FISHERIES of Canada

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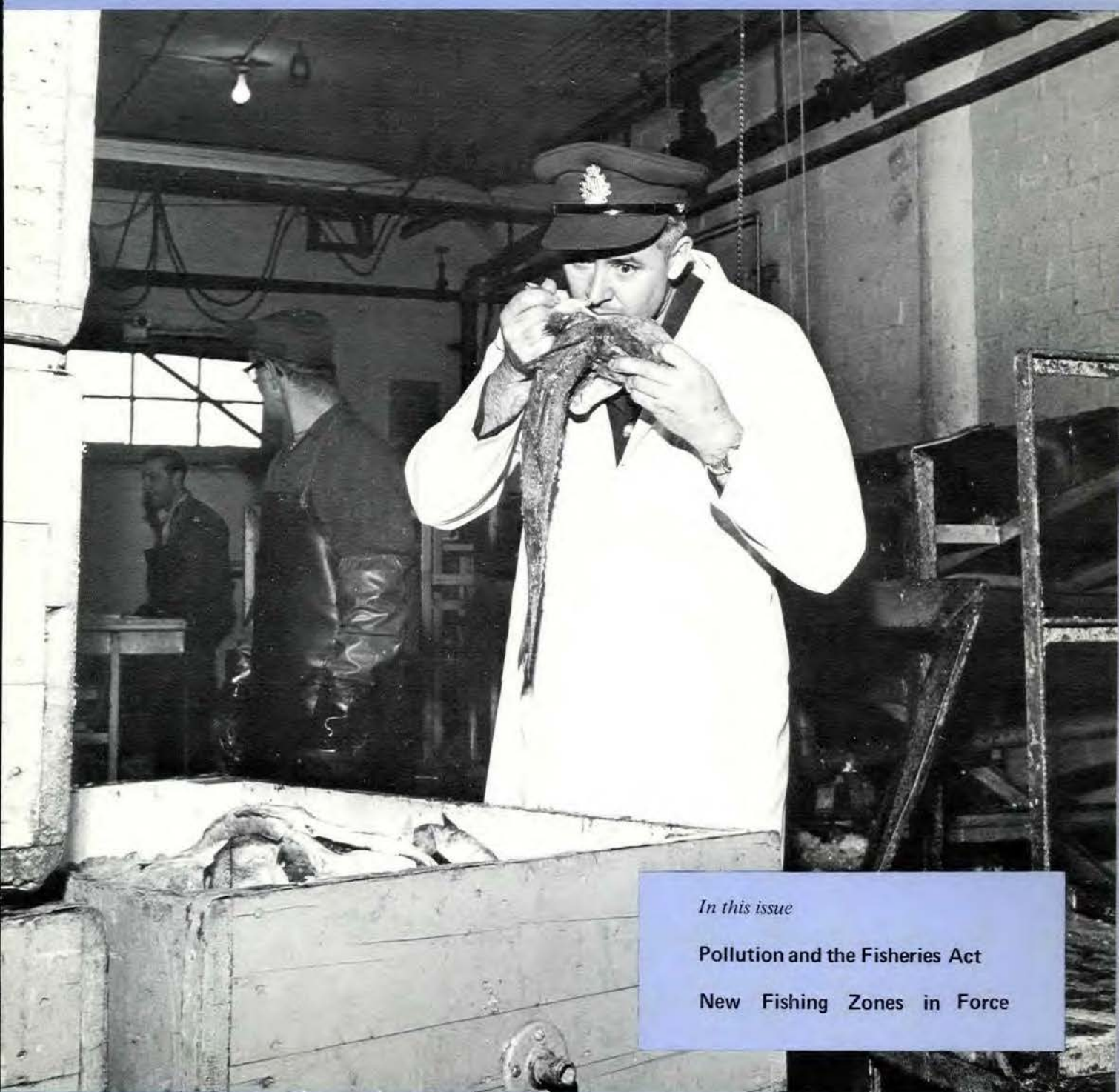

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Department of Fisheries and Forestry, Ottawa

JULY 1969

FISHERIES of Canada

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COVER PHOTO—Fish inspector Wilfred Watts, Halifax, applies the "nose test" during a routine inspection of fish at an East Coast processing plant. See page 12.

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Editor:
E.H. Hearnden

Minister Pinpoints Problems

Pollution and the Fisheries Act

STRICT LAWS protecting Canada's fisheries can be our first line of defence against pollution and our first line of defence of human health and welfare, federal Fisheries and Forestry Minister Jack Davis told members of Hamilton, Ont. Rotary Club in a speech entitled "Pollution and the Fisheries Act."

Healthy fish mean healthy human beings and also an attractive environment, Mr. Davis said. Ottawa would do well to protect the nation's fisheries for, by so doing, it will make Canada a finer, happier and healthier country in which to live.

Pointing out that Canada possessed one quarter of the world's freshwater supply to serve one-half of one percent of the world population, the Minister said the problem was not quantity of water but quality. This was especially so in highly-industralized areas such as Southern Ontario, Montreal and Vancouver.

The Great Lakes Basin, inhabited by more than 35,000,000 people, was where pollution presented its greatest challenge, particularly around Lake Ontario and Lake Erie. It was here that the main battle must be joined to to save our natural environment from destruction and decay.

Mr. Davis continued: Two kinds of pollution threaten our environment. The first of these is poisons. They are primarily chemical in nature and come from pulp mills and oil refineries, steel mills and mines, and from farm lands, sprayed with pesticides. All these poisons are being swept away to the sea. En route they kill and out in the ocean, they kill. They kill because they tend to concentrate in the bodies of fish and bird life all over the world.

DDT, for instance, has been detected in snowy owls in the Arctic and penguins in the Antarctic. It has been found in coho salmon in the Great Lakes and in tuna caught in the Indian Ocean. These poisons, in other words, are ubiquitous. They can reach out and touch all living things. And these living things, in turn, can concentrate the poisons again – concentrate them even as they spread to the far corners of the earth.

This concentrating process is both interesting and dangerous. It is characteristic of marine life. Adult trout, for example, can concentrate most poisons one hundred times over. Cod can concentrate poisons five hundred fold. Algae, like the vegetable matter in Lake Erie, can concentrate poisons a thousand fold. And minute marine organisms like plankton can concentrate them four thousand times at least.

It follows, of course, that marine life is ideal for testing purposes. It is ideal because it concentrates poisons so they can be detected in the first place. These poisons can be concentrated by shellfish or other minute marine organisms and our fisheries scientists can spot them more easily in this way.

These forms of marine life, I need hardly remind you, are basic in the natural scheme of things. They are the first link in the chain of life. Protect this first link in the chain of life and the rest of the animal kingdom can look after itself. Protect our fish from these chemical poisons and we, ourselves, will be buying the right kind of insurance. We will be protecting Canadians in their homes and factories as well.

OVER-ENRICHMENT

The second form which pollution takes is harder to define and more difficult to describe. It is the kind which is already evident in great profusion in Lake Erie. It is a condition resulting from the over-enrichment of water.

Chemicals with fertilizing qualities cause plant life to flourish. They include the phosphates and the nitrates. Along with sunlight they cause algae to "bloom" in the Great Lakes in the summertime. And ultimately they create a mess which not only looks bad but smells bad as well!

These waste chemicals are only

doing what fertilizers are supposed to do – that is to speed up the process of growth. The growth which they promote in our lakes is algae which is beginning to plug our water intakes, spoil our beaches and suffocate our fish. The Great Lakes are tending to become dead lakes in this way.

Most forms of vegetable matter, when they rot, use up oxygen. The higher and sportier species of fish need lots of oxygen so they are the first to be killed off by over-enrichment. They are the first to go when algae begins to accumulate.

Our fisheries scientists call this process "eutrophication" and eutrophication is encouraged by detergents with their high phosphorous content. It is encouraged by the dumping of starch into our rivers by food processing firms. It is speeded up by wood wastes from our pulp mills. All of these organic substances rot. They rot, they stink and they stifle our lower forms of animal life. They kill off our trout and our salmon by the millions.

Our fisheries research people are hard at work. They are checking the oxygen content of our rivers and lakes and they tell us that a minimum of four parts per million is needed to keep our coarser fish alive. By coarser fish I mean carp, perch, catfish, etc. But our more sensitive fish, like trout and like salmon need three or four times as much oxygen. They need sixteen parts per million of water to survive. So they are the first to die out when a lake begins to suffer from eutrophication. They are the first to disappear from our rivers and streams.

The extent and the depth of eutrophication in the lower lakes is

N.W. Territories Fishery Advisory Committee

The newly-formed Northwest Territories Fishery Advisory Committee held its meeting in Yellowknife, N.W.T., on May 13, The Committee was formed to bring together all interests of fishing in the Territories, and to advise the Department of Fisheries and Forestry and the Territorial Government on the best utilization and conservation of fisheries in the north. Left to right are: G. Gudmundsen, representing the commercial fishermen; Dr. Lionel Johnson, Fisheries Research Board, representing the Population Dynamics section of the Freshwater Institute; M.B. Howe (non-member) Acting District Officer, Hay River, N.W.T.: Sgt. Robert Ward, representing the R.C.M.P.; J.H. Hitchcock, representing the Territorial Government; R.N. Gordon (Chairman), representing the Dept. of Fisheries and Forestry; Chief Victor Beyonne, representing the native fishermen; Isadore Yukon (non-member), interpreter; C. MacEwan (non-member), Assistant Director, Central Region. Absent: Douglas Finlayson, representing the Tourist and Lodge operators and M. Budgell, representing the Department of Indian Affairs and Northern Development.

also being studied. Dr. A.L. Hamilton of our Fisheries Research Board staff, for instance, has pinpointed the areas of greatest deterioration. By studying the habits of bottom living insect larvae (or midges) he has confirmed that Lake Erie is in worse shape than Lake Ontario. He has also found that Lake Erie gets worse as we go west, the worst conditions being found in its shallow western basin.

Fortunately eutrophication is a reversible process. Lake Erie and Lake Ontario can be brought back to their original condition. But complete recovery is unlikely. Our lower lakes, in other words, may never be brought back to the same condition as Lake Superior because they have always been more productive in so far as the generation of vegetable matter is concerned. The best that can be hoped for is a condition similar to that of Lake Erie as it was at the turn of the century.

Temperature, as it turns out, is also an important factor. Generally speaking it rises as we move west in Lake Ontario. The depth of the warm water increases as we leave Kingston and approach Hamilton. Tiny crustaceans called zooplankton become increasingly abundant and there are likely to be more of them if more thermal power plants are built in this general area.

The Federal Government in Ottawa has not been unmindful of your plight. This is why the Department of Energy, Mines and Resources and the Fisheries Department have recently set up a large joint research centre at Burlington. It is called the Canada Centre for Inland Waters. Eutrophication research comes under the direction of Dr. J.R. Vallentyne of our Freshwater Institute at Winnipeg. Working with him, as head of the Fisheries section at Burlington, is an internationally recognized authority on lake eutrophication, Dr. Richard Vollenweider. Before coming to Canada last fall, Dr. Vollenweider completed a two-year study of world eutrophication problems while acting as scientific consultant to the Organization for Economic Cooperation and Development (OECD) in Paris, France.

THE FISHERIES ACT

We in Canada are fortunate in that we have a clear cut avenue for federal participation in the battle against pollution. We are fortunate in that we have an effective tool in the Fisheries Act. The Fisheries Act, as it happens, is nearly as old as Confederation itself. It predates most provinces and it certainly predates provincial legislation with respect to water quality and pollution control.

Most provincial legislation has been framed with our federal Fisheries Act in mind. Our Provincial Acts, in other words, surround the federal Fisheries Act, embroidering it so to speak. But provincial laws and provincial regulations must take second place to the Fisheries Act in any case, for fisheries are federal under our Constitution.

We are fortunate as compared to the United States where fishery matters are matters for the individual States. It is much more difficult for Washington to coordinate fisheries activities in the United States as its authority is limited to international treaties and the like.

In this country Ottawa has full authority over our "sea coast and inland fisheries". Under the British North America Act it makes our fishery laws and it approves our fishery regulations. True, Ottawa has delegated some of this authority to the provinces at times. It has delegated its powers over the freshwater fishery to Ontario, the Western Provinces and Quebec. But the relevant departments in these provinces, if they want to make a change in any of our regulations, must first submit them to the federal Government for approval. Any change in the Fisheries Act itself, of course, is a matter for Ottawa alone to decide.

LOOKING TO THE FUTURE

The shift in emphasis must be towards the future. We must deal with pollution before pollution occurs. We must get into the act before new plants are built; when they are in the design stage so to speak. We must insist on the best manufacturing techniques and the best devices for eliminating poisons and making sure that eutrophication is a thing of the past.

Our federal Fisheries Act, in other words, must be updated. It must include a few clauses which are essentially anticipatory in nature. It must not only say what kinds of chemicals can, and which cannot be discharged into Canadian waters, but see to it that our municipalities and our industries are aware of these guidelines ahead of time. It must provide certain penalties for non-compliance, of course.

