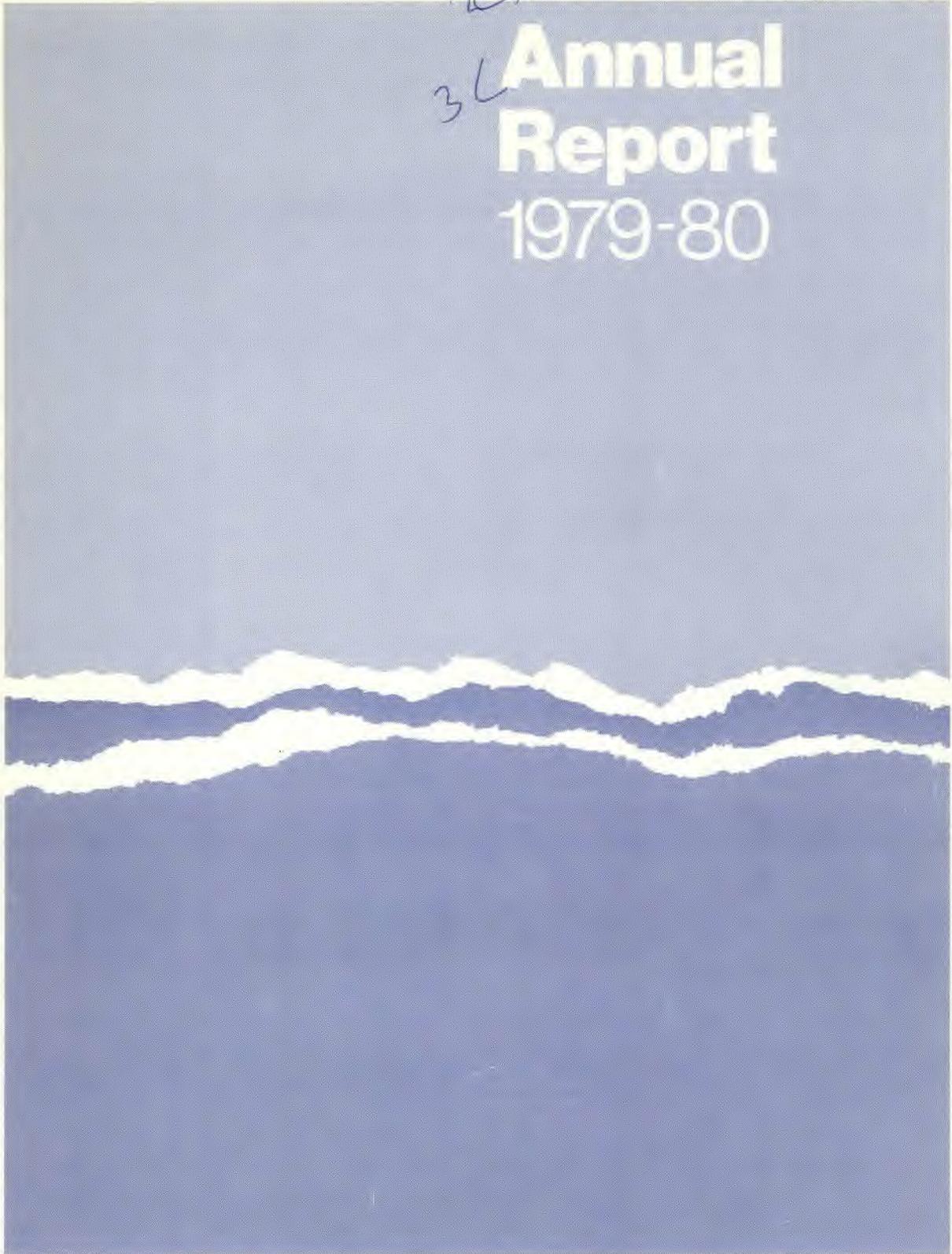


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Department of Fisheries and Oceans

Annual Report 1979-80



Canada



Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans

Department of Fisheries and Oceans

Annual Report 1979-80

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Minister of
Fisheries and Oceans

Ministre des
Pêches et des Océans

Your file *Voire référence*

Our file *Notre référence*

Ottawa, Canada
K1A 0E6

His Excellency
The Right Honourable Edward Schreyer
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 and Oceans
for the fiscal year ended March 31, 1980.

Respectfully submitted, -

Roméo LeBlanc



Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans

Deputy Minister

Sous-ministre

Ottawa, Canada
K1A 0E6

The Honorable Roméo LeBlanc
Minister of Fisheries and Oceans
Ottawa, Canada

Dear Mr. Minister:

I have the honor to submit the Annual Report of the
Department of Fisheries and Oceans for the fiscal year ended
March 31, 1980.

Respectfully submitted,



D.D. Tansley

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This is the first annual report of the Department of Fisheries and Oceans, which officially came into being on April 2, 1979, following proclamation of the Department of Fisheries and Oceans Act. The department is basically composed of those elements which functioned as the Fisheries and Marine Service within the former Department of Fisheries and the Environment.

Under the new Act, the duties, powers and functions of the Minister of Fisheries and Oceans include (i) sea coast and inland fisheries; (ii) fishing and recreational harbours; (iii) hydrography and marine sciences and (iv) the coordination of the policies and programs of the Government of Canada respecting oceans.

The department is composed of four main organizational components, each headed by an assistant deputy minister. These are: Atlantic Fisheries, Pacific and Freshwater Fisheries, Economic Development and Marketing, and Ocean and Aquatic Sciences. Support services are consolidated under a Management Services Bureau.

The objectives of Fisheries and Oceans are to ensure:

- the comprehensive husbandry and management of Canada's fisheries resource base, through the protection, rehabilitation and enhancement of individual fish stocks and the aquatic habitat upon which these resources depend;
- the "best use" of fisheries resources, through a variety of measures affecting when, where, how and by whom these resources are harvested, processed and marketed to obtain optimal social-economic benefits;
- an adequate hydrographic survey and chart production program to enable hydrographic charts and other publications to be produced for safe navigation in Canadian waters;
- the acquisition of the necessary knowledge base pertaining to oceanic processes and environments to support activities related to defence, marine transportation, the exploitation of offshore energy resources, and the management of the fishery resource and its aquatic habitat;
- the provision of a national ocean information service;
- the provision and administration of a national system of harbours in support of commercial fishing vessels and recreational boating.

