 | 139 | 1 | 157 |
| Other surveys | 10 | 5 | - - | 15 |
| | 195 | 245 | 16 | 456 |

New survey monuments were established and old monuments in danger of being destroyed by land erosion were replanted in all three provinces.

An examination of the contaminated area in Richibucto River was carried out. However, this examination did not reveal the presence of any large amount of oysters.

Test plantings of seed oysters made in Tracadie, N.B., during the fall of 1963 were examined during the summer. The results of these examinations were quite encouraging and additional plantings of spat and seed oysters were made in that area.

Maps showing oyster leases were maintained at both the Ellerslie and Newcastle offices. Maps were also maintained at the various Fisheries offices throughout the three provinces.

An examination of six areas in Newfoundland, considered to have possibilities as oyster growing areas, was carried out at the request of the Director, Newfoundland Area. This examination revealed that conditions in several of the areas are sufficiently encouraging to warrant the serious consideration of further investigations.

*Escalator Harvester*

The M. B. *Cyprina* (escalator shellfish harvester) was used most of the season recovering seed oysters and cleaning the bottom on the seed farm at Conway Narrows when tides and weather permitted, with the exception of approximately six weeks spent in New Brunswick surveying the fishery in that area.

In general, the results from this survey showed recovery quite definite in Cocagne and Buctouche areas with some promise further north.

*The Position of the Industry*

Complete production figures for the full year 1964 are not yet available. However, a total at the end of November 1964, of 3,593,000 pounds or 17,968 barrels valued at $436,000 is a decrease in pounds landed but an increase in landed value over the same period in 1963.

Indications were that the catch would be lower in Nova Scotia in 1964 than in 1963. This would be due to a smaller fishing effort at Aspy Bay and practically no effort at Pugwash, N.S. Reports from Aspy Bay were that the fishery was as good at the end of the season as it was at the beginning, and the price better than the previous year.



97556—3½

The Pictou area of Nova Scotia showed an increase of about 17,600 pounds landed over the previous year. The Wallace area of the same province also showed an increase of approximately 17,400 pounds landed over the previous year. Therefore, according to the above figures, the areas that have been affected by disease were on the increase while other areas in Nova Scotia were on the decline. This might have been due to other employment opportunities for fishermen.

The picture in New Brunswick showed signs of encouragement with an increase in pounds landed in Cocagne, Buchtouche, and Richibucto. Final figures for these areas were not available at the end of the year.

Neguac, N.B., showed approximately 80 barrels picked during the summer and relayed to leases and approximately 50 barrels fished from leases during the fall and put on the market for between $2000 and $2500, which is encouraging.

Farther north, the picture was not as bright but still brighter than it was one year before, with about 20 barrels of seed picked along shores in the Caraquet Bay area.

A further brief survey was carried out in the Bay du Vin area during the fall, indicating very little change from the previous year. A further survey was planned for early 1965 when weather conditions would be more favourable to obtain a more accurate estimation of the situation in this area, as reports from some local fishermen indicated that mortalities were still occurring in this area.

## NEWFOUNDLAND AREA

### *Protection Branch*

*Sport Fishing*

Salmon anglers landed 42,500 fish during 1964, an increase of 9,500 over the previous all-time high of 33,000 recorded in 1963. Again, the grilse run predominated, accounting for 90 per cent of the landings. The heaviest salmon, a 30-pounder, was taken from the Lower Humber. Water levels were favourable throughout the season, and the escapement to spawning areas was exceptionally good.

The recorded catch of speckled trout was 730,000. The heaviest speckled trout reported was a seven-pounder, while a lake trout tipped the scales at 25 pounds. Both prize specimens were taken from lakes in Labrador.

The tuna sport fishery in Conception Bay was highly successful. Three hundred and sixteen bluefins were boated, the heaviest weighing 790 pounds.

*Protection Activities*

Generally, the regulations governing the commercial and sport salmon fisheries and the lobster fishery were respected. Approximately 220 violations were detected, and convictions brought fines ranging from $20 to $150. In many instances, the court confiscated the fishing equipment produced in evidence.

Under the International Commission for the Northwest Atlantic Fisheries commitment, trawlers subject to ICNAF regulations were checked regularly. Some 370 otter trawl measurements were taken by Fishery Officers to ensure use of legal size trawl mesh in cod and haddock fishing.

*Marking salmon smolts in Newfoundland.*

Throughout the sealing season, aerial patrol of the Gulf St. Lawrence and Front areas was maintained, and territorial waters were protected from encroachment by foreign vessels. Regulations governing opening and closing dates of the seal fishery were enforced through pre-season and post-season patrol. Ten vessels and five helicopters were licensed for sealing operations.

Also licensed in 1964 were 10,000 lobster fishermen and 5,000 commercial salmon fishermen. Eight special lobster holding licenses were issued, as well as some 1,500 non-revenue licenses for cod trap and salmon berths in areas under control of local fishery committees. One whale catcher and 57 trawlers, draggers and Danish seiners also came under licensing.

The Department's educational program, in the interests of conservation, was expanded. Films, literature and posters were widely distributed. In addition, Protection Officers addressed high school students, fish and game clubs, youth clubs, and other organizations, and discussed with fishermen the great need for conservation measures.

*Patrol Fleet*

Newfoundland territorial waters, including the Labrador area, were patrolled by a fleet of ten vessels. In addition to offshore patrol, inshore protection and inspection received attention.

Besides the regular patrol vessels, eight speed boats were utilized (on inshore assignments) and there were 54 small boat charters for varying periods.

Ashore, the Protection Branch operated 26 motor vehicles in carrying out inland patrols. Helicopter and fixed wing aircraft also were utilized.

A more efficient operation has resulted from expansion of the Department's radio-telephone network in Newfoundland. Base stations now are in operation at Area Headquarters (St. John's), Bonavista, Long Harbour and Grand Bank. The patrol fleet is fully equipped, and patrol vehicles also carry mobile units. Further expansion of this communication system is planned for 1965.

*Bay Seal Bounty*

Approximately $6,500 was paid in bounty to fishermen for destruction of the bay seal. Bounty payments since this control measure was introduced in the early 1950's total almost $100,000.

## Fish Culture Development

*Exploits River Program*

The largest river on the Island of Newfoundland, the Exploits, has the greatest potential of any of our insular rivers for increased production of Atlantic salmon. Due to obstructions on the main stem (Grand Falls, in particular) less than 20 per cent of its area is utilized by salmon. Over the past several years, biological and engineering investigations have been carried out to determine the feasibility of making the area between Grand Falls and Red Indian Lake accessible to sea-run salmon. Until Great Rattling Brook was opened up by fishway construction in 1959, only 200 square miles of the 2,000 square mile area was accessible to salmon. The Great Rattling Brook project made possible utilization of 30 per cent of the Lower River and about 18 per cent of the whole system. The intention is to open most of the remainder of the Lower River. When completed, and fully utilized, the Lower Exploits (i.e. below Red Indian Lake) should support a spawning population of 15,000—25,000 fish as compared with less than 5,000 at present. The benefits accruing to both the commercial and sport fisheries should be considerable.

*Adult Salmon Transfer*

Though complete evaluation of the success of the adult salmon transfer from Little Rattling Brook (near Norris Arm) to Great Rattling Brook has not been made, it was noted in 1964 surveys that an area which carried no sea-run salmon prior to 1960 had a spawning run of approximately 1900. The inaccessibility of this section of the Exploits was remedied in 1959 with construction of a fishway—an integral part of the project involving the mass transfer of spawning stock from Little Rattling Brook. An auspicious start for development of the drainage area of the Exploits below Red Indian Lake is indicated.

*Artificial Spawning Channel*

An artificial or controlled-flow spawning channel, completed on the upper reaches of Indian River to compensate for the loss of spawning grounds as a result of hydro-electric development, is the first of its kind for Atlantic salmon. Designed to provide in a space of 10,000 square feet spawning accommodation equivalent to that which normally requires several miles of river, the channel is constructed adjacent to the main river, and provides what are believed to be ideal conditions for spawning and survival. In the fall of 1963 the first salmon entered the channel to spawn. Some 110 spawners deposited an estimated 185,000 eggs. Under normal conditions survival to the fry stage would be about eight per cent. By actual count

the survival was 25 per cent, and would have been at least three times greater but for unexpected flooding of the channel during the critical last few days of egg development. About 500,000 eggs are expected from the 1964 total run to the channel of 290 salmon. Barring any unforeseen development, such as the 1964 spring flooding, the fry production should total at least 375,000.

*Pollution Control*

With increasing industrialization and population growth, incipient pollution of fish bearing waters is becoming a serious problem. Studies and investigations in this field undertaken in 1964 will continue. In the main, they are associated with waste disposal (or potential disposal) to freshwater areas, especially from mine concentrators, pulp and paper mills, and domestic sewage from larger population centers.

*Lake Investigations*

In order to expedite studies of lakes and ponds for fishway management purposes, arrangements were made in 1964 whereby Memorial University of Newfoundland and Waterloo University (Waterloo, Ontario) participated in the program.

The projects, jointly financed, included (1) a study of the parasites of freshwater fish throughout the province (2) a study of the plankton and bottom organisms produced in a few typical water bodies, and (3) a study of the fish populations of the Gambo Lakes, especially the relationship between the sea-run and landlocked salmon in these waters.

*Engineering Activity*

Surveys of all major obstructions on the Terra Nova River were carried out to determine the engineering problems involved in further developing this river for salmon production. An engineering study was also undertaken to determine the best means to enable salmon to by-pass Grand Falls and other obstructions on the Exploits River.

Construction was begun on a large fishway at a falls on the lower part of Torrent River, Hawke's Bay. When completed, in two years, this structure will open up for salmon production several hundred square miles of Torrent River not previously accessible.

At the request of the Fish Culture Branch, a number of fishways in logging dams were built or repaired by the two paper companies using the dams. In addition, some 20 abandoned logging dams were removed in the interests of salmon production.

# DEPARTMENTAL VESSELS

AN IMPORTANT addition to the Department's fleet during 1964 was the *Arctica,* a 164-foot refrigerated cargo and freezer ship for the Newfoundland bait service, which was commissioned in July and replaced the bait vessel *Illex,* which had provided service for Newfoundland fishermen for more than 25 years.

The *Arctica* is outfitted with modern communication devices and navigation aids, enabling her to cope with any of the additional tasks she may have to perform in the Department's protection duties as well as in search and rescue operations.

During 1964 the Department operated a Protection Fleet of 80 vessels in addition to the *Arctica,* an inspection vessel named *Belle Bay* and two smaller craft in the fish culture service. The makeup of the complete fleet in 1964 was as follows:

## Protection Service

| Name | Tonnage | Length | Crew |
|---|---|---|---|
| *Maritimes Area—* | | | |
| Acartia | 7 | 37′ | 2 |
| Brule Point | 15 | 40′ | 3 |
| Buctouche Light | 25 | 45′ | 3 |
| Cardita | 15 | 45′ | 3 |
| Cheval Point | 12 | 39′ | 3 |
| Cratena | 56 | 65′ | 5 |
| Cumella | 65 | 65′ | 6 |
| Cygnus | 524 | 146.3′ | 29 |
| Gull Light | 12 | 39.4′ | 2 |
| Howe Point | 15 | 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 |
| *Newfoundland Area—* | | | |
| Aurelia | 29 | 48′ | 3 |
| Badger Bay | 48 | 57′ | 3 |
| Boltenia | 29 | 48′ | 3 |
| Cape Freels | 696 | 179′ | 28 |
| 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 |

| Name | Tonnage | Length | Crew |
|---|---|---|---|
| *Central Area—* | | | |
| Marila (Great Slave Lake) | 15 | 45′ | 2 |
| Rae Point (Great Slave Lake) | 18 | 40′ | 2 |
| *Pacific Area—* | | | |
| Agonus | 19 | 37′ | 2 |
| Alouette River | 10 | 25′ | 2 |
| Arrow Post | 44 | 54.6′ | 4 |
| Atlin Post | 45 | 61.5′ | 5 |
| Atolla | 16 | 37.3′ | 1 |
| Babine Post | 52 | 55.7′ | 4 |
| Babine River | 10 | 25′ | 1 |
| Beaver Rock | 26 | 51′ | 3 |
| Brama | 19 | 42′ | 1 |
| Chilco Post | 48 | 63′ | 5 |
| Ciona | 14 | 34.5′ | 3 |
| Clavella | 38 | 52′ | 4 |
| Comox Post | 45 | 54.2′ | 4 |
| Crescent Rock | 10 | 30′ | 1 |
| 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 |
| Hunter Point | 139 | 90.6′ | 11 |
| 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 |
| Sarda | 8 | 31.9′ | 1 |
| Seal Rock | 24 | 43.5′ | 2 |
| Sooke Post | 52 | 55.7′ | 4 |
| Star Rock | 18 | 39.9′ | 2 |
| Surge Rock | 33 | 48.3′ | 3 |
| Stuart Post | 44 | 54.6′ | 4 |
| Temple Rock | 16 | 45′ | 2 |
| Takla Rock | 6 | 26′ | 1 |
| Thrasher Rock | 17 | 36′ | 1 |
| Warrior Rock | 10 | 30′ | 2 |
| **Bait Service** | | | |
| *Newfoundland Area—* | | | |
| Arctica | 702 | 164.6′ | 19 |
| **Inspection Service** | | | |
| *Newfoundland Area—* | | | |
| Belle Bay (laboratory vessel) | 39 | 63.5′ | 4 |
| **Fish Culture Service** | | | |
| *Maritimes Area—* | | | |
| Ostrea | 8 | 35′ | 2 (when required) |
| Cyprina | 10 | 34.8′ | 2 |



97556—4

# INSPECTION SERVICE

DURING 1964 the Fish Inspection Regulations and the Canned Fish and Shellfish and Cannery Inspection Regulations were modified extensively and distributed to industry for comment. The draft Regulations include major inspection policy changes made necessary by advances which have taken place in the technology of fish handling, processing and marketing to meet the demands of more quality conscious consumers.

All fresh and frozen fish plants producing fish or fish products for sale outside the province of origin were surveyed in preparation for compulsory plant registration to become effective on April 1, 1965. Deficiencies in construction, equipment, and operating methods were reported to plant owners and were subsequently discussed with them by Departmental officers. There was a marked improvement in plant operations. In many cases where major alterations were necessary, these were undertaken during 1964.

A voluntary program of dockside inspection of landed fish and of fishing vessels was instituted in a number of areas during 1964. Boat captains and crew members were instructed in the proper use of ice for stowage of fish and the necessity for cleaning fish holds and pen boards after unloading the catch. A definite improvement in the landed quality of fish was evident as a result of better practices in the handling of fresh fish aboard vessels.

The number of plants which met the Canadian Government Specifications Board standards increased to 54, and a larger variety and volume of high quality products were produced in 1964.

## MARITIMES AREA

*Fish Plants*

A number of offshore draggers were added to the fishing fleet during 1964 and five new fresh and frozen fish plants were under construction in the Maritimes. Eleven other fresh and frozen fish plants were engaged in complete reconstruction programs and many others have made major improvements in construction and equipment.

Significant progress was also made in raising the sanitary standards of operation in cured fish plants. Extensive improvements were required in floor and wall construction in order for many plants to meet the requirements for plant registration. All cured fish plants were carefully supervised to ensure that the establishment and all equipment were maintained in a satisfactory condition.

All canneries, other than those packing sardines, were surveyed under revised cannery grading requirements, and good co-operation was obtained from packers in remedying deficiencies found during the survey. Sardine canneries will be surveyed during 1965.

Several additional plants were certified for processing under C.G.S.B., bringing the total of approved plants to sixteen. The total quantity of C.G.S.B. quality fish inspected amounted to 37,700,000 pounds.

*Fresh and Frozen Fish*

The poundage of groundfish inspected during 1964 amounted to 84,747,000 pounds. In addition, 3,367,000 pounds of smelts and 11,856,000 pounds of swordfish were inspected.

Shellfish in the following amounts were inspected during the year:

| | |
|---|---|
| scallops | 16,488,000 pounds |
| fresh and frozen lobster meat | 2,793,000 pounds |
| oysters in the shell | 3,825,000 pounds |

*Salted, Pickled and Smoked Fish*

Market demand and prices were good for saltfish throughout 1964. The supply, however, was less than in previous years. There was a reduced supply of Newfoundland salt codfish available for further processing and the decline in the catch of in-shore pollock, especially in the Bay of Fundy area, coupled with the increased acceptance of pollock by the fresh and frozen market further reduced saltfish production in the Maritimes. The amount of heavy salted codfish inspected decreased from 19,000,000 pounds to less than 15,000,000 pounds and pollock from 19,000,000 pounds to about 9,000,000 pounds.

*Product development laboratory at Halifax, N.S., showing can sealing equipment, with chemist and technician preparing lobster meat samples to study the effect of polyphosphate in controlling thaw drip in frozen lobster meat.*



97556—4½

In 1964, a total of 56,290,000 pounds of cured fish (salted, boneless, pickled and smoked) was inspected. This figure includes 6,638,000 pounds of bloaters and smoked herring fillets, and 7,796,000 pounds of pickled fish.

The production of pickled herring was down slightly from 1963 and the production of pickled alewives remained the same as in the previous year. The total amount of pickled fish inspected showed an overall increase due to an increased production of pickled mackerel from 1,500,000 pounds to over 3,400,000 pounds in 1964.

*Canned Fish*

The canned fish production at 1,136,364 cases was some 50,000 cases less than the previous year. Sardine production at 710,000 cases was down approximately 30 per cent, and decreased production was also noted for lobster paste, lobster cocktail, chicken haddie and canned clams. The production of kippered herring increased to 100,407 cases from 83,000 cases, and canned herring increased from 97,000 cases to over 150,000 cases. Increases were also registered in the amount of canned lobster, canned crabmeat and canned clam chowder.

*Inspection Laboratories*

The laboratory quality control program on domestic production resulted in the routine examination of 2,480 samples of canned fish and shellfish, fish sticks and breaded scallops.

Inspection laboratories at Halifax and St. Andrews examined 2,000 sample lots taken from imported canned fish and shellfish shipments totalling 6,752,879 pounds. As a result of inspection, 43 complete lots and six part lots, representing 39,250 pounds, were refused entry into Canada because of quality defects or because of the use of non-permitted chemical preservatives or colouring agents. The decrease in poundage of canned fish and shellfish inspected is accounted for by the opening of the canned fish section of the Toronto Laboratory in September, 1964, which assumed responsibility for sampling all imports through the port of Toronto. These had previously been sent to Halifax.

The laboratory staff completed 28,752 bacteriological tests on various fish products and water supplies. Special problems dealing with *Staphylococci* contamination, gaffkaemia in lobsters and canned shellfish processing were investigated.

Mobile laboratory units operated in Nova Scotia, New Brunswick and Prince Edward Island to assess sanitation practices in fish processing plants and to instruct the plant operators in the detection and prevention of bacterial contamination; to conduct sanitary surveys of prospective water supply sources; and to carry out survey work to determine the bacteriological quality of oyster growing-area waters, in co-operation with the Department of National Health and Welfare.

A total of 13,887 chemical analyses were performed by the laboratories.

Senior members of the field staff, as well as laboratory staff members, attended a number of technical meetings and conferences in 1964.