Mr. Davis concluded: With a new and amended Fisheries Act we will no longer have to find dead fish in order to prove our case. We will no longer have to wait until the damage is done to our environment.

We already have a Fisheries Department and we already have a Fisheries staff in the provinces. So we can use our existing establishment to do a job on pollution, to do it quickly, and to do it well.

Fisheries Committee Reports On Seal Hunt Inquiry

The House of Commons Standing Committee on Fisheries and Forestry has announced its conclusions and recommendations resulting from a series of public hearings concerning the annual seal hunt in the Gulf of St. Lawrence which comes under the supervision of the Department of Fisheries and Forestry.

The Committee's conclusions were as follows:

1. That grossly misleading information about the hunt was purveyed to the general public at home and abroad and that some misleading information continues to be purveyed—specifically the unjustified claim that seal herds are facing extinction by present harvesting methods.

2. The Committee considers that shocking irresponsibility was shown by producers of an Artek film of 1964 which included scenes of brutality, the legitimacy of which could not be determined from questioning of witnesses. The Committee also finds that Canadian Broadcasting Corporation showed a degree of irresponsibility in accepting the Artek film for broadcast without adequately checking its fairness and accuracy.

3. The Committee recognizes a legitimate concern about possible cruel practices in seal hunting. Although in the Committee's opinion, much of that protest was based upon misleading films and other misleading information, it believes that there have been instances of inhumane killing in the past and recognizes that continuous federal supervision of the hunt is required.

4. The Committee considers the credibility of some witnesses who appeared before it to be in grave doubt.

5. The Committee accepts the view of Mr. Tom Hughes of the Ontario Society for the Prevention of Cruelty to Animals, and others, that use of the club in killing the seal pups is the most humane method presently available to the industry.

6. The Committee finds that the campaign to destroy the pup seal hunting industry in the Gulf of St. Lawrence has caused financial hardship to residents of the region and has severely damaged this nation's reputation abroad.

RECOMMENDATIONS

Recommendations of the Committee were:

1. That seal hunting continue in the Gulf of St. Lawrence, under continuing safeguards as to (a) prevention of cruelty; and (b) preservation of the herds.

2. That the Fisheries Department undertake a program to institute a continuous flow of accurate information concerning this hunt and that this information be provided the public both at home and abroad.

3. That the Justice Department be advised of unresolved conflicts in the testimony of some witnesses, that the department undertake a thorough investigation of this matter with a view to instituting proceedings in the criminal courts if found advisable.

Committee hearings into the seal hunt took place on March 27, April 15, May 8, May 20 and May 22, 1969. Evidence was given by the Hon. Jack Davis, Minister of Fisheries and Forestry, and by the following witnesses:

From the Department of Fisheries and Forestry: Mr. C.R. Levelton, Director, Conservation and Protection Branch; Mr. M.F. Ronayne, Assistant Director, Information and Consumer Branch; Mr. S. Dudka, Field Supervisor; and Mr. P. Beauchesne, District Inspection Officer. Also Dr. D.E. Sergeant, biologist, Fisheries Research Board of Canada; Mr. A.A. Arsenault, information officer, Secretary of State Department; Mr. Henri Stadt, film producer, Montreal, P.Q.; Mr. Brian D. Davis, Executive Secretary, New Brunswick Society for the Prevention of Cruelty to Animals, Fredericton, N.B.; Mr. Tom Hughes, Manager, Ontario Humane Society (S.P.C.A.), Toronto, Ontario; Mr. André Fleury, president, Production 816, Montreal, P.Q.; Mr. Serge Deyglun, journalist, Montreal, P.Q.; Mr. Uwe Koneman, cameraman, Montreal, P.Q.; Mr. Ralph Kaye, photographer, Fredericton, N.B.; and Mr. Barry MacDonald, Director of Secretariat, Canadian Broadcasting Corporation, Ottawa.

New Fishing Zones In Force June 11

New fishing zones for the west coast and an extension of zones on the east coast of Canada, measured from straight baselines, became effective June 11. Geographical co-ordinates from which these baselines are drawn were published in the Canada Gazette on that date.

The 1964 Territorial Sea and Fishing Zones Act set the legislation for extending Canada's fishing zone and territorial sea. Up until now it had only been used to draw headland to headland baselines down the coast of Labrador and around the east coast of Newfoundland.

The announcement completes the naming of baseline co-ordinates on both coasts and will cover all sections where Canada's territorial waters and fishing zones can be measured from the same baseline.

Maps issued in connection with the announcement show baselines following the west coast of Vancouver Island and Queen Charlotte Islands, leaving a 96-mile gap across the entrance to Queen Charlotte Sound.

The baselines around Nova Scotia and Newfoundland leave the entrances to the Bay of Fundy and Gulf of St. Lawrence open.

"Legislation to amend the Act to bridge these important gaps will have top priority and is scheduled for the fall session of Parliament" said federal Minister of Fisheries and Forestry Jack Davis.

"This will enable us to draw fisheries 'closing lines' across these gaps to create exclusive Canadian fishing zones" Mr. Davis said.

Speaking in the House of Commons, the Hon. Mitchell Sharp, Secretary of State for External Affairs, said the first series of base lines was established by the government in November 1967 for the coast of Labrador and the southern and eastern coasts of Newfoundland. Pending the conclusion of negotiations with certain European countries, the fishermen of these countries have been allowed to continue, in Canada's outer nine mile zone, the fishing activities they had been carrying out in those areas where they had traditionally fished prior to the passage of the Territorial Sea and Fishing Zones Act and the establishment of base lines thereunder.

The countries involved in these negotiations were Great Britain, Norway, Denmark, France, Portugal, Spain and Italy. All of these have traditional fishing practices on Canada's east coast. It was now proposed to proceed further with the negotiations with the European countries concerned.

Mr. Sharp added that with respect to the United States, which has conducted traditional fishing activities off both Canada's east and west coasts, the Government intended to proceed with negotiations for the continuance of the present arrangement whereby Canadian and United States nationals are permitted to fish in the fishing zones of the other country on a reciprocal basis. Apart from traditional fishing practices, the United States and France also have certain treaty rights off Canada's east coast, and these rights will, of course, be respected, Mr. Sharp said.

Salt Fish Advisory Committee Formed

The formation of a Salt Fish Advisory Committee has been announced by Fisheries and Forestry Minister Jack Davis. The Committee, consisting of eight members of the Atlantic Coast industry, will advise the Minister on current problems and the effects of Government programs of assistance. A deficiency payment program for the current year was announced by Mr. Davis on April 25, and the Minister has said that reorganization of this industry will commence next year.

The members of the Committee are: Pat Antle, General Secretary, Newfoundland Federation of Fishermen, St. John's; John C. Malloy, St. Shotts; Lorenzo Dredge, Black Duck Cove; Fred Earle, Carbonear; Aaron Bailey, Port Union; Sherman Zwicker, Lunenburg, N.S., and Guy Bernier, Montreal. Richard Crewe, Newfoundland Director of Marketing, has also been named to the Committee.

Mr. Davis had his first meeting with the newly-formed committee in St. John's Nfld., on June 12.

Recommend Salmon Fishing Ban in NW Atlantic

Meeting in Warsaw recently, the International Commission for the Northwest Atlantic Fisheries adopted a resolution proposed by Canada recommending to member governments that fishing for salmon in waters outside national fishery limits should be prohibited in the Convention area, which extends from Greenland to Cape May, New Jersey.

The 14-country Commission also recommended conservation measures to control the fishing of haddock and hake, and decided it is necessary to impose further restrictions on the hunting of harp seals off Labrador and Newfoundland. The seal-hunting proposals will be discussed further at a meeting of interested nations later this year.

All recommendations of the Commission must be ratified by member governments before they can be put into effect.

Dr. A.W.H. Needler, Deputy Minister of Fisheries and Forestry of Canada, was elected chairman of the Commission for a two-year term. Next year's annual meeting will be held at St. John's, Nfld., and it is tentatively proposed to hold the 1971 meeting at Halifax, N.S., location of ICNAF headquarters.

Members of the Commission are: Canada, the United States, the Soviet Union, United Kingdom, France, Denmark, West Germany, Iceland, Norway, Poland, Portugal, Romania, Spain and Norway.

A communique issued after the five-day meeting stated that the prohibition on salmon fishing, if ratified, would apply to all methods. The only salmon fishing permissible would be within national fishing limits. In recent years high seas fishing fleets have increased their catches of Atlantic salmon, causing concern for the stocks which originate in the streams of Canada and New England and certain European countries.

Member governments will be asked to introduce conservation measures to control the intensity of haddock fishing on Browns Bank, about 100 miles off the southwest coast of Nova Scotia, and on Georges Bank, in the Gulf of Maine. Research authorities have determined that there has been poor haddock spawning, caused by extremely heavy fishing on recent stocks.

The recommended quota for Browns Bank for 1970 through 1972 was 18,000 metric tons and for Georges Bank 12,000 metric tons. The Commission recommended also that haddock fishing on Browns and Georges Banks be closed in March and April.

A closed season for red and silver hake for the southern part of the Convention area was recommended for January to March inclusive.

The ICNAF communique said that landings of groundfish species from the Northwest Atlantic in 1968 were approximately 2,500,000 metric tons, slightly lower than in 1967. Landings of herring soared to 860,000 metric tons, a 46 per cent increase.

Canadian commissioners attending the ICNAF meeting, in addition to Dr. Needler, were H.D. Pyke of Lunenburg, N.S. and Spencer G. Lake, of Burgeo, Nfld.

Fished Inside 12-Mile Limit: Captain Fined

The captain of a Japanese fishing vessel has been fined $3,500 for violating Canada's 12-mile fishing limit off the coast of British Columbia.

"Invasion of fishing rights in Canada is a serious business" Magistrate William Ostler, of Victoria, told Capt. Yurio Minenaga whose vessel, the 180-ft. *Koyo Maru*, was intercepted May 29 off the north end of Vancouver Island by the fisheries protection vessel *Laurier*.

The Japanese vessel was reported to be carrying 39 tons of ocean perch and a ton of black cod when intercepted. The vessel was equipped with two radar sets, a depth sounder and navigation gear.

Capt. Minenaga, who pleaded guilty to the charge, said when he first observed the fisheries vessel he believed he was beyond the 12-mile limit. He added that his boat was under pressure from wind and tide.

This is the second time this year that action has been taken against Japanese vessels for disregarding Canada's 12-mile limit. On Feb. 25 the *Kotoshiro Maru* was intercepted by the fisheries vessel *Tanu* and her captain subsequently fined $2,500 in Prince Rupert, B.C.

Build Counting Fence in Labrador

Atlantic Salmon Tagging Project

BY E.P. QUIGLEY

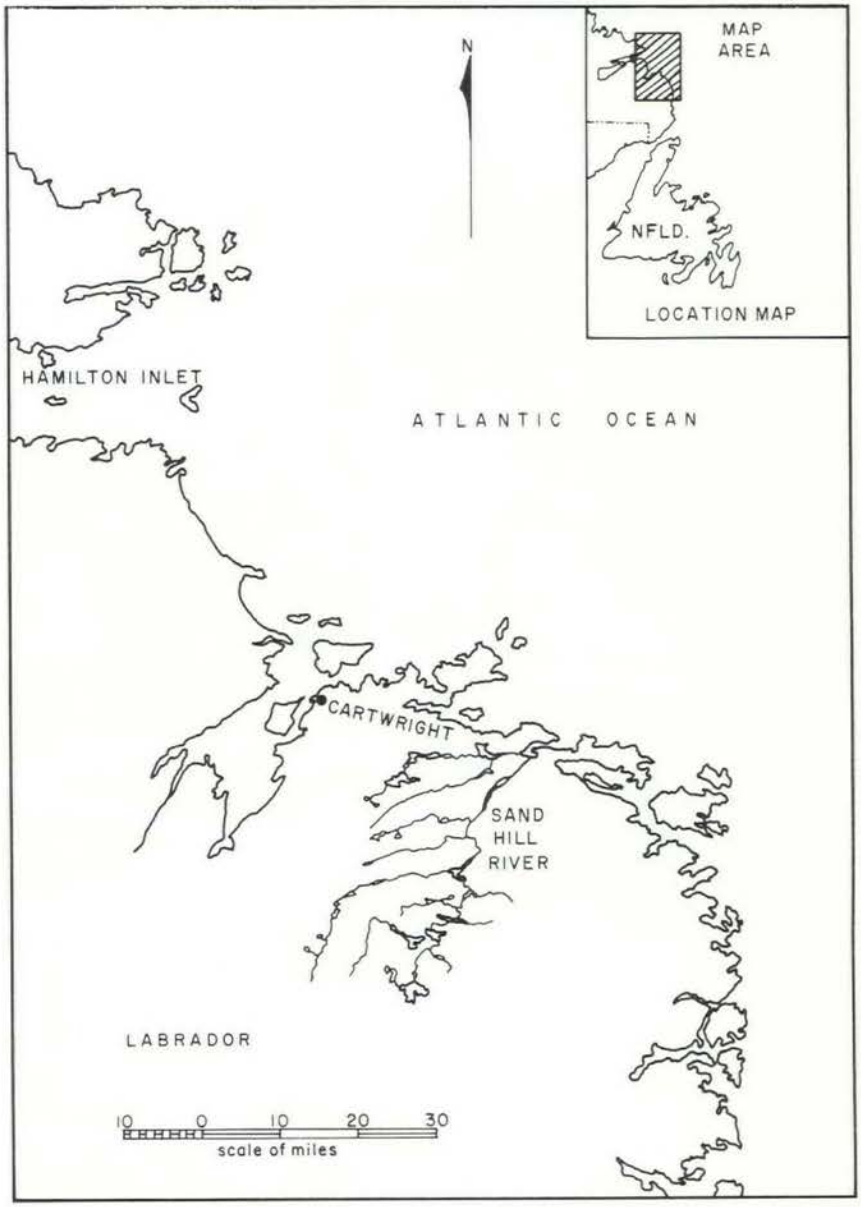
Biologists and other personnel with the Resource Development Branch of the Department of Fisheries and Forestry in Newfoundland will be involved once again this summer and fall in an extensive salmon tagging project designed to help determine the impact of the Greenland salmon fishery on Canada's Atlantic salmon stocks.