Operations of the department, which is highly decentralized, are carried out from Ottawa and regional offices and research establishments throughout Canada. A summary of the activities in fiscal year 1979-80 follows.

Fisheries Management

During the year under review, the department continued to concentrate its efforts on achieving stability and increased viability in the fishing industry across Canada, taking optimum advantage of the opportunities created by the extension of coastal fisheries jurisdiction to 200 miles.

Although the actual quantity of fish caught in Canadian waters in 1979 rose only slightly over the 1978 total, returns to fishermen increased significantly (from \$701 million to \$870 million), with product values expected to exceed the 1978 record total of \$1.6 billion. Canada continued to hold its position as the world's top fish exporter, with sales valued at more than \$1.3 billion. In regional terms, the Atlantic coast industry accounted for 61 per cent of the value of fisheries products produced, the Pacific coast 34 per cent and the inland fisheries, five per cent.

Since the declaration of the 200-mile limit, the Atlantic coast has seen a significant decrease in foreign fishing activity. Between 1976 and 1979 catches by foreign fleets have dropped from 66 to 31 per cent of the total allowable catch and during the same period the number of licences issued has been cut from 551 to 144.

Released during the year was the Levelton report, dealing with the Atlantic coast commercial fisheries licensing system. Acting on the report, steps have been taken to implement a number of recommendations to achieve more equitable distribution of access to available fisheries resources in line with good conservation practices.

Another report, "The Atlantic Salmon Review", prepared by a departmental task force, described major resource problems and recommended management changes. A series of public meetings was held to discuss the report and obtain comments from interested parties. The ban on commercial fishing of Atlantic salmon, introduced in 1972

in areas of the Maritimes, Quebec and Newfoundland as a conservation measure, was continued in 1979. Compensation was paid to the affected salmon fishermen.

With indications of a rapid recovery of the Northern cod stock off eastern Newfoundland and Labrador, a federally-sponsored seminar involving fishermen and processors was held in Newfoundland to assist in developing a long-range management plan for the stock.

Restrictions in the marketing of Atlantic coast swordfish in Canada, imposed in 1971 due to the presence of mercury, were relaxed in July, 1979, when a catch quota of 3,000 tonnes was established.

As an essential part of fisheries management, stepped-up efforts were made to patrol and monitor all aspects of the coastal fisheries. In the Newfoundland region, primary emphasis was placed on enforcement of salmon, lobster and licensing regulations, resulting in some 180 prosecutions and forfeiture of more than 60 nets and several boats and motors. Inland fishery violations increased to approximately 300, more than double the 1978 total.

The scheme for placing observers aboard foreign and domestic vessels to monitor fishing activities continued to show good results. Total time logged by observers on the Atlantic coast in 1979 was close to 10,000 sea days.

In the Newfoundland region 8,000 new fishermen and 4,600 new vessels entered the fishery -- an overall increase of 20 per cent over 1978. There was a slight increase in new entrants in the Maritimes region.

On the Atlantic coast, a primary objective for many departmental projects was the upgrading of fish quality. The most ambitious program in this regard is the inshore fish handling system which in the third year of a four-year program saw the establishment of 150 facilities out of a planned total of 200. The system, for which a user charge is planned, provides net bags, hoists, electronic scales, insulated containers and loading and unloading facilities, all of which are designed to get fish to the processing plant or market in the best possible condition.

Other successful development projects included continuation of the Fish Chilling Assistance Program under which financial assistance is provided for ice making and storage facilities, as well as vessel chilling equipment or insulation; projects designed to improve on-board handling equipment for small inshore vessels; and promotion of the use of mechanical and sun drying methods for squid.

Projects under the technology transfer program included the successful processing and marketing of underutilized species; a survey of new grounds suitable for Scottish seining techniques in Newfoundland and the Maritimes, experimental middle distance trawling for squid, and demonstrations of modern fishing methods to fishermen in Labrador. Another project was aimed at encouraging the use of seal meat by freezing and vacuum packaging for the Newfoundland and Japanese markets.

Programs under the broad title of "foreign arrangements" which resulted in significant benefits to the fishing industry included: (a) developmental charters under which foreign vessels were chartered by Canadian processors to catch fish not traditionally fished by Canadians for processing in whole or part at Canadian plants, (b) plant extension charters whereby foreign vessels were chartered for freezing and processing of catches by Canadian fishermen as extensions to the capacity of domestic processing plants; (c) resource short plant program, again using chartered foreign vessels to harvest the northern cod stock for 100 per cent processing onshore at a time when many Canadian plants were seriously short of fish; and (d) "Over-the-side" sales under which Canadian fishermen were permitted to sell fish directly to foreign vessels where potential catches were surplus to the processing and marketing capability of Canadian industry or where no domestic market existed to provide an acceptable economic return to fishermen.

The 1979 offshore seal fishery involved six Canadian and four Norwegian vessels and for the first time fishery officers were placed aboard Norwegian vessels as well as Canadian. Fixed wing aircraft and helicopters were used to monitor the operation, with one helicopter being placed aboard CSS Hudson which operated in the vicinity throughout the hunt. There was one minor incident involving a seal hunt protester on the ice.

The Fishermen's Community Services Program, a pilot project in the Maritimes Region, expanded to 21 personnel and provided a valuable communications link between the department and fishermen and their communities. The future of the project is under review.

Under the Newfoundland Bait Program, sale of bait to inshore line, lobster and crab fishermen amounted to 6.5 million pounds -- an increase of nearly 20 per cent.

In the Pacific region, the salmon fisheries in 1979 were highlighted by a better-than-expected return of

sockeye to the Fraser River due to returns of fish to the Chilko, Stellako and Adams Rivers tributaries, and the largest sockeye run on record to the Skeena River. For the first time, an experimental salmon gillnet fishery was initiated on the Taku and Stikine rivers in northwestern B.C. Although the roe herring catch declined substantially from 1978, the landed value reached a record high \$123 million (double the previous year's value).