## NEWFOUNDLAND AREA

*Salted and Dried Fish*

There were 56 salt fish plants registered for production in 1964, an increase of one over the previous year's figure.

The requirements relating to grading and inspection were amended at the request of the trade to accommodate foreign market requirements. A problem that existed in 1963 with respect to the moisture content of some shipments entering the Italian market was overcome through changes in the regulations to provide for a maximum moisture content in fish destined for Italy. There was a slight increase in the quantity of light salted fish inspected and the amount of heavy salted and salt bulk fish inspected was less than in 1963.

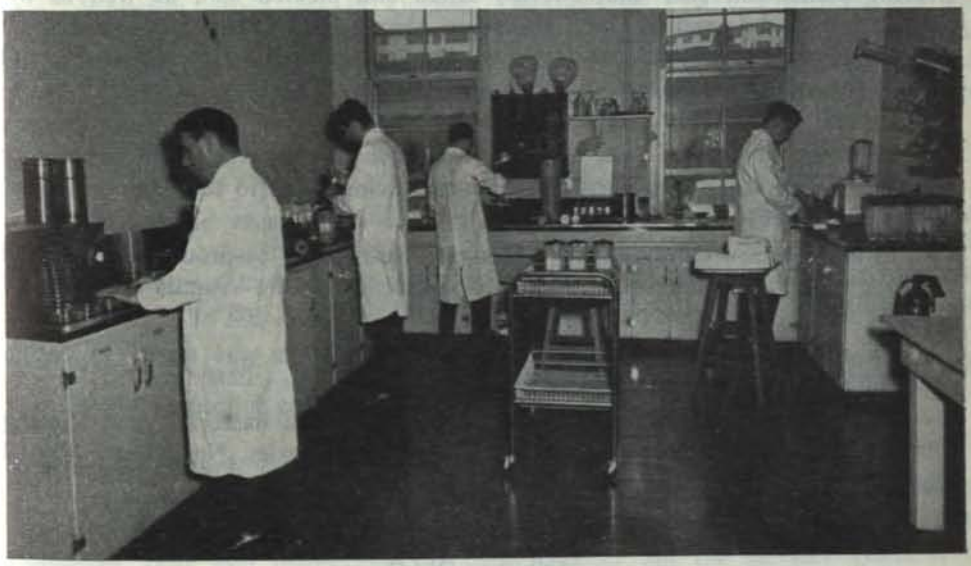
Competition among local buyers for the light salted output was as keen as in 1963 and, encouraged by the favourable 1963 prices, fishermen light salted a greater percentage of their catch.

Italy, Spain, Jamaica and Portugal were the principal markets for the light salted cure. A sizable portion of the Portuguese shipments was produced on the northwest coast, ordinarily not a producing area for this particular market.

Norway and Spain were the main outlets for saltbulk and, the heavy salted dried fish went mainly to the West Indies and Portugal.

There were no major complaints on the quality of salt fish from any of the foreign markets.

Two district courses were held for Inspection Officers involved in the grading and inspection of salted fish. In addition, two officers attended a salt fish inspection course at Halifax.



*Bacteriological section of Fish Inspection Laboratory, St. John's, Newfoundland.*

*Fresh and Frozen Fish*

There were 36 plants registered to process filleted fish for export, including three floating units. This represented an addition of one floating plant and an overall increase of five plants in comparison with 1963. The additional land based plants were located at Old Perlican, Bay Bulls, Trepassey and Harbour le Cou. Most of these operations had the services of a qualified Inspection Officer throughout production periods.

Under authority of the Fish Inspection Regulations, approximately 16,000 pounds of processed fillets were rejected as unfit for human consumption. A total of 2,500,000 pounds of round fish was deemed unsuitable for processing on arrival at filleting plants and was diverted to fishmeal production.

In general, plant operations were satisfactory and the quality of the frozen production was good. There were occasions, however, when it was necessary to take corrective action with respect to plant sanitation and operating methods.

Four plants were certified for operation under the requirements of the Canadian Government Specifications Board.

*Pickled Fish*

The quantity of pickled fish inspected, 15,820 barrels, compared favourably with the 1963 figure of 16,040 barrels. The amount of pickled mackerel inspected totalled 3847 barrels compared to 1130 barrels in 1963. Pickled herring at 10,000 barrels was down by 3000 from the previous year, while pickled turbot inspections of 2000 barrels equalled the 1963 figure. Quality of the 1964 production was generally satisfactory.

*Inspection Laboratory*

The Inspection Laboratory regularly checked samples from filleting and freezing plants and also sample-tested salted and pickled fish, as well as by-products, prior to export. The Laboratory Vessel—MV Belle Bay—visited all plants, including a floating unit stationed temporarily in the Labrador area, and carried out on-the-spot sampling of plant production. The Laboratory staff examined approximately 8,400 samples of various types.

Technical assistance was provided to industry through both laboratory and field service work with particular attention being given to the examination of plant water supplies.

In the chemical section of the laboratory, analyses of by-products established the protein, fat, ash and moisture content of fishmeals and the Vitamin A content of fish oils which are determining factors in market values.

All salt imported for use in cured fish production was tested to ensure conformity with established requirements.

The Laboratory assisted in the development of the bacteriological training course to be taught at the Newfoundland College of Fisheries, Navigation, Marine Engineering and Electronics at St. John's.

## QUEBEC AREA

In addition to the appropriate Federal Acts and Regulations, the Inspection Service in Quebec participates in the application of Provincial Acts and Regulations concerned with the processing and inspection of fresh and frozen, salted, smoked and canned fishery products.

*Fish Plants*

During the year 25 fresh fish plants, 27 cured fish plants and 11 canneries were issued operating permits. Two of these plants were approved under the CGSB specification for the production of fresh, frozen and prepared fish.

*Fresh and Frozen Fish*

The inspection of fresh and frozen fish products was effected through a program of continuous supervision of processing and daily examination of samples. Approximately 2300 samples were examined in the course of inspecting a total of 23,776,429 pounds of fresh and frozen fish. An amount of 686,251 pounds was rejected as being unfit for human food.

*Salted and Pickled Fish*

Salted and pickled fish inspected totalled 6,044,227 pounds. Production was checked by means of periodic visits by inspectors during curing and packing, and by examining randomly selected samples from the finished product. At the time of inspection 5000 pounds of pickled herring and 13,120 cases of bloaters were rejected as being unfit for human consumption.

*Canned Fish*

There were 26,831 cases of domestic canned fish inspected. All canneries were visited periodically by Inspection Officers who examined the raw material, checked the weight and vacuum and withdrew routine samples for submission to the Inspection Laboratory.

*Whitefish*

Whitefish originating in Quebec, Ontario, the Prairie Provinces and the Northwest Territories, amounting to 788,566 pounds, was examined at Montreal and the Blackpool Inspection Station. Of this amount 63,459 pounds were rejected either at Montreal or Blackpool and an additional 30,125 pounds were rejected in the United States.

*Imports*

During the year, 273,680 cases of canned fish and 1,546,226 pounds of imported fresh, frozen and preserved fish were inspected. Approximately 5,000 cases of imported canned fish were detained for label corrections or for return to the country of origin, and 21,200 pounds of frozen shrimp were rejected because of decomposition.

The field staff completed 6400 product inspections, 259 reinspections and issued 509 inspection certificates.

*Inspection Laboratory*

The main laboratory operation in the Quebec Area was transferred from Quebec City to Montreal in October, 1964. The laboratory completed 2624 analyses, tests and inspections on 2677 samples but the services available to industry were somewhat curtailed due to the relocation of the laboratory and the continued inability to fill some vacancies in the laboratory staff.

The mobile laboratory operated on the Gaspe Coast, at Seven Islands and in Montreal examining plant water supplies, surveying sanitary conditions in fresh and frozen fish plants and surveying shellfish growing areas. The staff completed 3123 analyses on 2883 samples of fresh fish, clams, oysters, breaded fish, shrimp and plant water supplies.

The laboratory on the Magdalen Islands completed 1719 analyses of fresh and frozen fish, water supplies and canned lobster. This laboratory was operated by the

District Supervisor and, as in the past, received assistance from the Department's laboratory in Charlottetown, P.E.I. Construction of a building to accommodate the District Office and the laboratory was undertaken in the fall of 1964.

*Staff Training*

French-speaking Fishery Officers attended a course at the Apprentice School of Fisheries, Grand River. The District Supervisor from the Magdalen Islands received training at the Quebec and Halifax Laboratories and two of the laboratory staff were trained at the Halifax Laboratory in the inspection of canned fish.

Senior members of the Quebec Area staff served as lecturers at the fishery courses given at the Apprentice School of Fisheries and at Laval University and attended a number of technical meetings and conventions in 1964.

## CENTRAL AREA

*Fresh and Frozen Fish*

In 1964, the Inspection Service examined 19,301,334 pounds of whitefish for export, which compares with 20,682,226 pounds in the previous year. Certification was refused 1,233,173 pounds, a decrease of 300,000 pounds from the all time high in 1963.

The United States Food and Drug Administration refused entry to 463,937 pounds of whitefish—an increase of 66 pounds over last year's rejection record.

Approximately 11,000,000 pounds of freshwater species, other than whitefish, were inspected for quality at the request of industry. This was an increase of 3,000,000 pounds over the amount inspected last year.

*Imports*

The amount of imported canned fish sampled during the year increased by approximately 37,000 cases to a total of 460,215 cases. The canned fish inspection section of the Toronto Laboratory began operations in September, 1964 and since that time has been doing all inspections of canned fish products imported through the Port of Toronto.

Imported fresh, frozen and processed fish products, totalling 7,511,000 pounds, were examined for quality and labelling acceptability as compared to 6,937,000 pounds in the previous year.

*Fish Plants*

The number of processing plants in Central Area approved under the CGSB standards remained at 14, the same as last year. However, the amount of CGSB fish produced in these plants dropped to 4,345,998 pounds from the 9,287,000 pounds produced in 1963.

A vessel inspection program introduced at the ports of Wheatley, Kingsville and Erieau during the year has been well received by both fishermen and plant management.

*Inspection Laboratories*

The Inspection Laboratories at Winnipeg and Toronto continued to provide industry with technical assistance to aid in the production of better quality fish products and improved sanitary operating conditions in plants. The laboratory staff also routinely examined samples of domestic fish products.

The Mobile Laboratory was engaged in field work at Wheatley, Windsor, Central Patricia, Port Arthur, Gimli, Winnipegosis and Lac la Ronge. The work carried out by this laboratory included water sampling, product analysis and plant surveys.

## PACIFIC AREA

*Canned Fish*

In 1964, the Fish Inspection Laboratory at Vancouver inspected 3,169 parcels of British Columbia canned salmon totalling the equivalent of 1,256,474 48-pound cases. This represents an increase over last year's figure of approximately 90,000 cases.

During the past year, 15 parcels of British Columbia canned herring totalling 10,957 cases were inspected.

*Imports*

Over 1,796 shipments of imported canned fish, totalling over 5,000,000 pounds, were imported into Canada through ports of entry west of the Great Lakes. Examination at the Vancouver Laboratory resulted in the detention of 201 shipments until labels had been amended to comply with regulations and the rejection of 43 lots totalling 163,000 pounds because of poor quality.

The inspection staff also examined samples from 1,954 shipments of imported fresh, frozen and processed fish, totalling approximately 16,000,000 pounds, imported into Canada through the port of Vancouver. Of these, 61 lots were detained until the labels were amended and 18 shipments consisting of approximately 39,000 pounds were refused entry because of poor quality or unsanitary condition.

*Fresh and Frozen Fish*

During 1964, 14 plants producing fresh and frozen fish under the Canadian Government Specifications Board program were subject to continuous inspection by field officers. These officers also conducted surveys of sanitation and sterilizing facilities in all canneries.

All fresh and frozen fish plants producing for export were surveyed to assess the degree of compliance with the standards to be established for compulsory registration of such plants.

The inspection of fishing vessels was continued in the Prince Rupert area throughout 1964 but, unfortunately, could not be extended because of shortage of staff.

*Shellfish*

Surveillance of shellfish growing areas to detect shellfish toxicity was continued through 1964. Some 910 samples collected by officers were extracted at either the Prince Rupert or Vancouver laboratories for bio-assay at the Laboratory of Hygiene in Ottawa. Unfortunately, the shellfish toxicity remained relatively high throughout the northern area during the year, and it was necessary to continue the prohibition of clam digging in the central and northern coastal regions of British Columbia.

In addition to the regular analyses required by plant survey work and domestic and imported product inspection, the bacteriological staff assisted the Provincial Department of Health Services and Hospital Insurance by providing bacteriological services for extensive field surveys of oyster leases during the spring and fall of the past year.

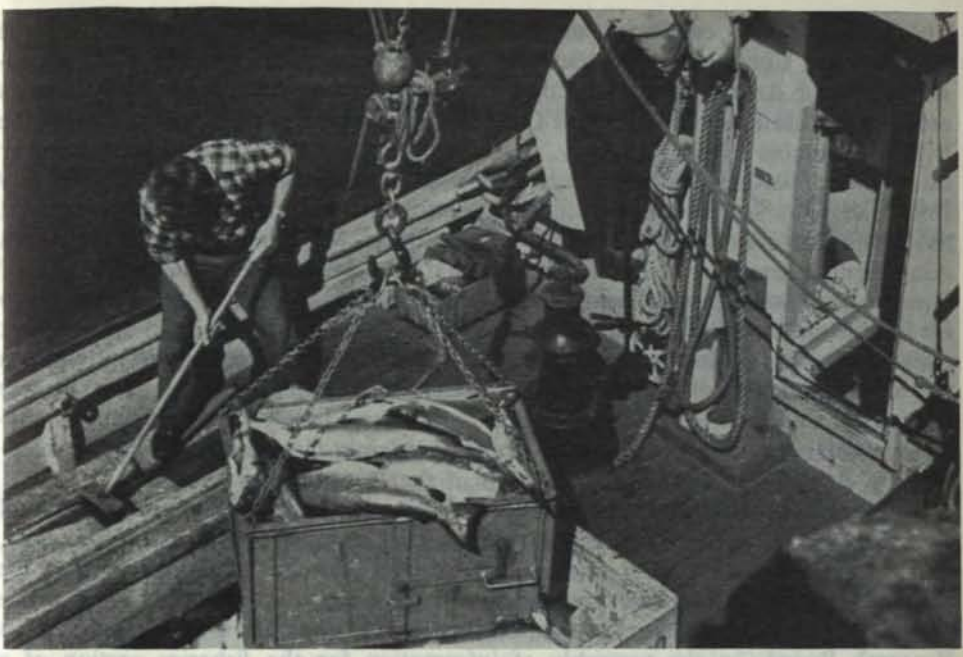
# ECONOMICS SERVICE

THE RESPONSIBILITY of the Economics Service for economic intelligence is fulfilled by the issuance of special reports and numerous monthly and annual statistical releases from the Area headquarters as well as from Ottawa. Special statistical compilations are prepared for international organizations such as the United Nations Food and Agriculture Organization, the Organization for Economic Co-operation and Development and the International Commission for the Northwest Atlantic Fisheries, and for Canadian publications such as the statistical appendix appearing annually in the June issue of *Canadian Fisherman*. The Service's contributions with respect to economic research include many reports or papers on particular topics or problems related to the fishing industry, including studies of the economics of a particular fishery or of certain types of fishing vessels and equipment. The Service has also contributed information and the services of staff members to assist the work of other federal and provincial government agencies and international organizations.

A Federal-Provincial Ministerial Conference on Fishery Development was held at Ottawa in January, 1964, and Departmental commitments stemming from it involved the Service in several projects. The Director served as chairman of an inter-governmental group investigating freshwater-fish marketing, which after several meetings presented a report in October to the Federal-Provincial Prairie Fisheries Committee. The report recommended that an export-sales authority be established for the trade in freshwater fish by federal legislation and that each provincial and territorial government provide for the appropriate reorganization of the fishing industries within its jurisdiction to ensure the control of supply to the export agency and the maximization of returns to primary producers. As a preliminary step in fulfilling the federal government's responsibility for the Northwest Territories regarding the second recommendation, the Economics Service contracted for the services of two economists to study and report on production, employment and incomes in the fisheries of Great Slave Lake and region.

Conferences on the marketing of salt fish from the Canadian Atlantic provinces culminated in a federal commission of enquiry, on which a staff member served as research economist. This project, sponsored by the Department of Trade and Commerce, also arose out of the Federal-Provincial Conference already mentioned.

A third outgrowth of that Conference was a symposium on the economic aspects of sport fishing, held on January 5 to 7, 1965, in Ottawa, under the joint sponsorship of the Economics Service and the Fisheries Research Board of Canada. The symposium considered the role of sport fisheries in relation to recreation, the theoretical basis for economic evaluation, the methods of evaluation, the economics of management and the research requirements and statistical needs. Participants included representatives of federal and provincial or state agencies in Canada and the United States, the universities and certain private groups concerned with these problems. The Economics Service was called upon to organize the symposium and to carry out the secretarial work involved. In addition, two of the eight background papers were prepared by members of the Service. The proceedings, which will include the background papers, are in process of publication.



*Unloading British Columbia salmon.*

During the year, Volume 12 of the series of annual reports on the economics of primary fishing enterprises was published. The study, entitled *Cost and Earnings of Selected Fishing Enterprises, Atlantic Provinces, 1962*, includes for the first time data for a sample of 97-foot scallop draggers and 115-foot wooden otter trawlers (fishing out of ports in Nova Scotia). Factors affecting the profitability of fishing enterprises are discussed and there is, in addition, a section detailing the sharing arrangements on various types of fishing vessels in each of the Maritime Provinces and Quebec. Eight or nine preliminary studies and summaries of fishing-vessel operations for 1963 were prepared and released to the public concerned.

Staff members presented papers at a number of meetings during the year. The Director attended the fourth conference of managers of co-operative fishermen's organizations and extension department field workers at Caraquet, N.B., and presented a paper on the economic outlook for Atlantic fisheries. The Assistant Director prepared a paper on "Economic Effects of Lobster Regulation" for the annual meeting of the Fisheries Research Board of Canada. Other papers by staff members included one on "Quebec and Atlantic Coast Fisheries: Main Problems and Prospects", presented at a symposium on fisheries arranged by the Eastern Quebec Planning Bureau Inc. at Laval University in January, and one on the Gulf of St. Lawrence fisheries at another symposium at Laval in March.

As part of a joint research project undertaken by the Newfoundland Government, Memorial University, the federal Department of Fisheries and the Fisheries Research Board of Canada, with assistance from the Agricultural Rehabilitation and Development Administration of the federal Department of Forestry, a member of the staff of the Service chaired a committee on the credit needs of Newfoundland fishermen and prepared a report, and another staff economist wrote a report on the inshore fishery resources of Newfoundland.

The Director continued during 1964 as Canadian commissioner to the International Commission for the Northwest Atlantic Fisheries. The chief economist at Pacific Area headquarters completed at the end of the year his assignment as secretary of the Federal-Provincial Committee on Wage and Price Disputes in the British Columbia Fishing Industry. A senior economist at Ottawa sat as a member on an interdepartmental committee on ship-construction assistance, on a Treasury Board advisory committee on marine construction and on an interdepartmental fisheries trade committee. The chief economist at Maritimes Area headquarters accompanied representatives of other federal and provincial departments and of industry on a fisheries reconnaissance mission to Iceland, Norway and Denmark, to investigate methods of catching, processing and marketing fish and government assistance to the fishing industry in those countries. A staff economist attended a Food and Agriculture Organization conference on "Business Decisions in Fishery Industries" at Rome, Italy, in September, and, immediately following that, a conference arranged by the Organization for Economic Co-operation and Development in Paris on "Rational Exploitation of the Resources of the Sea".