A commercial salmon fishery which developed off the west coast of Greenland reached large proportions between 1959 and 1961. This increased catch has caused concern in several countries on both sides of the North Atlantic Ocean as to what part the salmon resources of each nation contribute to this fishery.

In March, 1966, an investigation was launched in Labrador by the Resource Development Branch to find a river suitable for a smolt tagging operation as part of an overall Canadian investigation.

Preliminary reconnaissance surveys were made on 16 rivers in Labrador and 10 rivers on the Great Northern Peninsula of Newfoundland during 1966 and 1967. Rivers on the Great Northern Peninsula were investigated as possible interim tagging sites while more extensive investigations proceeded in Labrador for a more permanent site.

Temporary counting fences were constructed on four likely rivers to determine their adult salmon run. One fence was operated on St. Charles River in 1966 and others on Sand Hill River and Double Brooks in Labrador and on Salmon River on the Great Northern Peninsula during 1967. After all data had been evaluated, Sand Hill



Location of the Sand Hill River project for the tagging and enumeration of Atlantic salmon.

River was chosen as the permanent site. Last year construction was begun on smolt enumerating facilities at this location, while an interim smolt tagging operation proceeded on Salmon River.

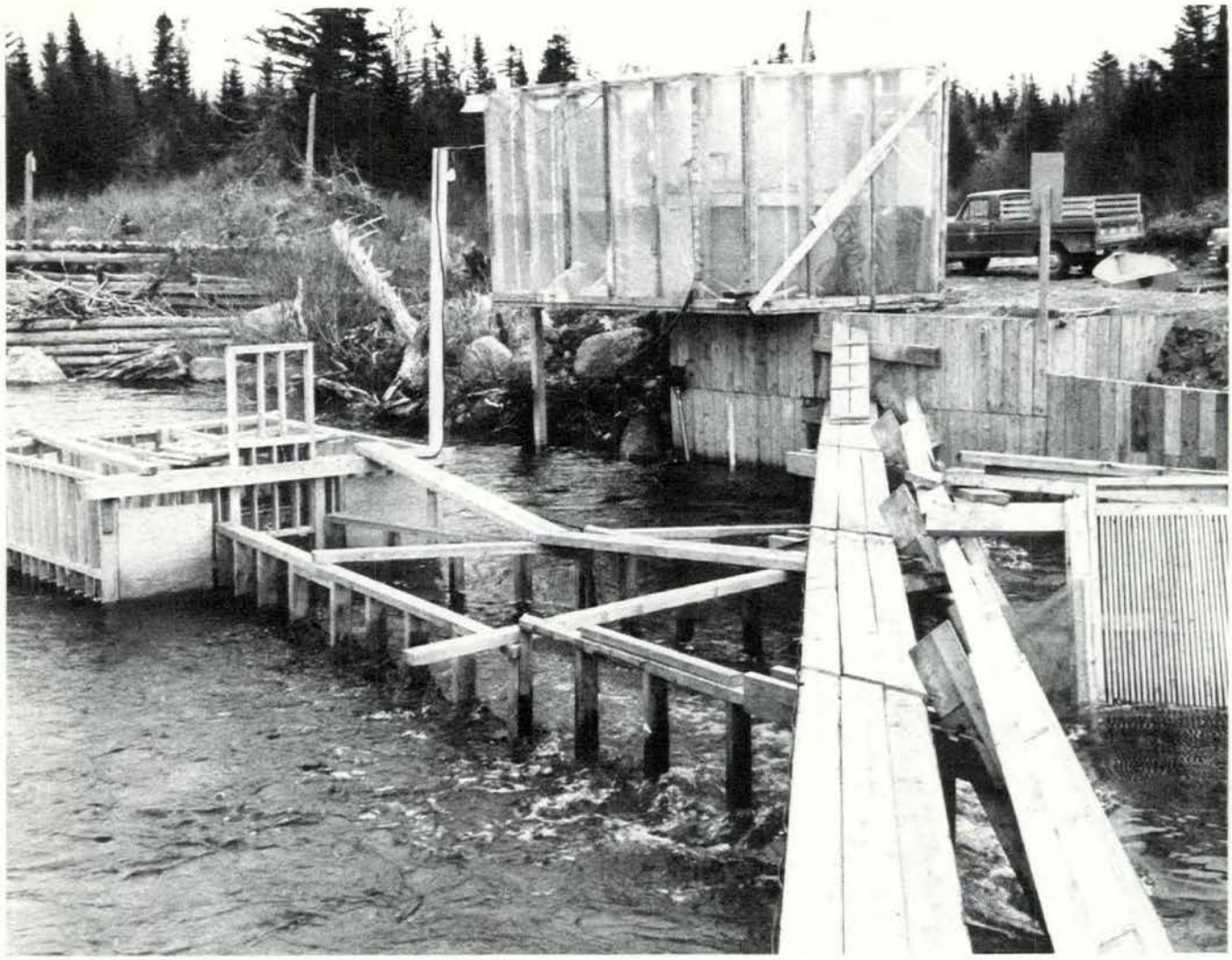
8,000 TAGGED

The Resource Development Branch operated the Salmon River fence in 1968 and during this period 8,000 of a total of 30,000 smolts were tagged using a green tag attached by stainless steel wire. A number of descending salmon kelts were also observed and some of these were tagged with a red tag; a few hundred of the ascending adult salmon were also tagged. The kelt and adult salmon tags were applied to assess tag recovery in the Greenland and local commercial fisheries, and in Salmon River itself in subsequent years.

Design and construction of counting facilities for the Sand Hill River Project is being undertaken by the Resource Development Branch's Engineering section. The fence design is considerably different than any previously constructed in Newfoundland.

The fence is in the shape of a "W" and is designed as a two-way counting facility for both smolt and adult salmon. The base of the structure is constructed of reinforced concrete which is anchored to the bedrock section of the river bottom by steel dowels. Fence panels are constructed of wooden slats spaced one-half inch apart.

Supplies and materials for the project were delivered to Sand Hill River in mid-June 1968, and transported three miles upstream to the construction site. Living quarters for those employed on the salmon tagging project were completed by mid-July at which time work was started on actual fence construction. Approximately 60%



Smolt trap and tagging shed at Salmon River, Nfld.

of the base had been completed by October, when construction was halted due to high water and cold weather.

Construction of the counting fence on Sand Hill River will continue during the summer and fall months of this year, and it is anticipated all phases of the project will be completed by early September.

Resource Development biologists will conduct smolt tagging on site at Sand Hill River over the next few months. In addition, the salmon counting operation will continue at Salmon River to determine the rate of return of fish that were tagged by Resource Development personnel in 1968.

Completion of the enumeration fence on Sand Hill River estimated to cost $115,000, will be the major construction project to be undertaken by the Branch's Engineering Section for 1969. Estimated total capital cost of the Sand Hill River project will be in the vicinity of $130,000.

Overall view of the Salmon River counting fence showing two smolt traps downstream and one adult trap in the apex upstream.

Adult salmon trap in the apex of the Salmon River fence upstream.

Resource Development Branch staff tagging a salmon smolt.

Canada Host to 40 Countries at FAO

Canadian fisheries personnel are taking a prominent part in an international technical conference on fish inspection opening July 15 in Halifax, N.S. As host country, Canada welcomes some 250 fishery specialists from 40 countries attending the 10-day gathering convened by the Food and Agriculture Organization (FAO) of the United Nations.

The Hon. Jack Davis, federal Minister of Fisheries and Forestry, will officially welcome the delegates on behalf of the Government of Canada. Provincial and civic officials will also participate in the opening ceremonies. Dr. R.R. Logie, Assistant Deputy Minister, Fisheries Service, Department of Fisheries and Forestry, will be general chairman of the conference.

A sadly ironic feature of the conference is the absence of one of its most active advocates and organizers, H.V. Dempsey, who died in Ottawa June 14. Mr. Dempsey, Director of the Fish Inspection Branch of Canada's Department of Fisheries and Forestry, was to have been a keynote speaker at the conference opening.

Roy I. Jackson, Assistant Director-General (Fisheries) of FAO, presents the opening address on "The need for effective utilization of fishery resources for human food". G.G. Anderson, Assistant Director of the Canadian Fish Inspection Branch, filling in for the late Director, will discuss the need for fish inspection and quality control programs.

Of more than 100 papers to be presented during the conference, 23 are authored by Canadians, representing the Inspection Branch, the fish processing industry, the Fisheries Research Board of Canada and other interested organizations.

The main objective of the gathering is to achieve a common understanding of the procedures used in various nations for fish quality assessment and control. A hoped-for result of the deliberations is international accept-

Dr. R.R. Logie

Conference general chairman

Seminar-Study Tour of Canada

Senior fisheries administrators from developing countries in Africa, Asia, Central and South America are taking part in a month-long seminar-study tour of fish processing, inspection and research establishments in Canada this summer. Most of the 27 countries invited by FAO have a representative on the tour, which begins with attendance at the FAO Technical Conference on Fish Inspection and Quality Control in Halifax, July 15-25.

The Government of Canada is host to the party of about 30 persons, including tour leaders and lecturers, due to arrive in Halifax July 11. While in the area, the group plans visits to nearby processing, research and inspection establishments.

At the conclusion of the Inspection Conference, the party embarks July 27 on a two-week tour of Maritime, Ontario and Prairie fish processing centres. Their itinerary calls for stops at Shediac, Cocagne, Cape Bimet, Black's Harbour and St. Andrews in New Brunswick, Toronto and Wheatley, Ontario, and Winnipeg, Selkirk and Hnausa, Manitoba.

Convened under the United Nations Development Program, the seminar-study tour is intended to provide an opportunity to study and discuss the development and organization of fish inspection systems, training activities, application of inspection and legislation, and to examine the Canadian fish inspection system and fish processing industry.

Those participating in the tour are senior administrators responsible for formulating policy with respect to fishery development, including fish inspection and quality control, in their respective countries.

onference on Inspection

ance of widely recognized inspection techniques and testing procedures.

Organization of the conference sprang from the work of an FAO subsidiary body known as the Codex Alimentarius Commission which aims to establish international quality standards for fish and other food products. Some form of product inspection is considered essential in order to ensure compliance with recognized quality standards.

Papers to be delivered and discussed at working group sessions cover such topics as national and industrial inspection methods, quality assessment techniques for frozen, canned and cured fish, and health and safety aspects of fish quality control. During intervals between sessions, conference participants will visit processing establishments and inspection and research laboratories in the Halifax-Lunenburg region.

Head of Inspection, H.V. Dempsey Dies

Henry Varner (Harry) Dempsey, Director of the Inspection Branch of the federal Department of Fisheries and Forestry since 1953, and widely respected throughout the world as an authority of fish inspection matters, died in Ottawa on June 14, a victim of cancer.

Raised in the Wainwright area of Alberta, Mr. Dempsey began his fisheries career with the Province of Alberta in 1938 and became closely associated with the biological survey program on whitefish lakes and trout streams.

During the Second World War he served overseas as a navigator with the R.C.A.F., returning to fisheries work in Alberta in 1945. Later that year he was appointed Chief Inspector with the federal Department of Fisheries with headquarters in Winnipeg, and in 1947 was promoted to Chief Supervisor for the Central Region.

Taking over as head of the Inspection Branch of the Department in Ottawa in 1953, Mr. Dempsey became responsible for that area of the Department's work concerned with development of quality control standards and for inspection of fish and fish products to ensure that a high standard of quality is maintained for both domestic and export trade.

Since the formation in 1962 of the Codex Alimentarius Commission of the United Nations (FAO/WHO), Mr. Dempsey had been prominently associated with this body which is concerned with establishing worldwide standards for food products. In 1965 he was elected vice-chairman of the Commission and has headed international committees dealing with food labelling and codes of practice in fish handling and processing. In 1967 he visited Russia as a consultant to an FAO Study Tour to deliver a series of lectures on fish inspection.