1979 saw the start of a two-year phase-out of Canadian fishermen from the Alaska halibut fishery, with the department introducing a plan to relocate halibut fishermen into the British Columbia halibut fishery and the black cod fishery, or to buy back their halibut gear.

Co-operative fishing arrangements continued with Poland in the hake fishery and with Japan in an experimental offshore squid fishery.

An innovation introduced by the region during the year was an O.R.R. (Observe, Record, and Report) program which allows the public to telephone toll-free from any part of the province and report enforcement problems related to fisheries.

The Salmonid Enhancement Program (S.E.P.), a multi-million dollar federal-provincial initiative aimed at doubling the salmonid population on the B.C. coast by 1990, expanded and attracted increased public involvement in its third year of operation. Overall production goals were achieved with an expected total hatchery production of 266,141,000 juvenile salmonids. The \$4.5 million Puntledge River hatchery, the most technically advanced in the province, was completed during the year. Other hatcheries, on the Chilliwack and Nitinat Rivers, Loon Creek on the Upper Fraser and Tlupana and Robertson Creeks on Vancouver Island's west coast are in the course of being built or expanded. Also the number of economic development projects operating as part of the plan to expand abundance of salmon was increased by five to a total of 14.

Public involvement in S.E.P. reached a new peak with 6,000 volunteers working on more than 70 projects throughout B.C. The Salmonid Enhancement Board continued to provide direction and advice on the program with the support of the Salmonid Enhancement Task Group, a public advisory body. S.E.P.-funded research currently includes work on disease control, nutrition, stock identification, lake pen rearing and ocean survival of the salmonids. An

experimental lake fertilization program has been expanded after producing good results.

In the inland fisheries, a primary focus was to provide an economic perspective in the public management of fisheries resources for commercial production and recreational benefits. The development of computerized statistical reporting systems has provided the ability to monitor the flow of fisheries production from lake to market and monitor the recreational fisheries in the Northwest Territories.

Enforcement and surveillance activities were conducted throughout the Northwest Territories with particular emphasis on Great Slave Lake commercial whitefish fishery and the Cambridge Bay Arctic char commercial fishery. Monitoring of the domestic harvests of arctic char, narwhal, beluga, walrus and seals continued in the coastal areas of the territories and amendments to the narwhal, walrus and beluga regulations were submitted for legislative approval. Conservation education and consultations on fishery regulations were conducted throughout the N.W.T. with various hunters and trappers associations. Great Bear and Great Slave lakes were designated as trophy lake trout waters and a restriction on fish size and reduction in catch limits introduced.

Under the terms of the Great Lakes Fisheries Convention, the Sea Lamprey Control Centre at Sault Ste. Marie, Ontario, carried out sea lamprey control activities on the Canadian side of Lakes Superior and Huron and on both sides of Lake Ontario. This included applying selective toxicants to 38 streams, estuaries and embayments to eradicate larval sea lamprey, surveying 189 streams by electrical or chemical means to detect ammocoete populations, and the collection of spawning-phase and parasitic-phase lampreys by various means to assess population levels. In addition, low-head barrier dams were designed for several tributaries as a control measure.

Fish inspection activities, aimed at assuring the compliance of Canadian and imported fish and fish products to quality, packaging, labelling and safety requirements, continued to expand. Nationally, inspections were carried out at all levels of the industry; aboard vessels, at landing sites, during transport, in holding rooms, during processing and storage. This involved 18,100 vessels and vessel landing inspections, 5,400 transport vehicle inspections, 9,600

plant surveys for construction and equipment requirements, 169,700 plant operations and product inspections, 28,300 samples taken for laboratory evaluations and 37,300 laboratory evaluations.

As a result of two illnesses traced to questionable manufacturing practices, special inspections of canneries were carried out, resulting in detention of suspected unsafe products. Imports valued at \$314 million were inspected for compliance to requirements.

Out of a total of 186,300 field inspections and 56,300 laboratory evaluations of domestic and imported products, there were 1,800 instances where the product did not meet the requirements of the regulations and was withheld from the consumer.

A series of meetings was held with fishermen and industry groups regarding measures that could be taken to reduce resource waste and upgrade fish product quality. A program directed at vessels, landed quality, processing plants and final produce quality has been developed and is under discussion with all sectors of the industry.

In Atlantic regions investigations included depuration of soft shelled clams; assessment of analytical procedures for paralytic shellfish poisoning and histamine; effects of bruising and bleeding on fish quality; effects of different handling methods on long-term frozen storage of capelin, and roughhead and roundnose grenadiers; preservation and drying of squid; quality of frozen or smoked harp seal meat; and the effects of handling procedures on quality of trap-caught cod. Extension services were provided to fishermen and industry in the form of workshops on mackerel and squid, and demonstrations of squid drying.

Developmental activities in the inland fisheries involved demonstration of the mobile fish plant; construction and testing of mechanized winter fishing equipment; under-ice fish detection with sonar; and small-scale fish fertilizer production. Supervision of the production and processing of whitefish roe resulted in elevated production volumes.

Technological investigations in the Pacific region emphasized evaluation and preservation of fish quality prior to secondary processing. These included studies of the causes of excessive softness in flesh of trap-caught black cod; effects of various handling and storage procedures on food herring quality; and assessment of effectiveness of cleaners and disinfectants against specific fish spoilage bacteria under simulated

commercial conditions. Technological information required to maintain the quality of roe from salmon, herring and pollock was provided.

An ongoing education program continues to inform fishermen on the use of refrigeration systems and tests have been made to improve handling methods on freezer vessels. Chilled seawater systems have been successfully applied to groundfish trawlers. Investigation of the area's marine plant resource potential continued.

Fish habitat management staff faced a mounting workload during the year, attributable in part to the fact that there are few fishing areas in Canada that are immune from habitat conflicts.

Key issues in which staff were involved included estuary habitat problems in British Columbia, particularly the damage that can be caused to aquatic life by log storage; the likely impact on salmon caused to aquatic life by log storage; the likely impact on salmon fisheries of the proposed expansion of the Kemano hydroelectric development in B.C.; erosion problems caused by logging at the sides of fish-bearing streams; the impact of new chemicals, such as the highly-toxic dioxins, on the health and fecundity of fish; effects on fish of proposed new pesticides; the hazards posed by west coast tankers transporting oil from Alaska to the U.S. midwest; and the implications for the fishery resources of the area of transporting hydrocarbons through the Northwest Passage and other Arctic regions.