Other tasks undertaken by the Service during the year included preparation of a resource narrative for the Emergency Measures Organization and the initial steps, undertaken in collaboration with the Dominion Bureau of Statistics and the Fisheries Research Board, in the development of a landings code for the Maritime Provinces and Quebec. Work was also started, in co-operation with the Fisheries Research Board, on the assembly of information for the fisheries section of a Canadian atlas to be published by the Geographical Branch of the Department of Mines and Technical Surveys. In British Columbia, the collection and analysis of information on fishermen's incomes, gathered from fish purchase slips, was continued. Shortage of staff prevented completion of the analysis of fishermen's returns for 1963, and publication of this report will be delayed and included with the 1964 analysis.

# INFORMATION AND CONSUMER SERVICE

THE DEPARTMENT'S public information and consumer promotion activities, are combined in the Information and Consumer Service. The two roles are inter-related as both involve contacts with the fishing industry, mass communications media and the general public.

The service, in collaboration with others within the Department, carries out continuing programs aimed at increasing public awareness of the importance of the fisheries resource, broadening understanding of the Department's role in conserving the resource and improving the product, and raising the consumption of seafoods in Canada.

While these programs continue from year to year, changes in emphasis in the fisheries and variations in the techniques of communication demand periodic revisions of the operations of the Service. As a direct result of the most recent of these revisions, a new section was established to administer a growing exhibitions program. This section was staffed in mid-summer in time to participate in several large fisheries and agricultural exhibitions in eastern and western provinces. Plans were completed for an expanded exhibition program in 1965.

A second new section, the Scientific and Technical Division, was also organized this year but there was insufficient time to the end of the calendar year for appointments to be made. This division will have a special responsibility to provide information to the fishermen, the fishing industry and to the public generally on:

1. The scientific programs of the Fisheries Research Board of Canada and the Department of Fisheries.
2. Technical developments in fisheries with particular emphasis on the work of the Department's Industrial Development Service.

In the Consumer Branch, a new position was approved for a Home Economist in the Newfoundland Area. This position arises from the establishment of large, modern high schools in the Province of Newfoundland and Labrador and the provision of facilities for courses in home economics at the high school level.

The programs of both branches of the Service were carried out although handicapped by severe problems of recruiting qualified personnel for key information and consumer posts. Of the seven field Home Economist positions, only three were staffed throughout the year. Two headquarters positions in the Information Branch were vacant for much of the year. One of the positions vacated was that of Chief, French Language Division, creating unavoidable delays in publishing "La Pêche" and other French language material.

*Publications*

New publications in the information and education series included "The Fishes Occurring in the Fresh Waters of Insular Newfoundland", by Dr. W. B. Scott and E. J. Crossman of the Royal Ontario Museum, and "Canada's Pacific Herring" by D. N. Outram of the Fisheries Research Board of Canada Biological Station, Nanaimo, B.C.

Arrangements were made for the revision of the popular booklet, "Canada's Pacific Salmon". The revision is to be carried out by the author Dr. Roderick Haig-Brown.

In total, the Service distributed more than 200,000 items of printed material in 1964.

*Radio and Television*

The Service continued its close working relationship with radio and television stations on national and regional levels.

Television has now become an important medium used by the Consumer Branch in promoting fish consumption in Canada. Home Economists of headquarters and in the regions, appear frequently on women's programs and special food shows as experts in the preparation and serving of fish dishes. This involvement in television increases greatly during the Lenten season and in the course of special advertising campaigns and promotions such as National Fish'n Seafood Week.

The Radio Division at headquarters supplied interviews and commentaries to stations across Canada. These featured senior officials of the Department discussing a variety of fisheries subjects. Field Information Officers at Vancouver, Halifax, and St. John's, provided daily information on fisheries to radio stations particularly the CBC Fishermen's Broadcasts, and they assisted television producers in obtaining material on fisheries for news and special telecasts.

*Exhibitions*

The Exhibition and Displays Division designed major exhibits for and participated in the following important exhibitions in 1964:

Corner Brook (Nfld.) Fall Fair; Lunenburg (N.S.) Fisheries Exhibition and Fishermen's Reunion; Pictou (N.S.) Lobster Fishery Carnival; Yarmouth Western Nova Scotia Exhibition; Souris (P.E.I.) Fisheries Exhibition; Summerside (P.E.I.) Lobster Carnival; Shippegan (N.B.) Fisheries Festival; Canadian Restaurant Association, Toronto; Canadian Home Economics Association Convention, Canadian Dietetic Association, Toronto; Hotel and Restaurant Suppliers Association, Montreal; Victoria (B.C.) Exhibition; Smithers (B.C.) Fall Fair; Open House, Nanaimo Biological Station, Fisheries Research Board.

In addition to the above, smaller displays were used in school science fairs, home economics conventions, teachers' federation meetings, etc. at various points across Canada.

*Educational Activities*

Both branches of the Service are involved in educational programs oriented to students at elementary, secondary and high schools as well as at the university level.

The Home Economists in the regions devoted much of their time and effort to special demonstrations and lectures for home economics students at secondary schools. At their initiative, projects on fish preparation were undertaken by students at universities.

Field Information Officers are active in conservation education in the schools. Films and lectures are presented at every opportunity. Information Officers also participated in special courses on fisheries.

Special emphasis was placed on informing teachers of the variety of free publications and audio-visual aids available from departmental sources. This resulted in increased demand for these materials.

*Films, Filmstrips and Advertising*

Films and filmstrips produced by the Department were used extensively in Canada both in educational programs and in promoting the use of sea foods. In many instances, films in the libraries in the areas were made available to television stations and shown to very large audiences through this medium.

A comprehensive survey of the audio-visual needs both immediate and longterm, of the Department was begun in co-operation with the National Film Board. This survey is aimed at determining film and filmstrip requirements and how they can be used to improve the efficiency of the Department's educational training and informational programs.

Production started on a new film on quality control in the fisheries of the inland provinces. This film will be ready for circulation in 1965.

Advertising continues to play an important supplementary role in the Department's information and education program. The relatively small budget is expended chiefly in promoting the use of sea foods and highlighting the continuing need for sound conservation principles in fisheries.

# INDUSTRIAL DEVELOPMENT SERVICE

MORE than a hundred development projects in Canada's fishing areas were completed, continued or initiated during 1964, as modernization of the fishing industry gained momentum. Many of these projects were carried out jointly by the Industrial Development Service of the Department and the provincial fisheries administration, usually in co-operation with industry; others were undertaken by the Service itself. They encompassed all aspects of the fishery from the location and catching of the fish in the primary industry through the various phases of processing, storage and distribution of the end product.

The expansion and diversification of the fishery necessitates the application of improved technology at all stages in the progress of the fish from its native habitat to the retail shelves, counters and freezers, and in addition to its own innovations, the Service closely follows developments in all major fishing countries.

The technological aspects of the Department's responsibilities fall under two main headings, "Vessel and Gear" and "Engineering". A third section administers the Department's programs of financial assistance to the fishing industry in connection with vessel construction and bait assistance, and carries out the Service's obligations for consultation and advice with respect to fisheries marine works and aids to navigation.

## VESSEL AND GEAR SECTION

### Exploratory Fishing

*Whaling*

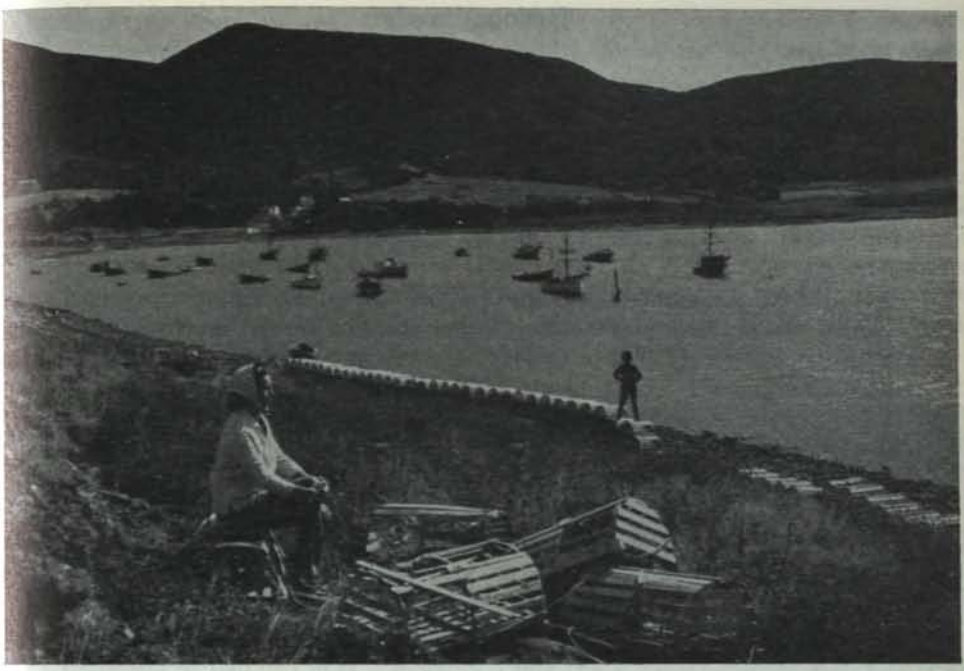
A joint effort of the federal and Nova Scotia Departments of Fisheries with the fishing industry has brought about a revival of the whaling industry in that province. A qualified and experienced crew sailed a small whale hunting vessel from Norway and successfully carried out this experimental fishery from Blandford in Nova Scotia.

*Tuna Seining*

The tuna stocks of the Northwest Atlantic have been successfully exploited by two 90-foot seiners out of New Brunswick in a joint federal-provincial effort to establish a viable tuna fishing industry in that province. Preliminary steps have also been made to implement a far distant water tuna fishery.

*Porbeagle Shark*

This fishing resource off the Atlantic coast is commercially exploited by Scandinavians but practically unexploited by Canadian fishermen. A joint federal-provincial effort has been made to longline this valuable species from the five Atlantic coast provinces. A particularly successful operation has been carried out by the experimental fishing vessel *Beineer* of Newfoundland. In general, the exploratory fishing cruises have demonstrated the viability of a successful shark fishery on the Canadian Atlantic coast and indicate that such an effort is worth pursuing.



*Lobster traps and fishing boats at the village of Mainadieu, on the Atlantic coast of Cape Breton Island, Nova Scotia.*

*Herring*

Various trawling and purse seining operations have been encouraged in a joint federal-provincial effort to increase the productivity of the herring fishery along the Atlantic coast. Specialized British Columbia fishermen gave advice and instruction at sea. Detecting techniques using efficient sonars were improved. Particularly successful purse seining operations took place in southwest Newfoundland which gave a new impetus to this industry.

*Scallop*

An investigation to ascertain the importance of scallop beds in the general area of Miscou Island was undertaken jointly with New Brunswick. Reports of the presence of scallops proved well founded, but these were so scattered that they did not justify a commercial scallop fishery in that area.

*Irish Moss*

Surveys of beds of this seaweed were conducted in co-operation with New Brunswick. Experienced divers discovered extensive moss beds with ideal bottom conditions suitable for drag raking in the Richibucto area.

*Pacific Groundfish*

With a view to diversifying and encouraging the fisheries of British Columbia, a commercial trawler was assigned to the exploration of grounds previously unexploited. Numerous prolific grounds were successfully fished. These trawlable grounds appear to be capable of supporting an important fleet of large groundfish trawlers.

## Fishing Vessels

*Stern Trawlers*

Following numerous surveys and actual fishing experience by the technical personnel of the Service, and an exchange of ideas with Canadian and foreign trawler operators, it was decided to incorporate new concepts in the design of a stern ramp trawler suited for off-shore operations from Canadian fishing ports. It is expected that the design will be completed in 1965.

*Tuna Seiners*

In order to encourage diversification of Canadian fishing operations, the Department co-operated in a project which resulted in the construction of the largest fishing vessel ever built in Canada, and the first distant water operation of a Canadian fishing vessel. This ship was built in Quebec and launched in November 1964. She is capable of trawling operations, but will commence tuna seining early in 1965 in the South Pacific. Future plans call for the construction of a tuna cannery in New Brunswick and the building of more distant water tuna vessels.

*Inshore Fishing Boats*

Following an investigation of the Atlantic inshore fishing operations, a commercial naval architect, engaged by the Department, made suggestions for increased use of combination boats capable of using many fishing techniques. Designs were completed for a 24- and a 37-footer. It is planned to construct such vessels and to test them in the near future. Plans are also in hand for the design of combination boats of 53 and 65 feet over-all length.

*Offshore Stern Trawler*

Two years ago, the Department contributed to the successful introduction of a pocket-size stern ramp trawler. Technologists carried out comparative studies on the operations of this vessel and traditional side trawlers. During 1964, arrangements were made to contribute towards the construction and operation of the first larger stern ramp trawler built in Quebec, the "Acadia Albatross", and to assess its performance. This vessel is 154 feet in over-all length, and extensive research and work preceded her design. Her hull lines were faired by computer and tank. Tests were made under the supervision of Dr. D. Doust of the National Physics Laboratory in England.

## Fishing Gear

*Gill Netting*

In co-operation with the Atlantic provinces, the introduction of cod gill nets was continued in areas where they had not yet been used. Multifilament and monofilament twines were used. Gasoline-powered haulers developed by this Service as well as British Columbia drum haulers permitted the use of more nets in the mechanization phase of this development, which proved highly beneficial to numerous fishermen who previously used jigging and longlining methods or used only traps in the cod fishery.

*Traps*

Cod traps made of synthetic material have been tested in Newfoundland. Their main advantage seemed to be that they stayed cleaner, which sustained their

productivity. Their life expectancy will undoubtedly be considerably lengthened. Lake Erie type fish traps were also successfully introduced in Great Slave Lake, Northwest Territories.

*Squid Jiggers*

Japanese fishermen were invited to demonstrate their automatic jigger in Newfoundland, the province of traditional hand squid jigging. Preliminary experiments undertaken jointly with the provincial authorities proved highly successful with catches at a rate of 32 squid per minute per line. Light attraction systems are used in conjunction with the jigger, and the squid are easily attracted in the shadow of the vessel. It is planned to follow up by rigging a 45-foot boat with powered reels and hundreds of improved jiggers.

*Squid jigging machine used in Newfoundland.*

*Danish Seining*

A high-liner fisherman from Scotland made a survey of the techniques used in Nova Scotia and New Brunswick. His advice resulted in the application of Scottish seine netting techniques to the Danish seining methods used in Canada.

*Igloo Lobster Traps*

At the request of and in co-operation with the Fisheries Department of Prince Edward Island, a number of plastic lobster traps with entrances on top, and of a

circular "igloo" shape, were made and distributed to fishermen in an effort to assess their "catching ability" and determine what modifications were required. No conclusive tests were made in 1964 but the experiment will be continued in 1965.

*Crab Trawling*

An experienced United States crab trawling skipper was engaged to carry out an experiment in the Shediac area of New Brunswick. This federal-provincial project called for the construction of crab trawls and the rigging of a lobster boat to put out trawls over both sides while a sampling drag could be towed from the stern. The experiment was a success and demonstrated the technical and economic feasibility of carrying on a commercial crab trawling fishery with a medium-sized lobster boat. However, the experiment revealed an even larger potential for a small trawling fishery for flatfish in the area.

*Crab Pot Fishing*

A project with the Quebec fisheries authorities resulted in a crab pot fishing and crab canning experiment. Modified lobster pots with flat square inlets were fished around the Magdalen Islands, with the best catches occurring near House Harbour. Generally speaking, the crabs were not found in large concentrations, but it is expected that in future lobster fishermen in the area will also fish for crabs.

*"Atlantic Western Trawl"*

In 1963 a vessel and gear technologist of the Service designed a four-seam trawl net which offered a higher reach, thus permitting a better catch of species swimming high above the sea bottom. This trawl was also rigged in such a way as to avoid bad tears, thus requiring less maintenance. The "Atlantic Western Trawl" constitutes a major breakthrough in the development of trawls. Its "catching ability" is consistently two and one-half times better than the traditional Yankee No. 41, although the two nets are of approximately the same size.

## ENGINEERING SECTION

*Road Transportation*

The co-operative work with the National Research Council and the Department of Agriculture in the field of refrigerated road transportation was concluded. The developed principles in the design of such equipment are being applied by manufacturers. Highways equipment is slowly improving and product temperatures are being lowered. It will undoubtedly be some time, however, before optimum temperatures are realized in road transport of frozen fishery products.

*Processing Plants*

Preliminary designs, layouts and cost estimates were prepared for processing operations in both inland and coastal regions. Investigations of processing methods and procedures were carried out and recommendations and advice were given in the fields of processing, materials handling, refrigerated storage and freezing.

Assistance was provided to other Departments in fisheries technology.

A new experimental canning laboratory is being set up in co-operation with the Department's Inspection Service.

*Freezing At Sea*

Refrigerated sea water holding systems and brine spray freezing and storage systems for tuna and halibut vessels installed in the past few years appear to be operating satisfactorily and would seem to be adequate for the purpose for which they were designed.

Experimental work is continuing in the use of refrigerated sea water to preserve fish aboard vessels.

Work was continued in the investigation of systems to pre-cool and preserve catches aboard trawlers with mechanical refrigeration.

*Salted Fish Drying*

A commercial scale installation of both high and low air velocity dryers, for initial drying of lightly salted fish and finish drying, was made in co-operation with Memorial University and a processing company. The dryers have not been operated sufficiently to assess their potential.

*Drum Drying of Fish Products*

Pilot plant operations in co-operation with the Department of Agriculture were continued at the Department's Fish Processing Experimental Plant in the processing of fish-potato "instant" type mixes. Suitable packaging was developed and improvements were made to the keeping quality of the product. Samples were distributed to those interested in many countries.

There is considerable interest among food processors; however, there is as yet no commercial production.

*Irish Moss Experimental Plant*

Work was carried out in the design of the plant and handling equipment. Processing equipment was investigated. It is planned that the plant will be in operation in 1965.

*Fisheries Educational Activities*

Staff members have participated in fisheries educational activities on both the Atlantic and Pacific Coasts. A course was held at the Department's Fish Processing Experimental Plant in co-operation with the Newfoundland College of Fisheries.

*Investigations Abroad*

The Chief Engineer attended a meeting of Commission IV of the International Institute of Refrigeration in Ireland, a meeting of Fishery Technologists sponsored by the Organization for Economic Co-operation and Development in the Netherlands and visited a number of processing plants.

*Fish Processing Experimental Plant*

The experimental plant in Valleyfield, Newfoundland continued experimental work in the processing and packaging of fishery products.

Experimental work in the processing, drying, storage and handling of traditional salt fish products was continued both in co-operation with Memorial University and commercial firms.

Work in the development of new techniques in the processing and shipment of such fish as salted herring and caplin was commenced.

Plant staff provided technical assistance to commercial processing firms both through visiting plants and through illustrating techniques to company personnel at Valleyfield.