In his spare time, Mr. Dempsey studied the history of Canada's fishing industry and assembled a considerable library of rare books on this subject.

His knowledge in this field was recognized when he was asked to write the Fisheries section for "Canada One Hundred, 1867-1967" – the special Canada Handbook produced for Centennial Year.

Codes of Practice Being Finalized

A project of the Food and Agriculture Organization of the United Nations to establish Codes of Practice for the handling, processing and distribution of fish has moved a step nearer fulfilment.

An FAO committee met in March and, on the basis of preliminary work and under the chairmanship of H.V. Dempsey, late director of the Inspection Branch, Department of Fisheries and Forestry, Ottawa, and with Dr. R. Kreuzer as secretary, finalized a draft f orm of the Codes of Practice.

The Codes for frozen and canned fish are now being distributed to member nations for comments. When finalized, the documents will be published by both FAO and the Codex Alimentarius Commission.

H.V. Dempsey

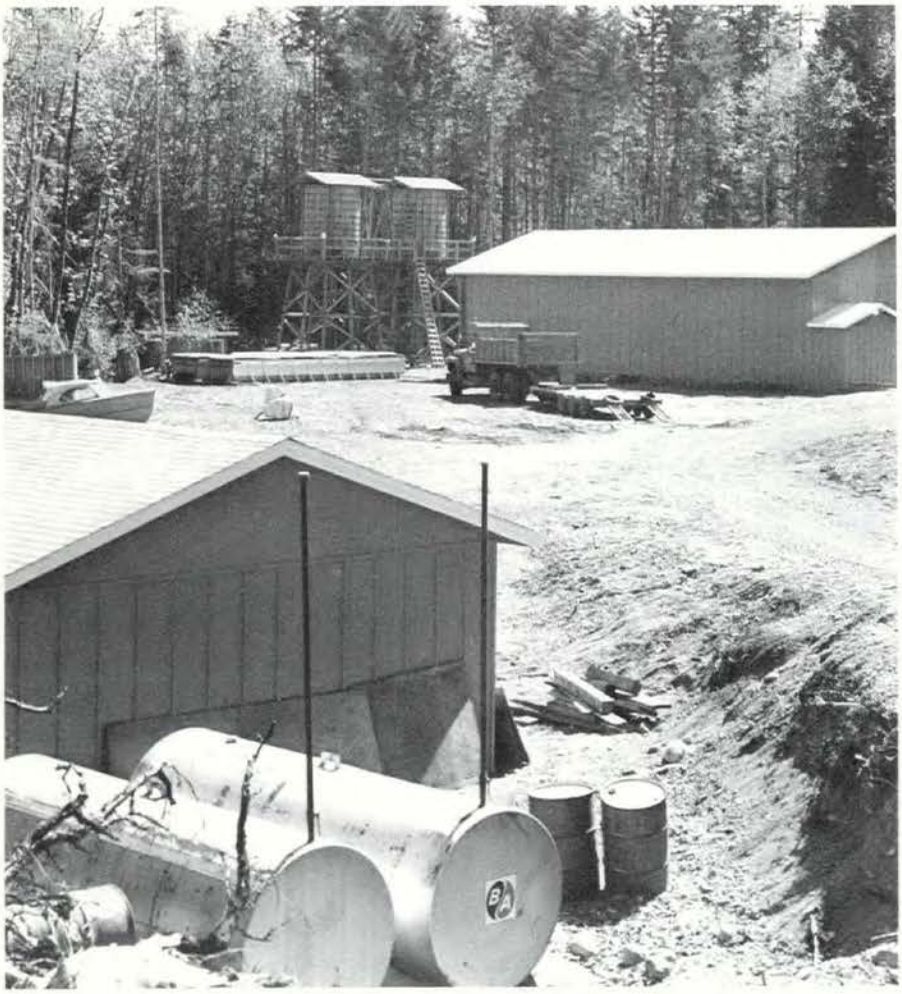
Study Salmon Genetics in B.C.

An experimental freshwater fish hatchery designed principally to provide a greater knowledge of salmon genetics has been constructed by the Fisheries Research Board of Canada on a 100-acre site at Rosewall Creek, near Fanny Bay, B.C.

Dr. John Calaprice, the scientist-in-charge, said experiments at the hatchery will enable researchers to compare the growth, survival and behaviour of different families of young salmon under varying conditions.

Experiments are being conducted with chums, pinks, sockeye, and coho salmon. Eggs used in the hatchery have been taken from Big Qualicum, Cowichan and Salmon Rivers and from Babine Lake.

The Rosewall Creek station is self-contained, having its own power plant and an extensive water supply system. Water is taken from Rosewall Creek by pumps and a separate set of pumps takes ground water from an 80-foot well at the rate of 550 gallons per minute. Each pumping system is connected to a 5,000-gallon storage tank.



A general view of the Fisheries Research Board of Canada's Experimental Freshwater Hatchery at Rosewall Creek, B.C.

Availability of the two types of water is an important element in the operation. Tests show that the temperature of the river water varies from near zero to 15 degrees centigrade, while the temperature of the ground water remains comparatively constant. The use of the two types of water provides a measure of temperature control which is important in regulating development of the young fish.

The complex includes a culture building, two laboratories and various support facilities. The culture building is equipped with 600 individual fish tanks, each connected by valves and piping so that river or ground water can be fed in as required.

Dr. Calaprice explained that in experiments at present underway, samples of male and female fish were taken from different river systems and transported to the Rosewell Creek station. The sperm and eggs from these fish were divided into groups, and males and females cross-bred from the samples. Members of each cross are reared in different parts of the hatchery and will be used in experiments to study the genetic factors which regulate growth, survival and behaviour patterns of the salmonids.

Environmental studies are also being conducted at the Rosewall Creek unit. This involves planting eggs from the same fish in different types of gravel under controlled water conditions observing the variations in the hatching process.

Automation: Friend or Foe?

BY L.W. PROCTOR*

To the uninitiated, automation is a frightening word engendering visions of mass unemployment for humans whilst machines take over their lives. Those who have been involved can, however, see the beneficial effects and know those areas which should be avoided.

Experience of automation has shown that no one has suffered by automating a system even though there may have been some drastic changes in the individual life routine. No one has been denied work through being replaced by a machine; in most cases re-training has provided a better class of work. Those who do find themselves without a job are generally those who are not prepared to change their routines.

Automation is not, of course, a panacea and can only offer advantage in the proper application following cost/benefit studies. These studies review factors of the existing system, this system maximized and then the automated system. A change to automation would only occur if it could be shown that there was to be a financial saving (rule of thumb 20%), increased production or a more efficient product. This type of examination of the operational system can be applied to the fishing industry.

There are a large number of operations in the fishing industry which can be automated although it is not necessarily true that they should be. Any item which can show a saving of time or cost can mean the difference between a debit and credit on the balance sheet.

As a simple example, if a stern trawler making ten tows in a 24-hour period could save five minutes at each net turn round, i.e. between hauling and setting, this would be over eight hours per average trip. If the operating cost of this vessel is, say, $70 per hour then $560 per trip or about $12,300 per year would be saved. In addition, obtaining sufficient crew members is already a problem in some areas and automated operations could make the difference between a vessel operating or being tied up.

EXAMPLE FOR REVIEW

Using the net setting and hauling as an area for review toward automation, perhaps the operational movements could be examined. There are a number of steps required, all of which are subject to human error of judgment and frailties. Taking each step in turn and examining the work required we have, following the order to set:

(a) The winch man hauls the codend to allow it to fall in the sea and then monitors the ground rope run to stop it at the otter board;

(b) the otter board is hooked up;

(c) the boards are released and the warps run out by judgment of winch operators to maintain length and speed balance;

(d) the Captain (or mate) has judged vessel speed through the water for correct pull off power;

(e) juggling of vessel speed and warp length for correct towing;

(f) hauling back has the winch man judging speed of warp recovery as a judgment independent of the judgment of the vessel speed;

(g) otter boards are disconnected;

(h) ground rope and net hauled in;

(i) codend untied;

(j) codend rope hitched to hoist;

(k) codend hoisted to empty.

The major areas of time loss are in the manual operations of hitching and unhitching otter boards and the judgments of winch and vessel speed. If the former could be dispensed with and the latter optimised, then it is probable that considerably more than five minutes per tow could be saved. In addition, equipment would undergo less strain, and consequently last longer, if the optimum conditions

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were applied in relationship to each other for winch and vessel speed operation.

At present there are designs out for automatic latches for use with otter boards although these are still being developed. Equipment for control of winch and vessel speed is available.

Pursuing the line of automating the setting/haul back operation, the relationship must be established between:

(1) Vessel speed through the water for satisfactory run off;

(2) warp load maximum and value for (1) above;

(3) optimum speed of net through the water for each fish species and warp loads at this speed;

(4) optimum net retrieval speed.

From the above criteria, a control program can be established to obtain the optimum relationship between engine power coupled with propeller pitch, vessel speed, warp length and winch power.

The control system would take care of the violent snatching which occurs during rough weather and it could also be used, of course, to handle fasteners.

Such a control system would require a sophisticated system of comparisons, possibly requiring a small computer, and would be fairly expensive. The benefits, however, may outweigh this cost by a considerable sum; a saving of, perhaps, $60,000 per year, per vessel by:

(i) Crew reduced by two, providing men for other vessels

(ii) one set of gear saved per year;

(iii) reduced maintenance of equipment;

(iv) economic fuel consumption;

(v) turn round time saved.

Although the above possibility may be viewed as Utopian, most of the controls are available now as separate items but have not been linked together. There are many other areas where automation can be used such as engine room, fish gutting and processing, convenience meals, and programmed course keeping. Not all would save money but would save physical effort. The day may not be too far away when the deck hand is a technically trained man wearing a collar and tie, pressing a button occasionally.

Perhaps more important is that automation is not an ogre eating up men's jobs but a means of improving job interest and increasing the pay for it.

Shrimp Industry Developing In Lake

In 1961, an unique industry was started at Watrous, Saskatchewan, where brine shrimp and eggs are harvested from Manitou Lake. This lake, which is about three miles from the town of Watrous, is saltier than either the Atlantic or Pacific Oceans. It is very narrow in some places and about three miles wide in others. The lake is 11-1/2 miles long and quite deep near the middle. It is inhabited by billions of small red shrimp that lay billions of microscopic eggs every year.

Only one other lake in the world is inhabited by these minute creatures and that is Salt Lake, Utah.

Scientists point out that a deposit of potash runs for some 400 miles across the wheat belt. Potash, which is a relative of ordinary table salt, is washed into the Manitou Lake by run-off water. As a result the lake is extremely salty, so much so that the water feels gritty to touch and whole potash crystals cling to the skin.

However, the scientists have no answer as to where the billions of shrimp came from. Nevertheless, they are there and there are indications that a million dollar industry will develop as a result.

The shrimp are caught in very fine mesh drag nets, brought ashore and dumped into large vats where they are washed in fresh water. They are then taken to a processing plant at Watrous for freezing and packaging into 2, 8 and 16 ounce plastic bags. They are then shipped to New York for distribution to world markets as food for tropical fish.

The shrimp eggs are washed up on the shore in tons. They resemble grains of sand so closely that they are hardly noticeable on the shore. They have to be viewed under a microscope to see that they are like any other egg in a shell. The eggs, as harvested, are mixed with empty egg shells, but a machine which is 95 per cent effective, is used to separate them. The eggs are also packaged and exported to U.S. as fish food.

The shrimp season is from May to September.

Strange Catches: No. 3

Whale Skulls from Georges Bank

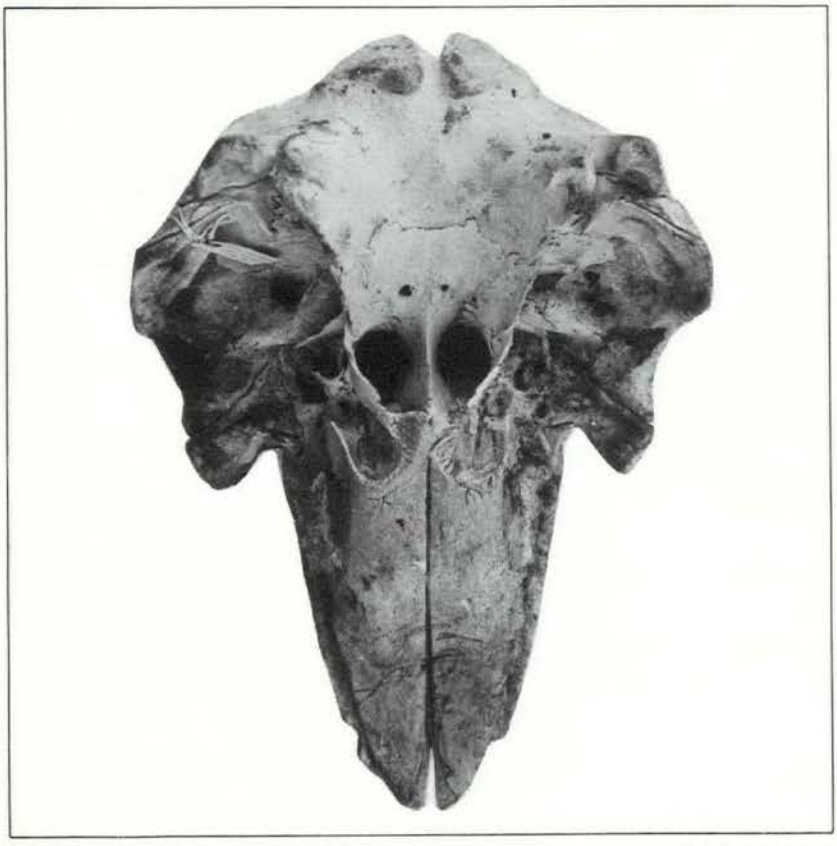
BY ESTHER I. LORD AND
ROSS A. CHANDLER

Fisheries Research Board of Canada,
St. Andrews, N.B.