With acid rain emerging as a serious threat to the freshwater and anadromous fisheries resource of a large area of Eastern Canada, plans for an intensified research program were developed. A departmental Acid Rain Policy Committee was created to coordinate DFO input to negotiations with the U.S. for a boundary air treaty, as well as contributing to the development of a Canadian control strategy.

Oil spill contingency plans for 10 drilling locations off the east coast were reviewed and a series of meetings held with fishermen to hear their concerns over the possible impact of offshore drilling.

As a follow-up to the pollution of coastal waters caused by the break-up of the tanker Kurdistan off Cape Breton, work began on preparation of a departmental marine emergency plan.

Headquarters staff worked closely with Western region in the review and control of activities associated with drilling in the Beaufort Sea. In this area, the dredging

of two harbours and the possible effect on fisheries became a matter of concern. There was continued involvement with the International Joint Commission on the Garrison Diversion and the Poplar River issues.

Fisheries Research

In the field of resource research, activities covered a broad spectrum of scientific investigations on marine and freshwater fishery resources, including the provision of biological advice required for their management. The main objectives are to develop and maintain a knowledge of the fisheries resources, including species interactions, and to assess the effects of environmental influences and fishing on the resource base; to develop and maintain a knowledge of the effects of contaminants and habitat alterations on aquatic resources and to study and investigate the enhancement of those resources, including the application of aquaculture.

Biological advice was provided directly to departmental resource managers, while on the East coast the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) continued to play a major role. Staff were also actively involved in the scientific deliberations of international fisheries commissions on both coasts and in the support of bilateral and multilateral negotiations.

At headquarters, staff of Resource Services Directorate took part in a number of departmental task forces and provided commissioners to the International Whaling Commission, the Inter-American Tropical Tuna Commission and the International Commission for the Conservation of Atlantic Tunas. Other activities included sponsorship of a workshop on "Multispecies Approaches to Fisheries Management" and publication of the first review of the Atlantic Resource Prospects to 1985.

In the Newfoundland region, where a primary research objective is provision of advice for fisheries management, improvements were realized in the accuracy of assessment models and the biological data base was extended to cover areas and stocks not previously studied intensively. Regional staff were responsible for a significant input to a report on management practices for Atlantic salmon and to the draft, "Blueprint for the Future of Atlantic Salmon". A joint cruise with the

U.S.S.R. in April found very young squid (Illex) in the oceanic area south and east of the Grand Banks for the first time. Studies were undertaken on whale entanglement in inshore fishing gear, including the development and evaluation of acoustic, visual and other alarms to reduce the number of whale/gear collisions. Other ongoing activities included the economic evaluation of scallop aquaculture, as well as studies on salmon enhancement, fish disease and electronic equipment for resource assessment.

In the Maritimes, highlights of the year's activities included the initiation of a series of seasonal groundfish surveys, and the further refinement of a system of editing and computerizing catch statistics. Several tagging programs were expanded, including the first tagging of herring in Sydney Bight in the winter. Squid research was intensified, with the joint cruise with the U.S.S.R. finding very young larvae south of the Scotian Shelf, while a description of Illex eggs, egg development, larvae and mating behaviour has been provided for the first time. Studies were undertaken to improve oyster spat survival, while the results of investigation of lobster larval distribution suggested some relationship between lobsters offshore on Brown's Bank and those inshore. The ecological impact and productivity of Irish moss dragrakes was studied. Work on the feeding of young salmon resulted in the production of a feeding chart and enabled significant saving of food through control of hatchery water temperature. Cage culture of salmon successfully produced fish of market size (3.4 kilograms). Techniques for producing lobster larvae year-round and of increasing their survival were developed.

In Québec, research was increased on herring, while Arctic research programs included work on marine mammals and biological oceanography and the generation of environmental data associated with non-renewable resource development. The marine mammal program provided information for management on the distribution, abundance, production and yield of seals and whales, and on their relation to the Arctic marine ecosystem, particularly with respect to feeding and predation and their ability to tolerate environmental disturbance resulting from man's activities. The biological oceanography program was designed to promote an understanding of the principal interactions within the Arctic marine ecosystem, in order to predict the effects

of disturbances associated with exploration and development of non-renewable resources, and to develop information to manage the harvest of fish and marine mammals.

The Western region's Arctic research program complemented that of Québec in that it conducted studies on freshwater and anadromous fish in support of both fisheries management and environmental impact activities. The fish habitat research group successfully operated a research facility at Saqvaqtuac near Chesterfield Inlet, Hudson Bay, N.W.T. which provided information on an Arctic lake ecosystem and its response to eutrophication.

Also, in the Western region, new initiatives were undertaken into intensive fish culture, as well as the use of rearing ponds and novel hatchery methods for the culture and enhancement of commercially-exploited species. Studies toward understanding the ecological importance of contamination of natural and freshwater systems by acid precipitation, heavy metals and radio-nuclides were emphasized at the Experimental Lakes Area near Kenora. A portable sonar was designed to monitor activity of fish in response to a point discharge of effluent.

Resource services staff in the Pacific region continued their high level of activity in support of fisheries management, and accomplished a major breakthrough in the technique for ageing certain groundfish. Studies also produced a significant increase in the knowledge of the effects of the time and size of release of young salmonids on sea survival and cost-effectiveness of fish production facilities. In other areas of investigation a potentially useful biological marker for some sockeye salmon stocks was discovered in the form of a stock specific brain parasite.

Fish nutrition research and endocrinology experts made significant progress in improving diets for hatchery-reared stocks and in increasing the efficiency of hatchery egg production, respectively.

Fisheries Economic
Development &
Marketing

The Economic Development Directorate is the departmental focus for economic policy development, financial assistance and marketing programs.

In the area of economic policy development, activity highlights included the initiation of a major review of Canadian fisheries policy involving consultations with fishermen and processor interest groups, national organizations and the academic community. A major structural analysis of the fishing industry was completed and complemented with more intensive, directed studies on specific fisheries. Surveys conducted included cost and earnings studies of selected fishing fleets and the planning for an economic survey of Canada's recreational fisheries. Staff provided ongoing support for federal-provincial initiatives, and publication of numerous statistical summaries and reports to meet the fisheries information needs of management, the fishing industry and the general public.