The staff also provided technical assistance in the implementation of the Provincial A.R.D.A. program on the Wesleyville area shore.

The Manager of the plant participated in courses sponsored by the Newfoundland College of Fisheries in St. John's.

# FISHERMEN'S INDEMNITY PLAN

ACCEPTANCE of the Fishermen's Indemnity Plan continued to expand through 1964. The Plan, which came into operation in 1953, offers fishermen operating fishing vessels the opportunity of obtaining insurance against total loss or partial loss for a nominal premium of one per cent of the appraised value of the vessel per annum. The Plan also provides a measure of low cost insurance to lobster fishermen on their lobster traps, items which frequently suffer widespread damage from unexpected storms.

During 1964, a change was made in the Fishing Vessel Indemnity Regulations. Provision was made for fishing vessels owned and operated by Eskimos to be eligible under certain conditions for cover. The conditions are that the vessel is used by the owner in harvesting a marine resource or in commercial fishing and that the vessel is acquired and financed by the owner in part out of a grant paid to him out of moneys appropriated by Parliament for grants to Eskimos towards the acquisition of boats. This part of the Plan is administered by the Department of Northern Affairs and National Resources. At the year end, no policies had been taken out by these fishermen.

At the close of 1964 a total of 6972 fishing vessels were covered under this voluntary marine insurance plan. The Plan has been most widely accepted in British Columbia where 2674 policies were in effect at the end of the year. In Newfoundland vessels owned by 1508 fishermen were covered; in the Maritimes 2245 vessels and in Quebec 545 vessels. It is estimated that about one-third of the eligible fishermen have availed themselves of the Plan. Because of the wide dispersion of small fishing boats in many hundreds of small fishing settlements, commercial insurance companies have been reluctant to offer insurance to such fishermen at rates within fishermen's capacity to pay.

## Fishermen's Indemnity Plan

NET PREMIUMS RECEIVED AND INDEMNITIES PAID FROM INCEPTION OF PLAN (JULY 1953) TO DECEMBER 31, 1964

| Province | Vessels | | Lobster Traps | |
|---|---|---|---|---|
| | Net Premiums | Indemnity | Net Premiums | Indemnity |
| | $ | $ | $ | $ |
| Newfoundland | 190,716 | 363,714 | 18,543 | 87,206 |
| Nova Scotia | 256,930 | 310,130 | 179,740 | 703,926 |
| New Brunswick | 75,195 | 58,090 | 628 | 1,070 |
| Prince Edward Island | 31,511 | 16,219 | 24,079 | 76,542 |
| Maritimes | 363,636 | 384,439 | 204,447 | 781,538 |
| Quebec | 55,968 | 104,836 | 14,175 | 36,346 |
| Atlantic Coast | 610,320 | 852,989 | 237,165 | 905,090 |
| British Columbia | 1,095,889 | 1,214,333 | ..... | ..... |
| Total | 1,706,209 | 2,067,322 | 237,165 | 905,090 |

Under the Plan fishermen pay a premium of one per cent of the appraised value of the vessel and in the event of total loss 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 in most years 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 in Newfoundland, Nova Scotia and Quebec, in excess of 20 per cent in New Brunswick and Prince Edward Island, 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 1739 claims have been settled with total indemnity payments of $2,067,322.

In 1964, the Lobster Trap Indemnity Regulations were amended to provide a more realistic deductible on losses in Lobster Fishing Districts where, over the years, losses had greatly exceeded those anticipated when the premium and indemnity rate structure was established. Over the years, acceptance of the lobster plan 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 premiums. 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 differences between the prescribed price and the average price at which such products are sold.

The year 1964 was one of continued strong demand and generally higher prices for fishery products at both fisherman and wholesale market levels. During the year the Board was confronted with no new requests for support although certain problems which had arisen in 1962 and 1963 required final disposition. During the year, bloaters were purchased and deficiency payments were made on pickled herring and pickled mackerel, all of which had encountered marketing difficulties in the previous years. Another problem carried over from 1963 was the disposition of excessive stocks of freshwater sauger where the market had been disrupted by several cases of botulism in the United States attributed to consumption of smoked fish of Great Lakes origin. In May 1964 the Board was authorized to purchase up to 500,000 pounds of frozen sauger in store at Winnipeg. Some recovery of the market took place and the quantity offered to the Board was limited to 93,745 pounds. Purchases made by the Board were disposed of to producers of meal for animal feeding.

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 1964 production of these items, payments were made to 6,403 fishermen totalling $326,855. Payments were also made to 413 processors amounting to $273,145. 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; Vice-Chairman, K. F. Harding, Prince Rupert, B.C.; Members: W. R. Ritcey, Riverport, N.S.; Bernard Blais, Quebec, P.Q.; H. I. Mifflin, Catalina, Nfld; Francis Millerd, Vancouver, B.C.; Executive Director, H. C. L. Ransom, Ottawa.



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# INTERNATIONAL COMMISSIONS

CANADA, in addition to obtaining the maximum possible production from her own fishery resources by following sound management practices, is also entitled to a fair share of those resources upon which other countries also depend. Interest in conservation to permit wise exploitation, therefore, goes beyond her own borders and territorial limits. Joint utilization of any resource calls for joint management, and in certain areas of common concern with other fishery nations Canada co-operates with many countries, through participation in the work of seven international fisheries commissions. The responsibility of these commissions is to co-ordinate scientific investigations and make recommendations to member governments for management procedures which will allow for conservation of the fish stocks. Four of the seven agreements under which the commissions operate are multilateral treaties and deal with the fisheries of the Northwest Atlantic Ocean, the fisheries of the North Pacific, the stocks of fur seals, and of whales. Canada and the United States are signatory to the other three, which deal with Pacific sockeye and pink salmon of the Fraser River system, the halibut of the North Pacific, and the fisheries of the Great Lakes. The 1964 programs of the various commissions are reviewed in this chapter.

## INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

A Convention between Canada and the United States in 1937 established the International Pacific Salmon Fisheries Commission for the preservation, protection and extension of the sockeye salmon of the Fraser River in British Columbia. A Protocol to the Convention, ratified in 1957, also placed the pink salmon of the Fraser River under the jurisdiction of the Commission with similar terms of reference. Some of the more important activities of the Commission since its inception have been:

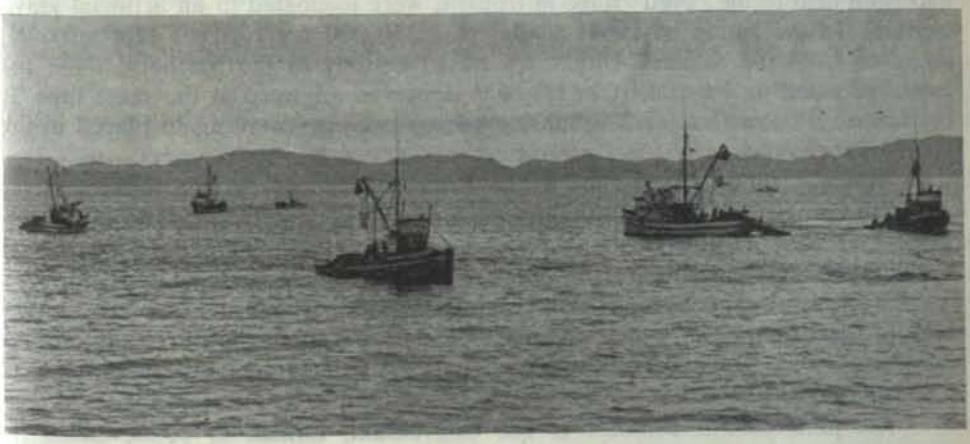
1. Extensive investigations which have established the timing and other characteristics of adult sockeye and pink salmon stocks as they migrate through the coastal fishing areas and through the Fraser River system to their individual spawning grounds.
2. The design and construction of several large fishways which have removed damaging obstructions to the upstream migration of salmon in the Fraser Canyon area.
3. Regulation of the fishery to provide, as nearly as possible, for the equal division of the catch between Canadian and United States fishermen and for the escapement of adequate numbers of fish to each of the spawning areas within the Fraser River system.
4. In co-operation with the Department of Fisheries, a continuous and increasing effort to foresee and alleviate deleterious effect on sockeye and pink salmon of industrial development throughout the Fraser River watershed.
5. Extensive research into all phases of the life history of sockeye and pink salmon to gain an understanding of the factors affecting survival with the aim of increasing the productivity of the river system.

The Commission maintains an administrative and technical headquarters at New Westminster near the mouth of the Fraser and a permanently staffed laboratory at Sweltzer Creek near Chilliwack. Permanent and semi-permanent field stations are also maintained at strategic locations throughout the watershed.

Since most Fraser River sockeye mature at four years of age and die after spawning, the runs occur in successive four-year generations or cycles. The 1964 cycle has been producing particularly good catches since 1948 (in 1948, 1952, 1956 and 1960). The major component of the run in this cycle has been the population spawning at Chilko Lake. In 1960, the brood year for the 1964 run, adequate numbers of sockeye spawned at Chilko Lake and these produced a record number of seaward migrants in 1962. However on the basis of certain environmental indices the Commission, in 1963, forecast a very small return in 1964.

Although the run in 1964 was slightly better than anticipated, due in part to an increase in the numbers of non-Chilko fish, the returns entirely justified the pessimistic forecast. From a total of 2,454,000 Fraser sockeye in the brood year, the catch declined 58 per cent to 1,023,000 in 1964. However, since a poor run had been expected, many fishermen had moved to and fished successfully in more northerly areas of the coast, allowing those remaining to make substantial catches and better than average incomes. United States fishermen took 508,087 sockeye and Canadian fishermen took 514,548, a difference of only 6,461 fish. The average weight of four-year-old fish was 5.8 pounds, up from 5.2 pounds in 1960.

The earliest portion of the sockeye escapement encountered record high stream flows and turbidities. Many of these fish did not reach their spawning grounds. The main portion of the escapement (destined for Chilko River) encountered an enormous slide of some 10 million cubic yards of earth and sand in the lower Chilcotin River. The resultant temporary obstruction and extreme turbidity delayed this portion of the run for about six days. Most of the 239,000 fish which reached the Chilko spawning grounds showed head injuries, but water temperatures were low and almost all spawned successfully. However, it was apparent that some Chilko fish were lost as a result of the slide since over 1600 sockeye, identified by their scales as Chilko fish, were found in other tributaries further up the river system. The Indian subsistence fishery in the river also took an unusually large number of potential spawners in 1964.



*Salmon seining, Fitz Hugh Sound, British Columbia.*

The total run of sockeye was estimated to be 1,728,000 fish, of which 1,022,635 were taken in the commercial fishery and 705,000 were estimated to have escaped upriver. The Indian catch amounted to 145,000 sockeye and 431,000 fish reached the spawning grounds. Thus a total of 129,000 sockeye were estimated to have been lost as a result of the very high flows and the Chilcotin slide.

The current great expansion of the forest industry in the Fraser River watershed is creating many potentially serious hazards to salmon and has necessitated an increase in administrative vigilance as well as new biological and engineering research by the Commission. In co-operation with the Department of Fisheries, technical discussions were continued during 1964 with companies planning construction of pulp mills at Prince George and Kamloops. Preliminary discussions were held with a third company planning a mill near Prince George. In addition to these projects, yet another two companies were investigating the feasibility of locating pulp mills in the Prince George and Quesnel areas.

Another phase of the expanding forest industry activity which can have serious effects on salmon is the use of streams for log transport. In recent years logs have been driven on the Quesnel, Tachie and Nadina Rivers. During 1964, interest was also indicated for similar drives on the Stellako and Middle Rivers. Since these activities can cause damage to spawning grounds, the Commission, in co-operation with the Department, is preparing a comprehensive report on the problem. On the Harrison River, dredging to facilitate transport of logs could result in lowered water levels over an important salmon spawning area and was temporarily halted during 1964 at the request of the Department. Arrangements were made for a co-operative study of this problem by the Department of Public Works, the Department of Fisheries and the Commission.

Progress was made in various phases of the continuing watershed improvement program during 1964. Obstructions to the upstream migration of salmon in the Fraser Canyon were removed by additional fishway construction and rock removal at Yale Rapids and Hell's Gate. A contract was let for the construction of a spawning channel at Weaver Creek to accommodate 20,000 sockeye spawners. Surveys were made and additional data obtained for possible sockeye spawning channels on Nadina, Raft and Barriere Rivers and for possible temperature control works on Horsefly River.

At the Upper Pitt River experimental hatchery, 2,967,000 sockeye eggs, which had been held to the "eyed" stage in troughs, were incubated in an artificial gravel channel. In the spring of 1964, a total of 2,250,000 fry (76 per cent survival) migrated from the channel. Unlike fry raised entirely in the hatchery, these fish appeared equal to the wild fry in size and vigor and migrated at the same time. In the fall of 1964, a total of 3,465,000 eyed sockeye eggs were again placed in this incubation channel.

Although pink salmon runs to the Fraser occur only in the odd-numbered years, the progeny of these fish migrate to sea as newly emerged fry during March, April and May of the even-numbered years. In 1964, sampling programs to estimate the abundance of seaward migrant fry were again conducted on two major tributary spawning populations (Harrison and Vedder Rivers) and in the estuarial area of the Fraser. The latter program indicated that more than 265 million pink salmon fry were produced by the Fraser in 1964 from a spawning population of 1,953,000 fish in 1963.

The pink salmon Protocol to the Convention, ratified in 1957, called for "a co-ordinated investigation of pink salmon stocks which enter Convention waters

for the purpose of determining the migratory movements of such stocks". To implement this agreement, the two countries appointed a Co-ordinating Committee consisting of representatives of the Washington State Department of Fisheries, the Canadian Department of Fisheries and the International Pacific Salmon Fisheries Commission. During 1959 and 1961 this committee sponsored very extensive field investigations throughout the coastal waters and tributary streams of Juan de Fuca Strait, Puget Sound, Georgia Strait, Johnstone Strait and Queen Charlotte Strait. In 1964 the Commission published for the Co-ordinating Committee a comprehensive numerical description of the 1959 pink salmon runs to the Fraser River and to other streams throughout these adjacent areas. During 1964, technical personnel of the agencies concerned, working under the auspices of the Co-ordinating Committee, also completed less extensive analyses of the 1961 run and the runs in earlier years.

The Commission held 12 formal meetings during 1964. At three of these meetings discussions were held with the Commission's Advisory Committee which consists of six members from each country representing various segments of the salmon fishermen and processors. Canadian Commissioners during 1964 were Senator Thomas Reid, W. R. Hourston, Area Director of Fisheries and A. J. Whitmore.

## INTERNATIONAL PACIFIC HALIBUT COMMISSION

During the past four decades the Pacific halibut fishery has been changed from an overfished and declining resource to one in which the permitted catch in recent years has been close to maximum levels.

Under the 1923 Convention between Canada and the United States regulation was confined to a winter closed season. Subsequently investigations demonstrated this to be ineffective in arresting depletion. Successive Conventions of 1930, 1937 and 1953 provided authority to divide the convention waters into areas, to control fishing by catch limits or by adjusting the length of the open season, and to apply size limits. These measures were effective in trebling the size of the stocks. The annual catch, which had declined to 44,000,000 pounds by 1931, has been increased to about 70 million pounds annually.

At the 1964 annual meeting on January 28 to 30 the Commission reviewed the condition of the stocks, conferred with the industry and recommended regulations for 1964, which became effective March 18 upon approval by the two governments.

In 1964 the regulatory areas were: Area 1— south of Willapa Bay; Area 2—Willapa Bay to Cape Spencer; Area 3A—Cape Spencer to Shumagin Islands; Area 3B South—Shumagin Islands and west not including Bering Sea; and Areas 3B North Triangle and 3B North—in the Bering Sea.

Significant regulatory changes in 1964 were—reduction of 3.0 million pounds in the Area 2 catch limit; designating September 15 as the closing date for Areas 1 and 2 in the event the catch limit in Area 2 was not attained; establishing a 4.0-million-pound catch limit in Area 3B South, continuing the level of catch which had been attained previously by controlling the length of the fishing season; and a reduction in the three-nation catch limit in Area 3B North Triangle from 11.0 million pounds in 1963 to 6.4 million pounds as recommended by the International North Pacific Fisheries Commission, whose conservation measures are implemented on behalf of Canada and the United States by regulations of the Halibut Commission.

Area 1, with no catch limit, and Area 2 opened May 1 and closed September 15 without attaining the 25-million pound catch limit in the latter area. The deficit, about five million pounds, resulted from a sharp reduction in fleet size, particularly in Alaska and continued low levels of catch per unit effort.

Area 3A opened May 1 and closed August 19 with a production of over 33 million pounds close to the 34-million pound catch limit of the area. The Canadian catch of 18 million pounds in Area 3A was an all-time high for that fleet.

Area 3B South opened on April 6 and closed on October 15 with catch slightly exceeding the catch limit of four million pounds.

Area 3B North Triangle opened March 25 and closed October 15 with a total catch of 2.1 million pounds, 1.9 by the United States and Canada and 0.2 by Japan much below the three-nation limit of 6.4 million pounds.

Area 3B North, with no catch limit, opened March 25 and closed October 15 with a Canadian and United States catch of 0.4 million pounds.

At a special meeting on June 4 the Commission met with the staff and industry representatives to review the very poor spring fishing in Bering Sea. The governments were advised that unless the stocks improved it might be necessary to recommend closure of a portion of Bering Sea in 1965. After further review on October 30 it was announced that the Commission was considering recommending that Area 3B North Triangle be opened in 1965 from April 6 to April 11 and the remainder of Bering Sea from March 25 to October 15; and in the event the season in Area 3B North Triangle could not be so limited it should remain closed in 1965.

The 1964 catch of 60 million pounds was 11 million less than in 1963, involving reductions of six million in the Bering Sea and five million in Area 2. The Canadian share of the catch of 33.6 million pounds was the third highest in history and would have exceeded the record high of 1963 had it not been for the low yields in Bering Sea. Present Canadian production is five times greater than in 1931, the year before regulation began.

The catch per unit effort in Area 2 rose in 1964, interrupting the downward trend of recent years. In Areas 3A and 3B South a moderate declining trend continued, but in Area 3A a contra-seasonal rise occurred in the latter part of the season. In Bering Sea the catch per unit effort fell sharply in Area 3B North Triangle and declined moderately in Area 3B North.

Tagging studies to provide information on the interrelationships and utilization of the stocks required several chartered vessel operations. A record total of 13,500 halibut were tagged chiefly in Area 3A and Bering Sea.

In age composition studies, used to indicate stock condition, over 121,000 fish were measured from a record total of 313 commercial trips, and 35,000 otoliths were read. In Areas 3A and 3B South the catches possessed a satisfactory age structure but in Area 2 they were unduly dependent upon young fish. Older fish are scarce on the important edge grounds in Area 3B North Triangle but are still well represented in other sections of Bering Sea.

Recruitment investigations that involved the trawl capture of nearly 9,000 young halibut at key sampling locations between Dixon Entrance and the Shumagin Islands continued to indicate that the 1961 brood class is very abundant and could make a strong contribution to the fishery within a few years. Emphasis was again placed on sampling in the Gulf of Alaska to detect any possible destruction of young by foreign trawling.