Whale skulls taken by scallopers on Georges Bank are among the interesting articles that have found their way to the St. Andrews Station during the past few years.

The first one (see photo) was taken in 1964 by the M.V. *Diplomat II* in 17 fathoms on the northern edge of Georges Bank just east of "The Rip". Henry E. d'Entremont, who was then mate, sent it to us through E.G. Sollows of Yarmouth, N.S. It is 25 inches long, 18 inches wide and almost complete except for the teeth. It is probably not ancient.

A second skull was brought into Yarmouth, N.S., on July 19, 1966, by the M.V. *Josie,* Eric J. d'Eon, captain. It came from 20 fathoms at 41°55' N. Lat. and 67°22' W. Long. – almost the same spot as the first. A photograph of this second skull was published in the July 28, 1966, issue of the Halifax Chronicle-Herald. It was similar to the first but smaller (22 by 16 inches) and much eroded.



Ventral view of pilot whale skull taken by the scallop dragger "Diplomat II".

A third one was caught on October 23, 1967, by the M.V. *Judith Suzanne,* Raymond Bartlett, captain. It came from 40 fathoms at 41°15' N. Lat. and 66°15' W. Long. and measured about 25-1/2 by 19 inches.

The fourth skull we received was taken in 1968 by M.V. *Continental,* Leslie d'Entremont, captain, and came from 25 fathoms at about 42°00' N. Lat. and 67°20' W. Long. It compared in size to the second skull.

Edward D. Mitchell, a sea mammal palaeontologist of the Fisheries Research Board's Arctic Biological Station, Ste. Anne de Bellevue, P.Q., has told us that the first two skulls belonged to adult *Globicephala melaena melaena.* Phillip M. Youngman, Curator of Mammals at the National Museum of Natural Sciences, identified the last two as belonging to the same species. In other words, it is the northernmost subspecies of the Atlantic pilot whale. They travel in herds and feed almost entirely on squid. The largest male usually acts as the leader. He is the "pilot", which probably accounts for this common name for the species. They are sometimes called pothead whales or blackfish, even though they are mammals – not fish. They are small to medium-sized toothed whales belonging to the porpoise and dolphin family.

Pilot whales have been hunted along the Atlantic coast for many

years; our best known fishery is near Dildo in Trinity Bay, Newfoundland. The whales are captured by herding them towards shore where they become stranded in shallow water and are then slaughtered in great numbers. There is a ready market for both the oil and meat and yields can be high because large males are 20 to 25 feet long and weigh up to 3 tons. Females are a bit smaller – they grow to about 17 feet.

Recently whales have been hunted off southern Nova Scotia, the main catch being finbacks with some minkes and bottlenoses.

Growth layers in their teeth show that pilot whales may live to an age of 50 years. Our specimens could not be aged because there were no teeth left in any of the skulls.

These pilot whale skulls may not have such an ancient tale to unfold as the walrus tusk and the concretions previously described in our FISHERIES OF CANADA notes on "Strange Catches" but they do add sound information on the distribution of this subspecies. It cruises far and wide in the North Atlantic and these finds have provided clues for establishing its southernmost range which so far has been poorly defined. The accurate positions and depths submitted with the skulls have added greatly to their scientific value.

We thank the fishermen for their catches, Messrs. Mitchell and Youngman for their identifications, and Dr. J.C. Medcof who has also assisted in this study. The four skulls have been deposited in the National Museum of Natural Sciences, Ottawa, and are catalogued as NMC Nos. 33521, 33522, 36999 and 37000.

Fishing Resumes In Placentia Bay

A large part of Placentia Bay, Nfld., which was closed to fishing May 5 by the federal Government as a precaution pending investigation into the so-called "red herring", was re-opened June 16.

Federal Minister of Fisheries and Forestry Jack Davis, in announcing the re-opening following a meeting at St. John's with a joint fishermen's committee from the area, said all fish caught will be purchased by the government. However, Long Harbour – location of the Electric Reduction Company of Canada Ltd. phosphorus plant – will remain closed.

The Minister emphasized that the important thing was to get the men back in their boats.

"The government will take the risk in buying all the fish caught until such time as exhaustive tests, now being conducted by the federal government, are concluded," he said.

The Minister also announced that all fish stocks presently being held by fishermen and fish buyers will be purchased by the government at going market prices. None of it, however, will be available for re-sale. "Consumers of fish, therefore, have nothing to worry about," the Minister said.

Fishermen in the affected area have received monthly cheques in compensation for earnings lost since the closing of Placentia Bay. These were calculated at 80 per cent of average monthly earnings over the past three years.

Mr. Davis said after the fishermen were back at work further adjustments will be made to bring their incomes for May and June more in line with seasonal trends when fishing is normally at its peak. These upward adjustments are to be worked out in close consultation with the fishermen themselves.

After his meeting with the fishermen, Mr. Davis flew by helicopter to Long Harbour to inspect the ERCO plant.

The unusual occurrence in Placentia Bay was first noticed in February when dead and dying fish were discovered. They had one common symptom – a red discoloration of the skin.

Placentia Bay, the largest inlet on Newfoundland's south coast, is a prolific ground for inshore fishermen. The fish affected by the red discoloration of the skin are confined to the Long Harbour section, although the fishing closure was enforced in a much larger area as a further precautionary measure.

JOINS PRICES SUPPORT BOARD

Eric S. Turnill, General Sales Manager, British Columbia Packers Limited, has been appointed a member of the Fisheries Prices Support Board, Fisheries and Forestry Minister Jack Davis has announced.

The members of the Fisheries Prices Support Board are appointed from the fishing industry across Canada. Other members are Harold Mifflin, Catalina, Newfoundland; Jack Estey, Halifax, N.S.; Bernard Blais, Quebec, and Ken Harding, Prince Rupert, B.C. G.L. Grant, of the Department of Fisheries and Forestry, Ottawa, is Chairman of the Board.

Dr. Needler Honored for International Role

Recognition of the role played by Dr. A.W.H. Needler, Canada's Deputy Minister of Fisheries and Forestry, in promoting international fisheries agreements and ensuring equitable distribution of the harvest of the seas, was made at the University of British Columbia recently in the granting of a honorary Doctor of Science degree.

The citation for the degree read in part:

"In a world and time in which the harvesting of the oceans has assumed critical importance, no man has won more influence and admiration than this Canadian scientist, civil servant, and diplomat for his knowledge of the law, economy, and biology of the seas, scrupulous honesty in the interpretation of scientific evidence, and unrivalled ability in the promotion of international agreements. These are the qualities that have guaranteed for Canada and other nations a judicious division of benefits that will multiply in future decades. So esteemed a service and so rich a legacy rightly invite our grateful homage."

Dr. Needler's career in fisheries extends back to 1924 when he became a volunteer investigator in groundfish studies at the Fisheries Research Board of Canada's station at St. Andrews, N.B. He was subsequently in charge of the Board's oyster work at Ellerslie, P.E.I. and director of FRB biological stations at St. Andrews, N.B., and Nanaimo, B.C. He was appointed Deputy Minister of Fisheries in 1963, and the same year was named chairman of the International North Pacific Fisheries Commission. He was elected chairman of FAO's Committee on Fisheries for its first two years – 1966 and 1967. He was recently appointed chairman of the International Commision for the Northwest Atlantic Fisheries for a two-year term. In recognition of his work in fisheries during the Second World War, Dr. Needler was made an officer, Order of the British Empire.

Dr. A.W.H. Needler, Deputy Minister of Fisheries and Forestry of Canada, receives an honorary Doctor of Science degree at the University of British Columbia. Participating in the ceremony are J.M. Buchanan (left), Chancellor of UBC, and Dr. F.K. Hare, President of UBC. (Photo courtesy UBC Extension Graphic Arts).

Salmon-Tagging Experiment

Fishery scientists and technicians from three European countries, the United States and Canada recently concluded a two-week visit to the Maritime provinces to participate in an international salmon-tagging experiment.

The tagging was carried out at the federal Department of Fishery and Forestry's Miramichi fish culture station in New Brunswick. The Department's Resource Development Branch in conjunction with the Fisheries Research Board's Biological Station at St. Andrews, N.B., arranged the event to test various salmon-tagging techniques. The visiting scientists represented Ireland, France, Sweden and the United States as well as Canada.

Seek Planet-wide Research in Oceans

Action to explore the world's seas and oceans on a planet-wide basis, including using nuclear submarines and space satellites, has been proposed by a team of international scientists.

The scientists drafted proposals for a long-term program for international scientific co-operation in exploring and researching the oceans and its resources for mankind's benefit. A resolution calling for such a program was adopted by the United Nations General Assembly in 1968.

The group also urged establishment of a world-wide monitoring system to guard against the growing danger of marine pollution.

The group's report was drafted at meetings held on the Island of Ponza, Italy, and in Rome. The meetings were organized by the scientific advisory bodies of the Food and Agriculture Organization, Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization, and World Meteorological Organization. The bodies are: the Advisory Committee on Marine Resources Research (ACMRR), Scientific Committee for Oceanic Research (SCOR), and the Advisory Group on Ocean Research (AGOR). FAO was host to the session.

Those who took part comprised oceanographers, geologists, marine biologists, meteorologists and other experts from Brazil, Canada, Federal Republic of Germany, France, Japan, Senegal, Sweden, United Kingdom, Union of Soviet Socialist Republics and the United States. Chairman was Dr. C.E. Lucas, chairman of ACMRR and Director of the Marine Laboratory of the Department of Agriculture and Fisheries of Scotland. The rapporteur was Prof. W.S. Wooster, President of SCOR, professor at the Scripps Institute of Oceanography, California.

In their report, the scientists recommended intensified national and international exploration and research to fill in gaps of knowledge about the oceans and their living matter, the mineral content of the ocean floor, and ocean interaction with the atmosphere. Marine pollution was treated as a major area of concern in any long-term program of oceanic research and development.

Giant Codfish

This giant codfish was taken by a longliner fishing in the Fogo Island area of Newfoundland, about 12 miles east of Round Head. It weighed an estimated 60 pounds and measured approximately four-and-a-half feet in length. After being split, salted and dried, the fish tipped the scales at 13 pounds, four ounces. Fogo Island fishermen say it was one of the largest codfish to be caught in the area in many years.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	Jan.–April 1968		Jan.–April 1969	
	Landings[1]	Value[2]	Landings[1]	Value[2]
	'000 lb.	$'000	'000 lb.	$'000
CANADA – TOTAL	**519,367**	**20,197**	**588,100**	**21,849**
ATLANTIC COAST – Total	**495,339**	**18,342**	**570,331**	**20,203**
Cod	97,781	4,281	83,068	3,545
Haddock	37,644	2,833	47,942	3,798
Redfish	8,769	216	20,292	473
Catfish	1,689	58	1,707	58
Halibut	1,628	675	1,525	611
Other Flatfishes	58,671	1,947	62,517	2,462
Pollock, Hake, Cusk	11,493	424	9,208	289
Other Groundfish	945	16	1,276	18
Herring & Sardines	266,917	2,783	329,981	3,054
Mackerel	–	–	Ø	Ø
Swordfish	219	161	79	78
Tuna	21	8	598	97
Alewives	36	2	93	5
Salmon	Ø	Ø	Ø	Ø
Smelts	2,098	226	2,978	238
Other Fish	312	26	278	25
Lobsters	2,249	2,029	3,521	3,106
Clams & Quahaugs	1,164	86	1,230	101
Scallops	2,484	2,119	2,248	1,791
Other Shellfish	1,219	138	1,790	394
Misc. Items	–	314	–	60
PACIFIC COAST – Total	**24,028**	**1,855**	**17,769**	**1,646**
Pacific Cods	7,556	592	4,365	346
Halibut[3]	447	105	687	225
Soles & Other Flatfishes	2,475	146	2,867	173
Herring	5,540	113	2,455	86
Salmon	632	300	427	267
Other Fish	2,350	68	1,535	35
Shellfish	5,028	525	5,433	514
Misc. Items	–	6	–	–
BY PROVINCES				
British Columbia	24,028	1,855	17,769	1,646
Nova Scotia	155,451	11,289	173,840	12,500
New Brunswick	49,009	1,063	28,638	1,166
Prince Edward Island	995	88	2,328	124
Quebec	12,728	323	14,686	278
Newfoundland	277,156	5,579	350,839	6,135

[1] Fish and Shellfish only. [2] All Products–Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms.
[3] Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES – APRIL 1969

		Montreal	Toronto
		$	$
Cod fillets, Atl. fresh, unwrapped	lb.	.423	.530
Cod fillets, Atl. frozen, cello 5's	lb.	.335	.437
Cod fillets, smoked	lb.	.415	.520
Haddock fillets, fresh, unwrapped	lb.	.557	.660
Herring, kippered, Atl.	lb.	.259	.330
Mackerel, frozen, round	lb.	.180	.277
Lobsters, canned, Fancy	Case 48-1/2s	69.947	72.600
Sardines, canned	Case 100-1/4s	10.048	9.910
Halibut, frozen, dressed	lb.	.480	.550
Silverbright, frozen, dressed	lb.	.662	.667
Coho, frozen, dressed	lb.	.912	.980
Sockeye, canned, grade A	Case 48-1/2s	28.053	28.907
Pink, canned grade A	Case 48-1/2s	18.710	19.360
Whitefish, fresh	lb.	.533[1]	.517
Lake Trout, frozen	lb.	.450	.563

[1] Dressed.