As part of its economic programs, the department administers the Fisheries Improvement Loans Act, designed to facilitate the availability of intermediate and short-term credit to fishermen for the improvement or development of fisheries enterprises. During the year 1,408 loans amounting to \$27.8 million were registered under the program.

Departmental staff continued to provide management and support services to the Fisheries Prices Support Board. No payment under an assistance program was required this year and the Board realized a net operating profit of \$26,306.

The Fishing Vessel Insurance Plan provided insurance to 7,716 commercial fishing vessels for a total insured value of \$182,699,404. Some 354 claims were settled during the fiscal year in respect of which \$3,531,458 was paid.

The Fishing Vessel Subsidy Program, operated under the Fishing Vessel Assistance Regulations of the Fisheries Development Act, was responsible for the granting of \$7,270,000 in subsidies for the construction of 513 fishing vessels under 75 feet in length. Of this total, 349 vessels were for use in the Atlantic fishery and 164 for the inland fishery.

Staff provided input to various fisheries-related assistance programs administered by the Department of Regional Economic Expansion. The number of applications for incentive grants to build fish processing plants

continued at the high level noted since the establishment of the 200-mile zone, necessitating a more restrictive approach as the amount of processing capacity in many areas has now become excessive in relation to the available resources. Liaison work with the Foreign Investment Review Agency continued, but at a reduced level due mainly to a decline in the activity of Japanese firms in the Pacific Coast fishery.

In the area of Marketing Services, initiatives were taken to assess and stimulate demand for food fish products in both domestic and export markets. This included the Canadian Fish and Seafood Month promotional campaign which was designed to increase the per capita consumption and consumer awareness of fish and seafood products, and the Worldwide Fisheries Marketing Study, designed to monitor the supply and demand situation on a global basis and assess potential competition for Canadian products on world markets to the year 1985.

The first phase of the world marketing study was completed and the second phase, involving some 35 countries, was initiated.

The Fisheries Food Centre continued to be the focal point of consumer education and product promotion. Within Canada, the Centre organized exhibitions, seminars, demonstrations, radio and television programs. Recipe brochures were distributed among consumers, retailers and institutions and the Centre participated in product promotions in the United States, Europe and Africa. Work continued on the program of developmental, experimental and testing activities for fishery products, utilizing both traditional and underutilized species in accordance with consumer needs and preferences.

Other market research and outlook activities entailed measurement of the domestic and foreign markets for fishery products, monitoring changes in supply, demand and prices, and preparation of both short and longer term market forecasts. Regular market bulletins and special reports were prepared to assist both the fishing industry in market planning and government and Crown corporations in formulating appropriate policies. Special attention was given to the study of under-utilized species and problems of transportation of fishery products.

Other major activities included studies of domestic consumption patterns, quality grading, channels of distribution, fish export guides, the coordination of metric conversion within the Department, development of a retail food price index for fish products, extensive

government/industry consultative sessions on the results and implications of the Worldwide Fisheries Marketing Study and on the issue of "orderly marketing". Staff also took part in federal/provincial consultative sessions on domestic promotion and other marketing activities and produced statistical analysis of fisheries trends and developments in major geo-political areas such as the EEC and other Western European countries.

International Activities

The International Directorate is concerned with all issues that involve dealings with foreign countries on a multilateral or bilateral basis.

The International Fisheries Relations branch continued to play a key role in the United Nations Law of Sea Conference, protecting Canadian interests and conservation principles through the final settlement of the marine mammals article, and by taking the lead in a renewed initiative to protect stocks in the area beyond 200 miles.

Work with 11 international fisheries commissions continued, as did implementation of bilateral fisheries agreements directed at improving fisheries management and securing advantages for the Canadian fishing industry related to the Canadian 200-mile limit. Significant arrangements were established with a number of countries, particularly Spain and Portugal, to develop new markets for Canadian fish products.

A one year extension to the bilateral agreement with EEC was negotiated, providing improved protection for Canadian interests. Negotiation with the EEC continued towards a long-term agreement aimed at providing improved access for Canadian fish to the European market.

The Branch also played a key role in completing the transition from ICNAF to its replacement, the Northwest Atlantic Fisheries Organization (NAFO), and in launching a scientific observer scheme for the NAFO area outside 200 miles.

Discussions continued with the United States on development of a new Canada/United States Pacific salmon convention. Staff were also active in the campaign to achieve ratification of the Canada-U.S.A. east coast fisheries and adjudication agreements, as well as in the August 1979 confrontation with the U.S.A. over west coast tuna fishing within Canada's 200-mile zone.

The Trade and Development Branch, established in mid-1979 as part of the International Directorate, focused its attention on the increasingly important trade and commercial aspects of Canada's relationships with foreign fishing nations and on the policies, approaches and trading environment needed to develop maximum benefits from these relationships. A specific area of concentration is the trade and marketing aspects of current bilateral negotiations which seek to obtain improved market access through tariff concessions or trade commitments.

Particular attention has been given to the tariff and non-tariff barriers facing Canadian exporters in various countries in an effort to improve the trading environment for the Canadian fishery.

In response to the uncertainties in the market outlook on squid which became apparent in August, the Branch undertook the departmental coordination of the various facets of the squid marketing strategy.

Other activities included the coordination of the international aspects of cooperative fishing arrangements and coordination of departmental activities with respect to Canada's external fisheries aid and assistance to developing countries, working interdepartmentally and in conjunction with international organizations.

Ships

The Fisheries and Oceans fleet consists of 21 major vessels more than 30m in length, 239 vessels between 6m and 30m, and more than 500 small craft under 6m, making it Canada's second largest civilian-manned fleet.

During the year studies were completed on the efficiency and effectiveness of the fleet. Planning was started on the next 10-year phase of the long range vessel acquisition program.

Construction began on four new vessels, two for fisheries research and two for fisheries patrol, all of which are scheduled to join the fleet in the summer of 1981. Preliminary designs are in progress for a replacement for the west coast survey vessel "Wm J. Stewart", a coastal patrol vessel and for a class of nearshore patrol vessels.