The Canadian Commissioners in 1964 were Dr. William M. Sprules, Vice Chairman, Ottawa; Martin K. Eriksen, Prince Rupert; Richard Nelson, Vancouver, to October 31; and Francis W. Millerd, Vancouver, from November 19. United States members were Harold E. Crowther, Chairman, Washington, D.C.; Mattias Madsen, Seattle, to May 15; and the late William A. Bates, Ketchikan, who passed away on October 29. F. Heward Bell is Director of Investigations and Secretary.

## THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

The International North Pacific Fisheries Commission was established in 1953 by Canada, Japan and the United States to promote the conservation of high seas fishery resources of the North Pacific. Since its inception, the Commission's work has centred about the salmon, halibut, herring and king crab resources of the easten Pacific and Bering Sea; however, the Commission is authorized to study other fishery resources of joint interest when necessary. Each of the three participating nations is represented by four Commissioners, who are for the most part fishing industry executives and officials of the national fisheries services. The Commission maintains a headquarters office in Vancouver, at the laboratory of the Fisheries Research Board of Canada on the campus of the University of British Columbia. Research for the Commission's purposes is performed by the established agencies of the three countries.

Since 1963 the International Convention for the High Seas Fisheries of the North Pacific Ocean, which is the basis for the Commission's functions, has been the subject to termination upon one year's notice by any of the three parties. No such notice has been given, but the desire of Japan for a revision of the Convention has led to three meetings of the Governments to consider whether a modified instrument might better serve to encourage full utilization of the resources under proper conservation safeguards. The latest meeting was held at Ottawa from September 9 to October 1, 1964. It produced no agreement on a new treaty, and the present Convention therefore continues in force.

While in a sense awaiting new instructions from the Governments, the Commission did not mark time in 1964 but continued its activities on the same scale and pattern as in earlier years. The regular annual meeting, held at Tokyo from November 16 to 21, was preceded by three weeks of scientific discussions in which the Commission's scientific advisers reviewed the year's research and prepared reports to guide the Commissioners in making their recommendations to the Governments. These reports incorporated new data on the distribution of salmon in the high seas and summarized progress in the search for methods of distinguishing salmon of Asian and North American origin. Much time and effort was spent on study of the groundfish resources of the eastern Bering Sea and the Gulf of Alaska, reflecting the Commission's increasing concern with the effects of the growing fisheries for bottomfish on the halibut stocks of those areas. The Commission also continued in 1964 its program of publication of scientific bulletins, including instalments in a comprehensive nine-part report on the biology of Pacific salmon on which scientists of the three member nations are collaborating.

Under the present Convention, Japan and Canada abstain from fishing for certain North American stocks of salmon, herring and halibut which are specified in an Annex to the Convention. The criteria for this abstention are that the stocks are already yielding the maximum catch that can be sustained, they are being managed and the fisheries regulated so as to maintain or increase their maximum sustainable

productivity and they are the object of scientific study to provide a basis for their management. Japan's abstention from fishing salmon of North American origin on the high seas is defined by a provisional Protocol line at 175° W. east of which Japan does not conduct salmon fishing. The Commission may recommend relocation of the Protocol line, if research shows that another line would more equitably separate Asian and American salmon stocks.

An important aspect of the Commission's work is to consider each year whether the stocks under abstention continue to satisfy the three criteria, whether scientific evidence on the high seas distribution of salmon indicates that the Protocol line should be located elsewhere and whether there may be other stocks that qualify for abstention. In 1964 the Commission made no recommendations to the governments for changes in the list of stocks under abstention nor for any change in the location of the salmon abstention line. Therefore, Japan continues to abstain from fishing for salmon east of 175°W, halibut off the North American coasts except in the Bering Sea and herring off the coasts of British Columbia except the west coast of the Queen Charlotte Islands.

In 1964 Canadian, Japanese and United States fishermen participated in halibut fishery of the eastern Bering Sea under regulations based on conservation measures recommended to the governments by the Commission. These recommendations were similar to those adopted for the 1963 season, except that the catch quota was reduced by nearly one-half, to 6.39 million pounds (2900 metric tons). Catches by the three nations in the eastern Bering Sea in 1964 fell far short of the quota, indicating that the condition of the stock required still more stringent conservation measures. The Commission, at its 1964 annual meeting, recommended for the critical Triangle area of the Bering Sea a 1965 fishing season of only seven days and a number of other measures designed to reduce pressure on the resource. These recommendations have been accepted by the governments and will form part of the 1965 halibut fishery regulations.

Under terms of the Convention, the Commission is empowered to undertake studies of fishery resources of concern to two or more of the parties. Since 1955 the Japanese and United States sections have been studying the king crab of the eastern Bering Sea under this provision without, however, arriving at any recommendation of conservation measures. At its 1964 annual meeting the Commission agreed to continue research on king crab, including study of the effectiveness of conservation measures that may be taken by Japan and the United States as a result of the latter's decision to manage the king crab stock unilaterally as a resource of the continental shelf.

At the 1964 meeting, Japanese representatives announced the intention of their Government to allow the trawl fishery in the Gulf of Alaska to develop from an experimental fishery to a full-scale commercial operation in 1965. This fishery is not yet subject to joint research, as Japan is the only substantial participant among the parties to the Convention. However, recognizing the interest of Canada and the United States in the bottomfish resources of the Gulf and their concern over the effects of trawling on halibut stocks of the area, Japan undertook to intensify scientific work in the area, exchange data and allow Canadian and United States observers aboard Japanese trawlers.

As it has in the past several years, the Commission in 1964 again adopted a resolution asking that the member governments frame their fishing regulations with full consideration of the requirements for conservation of salmon in the area of

common concern. This resolution refers to the unsettled question of the proper location of the provisional salmon abstention line in the mid-ocean areas where salmon stocks from the two continents intermingle.

In 1964 the chairman of the Commission was Iwao Fujita of Japan, vice-chairman was Edward W. Allen of the United States and the secretary was Dr. A. W. H. Needler, Deputy Minister of Fisheries of Canada. The other Canadian Commissioners were James C. Cameron, Carl E. Giske and John M. Buchanan, who was succeeded upon his retirement by Donovan F. Miller. Officers elected for 1965 were Chairman Edward W. Allen (United States), Vice-Chairman A. W. H. Needler (Canada) and Secretary Iwao Fujita (Japan). The long-time Executive Director of the Commission, Roy I. Jackson, left in May to become Director of the FAO Fisheries Division and was succeeded by W. G. Van Campen. Other Secretariat staff remained unchanged. The 1965 Annual Meeting of the Commission will be in Seattle, Washington, commencing November 8.

## INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

The most notable of the accomplishments of the International Commission for the Northwest Atlantic Fisheries since its beginning in 1951 has been the unselfish dedication to international fishery conservation and the remarkable co-operation among the scientists and administrators of the different member countries (Canada, Denmark, France, Germany, Iceland, Italy, Norway, Poland, Portugal, Spain, U.S.S.R., United Kingdom and United States of America) and world conservation agencies (ICES, NEAFC and FAO) in their efforts to maintain the stocks of fish in the Northwest Atlantic at a level permitting a maximum sustained catch.

The Commission early recognized the fundamental need for complete and reliable statistics on the fisheries in the Northwest Atlantic which would allow its research workers to make the scientific assessments which form the basis for regulating the fisheries in an effort to maintain the maximum sustained catch. Since 1951 ICNAF has concentrated effort on activity (ICNAF Sampling Yearbook and ICNAF Statistical Bulletin). Co-sponsorship with ICES and FAO of the Expert Meeting on Fishery Statistics in the North Atlantic area in 1959 and of the Continuing Working Party on Fishery Statistics in the North Atlantic area has resulted in standardized statistical requirements and procedures for the whole of the North Atlantic region.

The Commission, proceeding on the basis of making sure of the scientific data before embarking on ambitious regulatory measures, drew up an international fisheries research program and stimulated the development of new ideas and techniques for the solution of international and national fisheries-management problems by organizing international scientific symposia on

1. "biological fisheries survey problems and techniques for their solution" at Biarritz, France in 1956
2. "fishing effort, effects of fishing and selectivity of fishing gear" at Lisbon, Portugal with ICES and FAO in 1957
3. "redfish *Sebastes* in the North Atlantic" at Copenhagen, Denmark with ICES in 1959
4. "techniques for fish marking and methods of analyses of recovery data" at Woods Hole, Mass., U.S.A. in 1961



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5. "influence of the environment on the distribution and abundance of the major fish stocks of the ICNAF area" at FAO, Rome in 1964 (see also below).

All symposia are published in the ICNAF Special Publication series for world-wide distribution. In 1964, the first issue of the Commission's new scientific publication, the *ICNAF Research Bulletin,* was distributed.

Based on the success of an experimental 4½-inch mesh size regulation enforced in 1952 in Subarea 5 (Georges Bank) which allowed the small haddock in the declining trawl fishery for haddock to escape in the sizes and quantities recommended by Commission scientists, regulation by mesh size was applied as a conservation measure to other important commercial species in the other subareas. At present, ICNAF mesh-size regulations are enforced for cod and haddock in Subareas 3 (4-inch), 4 and 5 (4½-inch) and are proposed for all groundfish species in Subareas 1, 2 and 3, excluding redfish in Divisions 3 NOP (4½-inch) and for cod, haddock and flounders in Subarea 4 (4½-inch). In 1964, mesh regulations were changed to meet the growing and widespread use of synthetic fibres in place of manila in the manufacture of nets for use in the trawl fisheries.

Commission scientists pioneered in the development of methods for the assessment of the benefit of saving small fish by regulating mesh size of the nets. In 1962, they reported on the effects of fishing on the stocks of the major commercial species and on assessments of the effect on catches, both immediate and longterm, of changes in the selectivity of gear and in the mesh-size of trawls. These assessments of the benefit of mesh regulations are reviewed annually and are the basis for recommendations by the Commission for changes in mesh-size regulation to maintain the fish stocks at a level permitting a maximum continuous catch.

At its 1964 Annual Meeting in Hamburg, the Commission, from an assessment of the effect of the increasing fishing activity has found (a) that the fishing intensity with which many of the major stocks of cod and haddock are now being fished is near that at which they can provide their greatest sustained catches, (b) that mesh-size regulations cannot, in themselves, offset the consequences of the continuing build-up in fishing pressure. The Commission, concerned at the implications of these findings, has asked its scientists to continue studies of effects of fishing and to review possible additional conservation measures which might be used to ensure greatest continuous yield from the fish stocks in the Northwest Atlantic. This was to be a most important item for consideration at the 1965 Annual Meeting of the Commission, to be held in Halifax June 7-12.

The Commission developed and adopted an environmental program to assess the influence of natural causes on the abundance and distribution of fish stocks and on the success of fishing operations. From April to June 1963, a pioneering survey (NORWESTLANT I-III) studied the drift of cod eggs and larvae and redfish larvae in relation to their environment in the northern part of the ICNAF area and in the Irminger Sea. The survey involved the co-ordinated efforts of eight countries using 11 research vessels. Results are being prepared for publication in the ICNAF Special Publication series. The Commission also completed an international scientific symposium on the environment in relation to the major fish stocks in the North Atlantic at FAO, Rome, in early 1964. Results, to be published in 1965, provide ideas for environmental studies to distinguish between the effects of the environment and effects of fishing on changes in the fish stocks.

In addition to using regulation by mesh size as a conservation measure, the Commission has adopted exemption measures for the protection of the regulated

pecies (cod and haddock) taken in areas where there are substantial fisheries using small mesh nets for non-regulated species. Extension of the exemption principle to other species and areas will be considered at the 1965 Annual Meeting.

The Commission has agreed unanimously to recommend to contracting governments that a system of international enforcement of Commission regulations be set up to eliminate the variability of standards possible under a system of national enforcement. Practical problems and proposals for an acceptable system will be discussed at the 1965 Annual Meeting.

As a result of unanimous agreement in the Commission, the study and recommendation of conservation measures in the declining international fishery for harp and hood seals in the Northwest Atlantic will, it is hoped, become an ICNAF responsibility in 1965.

The outlook for the future is based on the Commission's concern for the rapidly increasing fishing activity in the Convention Area by the 13 member countries and at least two non-member countries on present and new stocks and species of fish. Commission scientists have warned of the consequences, and expansion must now give way to rational and controlled exploitation. Regulation of mesh size, although a good conservation measure, has been shown as not completely adequate in controlling exploitation and has raised serious enforcement and practical fishing problems. Additional conservation measures will be sought and problems of early implementation and enforcement will be considered in the immediate future. The Commission will continue to co-operate and exchange ideas with ICES, NEAFC and FAO with the aim of establishing common benefits for countries fishing in the whole of the North Atlantic. Commission scientists will continue to collect data on the fisheries and to develop new ideas and techniques which will allow them to advise the Commissioners, impartially and objectively, on the effects of fishing and of proposed regulative measures on the stocks and catches. The Commission will continue to look forward to international co-operation and goodwill to the end that all member countries may benefit from the fisheries in the Northwest Atlantic.

At the 1964 Annual Meeting, Klaus Sunnanaa of Norway presided as Chairman and Frank P. Briggs of the U.S.A. was Vice-Chairman. Canadian Commissioners were W. C. MacKenzie, Department of Fisheries, Ottawa, J. H. MacKichan, Halifax, Nova Scotia, and P. P. Russell, St. John's, Newfoundland.

## GREAT LAKES FISHERY COMMISSION

The need for international co-operation in managing the fisheries of the Great Lakes and particularly in controlling the parasitic sea lamprey led to ratification of the Convention on Great Lakes Fisheries by Canada and the United States in 1955. The two governments reviewed the Convention in 1964 and agreed that it be continued with a minor modification to allow each country to be represented by four instead of three members. It was also agreed to review the Convention again at the end of two years.

The Great Lakes Fishery Commission, established to carry out the objectives of the Convention, has been concerned mainly with control of the sea lamprey and re-establishment of lake trout in the upper Great Lakes. The sea lamprey control and research program is supported by contributions to the Commission from the Canadian and United States governments. Field operations and investigations are carried out in Canada by the Fisheries Research Board of Canada and in the United States by the U.S. Bureau of Commercial Fisheries under agreements with the



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Commission. Lake trout rehabilitation and associated fishery research are carried out by federal, state, and provincial agencies with their own funds and are co-ordinated by the Commission.

When the Commission was established, agencies in both countries were building electrical barriers on lamprey spawning streams to prevent reproduction. This method of control was replaced in 1960 by treatment of streams with chemicals selectively toxic to lamprey larvae.

Chemical operations began on Lake Superior in 1958 and by 1963 101 streams had been treated once and 50 of these twice. In 1964, 10 newly discovered streams were treated for the first time and 22 streams were retreated. Four small streams in which young larvae have been found recently are to be treated in 1965.

Indications that treatments were reducing sea lamprey came in the fall of 1961 when the incidence of trout with lamprey wounds dropped sharply. In the following spring the catch of spawning lamprey at assessment barriers was about 20 per cent of the average catch for the preceding 5 years. Since 1962 the catch has risen slightly from 9,992 to 12,173 in 1963 and 12,775 in 1964. The catches in the last two years would reflect the results of treating 13 streams for the first time and 27 streams for the second time in 1961 and 1962. Presumably those treated were not major lamprey producers. The results of treatments in 1963 and 1964 will not be evident until 1965 and 1966.

Lake trout in Lake Superior responded quickly to the reduction in sea lamprey. The abundance of large fish, particularly vulnerable to attack, has increased since 1961, indicating a high rate of survival not possible when sea lamprey were abundant. The spring catch of legal size lake trout per net exceeded the catches in the preceding four years except in waters of the State of Michigan where young native trout entering the fishery are very scarce. Restrictions on the catch of lake trout, imposed in the fall of 1962 on the Commission's recommendation, have prevented an increase in fishing pressure which would have slowed the recovery of the population.

The scarcity of young lake trout in many areas is the result of failure of spawning after 1959. This deficiency has been offset to some degree by planting hatchery fish. Federal, state, and provincial agencies have planted 10.7 million lake trout since 1958; 2.6 million were planted in 1964. Planted fish, which are marked for later recognition, represented 76 per cent of the catch in Canadian waters and 47 to 89 per cent of the catches in U.S. waters in 1964. Fish from early plantings are maturing and are appearing on spawning grounds in greater numbers each year.

Treatment of Lake Michigan's 99 lamprey streams began in 1960 and by 1963 63 streams had been treated once. Fifteen streams were treated for the first time in 1964 and 12 for the second time to prevent the escape of larvae established after the first treatment. The treatment of the remaining 21 streams is to be completed by mid-summer of 1966. No change in abundance of adult lampreys attributable to chemical operations is evident yet in Lake Michigan.

Eighty-five lamprey streams have been located on Lake Huron. Treatment of these streams began in 1960, but was discontinued in 1962 to expedite operations on Lake Superior and Lake Michigan.

Sea lamprey operations on the lower lakes have been limited to surveys in Canada to locate lamprey streams. Young sea lamprey have been found in one tributary to Lake St. Clair, six tributaries to Lake Erie, and 21 tributaries to Lake Ontario. Surveys are to be completed in 1966.

In addition to its direct responsibility for the sea lamprey program, the Commission is required to formulate research programs designed to determine the need for measures to make possible the maximum sustained productivity of stocks of common concern. Some general recommendations on the kinds of investigations needed on each lake were made in 1959 and 1960. In 1963, however, the Commission with the assistance of individuals and agencies concerned with the fishery began a more detailed examination of the activities necessary to provide the information required. The resulting report, *A Prospectus for Investigations of the Great Lakes Fishery*, was submitted to the two governments in 1964, to assist and encourage federal, state, and provincial agencies to continue, expand, or initiate cooperative studies. The Commission has called for the formation of lake committees to co-ordinate the work of the various agencies on each lake in accordance with accepted objectives.

Canadian members of the Commission during 1964 were Dr. A. O. Blackhurst, Port Dover, Dr. J. R. Dymond, Toronto, and Dr. A. L. Pritchard, Ottawa.

## NORTH PACIFIC FUR SEAL COMMISSION

The North Pacific Fur Seal Commission was established in January 1958, pursuant to the Interim Convention on Conservation of North Pacific Fur Seals, signed by the governments of Canada, Japan, the Union of Soviet Socialist Republics and the United States of America. The Commission's function is to develop the stocks and achieve maximum sustained productivity of the North Pacific fur seal herds. The Seventh Annual Meeting was held in Moscow February 17-22, 1964, with the Canadian Commissioner, Dr. W. M. Sprules, Special Assistant to the Deputy Minister of Fisheries, as chairman.

The Commission heard reports on the pelagic research carried out by scientists of all four countries, and research on land by those of the U.S.A. and the U.S.S.R., the two countries which take a controlled catch of seals on the Pribilof Islands (U.S.A.) and the Commander Islands and Robben Island (U.S.S.R.) each year. Canada and Japan do not take an active part in the commercial seal harvest. However, the Convention contains a provision whereby each of those two countries receives 15 per cent of the seal skins taken in commercial operations on the breeding grounds, or rookeries, of the Pribilof Islands, and, subject to certain specifications, a like percentage of the commercial take on the Commander Islands and Robben Island. Canada's share of the North Pacific fur seal skins sold during the fiscal year 1964-65 produced a net revenue of $640,351.