PRICES PER CWT. PAID TO FISHERMEN
(Week ending April 12th)

	1968	1969
	$	$
Halifax		
Cod Steak	5.75	5.75
Cod Market	5.5	5.5
Haddock	9	9
Plaice	4.5-5.25	4.5-5.25
Yarmouth		
Haddock	–	8
Vancouver		
Ling Cod	12-16	12-16
Grey Cod	6-7.5	7-8
Soles	7.5-8.5	8-8.5
Salmon (Redspring)	34-63	–

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF APRIL

	1968 '000 lb.	1969 '000 lb.
TOTAL – Frozen Fish, Canada	**53,155**	**45,942**
Frozen – Fresh, Sea Fish – Total	**33,405**	**29,000**
Cod, Atlantic, Fillets & Blocks	6,306	6,386
Haddock, Fillets & Blocks	5,119	5,496
Rosefish, Fillets & Blocks	1,471	1,091
Flatfish, (excl. halibut) Fillets & Blocks	3,688	1,857
Halibut, Pacific, dressed & steaks	4,147	1,085
Other Groundfish, dressed & steaks	845	848
Other Groundfish, fillets & blocks	3,258	1,948
Salmon, Pacific, dressed & steaks	2,122	3,181
Herring, Atlantic & Pacific	325	288
All Other Sea Fish, all forms	4,173	4,746
Shellfish	1,951	2,074
Frozen – Fresh, Inland Fish – Total	**5,707**	**5,313**
Perch, round or dressed	1,628	705
Pickerel (Yellow & Blue) fillets	487	183
Sauger, round or dressed	150	110
Tullibee, round or dressed	114	333
Whitefish, round or dressed	551	636
Whitefish, fillets	90	124
Other, all forms	2,687	3,222
Frozen – Smoked Fish – Total	**1,521**	**1,310**
Cod, Atlantic	605	482
Sea Herring, kippers	453	250
Other, all forms	463	578
Frozen For Bait and Animal Feed	**12,522**	**10,319**

SALT FISH STOCKS AS AT END OF APRIL

		1968 '000 lb.	1969 '000 lb.
Salted and Pickled Fish, Atlantic Coast			
Wet-Salted – Total		**10,421**	**5,331**
Cod		8,492	4,465
Other		1,928	866
Dried-Salted – Total		**13,151**	**7,337**
Cod		11,993	7,088
Other		1,158	249
Boneless – Total		**1,165**	**635**
Cod		1,085	621
Other		80	14
Pickled – Total	(barrels)	**4,289**	**629**
Herring	"	3,687	[1]
Mackerel	"	[1]	502
Alewives	"	602	127
Turbot	"	–	–
Bloaters	(18 lb. boxes)	96,119	59,219
Boneless Herring	(10 lb. boxes)	[1]	4,483

[1] Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS JANUARY – MARCH

	1967-68 $'000		1968-69 $'000	
TOTAL EXPORTS		**48,371**		**57,379**
By Markets:				
United States		30,471		34,581
Caribbean Area		3,969		3,713
Europe		12,233		16,533
Other Countries		1,698		2,552
By Forms:				
Fresh and Frozen		**28,137**		**35,124**
Whole or Dressed	**8,528**		**11,405**	
Cod, Haddock, Hake	265		216	
Halibut, Pacific	945		1,148	
Salmon, Pacific	2,773		5,336	
Swordfish	132		123	
Other Seafish	1,603		1,506	
Whitefish	1,362		1,537	
Pickerel	438		444	
Other Freshwater Fish, n.e.s.	1,010		1,095	
Fillets, Blocks and Slabs	**14,053**		**15,853**	
Cod, Atlantic	4,052		5,137	
Haddock	1,721		1,870	
Ocean Perch, Hake, Cusk, Pollock	2,101		2,182	
Flatfish	3,609		4,191	
Pickerel	649		470	
Other Fillets and Blocks	1,921		2,003	
Shellfish	**5,322**		**7,305**	
Lobsters (in shell & meat)	3,217		4,625	
Scallops	1,785		2,033	
Other	320		647	
Frozen Fish & Shellfish, pre-cooked	**234**		**561**	
Cured		**5,230**		**4,560**
Smoked	**557**		**684**	
Herring	295		346	
Other	262		338	
Salted, Wet & Dried	**3,975**		**3,303**	
Cod	3,428		2,849	
Other	547		454	
Pickled	**698**		**573**	
Herring	452		394	
Mackerel	147		62	
Other	99		117	
Canned		**12,236**		**12,942**
Salmon	9,669		10,531	
Sardines	1,691		1,577	
Lobsters	310		145	
Other	566		689	
Miscellaneous		**2,768**		**4,753**
Meal	1,349		3,386	
Oil	104		323	
Other	1,315		1,044	

Current Reading

THE SEINE NET – ITS ORIGIN, EVOLUTION AND USE
by David Thomson.

Published by Fishing News (Books) Ltd., London, Eng.
Price $11.75

It was while Scottish-born David Thomson was a lecturer in fishing gear technology at the College of Fisheries, St. John's, Newfoundland in 1965-66 that he became deeply interested in the origin and special development of the seine net. This interest intensified following his appointment as Assistant Professor in the Department of Fisheries and Marine Technology, University of Rhode Island, and culminated in the writing of a comprehensive book on the subject.

Tracing the history and development of the seine net from its origin in Denmark in 1848 when Jens Laursen Vaever first made huge catches of plaice with his "snurrevod", Mr. Thomson relates how the idea was picked up by English and Scottish fishermen and later spread all over the world.

Detailed descriptions are given of the original Danish method of anchor-dragging, the tow-dragging method used by the Japanese, and the techniques of fly-dragging adopted by Scottish fishermen. Other chapters deal with seine net gear, vessels and equipment, Australian, Canadian and American modifications to the gear and a summary of costs and earnings of seine net vessels representative of Denmark, Scotland and Canada. A useful bibliography is included.

The author, who went to sea at the age of 15 and received his skipper's certificate at 21, points out that the seine net is presently being used by more than ten countries with well-developed fisheries and that it is estimated that the gear catches nearly a million tons of fish annually.

Mr. Thomson adds that the gear has probably reached its peak of use in Europe and possibly Japan, but is only beginning to reveal its effectiveness in Canada, the U.S. and the temperate countries of the southern hemisphere.

JOURNAL OF FISH BIOLOGY, Vol. 1, No. 1.

Published for the Fisheries Society of the British Isles by Academic Press, London and New York.
Subscription: $14.50 annually.

The Fisheries Society of the British Isles was inaugurated in October 1967 with the object of promoting a liaison between the workers in the field of fish biology. The Society also has as one of its aims the regular dissemination of technical and other information on all aspects of fish biology and fishery research and management through a quarterly publication entitled *Journal of Fish Biology,* the first issue of which has just appeared.

Of somewhat similar format to the *Journal* of the Fisheries Research Board of Canada, the U.K. publication is edited by James C. Chubb, of the Department of Zoology, University of Liverpool, with the assistance of an international editorial board. Dr. Chubb says it is hoped to attract papers from all parts of the world and thus present a truly international survey of current research on fish and fisheries.

Perhaps understandably, the contributors to the first issue are all British, with the exception of one American co-author. The research reported is of a generally high standard and the publication is well produced. However some readers may be critical of the fact that the articles do not carry abstracts, although some do include a summary at the end.

HANDY MEDICAL GUIDE FOR SEAFARERS
By R.W. Scott.

Published by Fishing News (Books) Ltd., London, Eng.
Price $2.75

This is a booklet which deserves a place in the medical cabinet of any fishing vessel. Written by a doctor who has had considerable experience in dealing with seafaring accidents and illnesses, its 15 chapters cover examination and diagnosis of illness, treatment of wounds, head injuries, the digestive system, ear, nose and throat injuries, burns and fire hazards, and cold and survival factors.

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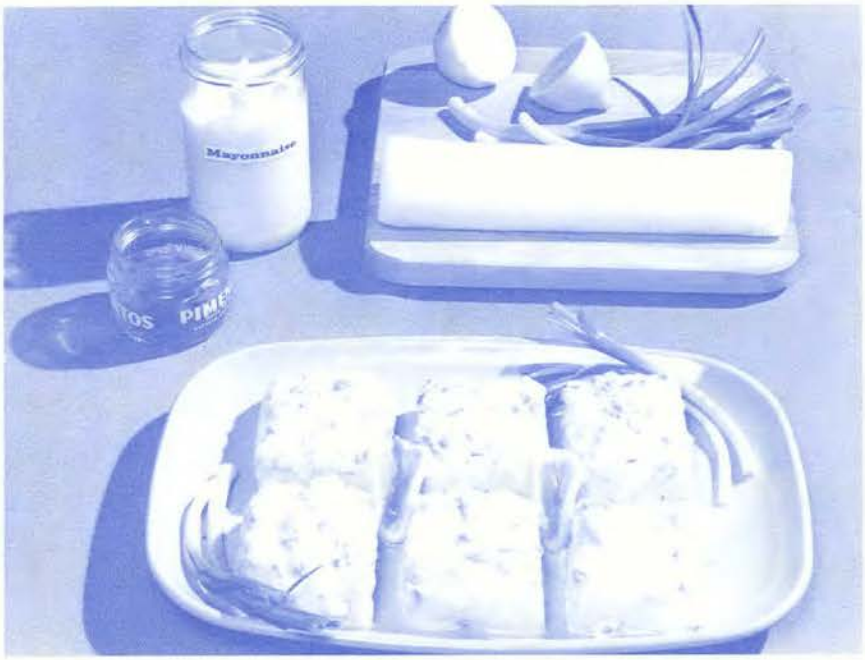
Spotlight on Sole

IF RECIPES are any indication, sole is a very popular fish both on this continent and in Europe. In the annals of cookery, there are perhaps more recipes for fillets of sole than for any other single fish product. *Larousse Gastronomique,* the famous French encyclopedia of food and cookery, lists over a hundred different preparations.

True sole is a European fish which inhabits waters from the Mediterranean to the North Sea. It is not caught on this side of the Atlantic. The fillets displayed in Canadian food stores labelled sole are from small members of the flatfish or flounder family caught along both coasts. Four separate varieties from the east coast (plaice, gray sole, yellowtail, and winter flounder) with three from the west coast (brill, lemon sole, and rock sole) make up the bulk of our commercial catch.

Regardless of name, fillets labelled sole or flounder are very versatile. They cook quickly by any of the standard methods. Bake, broil, poach, or fry them. Roll or fold them to make an elegant entree. Tastefully prepared, they are a treat. Here is a recipe suggestion from the home economists of the Department of Fisheries and Forestry.