Small Craft Harbours

Under the Small Craft Harbours program, the department administers and develops commercial fishing and recreational harbours across Canada. Currently there are 2,363 harbours, with a replacement value of approximately \$1,345 million, for which the department is responsible.

Of the \$29.2 million total program for 1979-80, \$25.2 million was allotted to commercial fishing harbour projects and \$2.4 million to recreational harbour projects. Included in these amounts were \$728,000 in Economic Development funds for continued development of facilities at Blue Beach, Newfoundland and \$2.0 million for 149 Canada Works projects. Assistance to developers to provide for the construction of recreational boating marina projects amounted to \$1.5 million. Larger commercial fishing projects, many of which are phased over several years, included \$1.3 million for Steveston, B.C., almost \$1.0 million for Pointe Sapin, New Brunswick, and \$0.6 million for Wedgeport, Nova Scotia.

Extensive field trials were conducted in the Pacific region involving the selection, training and employment of harbour managers at the larger harbours. Results were most satisfactory as measured by improved harbour services to clients and more effective utilization of available berthing accommodation.

Ocean and Aquatic Sciences

The primary concern of Ocean and Aquatic Sciences (OAS) is research and development of the marine environment around and within Canada and the optimum use of renewable and non-renewable ocean resources.

Headquarters elements of OAS comprise the Policy and Program Coordination Branch; the International Marine Policy Branch; the Marine Sciences and Information Directorate; and policy, coordination, and production elements of the Canadian Hydrographic Service. Oceanographic and hydrographic field programs are supervised from regional offices based at the Bedford Institute of Oceanography, Dartmouth, N.S., the Institute of Ocean Sciences, Sidney, B.C.; the Canada Centre for Inland Waters, Burlington, Ontario; and the Gare Maritime, Quebec City.

A summary of the year's activities follows.

Marine Sciences and
Information Directorate

At headquarters the Ocean and Aquatic Science Affairs Branch coordinates activities affecting the national interest in ocean and aquatic sciences. During the year the branch's involvement included offshore oil and gas exploration projects, various Arctic marine transportation issues, Lancaster Sound environmental assessment studies, amendments to the Canadian Shipping Act, contingency planning, and the development of the Canadian Climate Program.

The Branch provided an OAS focus for the Unsolicited Services, the cooperative programs with industry (COPI), the departmental science subvention program to Canadian universities, funds for research contracts in support of the Ocean Dumping Control Act and departmental participation in the Natural Sciences and Engineering Research Council's post-doctorate fellowship program.

Staff served on several committees and subsidiary bodies of the Intergovernmental Oceanographic Commission, with the head of the Canadian delegation continuing to serve as its first vice-chairman. Other international activities included involvement in the Marine Sciences Panel of the NATO Science Committee, the London Dumping Convention and provision of staff support for a number of science and technology bilateral agreements with other countries.

The Scientific Information and Publications Branch publishes and distributes scientific and technical documents for the department as well as for other institutions engaged in related work, ensuring an orderly flow of information from scientists to a diverse international community of users.

Nearly 13,000 pages were printed in the Canadian Journal of Fisheries and Aquatic Sciences (formerly Journal of the Fisheries Research Board of Canada) and other series. Complementing the Journal were several bulletins and special publications whose topics ranged from the biology of the harbour seal and distribution of lampreys in the northern hemisphere to a synopsis of parasites of fishes in Canada. The Branch also produced publications on behalf of the Canadian Hydrographic Service and coordinated publication of 237 regional scientific and technical reports.

In addition to answering more than 6,000 requests for information, the Branch continued to act as the Canadian input centre for the U.N. Aquatic Sciences and Information System (ASFIS), providing on-line access to the international bibliographic database, Aquatic Sciences and Fisheries Abstracts.

A translations program, in cooperation with the Canada Institute for Scientific and Technical Information and the U.S. National Marine Fisheries Service, provided 175 translations of important articles to DFO scientists. Branch editors also provided advice on communicating scientific evidence to target audiences and assisted in developing cooperative international information systems and technology transfer.

The Marine Environmental Data Services Branch continued to collect and dispense oceanographic data in response to national and international commitments. The most significant change for 1979-80 was the increased data output in respect of offshore hydrocarbon exploration programs in Baffin Bay, Davis Strait and the Labrador Sea. This resulted in the collection of data from ten drilling units (double that of the previous year) for the Wave Climate Study. A new initiative was undertaken with the development of a computerized inventory of OAS data holdings.

Regional Activities (other than CHS)

In the Atlantic region, the Oceanographic and Marine Ecology Laboratories at the Bedford Institute of Oceanography (BIO) undertook various projects concerned with climate prediction, studies into industrial activities and their effect on the marine environment and fish stock management programs, and an examination of other problems related to offshore oil and gas development.

Research continued into the physical and chemical oceanographic properties of the northwest Atlantic Ocean, especially in the area of the Canadian continental shelves. Results from the recently completed Shelf Break Program have led to a new understanding of the influence of the Gulf Stream on continental shelf waters and the role of physical processes in the biological system in the important fishing area south of Halifax.

As part of the Labrador Sea Project, begun in 1976, physical oceanographers continued to evaluate the seasonal and year-to-year variations in the Labrador current that affect the climate and fisheries of the area.

During the summer field season marine ecological studies were carried out from the Canadian Coast Guard icebreaker Louis St. Laurent and the BIO-based Baffin in Lancaster Sound and Ungava Bay respectively. Emphasis of the studies was on photosynthesis and the physiology of cold water phytoplankton populations, knowledge that is essential in assessing the impact of offshore oil developments.

Chemical oceanographic measurements in the eastern Arctic, undertaken during the past year, have led to significant advances in knowledge relating to the distribution of nutrients, trace metals and organic materials in the water. Additional information on the amount of fresh water in Baffin Bay and the source of water masses has also been obtained.

A major responsibility in the Lomonosov Ridge Experiment near the North Pole was the provision of navigational positioning data to all experimenters, using polar satellite-positioning techniques.

An environmental study, begun in 1978, to predict ecological changes that could result from construction of a tidal power barrage in the Bay of Fundy was continued. Another Bay of Fundy study is aimed at predicting marine environmental changes resulting from the operation of the Point Lepreau nuclear power station.