Under the Convention, North Pacific fur seals are taken for their skins only on the islands mentioned, all of which are in the Bering Sea, and on which are the great seal rookeries. However, each of the member countries is authorized to take a stated number of seals at sea each year, for purposes of research.

During the year prior to the Seventh Annual Meeting a Protocol to the Interim Convention was negotiated, amending the Convention and continuing it in force for six additional years.

Commissioner Shunichi Ohkuchi of Japan was elected chairman of the Commission to succeed Dr. Sprules. Mr. Ohkuchi, who had been vice-chairman, was succeeded in that office by Commissioner A. S. Babaev of the U.S.S.R.

## INTERNATIONAL WHALING COMMISSION

The International Whaling Commission, of which Canada has been a member since its inception in 1946, recommends catch quotas, closed seasons, minimum size limits and methods of catching whales to member governments. The Commission was established under the International Whaling Convention, which was signed by a number of countries for the purpose of conserving the world's stock of whales.

Contracting governments represented at the Commission's 1964 meeting, held in June at Sandefjord, Norway, were represented by Commissioners and delegates from Argentina, Australia, Canada, Denmark, France, Iceland, Japan, Mexico, the Netherlands, New Zealand, Norway, the Republic of South Africa, the United Kingdom, the United States and the Union of Soviet Socialist Republics. Observers were present from Chile, Italy, the International Council for the Exploration of the Sea, the Food and Agriculture Organization of the United Nations, the International Society for the Protection of Animals, and two members of the Committee of Four Scientists appointed by the Commission to investigate whale stocks.

The Canadian Commissioner at the meeting was Dr. W. M. Sprules, Special Assistant to the Deputy Minister of Fisheries of Canada.

The meeting was told that the continual decline in the stocks of whales in the past 20 years, taken together with an increase in whaling, indicated that some of the Antarctic stocks of whales were threatened with serious depletion and even extinction, unless scientists, government experts and diplomats cooperated to strike a balance between two conflicting but fully legitimate interests.

Sixteen expeditions (seven Japanese, four from the U.S.S.R., four Norwegian, and one Dutch) were at work in the Antarctic during the 1963-64 season, catching a total of 8,429 blue whale units (one blue whale equals two fin or two and one-half humpback or six sei whales).The position of the blue whale stock in the Antarctic was considered so serious that extinction was thought possible and the Commission voted in favour of closing the area between 40-55° South Latitude and 0-80° East Longitude. The blue whale was thus protected for the forthcoming season throughout the Antarctic. Protection of this species in the North Atlantic, already in effect, was extended for a further five years after February 24, 1965.

Possible quotas for fin and sei whales taken in the Antarctic were discussed at the meeting but none were found acceptable to enough countries to allow for a blue whale unit limit to be set for the Antarctic season 1964-65. The limits suggested by the Commission's scientific advisers were considered too low by the Antarctic pelagic whaling countries. These countries, however, conferred separately and agreed to recommend to their governments that the total number of baleen whales taken during the 1964-65 season should not exceed 8,000 blue whale units.

The humpback stocks in the North Atlantic were thought to be in as poor condition as those of the blue whale and it was decided to extend the total protection of this species for a further five years from November 8, 1964.

The Commission decided that there should be no change in the open season for Antarctic pelagic whaling, which would remain at December 12 to April 7.

In view of the grave fears expressed about the stocks in the North Pacific, the Commission set up a group of Commissioners of the North Pacific countries to consider whether it would be possible to reduce the amount of whaling in that area during the current season.

In the Antarctic, in addition to the pelagic whaling fleet, two Japanese land stations operated from the island of South Georgia in 1963-64.

Outside the Antarctic, 37 land stations and seven factory ships were in operation during 1963. In addition, Antarctic pelagic expeditions on their way to the Antarctic took a number of sperm whales.

Commissioners from Japan, the Netherlands, Norway, the U.K. and the U.S.S.R. met in Sandefjord and produced a set of draft rules for the implementation of an International Observer Scheme, under which those countries which are engaged in Antarctic pelagic whaling would place observers on each other's factory ships. These draft rules were to be submitted to the governments concerned.

# FEDERAL-PROVINCIAL FISHERIES COMMITTEES

IN ORDER to meet special problems where the interests of both federal and provincial governments are concerned, four Federal-Provincial Fisheries Committees have been established. Two were in existence prior to 1964: the Federal-Provincial Atlantic Fisheries Committee, on which are representatives of the federal Government and the Governments of Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland, and the Federal-Provincial Committee for Ontario Fisheries. Two others were established during 1964 as a result of the Federal-Provincial Conference on Fisheries Development held in Ottawa in January. They are the Federal-Provincial Prairie Fisheries Committee and the Federal-Provincial British Columbia Fisheries Committee.

Members of the committees are the Deputy Minister of Fisheries of Canada, the Deputy Ministers of provincial departments responsible for fisheries and, where only one province is involved, members of federal and provincial agencies, who are included in order to bring the committees up to strength.

Sub-committees make recommendations for industrial development, research, and marketing problems. The main committee in each case co-ordinates, where practicable, all activities in the respective fields of responsibility of its members, and suggests to the respective governments means of carrying out fisheries programs and projects of common concern. These include the development of methods and techniques in the catching of fish and of shore and plant facilities, and studies of the economics of fisheries to ensure that any proposed program of development is soundly based.

## ATLANTIC FISHERIES

Subjects under review at the Sixth Annual Meeting of the Federal-Provincial Atlantic Fisheries Committee in September included Canada's participation in international conservation programs for the Northwest Atlantic, territorial waters and Canada's exclusive fishing zone; fisheries training and marine works in the Atlantic provinces; financial assistance for special projects and other programs; inspection procedures and marketing organization. A progress report on the Canadian Atlantic Fishing Vessel Conference, to be sponsored by the Committee and to be held in Montreal in February 1966, was submitted, as were reports from the Industrial Development Section and from the special sections dealing with salmon and trout and with oysters.

## ONTARIO FISHERIES

Among the matters considered by the Federal-Provincial Committee for Ontario Fisheries, at its meeting in April 1964, were the introduction of new species into waters of the Great Lakes system; the results of a Lake Erie smelt study; plans for alternate open and closed years for walleye fishing in Georgian Bay; data on the Lake Superior trout populations; the preparation of recommendations for general fisheries research on all the Great Lakes by the Great Lakes Fishery Commission; the additional but still limited facilities available for selective breeding experiments; ways and means of promoting new fish products developed at the Fisheries

Research Board's Technological Station at London, Ont., and the need for additional data on the effect of smelt and perch trawling operations on other species.

The Committee, realizing that the proposed replacement of marine railways on the Severn River by navigation locks would provide a new and ready access route for sea lamprey to enter Lake Simcoe, where they would have a serious adverse effect on the fisheries, considered possible means of preventing such migration. Experiments to determine the upper lethal temperature of lampreys were authorized, with a view to finding out if the application of heat would prove to be an effective means of controlling lamprey. The Committee also considered the results of the lamprey control program of the Great Lakes Fishery Commission.

## PRAIRIE FISHERIES

The Federal-Provincial Prairie Fisheries Committee was established in May 1964 to provide for the orderly and progressive development of the freshwater fisheries of Manitoba, Saskatchewan, Alberta and the Northwest Territories. A representative of the Ontario Government is invited to meetings as an observer because the fisheries problems of Ontario's northern lakes are similar to those of the Prairie Provinces.

Industrial development, catching methods, research and marketing problems peculiar to the fisheries of the Prairie Provinces and the Northwest Territories were discussed at the initial meeting, and sub-committees were requested to conduct investigations and make recommendations.

## BRITISH COLUMBIA

At its first meeting in November the Federal-Provincial British Columbia Fisheries Committee reviewed problems affecting the maintenance and development of the salmon resources in freshwater areas. These include the effects of logging, gravel removal, pollution and other water-use projects on the freshwater environment. Ways of assuring that major salmon spawning areas will be kept unharmed are to be explored with the appropriate government departments.

The Committee accepted the fact that further experimentation and research are desirable to develop more effective utilization of oyster grounds on the Pacific coast and agreed that a review of purification techniques for possible application in the Pacific area would be of value. Administration of the oyster resource is to be discussed with other agencies concerned.

The relationship of sport and commercial fisheries was also discussed. While the federal Department of Fisheries is responsible for administration of sport fisheries in tidal waters, their well-being is of importance also to the province because of the expansion of sport fishing and its relation to the tourist industry. The Committee decided to authorize a periodic review, by a sub-committee, of salmon sport fishing regulations and conservation problems with respect to coho, chinook and steelhead salmon.



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# THE FISHING INDUSTRY 1964

THE PHYSICAL output of the commercial fishing industry in Canada is measured in terms of the weight of fish and shellfish sold by fishermen to buyers in this country, plus small quantities delivered under treaties to buyers in the United States. This output has tended to vary around a figure of two billion pounds each year and, in recent years, the range has been from 1.8 to 2.2 billion pounds. A large part of this year-to-year variation is contributed by the herring fishery of British Columbia and the cod fishery of the Atlantic Provinces. The smallest national landings in the last 12 years occurred in 1953, when the combined landings of cod and herring totalled 0.8 billion pounds. The largest national landings were recorded in 1963 and in that year the total for cod and herring was 1.2 billion pounds. Each year there are minor variations in the landings of the many species sold by commercial fishermen, but these tend to offset one another and do not have much significance for the total.

In 1964 landings are estimated to have been 2.2 billion pounds, just slightly less than the 1963 figure. The value of landings, i.e. the gross return to fishermen, increased from $130.4 million in 1963 to $147.5 million last year—an increase of about 13 per cent—due almost solely to higher dockside prices.

*Salmon being unloaded in British Columbia.*

## PACIFIC

Fishing in British Columbia in 1964 continued without interruption due to price disputes except for a 29-day disruption of herring seining in November. Prices for net-caught salmon were settled without loss of fishing time. The market for meal and oil improved and the basic price to herring seine fishermen was increased after the strike referred to above. Halibut prices increased over those reported the previous year. The total value of all fish and sea mammals landed, including landings of halibut by Canadian fishermen at United States ports, whales, seals, and fish livers in 1964 amounted to $48.9 million, up nearly 12 per cent from 1963.

The halibut fishery started off badly as a result of poor catches in the Bering Sea. Opening halibut prices were low—about the same level as obtained in 1963. As the season advanced and it became apparent that the catch would be down sharply, prices became firmer. The average landed value for 1964 increased to 25 cents, compared with 22 cents in 1963. This was the highest average value received by fishermen in recent years, with the exception of 1962 when a record of 31.7 cents per pound was received.

Total landings of halibut by Canadian fishermen at Canadian and United States ports declined from 37.3 million pounds in 1963 to 33.3 million pounds in 1964. Landings by United States fishermen declined from 34.2 million pounds to an estimated 26.4 million pounds in the same years.

Negotiations on minimum prices of net-caught salmon resulted in an agreement which was signed June 28. The comparison with the agreed prices for 1962 follows:

| | *1964 cents/lb.* | *1962 cents/lb.* |
|---|---|---|
| Sockeye | 36 | 33 |
| Coho | 26 | 24 |
| Pinks | 11 | 11.5 |
| Summer Chums | 12 | 11 |
| Fall Chums | 12–13–15 | 11–14 |

The 1964 salmon production was better than anticipated and a preliminary pack of 1,255,308 cases was reported, made up of:

343,359 cases of sockeye
204,732 cases of coho
464,107 cases of pinks
232,721 cases of chums
10,389 cases of other species.

Herring landings during the calendar year of 1964 totalled 253,000 tons, the second highest on record but down 12 per cent from the record landings of 1963. Prices for herring oil and meal were up over 1963. In December of 1964 prices for herring oil in Seattle were quoted at 11 cents per pound, Canadian funds, compared with 9 to 9.25 cents per pound a year earlier. Herring meal prices for 70 per cent protein were $154.40 per ton, U.S. funds, F.O.B. Vancouver, in December 1964, compared with $133 in December 1963.



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The production of groundfish, mainly by draggers, increased substantially in 1964. For the last five years landings of these species have been as follows:

| | | |
|---|---|---|
| 1960 | 26.2 | million lb |
| 1961 | 23.7 | million lb |
| 1962 | 25.9 | million lb |
| 1963 | 22.2 | million lb |
| 1964 | 30.2 | million lb |

Landings of grey cod accounted for the bulk of the increase between 1963 and 1964. The catch of this species rose from 6.7 million lb to 12 million in this period.

## ATLANTIC

The yearly record of landings was uneven in the Atlantic Provinces during 1964. Nova Scotia had a record year and landings were up in volume, by almost 22 per cent, over 1963. Smaller increases were registered in New Brunswick, Prince Edward Island and Quebec and a decline in Newfoundland. There was a universal upward price trend, however, and the landed value set a record in each of the provinces. For the Atlantic region as a whole the landed value in 1964 increased by almost 15 per cent over 1963.

In Newfoundland all species are subordinate in value and interest to codfish. The search for supplies of codfish has led to a revival of the Labrador "floater" fishery which had been abandoned some years ago. Forty-seven vessels engaged in this fishery in 1964 but their production (in terms of wet-salted codfish) was about 40 per cent less than that recorded from the smaller Labrador fleet of 1963. This development was worsened with the result of the trap fishery along the northeast coast, particularly in White, Notre Dame and Bonavista Bays. The Labrador and the trap fishery of the island proper supply the bulk of the raw material of the salted fish trade. Total salted fish production in 1964 is estimated to have been 448,000 quintal (light dry equivalent), compared to 530,000 in 1963. The quantity of codfish utilized for salting was about 40 million pounds less in 1964 than in the previous year.

Considerable interest was evidenced in the Newfoundland seal fishery because of the high prices paid for pelts—double those of 1963. The total kill was not large in 1964 and is now estimated at 45,700 animals of which 27,400 were taken by sealing vessels. In 1963 about 78,000 pelts were taken by the vessels and by landsmen.

In the Maritime Provinces both the volume of fish and shellfish landed and the value to fishermen, in 1964, were the highest on record. Fishing effort was intensified with the acquisition of several new trawlers that engaged in groundfish operations and the fleet of large scallop draggers expanded substantially. The landed value is now estimated at $58.5 million for the year, which is an increase of nearly $8 million over the previous record set in 1963. Lobsters continued to dominate landings in terms of value, and brought fishermen $20.6 million in 1964, although the volume was about two million pounds less than in the previous year. Prices for both "canners" and "markets" were consistently above those of previous years and demand was exceptionally keen, not only from North America but also from Europe. The largest single air shipment of lobsters went forward to Europe in December and weighed 11,100 pounds.

Swordfish and scallop landings were maintained at 1963 levels but at the cost of greater effort in terms of the number of vessels engaged and the number of trips undertaken. It became apparent, as the year went on, that average landings per trip were declining from the levels of 1962 and 1963. However, the high prices offered at dockside maintained interest in these fisheries and resulted in an increase in landed values, over 1963, of almost one million dollars for each of these species.

Fishing started slowly in Quebec in April with operations hampered by fog and harsh weather. From the beginning of the season it appeared that codfish were scarce in the Gulf and many skippers concentrated their efforts on redfish. This is borne out by the first estimates of landings which show a decline in the catch of codfish from 63 million pounds in 1963 to 54 million in 1964. Landings of redfish, however, increased from 10 to 20 million pounds in the same period.

The active demand for fishery products and the trend towards increasing prices at all levels, was augmented by the programs of federal and provincial governments to maximize the utilization of aquatic resources in near and distant waters.

Thirteen new trawlers were licensed in 1964 by the Department of Fisheries, bringing the total to 101. These were distributed by provinces as follows: Nova Scotia 55, Newfoundland 40, Quebec two, and New Brunswick four. Not only is the trawler fleet growing in numbers but also in average size.

# STATISTICS OF THE FISHERIES

## FISH AND SHELLFISH - LANDINGS AND LANDED VALUES, BY AREAS AND SPECIES

## 1963 AND 1964

| | Landings | | Landed Values | |
|---|---|---|---|---|
| | 1963 | 1964[1] | 1963 | 1964[1] |
| | '000 lbs. | | '000 $ | |
| *Pacific Coast* | *772,690* | *712,297* | *40,466* | *48,899* |
| Salmon | 119,324 | 124,198 | 22,790 | 30,244 |
| Halibut[2] | 37,274 | 33,292 | 8,249 | 8,309 |
| Herring | 572,202 | 505,287 | 6,477 | 6,167 |
| Ling Cod | 3,238 | 3,797 | 379 | 384 |
| Oysters | 12,768 | 11,509 | 635 | 587 |
| Soles and Flounders | 5,686 | 6,317 | 359 | 420 |
| Crabs | 3,405 | 4,351 | 405 | 699 |
| Shrimps and Prawns | 1,788 | 1,052 | 284 | 161 |
| Grey Cod | 6,756 | 12,008 | 414 | 722 |
| Other Species | 10,249 | 10,486 | 474 | 1,206 |
| *Atlantic Coast* | *1,425,298* | *1,495,989* | *76,608* | *86,137* |
| Lobsters | 44,373 | 41,875 | 21,281 | 24,244 |
| Cod | 609,722 | 571,197 | 20,998 | 20,760 |
| Haddock | 90,911 | 106,372 | 4,916 | 6,225 |
| Scallops | 16,437 | 16,683 | 6,256 | 7,274 |
| Herring | 252,702 | 312,556 | 3,086 | 3,204 |
| Small Flatfishes | 127,349 | 164,503 | 4,089 | 5,294 |
| Halibut | 4,926 | 4,523 | 1,604 | 1,438 |
| Pollock | 57,134 | 56,959 | 1,735 | 1,832 |
| Salmon | 4,052 | 4,377 | 1,833 | 2,020 |
| Redfish | 83,274 | 78,913 | 2,221 | 2,140 |
| Swordfish | 14,458 | 11,856 | 2,975 | 3,559 |
| Other Species | 119,960 | 126,175 | 5,614 | 8,147 |

[1]Preliminary figures.
[2]Including halibut landed in United States ports by Canadian Fishermen.

## FISH AND SHELLFISH - LANDINGS AND VALUES, BY AREAS AND PROVINCES 1963 AND 1964

| | Landings | | Landed Values | |
|---|---|---|---|---|
| | 1963 | 1964[1] | 1963 | 1964[1] |
| *Sea Fisheries—Total* | *2,197,988* | *2,208,286* | *117,074* | *135,036* |
| Atlantic Coast—Total | 1,425,298 | 1,495,989 | 76,608 | 86,137 |
| Nova Scotia | 429,016 | 517,784 | 36,643 | 42,455 |
| Newfoundland | 594,961 | 555,555 | 20,429 | 21,425 |
| New Brunswick | 232,884 | 250,247 | 9,290 | 10,280 |
| Prince Edward Island | 38,462 | 41,002 | 4,630 | 5,750 |
| Quebec | 129,975 | 131,401 | 5,616 | 6,227 |
| Pacific Coast—Total | 772,690 | 712,297 | 40,466 | 48,899 |
| *Freshwater Fisheries—Total* | *123,832* | *115,000*[2] | *13,302* | *12,500*[2] |
| Ontario | 54,342 | 50,500[2] | 5,504 | 5,200[2] |
| Manitoba | 35,738 | 33,200[2] | 4,356 | 4,100[2] |
| Saskatchewan | 14,089 | 13,100[2] | 1,299 | 1,200[2] |
| Alberta | 8,509 | 8,000[2] | 676 | 600[2] |
| Northwest Territories | 6,347 | 5,900[2] | 796 | 700[2] |
| Quebec | 2,803 | 2,500[2] | 608 | 600[2] |
| New Brunswick | 2,004 | 1,800[2] | 63 | 100[2] |
| *Grand Total* | *2,321,820* | *2,323,286* | *130,376* | *147,536* |

[1]Preliminary figures.
[2]Estimated.