Sole Fillets With Mayonnaise Topping

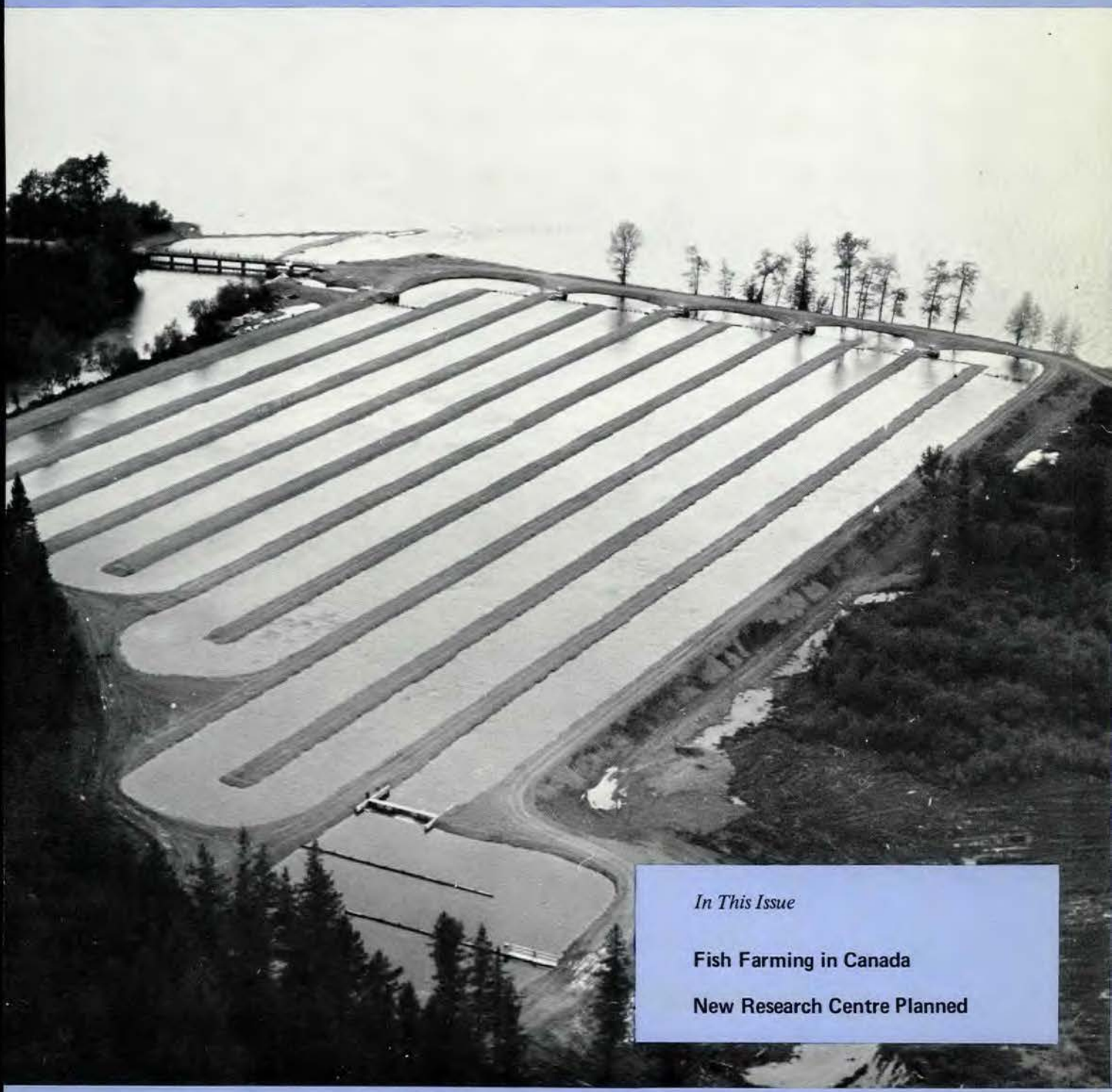
Sole fillets may look anonymous but they won't taste anonymous if baked with a tart mayonnaise topping. This short, easy recipe makes an attractive dish which should net a good catch of compliments. Why not start some baked potatoes in the oven first and have a tossed salad waiting. Dinner's done!

1 pound sole fillets, fresh or frozen
1/4 teaspoon salt
1/4 cup mayonnaise
2 teaspoons lemon juice
1 tablespoon finely diced pimiento
2 tablespoons finely chopped green onions, including tops

If fillets are large, cut into serving-size portions. Frozen fillets should not be defrosted. However, if using a frozen fillet block, allow it to stand at room temperature for 30 minutes to ease cutting into portions. Place fillets, single layer deep, in a shallow, greased, baking pan. Sprinkle with salt. Combine mayonnaise, lemon juice, pimiento and green onion. Spread mixture evenly over fillets. Place in an oven preheated to 450°F. Bake until fish flakes easily on testing with a fork and has lost its grey, watery look, taking on a milky white shade throughout. Allow about 10 minutes cooking time per inch thickness for fresh fillets and double that time for frozen ones. A frozen fillet block, 1-1/4 inches thick, takes about 30 minutes.
Makes 3 servings.

FISHERIES of Canada

Aug. 1969 Vol. 22 No. 2



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The Hon. Jack Davis, Minister

Dr. A.W.H. Needler, Deputy Minister

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COVER PHOTO — Sockeye salmon spawning channel at Pinkut Creek, Babine Lake, B.C., completed in September, 1968.

Published by the Department of Fisheries and Forestry, Ottawa

Editor:
E.H. Hearnden

$7.5 Million Research Complex To Develop Freshwater Fisheries

Plans for the construction of an ultra-modern $7.5 million Freshwater Research Institute on the University of Manitoba campus were announced June 23 by federal Fisheries and Forestry Minister Jack Davis during a visit to Winnipeg.

The new building, which will be the largest federally-financed structure on the campus, is designed to house all the Fisheries Minister's staff working on freshwater development in Canada. Construction is scheduled to begin in the fall.

Mr. Davis said that the University of Manitoba campus was chosen because 80 per cent of the nation's freshwater lakes lie within a 1,500 mile radius of Winnipeg.

The accent of the new Freshwater Institute's work will be on development. It will be directed toward fish farming and the improvement of existing fish stocks in our northern waters. Pollution control is, of course, important, Mr. Davis said. For this reason the staff at the Institute will be responsible for studies on eutrophication in river systems as far apart as the Okanagan in British Columbia and the St. John River in New Brunswick.

The buildings containing the new Freshwater Institute are the first of a series in what is expected to become a renewable resource complex, Mr. Davis said. It will include research laboratories, a working library, seminar facilities, fish holding tanks and pilot plant facilities. It will be second to none in North America, trebling in size over the next decade and attracting some of the best biologists in the world.

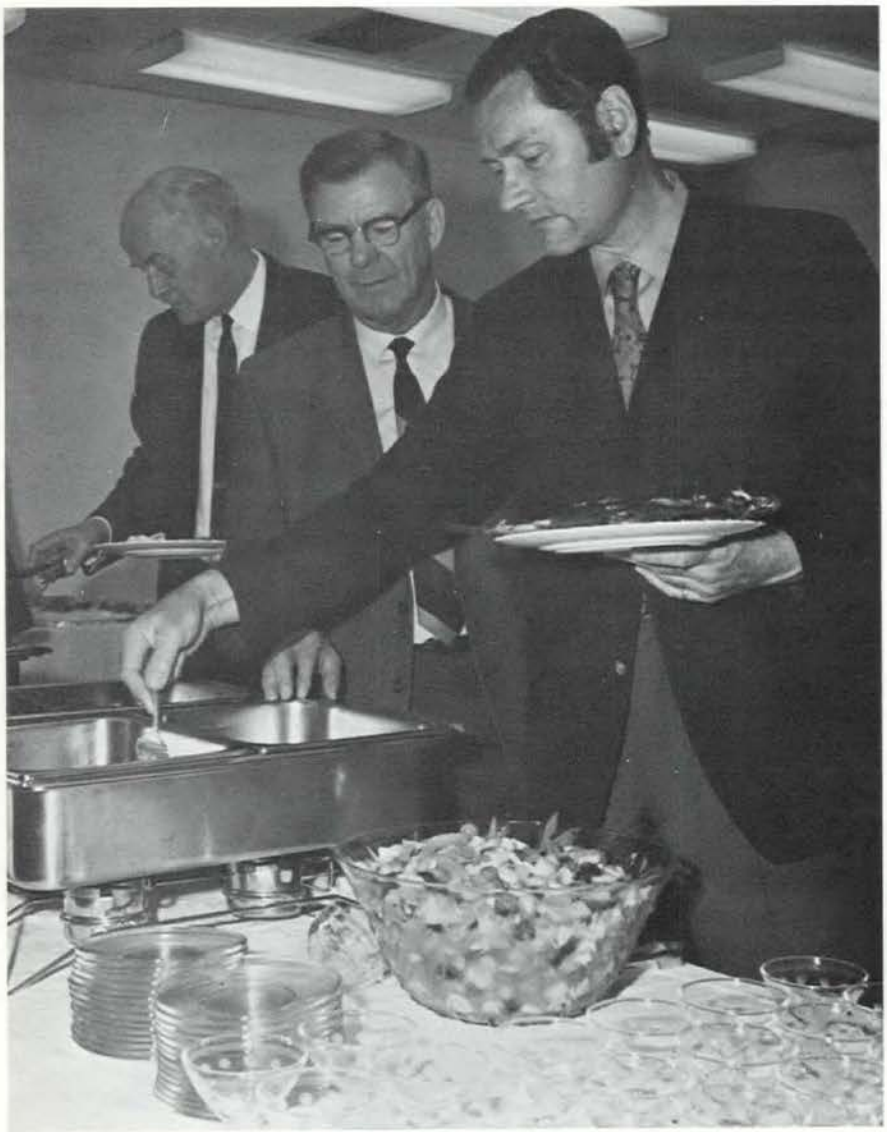
The new 188,000 square foot building will be located on the southwest corner of University Crescent and Dafoe Road directly across from the

An artist's impression of $7.5 million Freshwater Research Institute to be built on the campus of the University of Manitoba.

University of Manitoba animal science building. Mr. Davis said that space will be provided for the Association of Universities and Colleges of Canada, the Department of Energy, Mines and Resources Inland Waters Branch and the Department of National Health and Welfare's Public Engineering Division.

Winnipeg's new Freshwater Institute will be under the direction of Dr. W.E. Johnson, Dr. Johnson and an initial staff of more than 340 will concern themselves primarily with the future of freshwater fishing and the quality of the water in Canada's lakes, rivers and streams from coast to coast.

During his visit the Fisheries Minister toured the existing laboratory facilities of the Fisheries Research Board of Canada's Freshwater Institute and enjoyed a lunch featuring specially-prepared species of freshwater fish.



Specially-prepared freshwater fish species were sampled by federal Fisheries Minister Jack Davis during his visit to the FRB Freshwater Institute at Winnipeg. With him is A.W. Lantz (centre), who is in charge of the unit of developing special products from freshwater fish, and Dr. H.H. Saunderson (left), President of the University of Manitoba.

Lobsters Not Disturbed By Moss Raking

Investigations have shown that Irish moss harvesting along the Prince Edward Island coast does not disturb the lobster population.

Scientists from the Fisheries Research Board and officers of the federal Department of Fisheries came to this conclusion following many underwater and on-boat observations. The studies were undertaken following charges by some lobster fishermen that the intensive raking of Irish moss killed and injured lobsters and destroyed the cover for juvenile lobsters.

In an announcement, federal Minister of Fisheries and Forestry Jack Davis said that the underwater observations in the Tignish area indicated that the harvesting rakes did very little, if any, damage. The rakes made clean cuts on only the top few inches of the moss, leaving the holdfasts and young growth intact. The investigators, using scuba diving gear, noted particularly that few rocks were disturbed, and they stressed that no dead or injured lobsters were observed.

On-boat observers reported that only two lobsters were brought up in 18 hours of raking and, in another instance, only one lobster in four hours of raking. These live lobsters were returned to the sea.

The area in which Irish moss is raked is quite small in comparison to that occupied by lobsters. The value of Irish moss to the fishermen of Prince Edward Island in 1968 was approximately $1,200,000.

Big Potential in Central Area

Fish Farming in Canada

During his visit to Winnipeg to announce to establishment of a new Freshwater Institute, federal Fisheries and Forestry Minister Jack Davis issued the following statements dealing with the potential for fish farming in Canada's freshwater lakes:

Our present methods of commercial fish production have not changed for centuries. We are still harvesting fish from wild stocks much as any primitive hunting society might do. If agriculture were at a comparable stage then beef production in Canada might consist of killing wild buffalo up to the limits that the herds could sustain. Similarly, grain production would consist of harvesting natural strains with all the attendant hazards involved.

The development of an agriculture similar to farming has been slow at best. In the case of large lakes and the seas with their many species, this tardiness is understandable. However the husbanding of fish in small lakes is something else again. The number of fish species can be limited and the natural predators brought under control. Canada, which is blessed with many small lakes has a great advantage in this connection. These natural fish ponds, which are fed by nature and which can be sown and harvested without encountering high costs will undoubtedly be exploited by fish farmers in the years to come.

Immediate attention is being given to the intensive production of rainbow trout in small lakes in Manitoba. Those in the Manitoba Interlake region are well suited to a program of this kind. Other high quality species such as "splake" or kokanee salmon may also be used. Suffice it to say that the early tests have been encouraging and these results are being followed up enthusiastically by the Department of Fisheries and Forestry in cooperation with the federal Departments of Indian Affairs and Regional Economic Expansion.

DEMAND FOR TROUT

There is a high commercial market demand for rainbow trout in both Canada and the United States. The United States imports about 13,000 tons of rainbow trout per year from Denmark and Japan. These fish, which are marketed frozen, dressed with head on and packaged two per box, have a market value of about $1.50 per pound. That is, their market value exceeds the present total value of all Canadian frsehwater fish products.

In Denmark and Japan these trout are produced by intensive culture in fish ponds. Production of these trout is attained by planting fry or fingerlings and feeding them on wastes from marine fish plants and from other inexpensive sources. The individual fish produced have a live weight of about one-half pound. The quality of these trout is not particularly high. There is an indication that regulations may be enacted in the United States to prevent importation of these trout because of the possibility of introduction of diseases to North American waters. However, even if this does not happen, there is a vast potential market for trout of high quality.