The dramatic breakup of the oil tanker Kurdistan in March, 1979, resulted in various instances of staff involvement, including the estimation of the speed and direction of oil movement; measurements of the distribution of oil floating on the sea surface and dissolved/dispersed within the water; the development of surface drifter techniques; the investigation of oil in near-shore sediments; observing the behaviour of oil in ice; and the identification of the source of oil in the marine environment.

The region continued to assume major responsibility for physical oceanographic investigations by the Flemish Cap International Experiment into the factors that determine year-class success for Flemish Cap groundfish. Two cruises were made to the area to take temperature and salinity measurements, to recover and replace current meters and to deploy drifting buoys. Staff were also actively involved in the Gulf of Maine - Georges Bank Research Project on herring.

In March, 1980, the region hosted a National Fisheries and Oceans Climate Workshop, attended by representatives from industry, universities, the provinces and the federal government. Topics included research requirements as they concern climate variation in the ocean, and the way in which climate and the ocean/atmosphere system affect fisheries and marine ecology.

An important acquisition for BIO technical facilities was a CDC Cyber 171 computer which replaces an obsolescent machine purchased in 1966. Construction of new buildings at the Institute, scheduled for completion in 1980/81, continued on schedule.

In the Quebec region the biological oceanography group continued their systematic study of the spacial and temporal variability of the primary and secondary productivity of the St. Lawrence Estuary, taking monthly samples of water and plankton. A Department of Transport icebreaker was used for winter work. The chemical oceanography group concentrated on studies of the distribution of mercury and other trace metals in the waters and ecosystems of the Saguenay fjord.

Central region expanded its biolimnological studies in the Great Lakes which were initiated after the 1978 signing of the revised Canada/U.S. Water Quality Agreement calling for increased efforts in contaminants surveillance. In addition, considerable effort was devoted to studies of the many problems related to lake acidification and contaminants derived from the atmosphere.

A survey in the Sverdrup Basin, conducted from the Panarctic oil drilling site "Whitefish" collected and evaluated data in respect of tidal and non-tidal motion in the archipelago.

A major winter field operation began in early 1980 in the James Bay/La Grande area to investigate changes to marine and estuarine environments brought about by hydro-electric developments.

The fourth yearly erosion survey of the Great Lakes shoreline under a five-year federal-provincial monitoring program involved the re-measuring of 162 sites, totalling approximately 2,000 km of erodible shores.

OAS vessels in the region made a significant contribution to the Search and Rescue program throughout the year, with Bayfield earning a special commendation from the U.S. Coast Guard for assisting in fighting a fire aboard a large lakes' tanker.

In the Pacific region, developments over the year included the signing of a federal-provincial agreement to set up a Marine Technology Centre adjacent to the Institute of Ocean Sciences, devoted to the enhancement of high technology marine industry on the Pacific coast.

In the area of Arctic physical oceanography, the Frozen Sea Research Group made several field trips to Bridport Inlet on Melville Island, the proposed liquid natural gas northern terminal for the Arctic Pilot Project. Other work included testing measuring techniques used to determine the heat flow from polynyas (areas of open water within ice fields), acquiring data to develop a computer model for sea ice motion in the Beaufort Sea, and studies into the physics of underwater well blowouts. In the area of instrument development, a "salinity sucker" (device for looking for ice crystals in water) has been constructed to assist in studying the phenomenon of super-cooling of waters beneath growing sea ice.

Definitions and equations developed by staff designed to provide a consistent universal method of calculating salinity were accepted by the International Association of Physical Sciences of the Ocean at the International Union of Geodesy and Geophysics meeting in Australia in December, 1979.

Work in chemical oceanography included establishment of a Marine Carbon Research Centre to consolidate efforts to assess the climatic effects of carbon dioxide and the ocean's role in the global carbon cycle. This included participation in an international cruise to study air-sea carbon dioxide exchange in the equatorial Pacific and conducting an experiment at Patricia Bay, B.C., to understand the marine carbon cycle.

A new experimental system, Chemcell, capable of enclosing 375 cubic metres of sea water, was designed and constructed for joint work with scientists from France, Germany, Japan and the U.S.A. Marine hydrocarbon work was concentrated on an environmental baseline study at Kitimat harbour, while extensive research was conducted into various contaminants found in dredged spoils, mine disposal areas and marine sediments.

In the area of Coastal Zone Oceanography a major field operation was mounted to study ocean circulation on the continental shelf and slope west of Vancouver Island. The data collected is to be coordinated with studies into deep water circulation in the Alberni Inlet. The year also saw the Institute of Ocean Sciences hosting a

workshop on Fjord Oceanography, funded by the NATO Advanced Studies Institute and attended by 102 physicists, chemists and biologists from ten countries.

November 1979, marked the official end of the observational year of the First GARP Global Experiment (FGGE). As part of this program, 368 buoys were deployed from seven countries, including Canada, in the southern hemisphere, and in the Arctic and equatorial waters, to measure barometric pressure and surface temperatures. An IOS staff member served as chairman of the committee which organized the buoy program and also managed the Buoy Control Centre in Toulouse, France.

Various sea-surface temperature studies were continued to gain a better understanding of the influence of the ocean temperature upon weather and climate patterns. This year also saw continued participation in the Anomaly Dynamics Study of NORPAX, aimed at resolving the mechanisms responsible for the evolution of the thermal structure of the upper 300 metres of the open ocean.

The Ocean Ecology Laboratory completed a full year of research cruises in the Pelagic Ecosystem Prediction Project off the west coast of Vancouver Island and in connection with the Coastal Oceanic Dynamics Experiment. Work is also being contracted for benthic studies into the toxicity levels for sludge worms.

Canadian Hydrographic Service (CHS)

A successful year in hydrographic surveying and chart production was achieved, despite the impact of fiscal restraint. The majority of charts produced were new editions and reprints to update existing charts as a result of new surveys and the introduction of Loran-C. The hydrographic research activity, largely supported by funds from the Interdepartmental Committee on Energy, Transportation Section, concentrated on developing instrumentation to enhance the ability to obtain hydrography in Arctic waters.