## FISH AND SHELLFISH - EXPORTS BY TYPES OF PRODUCTS 1963 AND 1964

| | Quantity | | Value | |
|---|---|---|---|---|
| | 1963 | 1964 | 1963 | 1964 |
| | '000 lbs. | | '000 $ | |
| Fresh and Frozen Fish, whole or dressed | 143,217 | 178,991 | 37,505 | 41,501 |
| Fresh and Frozen Fillets | 172,249 | 203,030 | 43,948 | 52,861 |
| Smoked Fish | 9,279 | 10,573 | 1,654 | 1,745 |
| Pickled Fish | 20,891 | 19,678 | 2,665 | 2,617 |
| Salted and Dried Fish | 106,359 | 93,574 | 21,267 | 21,166 |
| Canned Fish | 48,285 | 58,820 | 23,776 | 31,851 |
| Molluscs and Crustaceans (fresh & canned) | 40,309 | 44,054 | 29,070 | 34,639 |
| Fish Oils ('000 Gallons) | 17,645 | 34,691 | 1,073 | 3,009 |
| Miscellaneous | | | 11,168 | 13,222 |
| TOTAL | | | 172,126 | 202,611 |

## FISH AND SHELLFISH - VALUE OF EXPORTS BY MAIN COUNTRIES OF DESTINATION 1963 AND 1964

| | Value | |
|---|---|---|
| | 1963 | 1964 |
| | '000 $ | |
| United States | 115,879 | 130,880 |
| United Kingdom | 17,104 | 26,867 |
| Other European Countries | 15,657 | 19,681 |
| Jamaica | 5,693 | 6,275 |
| Puerto Rico | 3,341 | 1,393 |
| Dominican Republic | 2,792 | 3,605 |
| Other Caribbean Areas | 5,725 | 7,348 |
| Australia | 2,039 | 2,513 |
| All Other Countries | 3,896 | 4,049 |
| TOTAL | 172,126 | 202,611 |

## NUMBER OF FISHERMEN IN CANADA, BY AREAS 1962 AND 1963

| | 1962 | 1963 |
|---|---|---|
| *Sea Fisheries* | *62,134* | *64,377* |
| British Columbia | 16,437 | 16,624 |
| Maritimes and Quebec | 25,880 | 26,346 |
| Newfoundland | 19,817 | 21,407 |
| *Freshwater Fisheries* | *16,684* | *17,305* |
| TOTAL | 78,818 | 81,682 |

## VALUE OF FISHING CRAFT IN CANADA, BY AREAS, 1962 AND 1963

| | 1962 | 1963 |
|---|---|---|
| | '000 $ | |
| *Sea Fisheries* | *106,096* | *136,413* |
| British Columbia | 57,911 | 70,865 |
| Maritimes and Quebec | 35,781 | 48,809 |
| Newfoundland | 12,404 | 16,739 |
| *Freshwater Fisheries*[1] | *6,204* | *6,642* |
| TOTAL | 112,300 | 143,055 |

[1]Excludes Alberta.

# APPENDIX 1

## FINANCIAL STATEMENTS 1964-65

# COMPARATIVE SUMMARY OF EXPENDITURES

| Appropriation | 1964-65 | 1963-64 | 1962-63 |
|---|---|---|---|
| | $ | $ | $ |
| Gratuities to Families of Deceased Employees | ..... | 1,035 | 570 |
| Minister's Salary and Motor Car Allowance | 17,000 | 17,047 | 17,000 |
| Departmental Administration | | | |
| Departmental Administration | 507,515 | 466,639 | 463,298 |
| Information and Consumer Service | 333,654 | 261,271 | 297,418 |
| Economics Service | 367,897 | 329,759 | 308,163 |
| FISHERIES MANAGEMENT AND DEVELOPMENT | | | |
| Operation and Maintenance | | | |
| Industrial Development Service | 1,275,745 | 638,996 | 665,098 |
| Field Services Administration | 982,566 | 891,020 | 874,683 |
| Conservation and Development Service | 7,388,265 | 6,719,536 | 6,325,030 |
| Inspection Service | 2,165,575 | 2,147,902 | 2,065,793 |
| Fishermen's Indemnity Plan Administration | 284,862 | 263,812 | 257,223 |
| Canadian Share of Expenses of the International Commissions | 1,193,024 | 1,121,318 | 1,092,867 |
| Newfoundland Bait Service | 525,665 | 1,650,143 | 607,693 |
| Fisheries Prices Support Act—Administration | 65,414 | 62,867 | 57,777 |
| Construction or Acquisition | | | |
| Industrial Development Service | 36,672 | ..... | ..... |
| Field Services Administration | 6,578 | | |
| Conservation and Development Service | 876,563 | 1,300,334 | 1,697,963 |
| Inspection Service | 115,979 | ..... | ..... |
| Fishermen's Indemnity Plan—Administration | 6,044 | ..... | ..... |
| International Commissions | 16,485 | ..... | ..... |
| Newfoundland Bait Serivce | 301,764 | ..... | ..... |
| Grants, Contributions and Subsidies | | | |
| Educational Work in Fisheries Techniques, and Co-operative Producing and Selling among Fishermen | 119,412 | 117,633 | 114,722 |
| Payment of Assistance to Producers of Salted Fish | 600,000 | 599,999 | 600,000 |
| Assistance in Construction of Fishing Vessels | 800,000 | 500,000 | 500,000 |
| Assistance in Construction of Bait Freezing and Storage Facilities | 21,340 | 22,671 | 28,313 |
| Fishing Bounty | 159,004 | 159,991 | 159,480 |
| Estimated amount required to recoup the Fishing Vessel Indemnity Account and the Lobster Trap Indemnity Account to cover the net operating losses in the said accounts as at March 31, 1965 | 81,000 | 196,999 | 257,333 |
| Refunds of amounts creadited to Revenue in previous year | ..... | 221 | 471 |
| FISHERIES RESEARCH BOARD OF CANADA | | | |
| Administration, Operation and Maintenance | | | |
| Headquarters Administration | 269,348 | 227,837 | 218,978 |
| Operation and Maintenance | 5,957,696 | 5,283,540 | 5,195,332 |
| Construction or Acquisition of Buildings, Works, Land and Equipment | 1,118,194 | 735,744 | 1,487,495 |
| | 25,593,261 | 23,716,314 | 23,292,700 |

## COMPARATIVE SUMMARY OF REVENUES

| | 1964-65 | 1963-64 | 1962-63 |
|---|---|---|---|
| Return on Investments | | | |
| Pelagic Sealing (Profit on sales of skins) | 640,351 | 466,490 | 488,855 |
| Interest on Sale to Bonavista Cold Storage Co. Ltd. | | 500 | 750 |
| | 640,351 | 466,990 | 489,605 |
| Privileges, Licenses and Permits | 128,664 | 124,659 | 115,671 |
| Proceeds from Sales | 126,788 | 176,758 | 116,824 |
| Service and Service Fees | 28,605 | 24,623 | 33,197 |
| Refund of Previous Years' Expenditure | 11,141 | 61,465 | 24,929 |
| Miscellaneous | 41,892 | 47,328 | 63,945 |
| TOTALS | 977,441 | 901,823 | 844,171 |

## BAIT SERVICE - NEWFOUNDLAND

### Receipts and Payments 1964-65

| | | |
|---|---|---|
| RECEIPTS: | | |
| Sales of Bait | | $ 95,975 |
| Storage and Other Service Charges | | 3,811 |
| Refund of Previous Years' Expenditure | | 4,162 |
| Total Receipts | | 103,948 |
| PAYMENTS: | | |
| Purchase of Bait | 92,562 | |
| Other Operating Expenses | 433,103 | |
| | | 525,665 |
| CAPITAL EXPENDITURES: | | |
| Acquisition and Construction of Buildings | 56,345 | |
| Acquisition of Equipment | 245,419 | |
| | | 301,764 |
| Excess of payments over Receipts | | 723,481 |

# FISHING BOUNTY PAYMENTS 1964-65

| Province and County | Boats | Men | Amount | Vessels | Tons | Men | Amount | Total Amount |
|---|---|---|---|---|---|---|---|---|
| | | | $ | | | | $ | $ |
| NOVA SCOTIA | | | | | | | | |
| Annapolis | 70 | 113 | 1,154.80 | 10 | 250 | 31 | 547.60 | 1,702.40 |
| Antigonish | 55 | 81 | 832.95 | 1 | 18 | 3 | 46.80 | 879.75 |
| Cape Breton | 105 | 189 | 1,918.80 | 61 | 2,164 | 376 | 5,773.60 | 7,692.40 |
| Cumberland | 8 | 18 | 180.80 | 3 | 67 | 8 | 143.80 | 324.60 |
| Digby | 131 | 209 | 2,137.40 | 80 | 1,604 | 212 | 3,639.20 | 5,776.60 |
| Guysborough | 278 | 380 | 3,926.00 | 37 | 1,618 | 262 | 4,133.20 | 8,059.20 |
| Halifax | 377 | 549 | 5,648.10 | 40 | 1,974 | 402 | 5,854.50 | 11,502.60 |
| Inverness | 98 | 150 | 1,538.00 | 28 | 793 | 108 | 1,829.80 | 3,367.80 |
| Kings | 15 | 26 | 264.60 | 4 | 110 | 10 | 206.00 | 470.60 |
| Lunenburg | 304 | 346 | 3,625.95 | 31 | 2,099 | 368 | 5,632.50 | 9,258.45 |
| Pictou | 13 | 20 | 205.00 | ..... | ..... | ..... | ..... | 205.00 |
| Queens | 72 | 117 | 1,195.20 | 33 | 751 | 102 | 1,730.20 | 2,925.40 |
| Richmond | 120 | 194 | 1,982.40 | 23 | 776 | 135 | 2,072.00 | 4,054.40 |
| Shelburne | 333 | 505 | 5,181.00 | 313 | 5,292 | 770 | 12,684.00 | 18,865.00 |
| Victoria | 160 | 243 | 2,502.10 | 7 | 133 | 23 | 353.80 | 2,855.90 |
| Yarmouth | 22 | 41 | 415.60 | 95 | 1,668 | 257 | 4,156.15 | 4,571.75 |
| TOTAL | 2,161 | 3,181 | 32,708.70 | 766 | 19,317 | 3,067 | 48,803.15 | 81,511.85 |
| PRINCE EDWARD ISLAND | | | | | | | | |
| Kings | 209 | 308 | 3,166.50 | 22 | 935 | 99 | 1,885.40 | 5,051.90 |
| Prince | 346 | 553 | 5,655.50 | 2 | 25 | 4 | 63.40 | 5,718.90 |
| Queens | 91 | 186 | 1,876.60 | 2 | 49 | 3 | 77.80 | 1,954.40 |
| TOTAL | 646 | 1,047 | 10,698.60 | 26 | 1,009 | 106 | 2,026.60 | 12,725.20 |

## FISHING BOUNTY PAYMENTS 1964-65—Conc.

| Province and County | Boats | Men | Amount | Vessels | Tons | Men | Amount | Total Amount |
|---|---|---|---|---|---|---|---|---|
| | | | $ | | | | $ | $ |
| NEW BRUNSWICK | | | | | | | | |
| Charlotte | 74 | 112 | 1,149.20 | 85 | 2,086 | 274 | 4,716.40 | 5,865.60 |
| Gloucester | 342 | 655 | 6,650.25 | 140 | 3,852 | 499 | 8,642.40 | 15,292.65 |
| Kent | 67 | 110 | 1,123.00 | 80 | 928 | 154 | 2,406.40 | 3,529.40 |
| Northumberland | 16 | 27 | 275.20 | 89 | 1,069 | 180 | 2,797.00 | 3,072.20 |
| Restigouche | 3 | 3 | 31.80 | ..... | ..... | ..... | ..... | 31.80 |
| Saint John | 4 | 8 | 80.80 | ..... | ..... | ..... | ..... | 80.80 |
| Westmorland | 29 | 38 | 393.80 | 5 | 63 | 10 | 159.00 | 552.80 |
| TOTAL | 535 | 953 | 9,704.05 | 399 | 7,998 | 1,117 | 18,721.20 | 28,425.25 |
| QUEBEC | | | | | | | | |
| Bonaventure | 67 | 92 | 953.70 | 21 | 618 | 79 | 1,376.40 | 2,330.10 |
| Gaspe | 375 | 548 | 5,645.60 | 94 | 2,398 | 372 | 5,969.20 | 11,614.80 |
| Magdalen Islands | 396 | 833 | 8,392.80 | 35 | 1,203 | 152 | 2,662.20 | 11,055.00 |
| Matane | 81 | 130 | 1,329.00 | ..... | ..... | ..... | ..... | 1,329.00 |
| Saguenay | 602 | 919 | 9,396.80 | 11 | 298 | 33 | 615.85 | 10,012.65 |
| TOTAL | 1,521 | 2,522 | 25,717.90 | 161 | 4,517 | 636 | 10,623.65 | 36,341.55 |
| GRAND TOTAL | 4,863 | 7,703 | 78,829.25 | 1,352 | 32,841 | 4,926 | 80,174.60 | 159,003.85 |

## DISTRIBUTION OF EXPENDITURES

| | General | Newfoundland | Nova Scotia | Prince Edward Island | New Brunswick |
|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ |
| Minister of Fisheries | 17,000 | ..... | ..... | ..... | ..... |
| Departmental Administration | 507,515 | ..... | ..... | ..... | ..... |
| Information and Consumer Service: | | | | | |
| Information Service | 205,404 | 10,068 | 16,782 | 53 | 108 |
| Consumer Service | 37,543 | ..... | 8,717 | ..... | ..... |
| Economics Service | 151,732 | 46,033 | 55,661 | 1,000 | 1,619 |
| Industrial Development Service | 285,474 | 777,765 | 71,220 | ..... | 95,394 |
| Field Services Administration | 131 | 296,304 | 225,524 | 11,566 | 27,209 |
| Conservation and Development Service: | | | | | |
| Protection | 127,744 | 805,942 | 1,168,966 | 220,397 | 726,772 |
| Fish Culture | ..... | 113,542 | 621,468 | 131,452 | 309,428 |
| Inspection Service | 69,814 | 480,949 | 532,566 | 85,057 | 217,101 |
| Fishermen's Indemnity Plan Administration | 16,554 | 76,100 | 62,240 | 6,221 | 14,063 |
| Canadian Share of Expenses of the International Fisheries Commissions | 20,691 | ..... | 19,256 | ..... | ..... |
| Newfoundland Bait Service | ..... | 525,665 | ..... | ..... | ..... |
| Fisheries Prices Support Act—Administration | 54,801 | 4,825 | 5,679 | 1 | 105 |
| Construction or Acquisition: | | | | | |
| Industrial Development Service | 763 | 4,866 | ..... | 31,043 | ..... |
| Field Services Administration | ..... | ..... | ..... | ..... | ..... |
| Conservation and Development Service: | | | | | |
| Protection | ..... | 85,754 | 20,720 | 39,978 | 25,485 |
| Fish Culture | ..... | 71,808 | 52,921 | 22,254 | 20,054 |
| Inspection Service | ..... | 30,850 | 6,817 | 1,248 | 20,502 |
| Fishermen's Indemnity Plan Administration | ..... | 18 | 1,945 | ..... | 4,081 |
| International Commissions | ..... | ..... | ..... | ..... | ..... |
| Newfoundland Bait Service | ..... | 301,764 | ..... | ..... | ..... |
| Educational Work in Fisheries Techniques and Co-Operative Producing and Selling Among Fishermen | ..... | 30,000 | 39,911 | 3,780 | 8,009 |
| Payment of Assistance to Producers of Salted Fish | ..... | 316,924 | 191,878 | 9,812 | 48,156 |
| Assistance in Construction of Fishing Vessels | ..... | 247,422 | 298,516 | 2,828 | 75,233 |
| Assistance in Construction of Bait Freezing and Storage Facilities | ..... | 21,340 | ..... | ..... | ..... |
| Fishing Bounty | ..... | ..... | 81,512 | 12,725 | 28,425 |
| Fishing Vessel and Lobster Trap Indemnity Accounts | ..... | 8,775 | 13,227 | 217 | 5,497 |
| Fisheries Research Board of Canada: | | | | | |
| Headquarters Administration | 269,348 | ..... | ..... | ..... | ..... |
| Operation and Maintenance | 72,489 | 860,227 | 696,673 | ..... | 1,042,610 |
| Construction or Acquisition | ..... | 42,021 | 137,074 | ..... | 206,051 |
| | 1,837,003 | 5,158,962 | 4,329,273 | 579,198 | 2,864,908 |

## DISTRIBUTION OF REVENUE

| | General | Newfoundland | Nova Scotia | Prince Edward Island | New Brunswick |
|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ |
| Return on investments | 640,351 | ..... | ..... | ..... | ..... |
| Privileges, licenses and permits | ..... | 24,915 | 20,109 | 6,320 | 14,856 |
| Proceeds from sales | ..... | 117,551 | 3,838 | 1,799 | 96 |
| Service and service fees | ..... | 9,023 | 261 | ..... | ..... |
| Refund of previous year's expenditure | 3,256 | 1,646 | 1,153 | 22 | 572 |
| Miscellaneous | ..... | 4,856 | 5,088 | 5,311 | 4,037 |
| | 643,607 | 157,991 | 30,449 | 13,452 | 19,561 |

## BY PROVINCES 1964-65

| Quebec | Ontario | Manitoba | Saskat-chewan | Alberta | British Columbia | Yukon Territory | Northwest Territories | Total |
|---|---|---|---|---|---|---|---|---|
| $ | $ | $ | $ | $ | $ | $ | $ | $ |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 17,000 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 507,515 |
| ..... | ..... | ..... | ..... | ..... | 21,323 | ..... | ..... | 253,738 |
| 3,948 | 10,444 | 7,896 | ..... | 725 | 10,643 | ..... | ..... | 79,916 |
| 517 | ..... | 14,077 | ..... | ..... | 97,221 | ..... | 37 | 367,897 |
| 19,981 | ..... | ..... | ..... | ..... | 25,911 | ..... | ..... | 1,275,745 |
| 44,580 | 7,570 | 47,497 | 2,072 | ..... | 299,381 | 1,231 | 19,501 | 982,566 |
| 1,013 | 267 | 1,072 | ..... | ..... | 2,167,588 | 22,047 | 92,203 | 5,334,011 |
| ..... | ..... | ..... | ..... | ..... | 878,364 | ..... | ..... | 2,054,254 |
| 261,079 | 105,937 | 102,888 | 43,444 | 13,404 | 204,338 | ..... | 48,998 | 2,165,575 |
| 42,881 | ..... | ..... | ..... | ..... | 66,803 | ..... | ..... | 284,862 |
| ..... | 513,798 | ..... | ..... | ..... | 639,279 | ..... | ..... | 1,193,024 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 525,665 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 65,414 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 36,672 |
| 1,488 | ..... | ..... | ..... | ..... | 5,090 | ..... | ..... | 6,578 |
| ..... | ..... | ..... | ..... | ..... | 137,729 | ..... | 7,811 | 317,477 |
| ..... | ..... | ..... | ..... | ..... | 392,049 | ..... | ..... | 559,086 |
| 32,867 | 6,298 | 4,148 | 1,611 | ..... | 11,633 | ..... | 5 | 115,979 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 6,044 |
| ..... | ..... | ..... | ..... | ..... | 16,485 | ..... | ..... | 16,485 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 301,764 |
| 27,100 | ..... | ..... | ..... | ..... | 10,612 | ..... | ..... | 119,412 |
| 33,230 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 600,000 |
| 176,001 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 800,000 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 21,340 |
| 36,342 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 159,004 |
| 4,001 | ..... | ..... | ..... | ..... | 68,713 | ..... | ..... | 81,000 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 269,348 |
| 405,780 | 372,581 | ..... | ..... | ..... | 2,507,336 | ..... | ..... | 5,957,696 |
| 463,426 | 12,327 | ..... | ..... | ..... | 257,295 | ..... | ..... | 1,118,194 |
| 1,546,235 | 1,029,222 | 177,578 | 47,127 | 14,129 | 7,817,793 | 23,278 | 168,555 | 25,593,261 |