The most pressing survey priorities continued to be centred in the Arctic, where systematic surveys of tanker routes are critical to the development of frontier oil and gas reserves. However severe ice conditions in 1979 again disrupted the survey program in the Eastern Arctic, as was the case in 1978.

The decentralization of chart construction continued in 1979 and it is confidently expected that the benefits of having cartographers and hydrographers working side by side will be readily apparent in a few years. Steps were also taken toward the end of the year to improve production facilities in the Québec Region.

In the Atlantic Region, the Field Surveys Division undertook operations from the Bay of Fundy to the Eastern Arctic involving the CSS Baffin (along the Labrador Coast), the CSS Maxwell (Bay of Fundy and Labrador Coast), the MV Meta (St. Mary's Bay and Short Reach, Newfoundland), and three Canadian Coast Guard icebreakers (Eastern Arctic).

Three Tidal Acquisition Telemetry Systems (TATS) were acquired and installed at the permanent water level gauging stations in North Sydney and Halifax, N.S., and Saint John, N.B. Work will continue on the installation of TATS gauges at major ports in Atlantic Canada as funds become available.

In Central region, the St. Lawrence River survey was resumed after a delay of several years, with work beginning at Gananoque and continuing eastward to Rockport. Aerial hydrography project flights were made over a section of the surveyed area. A cyclical survey was made of the Trent-Severn Waterway charts. Despite ravaging spring floods, the survey of the eastern half of Lake Nipissing was completed.

The problem of supplying suitable electric power for portable positioning systems during Arctic surveys was solved in 1979 with the development of a solar power system. A small easily-mounted solar panel, measuring 60 centimetres square, supplies 24 volts directly to the transponders of Mini Ranger positioning systems. Work continued on the development of a larger system which would be capable of working under low sunlight conditions.

"The Hydrographic Story" was well represented at a three-day open house at the Canada Centre for Inland Waters, Burlington, Ontario, by means of a series of film shows, posters, displays and demonstrations. More than 20,000 visitors attended the event.

In the Pacific region, fiscal restraint limited the extent of hydrographic surveys in 1979-80. The only major ship survey was conducted in the Laredo channel and sound to complete the modern surveys for the main ore-carrier shipping route to Kitimat. In addition a

shore-based party completed a first-time survey of Harrison Lake and River, both highly-used recreational areas.

One of Pacific Region's smaller vessels, CSS Richardson, ranged over the entire British Columbia coast during the year, completing surveys of port San Juan, Mayne Passage, the Ucluth Peninsula area and surveys of Masset Inlet and the new Skidegate Channel ranges in the Queen Charlotte Islands.

A major effort was mounted in conjunction with oceanographers to study the waters on and adjacent to the Continental shelf on the West coast of Vancouver Island, involving deployment of 35 current meters and 11 tide gauges. Four Tidal Acquisition and Telemetry System units were installed at Vancouver, Pt. Atkinson, Victoria and Bamfield.

In the Quebec Region two survey programs were undertaken, one of Lac St. Jean and one of the small harbours along the coast of the Gaspé Peninsula. At CHS Headquarters another step in the progress towards automated chart production was reached with the publication of Chart 3457 (Nanaimo Harbour and Departure Bay, B.C.). This new contour style matrix chart is the first to be taken through all the stages of automated drafting.

Another major accomplishment was the production of the General Bathymetric chart of the Oceans (GEBCO) sheet of the Arctic, which incorporated, for the first time, the results of many years of field work by the CHS and the Polar Continental Shelf Project.

Work began in 1979 on the production of a gazetteer of Undersea Feature Names. This will list all geographic features which are submerged at low water, together with the geographic coordinates and the chart, paper or report on which the feature appears or is referenced.

The Chart Distribution Centre, opened five years ago in Ottawa, reported an increase in revenue of 20 per cent in 1979. Throughout Canada, a total of 508,661 charts, 83,062 volumes of tide tables and 11,099 copies of sailing directions and small craft guides were distributed during the year.

Of the 1,170 weekly Notices to Mariners issued during 1979, 400 were initiated by the Canadian Hydrographic Service. Requirements for chart corrections continue to be numerous: a total of 1,850,000 corrections were applied to 275,000 charts and 1,300 small craft chart correction lists were distributed to users.

Publications issued during the year included: Sailing Directions, Nova Scotia (S.E. Coast) and Bay of Fundy, 8th Edition; Sailing Directions, British Columbia, Volume 1, 11th Edition; Sailing Directions, Labrador and Hudson Bay, 4th Edition; Small Craft Guide, British Columbia, Volume 1, 4th Edition; and Instructions Nautiques, Nouvelle-Écosse (Côte S.E.) et baie de Fundy, 8ième édition.

The undoubted highlight of the year was the first International Hydrographic Technical conference held May 14-18 under the sponsorship of the Canadian Institute of Surveying (CIS), the Canadian Hydrographers' Association (CHA), the Fédération Internationale des Géomètres (FIG), and the CHS. Over 400 delegates from 35 countries, including 8 heads of hydrographic offices, met in the Government Conference Centre in Ottawa. Twenty-five papers were presented on the theme "The Development of Ocean Resources".

Concurrent with the conference the Joint International Hydrographic Organization (IHO)/Intergovernmental Oceanographic Commission (IOC) GEBCO Guiding Committee met and reviewed the substantial progress being made on the Fifth Edition of General Bathymetric Chart of the Oceans (GEBCO). The IHO/FIG International Advisory Board of the Training of Hydrographers also met. Currently under consideration is the extent to which the "Standards of Competence for Hydrographic Surveyors" issued by the Board should be adopted by CHS and whether any changes in the Canadian training program are warranted.

The Canada Lands Surveys Examination Regulations, which came into force in 1979 following amendments to the Canada Lands Surveys Act, extend the definition of "Canada Lands" to all of Canada's continental margins. The regulations recognize "Hydrographic Surveying" as co-equal with cadastral, geodetic, and photogrammetric surveying for granting a commission as a Canada Lands Surveyor. The board of examiners, increased from three to five, now includes the Dominion Hydrographer to represent hydrographic interests. The amended Act is important to hydrographers as it provides them with the mandate for delimiting Canada Lands under water and the authority to trespass on private lands in the conduct of their work.

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