## BY PROVINCES 1964-65

| Quebec | Ontario | Manitoba | Saskat-chewan | Alberta | British Columbia | Yukon Territory | Northwest Territories | Total |
|---|---|---|---|---|---|---|---|---|
| $ | $ | $ | $ | $ | $ | $ | $ | $ |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 640,351 |
| 1,537 | ..... | 43 | ..... | ..... | 43,740 | 11,288 | 5,856 | 128,664 |
| ..... | ..... | ..... | ..... | ..... | 3,504 | ..... | ..... | 126,788 |
| ..... | 19,321 | ..... | ..... | ..... | ..... | ..... | ..... | 28,605 |
| 40 | ..... | ..... | ..... | ..... | 4,452 | ..... | ..... | 11,141 |
| ..... | ..... | ..... | ..... | 4 | 22,351 | ..... | 245 | 41,892 |
| 1,577 | 19,321 | 43 | ..... | 4 | 74,047 | 11,288 | 6,101 | 977,441 |

# APPENDIX 2

## FISH CULTURE DEVELOPMENT STATEMENTS, 1964

## FISH DISTRIBUTED BY SPECIES, 1964

| Species | Advanced Fry and Fry | Fingerlings | Yearlings and Older | Total Distributions |
|---|---|---|---|---|
| Salmo salar—Atlantic salmon | 283,000 | 5,232,405 | 542,352 | 6,057,757 |
| Salmo trutta—Brown trout | ..... | 2,175,639 | 10,733 | 2,186,372 |
| Salmo gairdneri—Rainbow trout | ..... | 224,795 | 12,685 | 237,480 |
| Salmo salar sebago—Sebago salmon | ..... | ..... | 116,850 | 116,850 |
| Salvelinus fontinalis—Speckled trout | 63,000 | 15,392,970 | 215,346 | 15,671,316 |
| | 346,000 | 23,025,809 | 897,966 | 24,269,775 |

## DISTRIBUTION BY PROVINCES, 1964

### Fry, Fingerlings, Yearlings & Older Fish

| Province | Advanced Fry and Fry | Fingerlings | Yearlings and Older | Total Distributions | |
|---|---|---|---|---|---|
| | | | | By Species | By Province |
| NOVA SCOTIA | | | | | |
| Atlantic Salmon | ..... | 1,857,840 | 227,034 | 2,084,874 | ..... |
| Brown Trout | ..... | 1,845,009 | 10,733 | 1,855,742 | ..... |
| Rainbow Trout | ..... | 95,795 | 338 | 96,133 | ..... |
| Speckled Trout | 3,000 | 7,388,809 | 120,511 | 7,512,320 | ..... |
| | 3,000 | 11,187,453 | 358,616 | 11,549,069 | 11,549,069 |
| NEW BRUNSWICK | | | | | |
| Atlantic Salmon | 283,000 | 3,332,365 | 315,318 | 3,930,683 | ..... |
| Brown Trout | ..... | 330,630 | ..... | 330,630 | ..... |
| Rainbow Trout | ..... | 92,000 | 12,347 | 104,347 | ..... |
| Sebago Salmon | ..... | ..... | 116,850 | 116,850 | ..... |
| Speckled Trout | ..... | 7,772,061 | 57,041 | 7,829,102 | ..... |
| | 283,000 | 11,527,056 | 501,556 | 12,311,612 | 12,311,612 |
| PRINCE EDWARD ISLAND | | | | | |
| Atlantic Salmon | ..... | 42,200 | ..... | 42,200 | ..... |
| Rainbow Trout | ..... | 37,000 | ..... | 37,000 | ..... |
| Speckled Trout | 60,000 | 232,100 | 37,794 | 329,894 | ..... |
| | 60,000 | 311,300 | 37,794 | 409,094 | 409,094 |
| TOTALS | 346,000 | 23,025,809 | 897,966 | 24,269,775 | 24,269,775 |

# DISTRIBUTIONS BY FISH CULTURE STATIONS, 1964

| Station | Location | Established | Species | Advanced Fry and Fry | Fingerlings | Yearlings and Older | Total Distribution | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | By Species | By Station |
| Antigonish | St. Andrews, N.S. | 1929 | Atlantic salmon | ..... | ..... | 44,384 | 44,384 | |
| | | | Brown trout | ..... | 295,739 | ..... | 295,739 | |
| | | | Speckled trout | ..... | 1,025,066 | 6,693 | 1,031,759 | 1,371,882 |
| Cobequid | Collingwood, N.S. | 1937 | Atlantic salmon | ..... | 763,000 | 32,883 | 795,883 | |
| | | | Brown trout | ..... | 338,750 | ..... | 338,750 | |
| | | | Speckled trout | ..... | 695,050 | 12,967 | 708,017 | 1,842,650 |
| Coldbrook | Coldbrook, N.S. | 1938 | Atlantic salmon | ..... | 32,540 | ..... | 32,540 | |
| | | | Speckled trout | 3,000 | 1,203,200 | ..... | 1,206,200 | 1,238,740 |
| Grand Lake | Wellington Station, N.S. | 1936 | Atlantic salmon | ..... | 2,101 | ..... | 2,101 | |
| | | | Speckled trout | ..... | 34,480 | 51,800 | 86,280 | 88,381 |
| Kejimkujik | New Grafton, N.S. | 1937 | Atlantic salmon | ..... | 392,201 | 40,022 | 432,223 | |
| | | | Brown trout | ..... | 105,056 | ..... | 105,056 | |
| | | | Speckled trout | ..... | 188,180 | ..... | 188,180 | 725,459 |
| Lindloff | St. Peters, N.S. | 1912 | Brown trout | ..... | 419,325 | 300 | 419,625 | |
| | | | Rainbow trout | ..... | 95,795 | 338 | 96,133 | |
| | | | Speckled trout | ..... | 709,500 | 21,431 | 730,931 | 1,246,689 |
| Margaree | Frizzleton, N.S. | 1902 | Atlantic salmon | ..... | 357,300 | ..... | 357,300 | |
| | | | Speckled trout | ..... | 2,190,318 | 27,620 | 2,217,938 | 2,575,238 |
| Mersey | Liverpool, N.S. | 1935 | Atlantic salmon | ..... | 100,148 | ..... | 100,148 | |
| | | | Brown trout | ..... | 145,554 | ..... | 145,554 | |
| | | | Speckled trout | ..... | 181,300 | ..... | 181,300 | 427,002 |
| Yarmouth | South Ohio, N.S. | 1929 | Atlantic salmon | ..... | 210,550 | 109,745 | 320,295 | |
| | | | Brown trout | ..... | 540,585 | 10,433 | 551,018 | |
| | | | Speckled trout | ..... | 1,161,715 | ..... | 1,161,715 | 2,033,028 |
| Charlo | River Charlo, N.B. | 1939 | Atlantic salmon | ..... | 1,200,939 | 99,224 | 1,300,163 | |
| | | | Speckled trout | ..... | 400,386 | 4,265 | 404,651 | 1,704,814 |
| Florenceville | Florenceville, N.B. | 1928 | Atlantic salmon | ..... | ..... | 21,623 | 21,623 | |
| | | | Sebago salmon | ..... | ..... | 50,740 | 50,740 | |
| | | | Speckled trout | ..... | 1,502,300 | 14,038 | 1,516,338 | 1,588,701 |

## DISTRIBUTIONS BY FISH CULTURE STATIONS, 1964—*Conc.*

| Station | Location | Established | Species | Advanced Fry and Fry | Fingerlings | Yearlings and Older | Total Distribution | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | By Species | By Station |
| Grand Falls | Grand Falls, N.B. | 1880 | Atlantic salmon | ..... | 72,000 | 23,893 | 95,893 | |
| | | | Speckled trout | ..... | 1,395,225 | 3,934 | 1,399,159 | 1,495,052 |
| Haley Brook | Plaster Rock, N.B. | 1950 | Atlantic salmon | ..... | 90,000 | 43,100 | 133,100 | |
| | | | Speckled trout | ..... | 182,400 | ..... | 182,400 | 315,500 |
| Miramichi | South Esk, N.B. | 1874 | Atlantic salmon | 283,000 | 1,712,700 | 53,051 | 2,048,751 | |
| | | | Speckled trout | ..... | 238,900 | ..... | 238,900 | 2,287,651 |
| Saint John | Saint John, N.B. | 1914 | Atlantic salmon | ..... | 256,726 | 74,427 | 331,153 | |
| | | | Sebago salmon | ..... | ..... | 66,110 | 66,110 | |
| | | | Brown trout | ..... | 330,630 | ..... | 330,630 | |
| | | | Rainbow trout | ..... | 92,000 | 12,347 | 104,347 | |
| | | | Speckled trout | ..... | 4,052,850 | 34,804 | 4,087,654 | 4,919,894 |
| Cardigan | Cardigan, P.E.I. | 1938 | Atlantic salmon | ..... | 42,200 | ..... | 42,200 | |
| | | | Rainbow trout | ..... | 37,000 | ..... | 37,000 | |
| | | | Speckled trout | 60,000 | 232,100 | 37,794 | 329,894 | 409,094 |
| | | | | 346,000 | 23,025,809 | 897,966 | 24,269,775 | 24,269,775 |

# CO-OPERATIVE OR SPECIAL TRANSFERS AND STOCK SUPPLIED FOR SCIENTIFIC INVESTIGATIONS, 1964

| Species | From | To | Number | Details | Date |
|---|---|---|---|---|---|
| Atlantic Salmon | Cobequid F.C. Station | Sydney, Australia | 100,000 | Eyed eggs | Feb. 28 |
| | Miramichi F.C. Station | Vermont, U.S.A. | 104,000 | Eyed eggs | Feb. 18 |
| | | Miramichi F.C. Station | 208,000 | Eyed eggs | Feb. 18 |
| | Miramichi F.C. Station | Maine, U.S.A. | 321,900 | Green eggs | Oct. 27 |
| | Florenceville F.C. Station | Pollett River Research Station | 2,100 | 2 yrs. | April 20 |
| | Florenceville F.C. Station | University of New Brunswick | 3,200 | Fingerlings | Feb. 11—April 25 |
| | Florenceville F.C. Station | University of New Brunswick | 3,240 | Yearlings | Jan. 31—Sept. 29 |
| | Kejimkujik F.C. Station | Fisheries Research Board | 375 | Yearlings | May 8 |
| | Kejimkujik F.C. Station | Fisheries Research Board | 5,000 | Fingerlings | Nov. 17 |
| | Miramichi F.C. Station | Fisheries Research Board | 2,250 | Yearlings | April 16 |
| | Saint John F.C. Station | Fisheries Research Board | 300 | Fingerlings | Jan. 8 |
| | Saint John F.C. Station | Pollett River Research Station | 2,250 | Yearlings | April 15 |
| | Saint John F.C. Station | Fisheries Research Board | 800 | Fry | May 11 |
| | Saint John F.C. Station | Fisheries Research Board | 1,000 | Fingerlings | June 6 |
| | Saint John F.C. Station | Carleton University | 500 | Yearlings | June 12 |
| | Saint John F.C. Station | Carleton University | 3,000 | Fingerlings | June 12 |
| | Saint John F.C. Station | Carleton University | 250 | Yearlings | July 30 |
| | Saint John F.C. Station | Carleton University | 2,000 | Fingerlings | July 30 |
| | Saint John F.C. Station | Fisheries Research Board | 100 | Fingerlings | Oct. 16 |
| | Saint John F.C. Station | University of Western Ontario | 100 | Fingerlings | Oct. 20 |
| | Saint John F.C. Station | Carleton University | 1,000 | Fingerlings | Oct. 20 |
| | Saint John F.C. Station | Carleton University | 700 | Yearlings | Oct. 20 |
| | Yarmouth F.C. Station | University of Ottawa | 35 | Fingerlings | Dec. 18 |
| | River Philip Salmon Pond | Fisheries Research Board | 18,000 | Green eggs | Nov. 7 |
| | River Philip Salmon Pond | Fisheries Research Board | 13 | Adult | Nov. 7 |
| Lake Trout | NIL | | | | |
| Rainbow Trout | Coldbrook F.C. Station | University of Ottawa | 35 | Fingerlings | Dec. 18 |
| | Lindloff F.C. Station | Fisheries Research Board, NB | 400 | Fingerlings | June 4 |
| | Lindloff F.C. Station | Fisheries Research Board, NS | 20 | Adult | July 18 |
| | Lindloff F.C. Station | Fisheries Research Board | 7 | Adult | Dec. 16 |
| | Saint John F.C. Station | Fisheries Research Board | 12 | Fingerlings | Jan. 8 |
| | Saint John F.C. Station | Fisheries Research Board | 300 | Fingerlings | May 11 |
| | Saint John F.C. Station | Fisheries Research Board | 500 | Fingerlings | July 24 |
| Brown Trout | Yarmouth F.C. Station | University of Ottawa | 35 | Fingerlings | Dec. 18 |
| Sebago Salmon | Cobb Hatchery, Enfield, USA | Florenceville FCS | 90,000 | Eyed eggs | March 11 |
| Speckled Trout | Cardigan F.C. Station | Fisheries Research Board | 4,000 | Finglerlings | Nov. 21 |
| | Cardigan F.C. Station | Fisheries Research Board | 1,994 | Yearlings | Nov. 19 |
| | Cobequid F.C. Station | N.S. Museum of Science | 4 | Adult | May 28 |
| | Cobequid F.C. Station | N.S. Museum of Science | 8 | Adult | July 28 |
| | Cobequid F.C. Station | Jasper National Park | 500,000 | Eyed eggs | Jan. 27 |
| | Florenceville F.C. Station | University of New Brunswick | 1,000 | Fingerlings | Sept. 29 |

# COLLECTION AND DISPOSAL OF EGGS BY SPECIES, 1964

| Species | Collection Area | Egg Collecting Period | Number Collected | Disposal Establishment at | Date Eggs Received | Number | Total by Species |
|---|---|---|---|---|---|---|---|
| Atlantic Salmon | Restigouche River | Oct. 27–Nov. 4 | 1,095,100 | Charlo | Oct. 27–Nov. 4 | 1,095,100 | |
| | New Mills Pond | Oct. 23–Nov. 12 | 1,969,540 | Maramichi | Nov. 5–Nov. 11 | 4,350 | |
| | | | | Charlo | Oct. 23–Nov. 12 | 1,965,190 | |
| | River Philip, N.S. | Oct. 4–Dec. 4 | 1,071,360 | Cobequid | Nov. 6 | 478,800 | |
| | | | | Fisheries Research Board | Nov. 7 | 18,000 | |
| | | | | Cobequid | Nov. 12 | 364,800 | |
| | | | | Cobequid | Nov. 20 | 186,960 | |
| | | | | Cobequid | Dec. 4 | 22,800 | |
| | Beechwood Dam | Oct. 22–Nov. 9 | 284,700 | Florenceville | Oct. 22–Nov. 9 | 284,700 | |
| | Margaree River | Nov. 2–Nov. 16 | 451,861 | Margaree | Nov. 2–Nov. 16 | 451,861 | |
| | Marimiehi Pond | Oct. 22–Nov. 27 | 6,449,475 | Maine, U.S.A. | Oct. 27 | 321,900 | |
| | | | | Miramiehi | Oct. 22–Nov. 27 | 6,127,575 | |
| | Curventon | Oct. 22–Nov. 23 | 74,625 | Miramichi | Oct. 22–Nov. 23 | 74,625 | 11,396,661 |
| Brown Trout | Yarmouth Ponds | Oct. 16–Nov. 9 | 2,078,650 | Yarmouth | Oct. 16–Nov. 9 | 2,078,650 | |
| | Lindloff Ponds | Oct. 14–Dec. 2 | 1,723,874 | Lindloff | Oct. 16–Dec. 2 | 1,723,874 | 3,802,524 |
| Rainbow Trout | Lindloff Ponds | April 1–April 23 | 493,334 | Lindloff | April 1–April 23 | 493,334 | |
| | Saint John Ponds | April 30–May 12 | 437,800 | Saint John | April 30–May 12 | 437,800 | 931,134 |
| Sebago Salmon | Chamcook Lake | Nov. 9–Nov. 25 | 40,000 | Saint John | Nov. 9–Nov. 25 | 40,000 | 40,000 |
| Speckled Trout | Antigonish Ponds | Oct. 28–Nov. 18 | 6,449,142 | Lindloff | Oct. 29 | 1,005,885 | |
| | | | | Lindloff | Nov. 3 | 1,002,362 | |
| | | | | Cardigan | Nov. 10 | 1,010,746 | |
| | | | | Antigonish | Oct. 28–Nov. 18 | 3,430,149 | |
| | Cobequid Ponds | Oct. 29–Nov. 25 | 3,845,060 | Kejimkujik | Nov. 3 | 500,000 | |
| | | | | Cobequid | Oct. 29–Nov. 25 | 3,345,060 | |
| | Florenceville Ponds | Oct. 15–Nov. 3 | 2,686,200 | Florenceville | Oct. 15–Nov. 3 | 2,686,200 | |
| | Grand Falls Ponds | Oct. 14–Nov. 5 | 2,500,150 | Grand Falls | Oct. 14–Nov. 5 | 2,500,150 | |
| | Grand Lake Ponds | Nov. 6–Nov. 19 | 80,000 | Grand Lake | Nov. 6–Nov. 19 | 80,000 | |
| | Margaree Ponds | Oct. 27–Nov. 16 | 2,949,575 | Margaree | Oct. 27–Nov. 16 | 2,949,575 | |
| | Saint John Ponds | Oct. 22–Nov. 17 | 11,426,109 | Coldbrook | Nov. 3 | 2,008,800 | |
| | | | | Yarmouth | Nov. 4 | 2,002,200 | |
| | | | | Grand Falls | Nov. 17 | 465,300 | |
| | | | | Florenceville | Nov. 17 | 512,800 | |
| | | | | Saint John | Oct. 22–Nov. 17 | 6,436,919 | 29,936,146 |
| | | | | | | Total all Species | 46,506,465 |