In central Canada, with its suitable climate and abundant water supply, it appears we may have a unique opportunity for the commercial production of rainbow trout on a large scale. Many of the waters in this area are alkaline in nature and have a very high production of natural fish food. This food consists mainly of small crustaceans which provide an excellent diet for rainbow trout. The approach to fish culture here would be to harness this high production of natural foods for the rearing of rainbow trout. An essential requirement is to have waters which have no other fish present so that the total food resources can be utilized for trout production.

NORA LAKE EXPERIMENT

An initial experiment was carried out in the summer of 1968 at Nora Lake near Erickson, in western Manitoba. This lake has a surface area of 65 acres and a maximum depth of 15 feet. Lake many small lakes in the area it winterkills because of its extreme shallow depth and thus had no resident fish population. Rainbow trout fry one inch to one and one-half inches in length were planted in Nora Lake in mid-June and harvested in October. In spite of the late planting. growth was excellent and many of the fish reached one-half pound in size by

October. These trout fed almost exclusively on the abundant supply of one species of small crustacean (Gammarus).

It is obvious that with planting of fry earlier in the year, in April or May just after the ice goes out, fish of marketable size can easily be produced by autumn. These fish were of extremely high quality and comparative tests show them to be greatly superior to the Japanese and Danish products in every respect. Continuing tests have demonstrated that this high quality is still maintained up to the present time, after eight months in frozen storage.

The only disappointing feature of the Nora Lake experiment was the high mortality experienced by the trout. This resulted, in all probability from heavy predation in early stages by the large salamander population present and/or predation by fish-eating birds. It appears likely that this problem can be overcome. The total harvest from Nora Lake in 1968, using gill nets, was only five pounds per acre. However, experience elsewhere suggests that one might easily attain a production of one hundred pounds per acre per year from lakes of this type. Some evidence indicates that two hundred or more pounds per acre production might be possible.

SEASONAL CROP

The important point established with the 1968 work is that a valuable high quality marketable product can be produced in one season with planting in the spring and harvest in the autumn. It points out the real possibilities for development of fish farming: an aquiculture analogous to agriculture.

Nora Lake is typical of a vast number of small and shallow prairie lakes which have no resident fish populations because of their propensity to winterkill. Winterkill is a feature of advantage in that it ensures that all fish are removed before the next season's crop is planted. If some large trout survived over winter they could be a problem in preying on the newly planted stock the following spring. Many small lakes which do not winterkill regularly might be induced to do so by fertilization during the summer; this would have the added advantage of producing more fish food during the summer also. However, the present program is being restricted to lakes of the winterkill type.

EXPANDED PROGRAM

In 1969 a considerably expanded program is being carried out on lakes in the vicinity of Nora Lake. Ten lakes ranging in size from 12 to 65 acres have been planted with rainbow trout. These lakes vary in depth as well as in size and will provide a basis for establishing the range of conditions in lakes of this type which can be tolerated. Two sizes of trout have been used for planting: (1) the 1 to 1-1/2 inch fry used in 1968, and (2) 2-1/2 to 3 inch fingerlings imported from a commercial rainbow trout hatchery in the United States. This will serve to establish if there are any differences in mortality due to size of fish planted, and to generally assess the most economical method of planting. This year's program will also contribute to assessing the extent and various causes of mortality and the extent of production per acre that can be achieved. Improved methods for efficiently making as complete a harvest as possible will also. be undertaken, and further tests of quality, methods of handling, processing and storage will be carried on.

Assessment of the economics of this approach to rainbow trout farming cannot be made with any precision at the present time. However, some assumptions allow at least a general approximation. As stated above there is good evidence to indicate that small, shallow lakes of the type with which we are dealing can produce 100 pounds of rainbow trout per year. (This estimate is believed conservative.) The market price of these fish indicates the farmer could expect to receive about $1.00 per pound for this product. In other words, a gross income of $100 per acre per year might be expected.

In winterkill lakes, the only costs are for purchase of planting stock each spring and for harvesting, cleaning and handling each autumn. The price of 1-1/2 inch fish delivered in Winnipeg from commercial trout hatcheries in the United States is $10.00 per thousand. It is expected that planting at the rate of 500 per acre of this size might be sufficient: that is, a cost of $5.00 per acre. If more or larger sized fish are required, the cost of planting might be as high as $15.00 to $20.00 per acre. The costs for harvesting, cleaning and handling are estimated at $5.00 to $10.00 per hundred pounds. Thus, total costs are estimated to be in the range of $10.00 to $30.00 per acre per year.

COST-BENEFIT RATIO

Compared with the estimated gross income of $100 per acre, this leaves a net income of $70.00 to $90.00 per acre per year. Although this is a crude estimate, its indications are most encouraging. (For example, good agricultural land in Manitoba provides a net income of only $20.00 per acre per year.)

In view of the excellent cost benefit ratios estimated, other possible methods of commercial trout rearing

justify experimentation. Certainly, it would seem most justifiable to use fertilizers to induce winterkill as a means of removing weed species of fish from many small lakes which would be suitable for trout rearing, and which in their present condition are of no value to either the sport or commercial fishery. (Fish toxins might also be considered, although their costs are generally high).

Two further methods of rearing trout should be investigated: One is the use of floating cages in suitable lakes. This method has the advantages of eliminating predation and ease of harvest, but may require supplementary feeding. The second method is the construction of artificial ponds where there is a suitable supply of rich water and high production of natural fish foods can be attained. Drainable, or partly drainable, ponds have several advantages: harvesting is simple and fish are obtained in excellent condition; small fish can be put back for further growth without damage; predators of all types are easier controlled.

If ponds prove feasible and economic, there are vast areas in contral Canada which, having excellent water supply and cheap land, could be developed to this end. Of particular interest in this regard is the Interlake Region of Manitoba between Lakes Winnipegosis, Manitoba and Winnipeg. Here the land is flat and much of it is unsuited to agriculture or forestry; and, there is an abundant supply of rich water, much of which originates underground and surfaces through artesian wells. These natural endowments of the area give great encouragement to the prospects of developing a commercial fish farming of considerable magnitude. In face of the generally declining prospects in the commercial fisheries dependent on wild stocks there is every reason to proceed immediately with the necessary investigations to establish the full possibilities inherent in fish culture.

Federal Fisheries Minister Jack Davis (right) discusses details of the proposed Freshwater Research Institute at Winnipeg with Dr. W.E. Johnson, who will be in charge of the new complex.

Loan Limit Increased to $25,000

Canadian fishermen will now be able to borrow a maximum of $25,000 under the Fisheries Improvement Loans Act following the amendment passed by Parliament to raise the ceiling from its original $10,000.

The Act has been further amended to allow fishermen to borrow up to 90% of the cost of a project instead of the former 75%. There is one exception – a loan for a vehicle can be only 66-2/3% of the purchase price.

A previous amendment freed the interest rate on improvement loans. Now the maximum rate payable on the principal outstanding will be set twice annually. This will be 1% above the cost of intermediate term money borrowed by the federal government.

Loans may be made for purchase or construction of a new boat; a used boat; repairs to boats; purchase of fishing equipment of all kinds; purchase of electronic fishing and navigational aids; construction of buildings ashore and installations; purchase of vehicles necessary to carry on a fishing business.

The Act has also extended the list of institutions that can make loans. Now included are charter banks, trust companies, loan companies, credit unions and insurance companies.

Loans must be secured and details for a Fisheries Improvement Loan are worked out between the fisherman and his banker. The government's role is guarantor.

Referring to the new legislation during debate in the House of Commons, Fisheries and Forestry Minister Jack Davis said: "I would like to point out that now the maximum amount of an individual loan is $25,000 it is possible for a fisherman to finance the construction of a new vessel costing as much as $37,500, because two-thirds of the funds required can be provided under the Fisheries Improvement Loans Act."

The Minister went on to say the name of the Act suggests improvements. "It is not intended to accomplish all the objectives of the fishing industry or of the federal government" he said. "It is the intention of the government at the next session of Parliament to set up a loans program which will enable fishermen, by means of direct loans, to finance the construction of new vessels."

Mr. Davis added that it was also the Government's intention to redraw the fisheries indemnity legislation so as to improve the coverage of fishing boats and to reduce the cost of insurance to fishermen.

Fish-Duck Mix Boosts Crops

Farmers in Hungary have found a new way of producing more fish, fowl and agricultural crops: they dig ponds.

The practice which began as an experiment about a decade ago, is being carried out on a growing scale by agricultural and fishery co-operatives in various parts of the country, mainly where the land is poor.

Basically it involves building large ponds which are stocked with several varieties of carp, a popular fish in eastern Europe, and with Long Island duck.

The carp and the duck are carefully tended until they develop into flourishing colonies, then harvested and sent to market. The ponds are drained, and rice, maize and other crops are planted in the exposed bottom. The resulting harvests are 15 to 20 percent higher than for similar crops grown elsewhere in the country.

The high-sodium soil has been improved by the action of the water and fertilized by the droppings of the carp and duck which form a thick sludge on the bottom containing organic substances.

After each harvest the ponds are re-flooded and the process is repeated, generally on a three to five-year cycle. Thus, a continuous chain is established and the same plot of normally unproductive land is made to yield fish, birds and agricultural food.

The system is described as efficient and economical, requiring few attendants. The ponds, dug by bulldozer, vary in area from several hectares to several hundred hectares and average four feet in depth. Artificial islands in the middle ensure havens where the ducks can feed from dispensing machines set in the water.

Discuss Sea Lamprey Control

Progress of sea lamprey control and the likelihood that the program would be curtailed for lack of funds were the main subjects discussed at the 14th annual meeting of the Great Lakes Fishery Commission in Niagara Falls, N.Y.

It was pointed out by Chairman L.P. Voigt that the Commission had requested sufficient funds to meet rising costs and extend the program in an orderly manner to control lamprey in Lakes Superior, Michigan, and Huron by 1970. The funds requested in recent years had not been appropriated by the United States and since the program cost was shared (Canada 31 percent, United States 69 percent) Canada reduced its contributions accordingly. The United States had proposed an appropriation for fiscal year 1970 which was only 12 percent more than its appropriation in fiscal year 1960. Despite an essentially "fixed" budget, ranging from 1.4 to 1.5 million, the program had been extended by improving methods and adjusting programs to give greater emphasis to stream treatments. This procedure could not be continued in order to complete Lake Huron without endangering control in the other lakes. An effective level of control could not be established on the three Upper Lakes if additional funds were not provided.

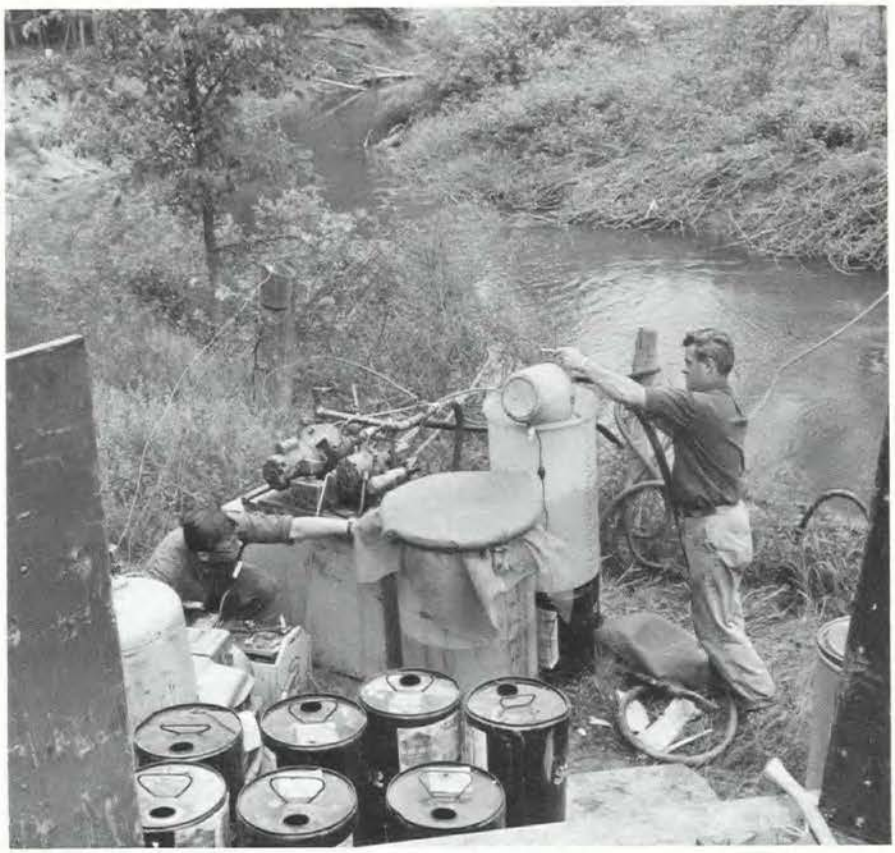
LAMPREY COMING BACK

The Commission was advised by its agents that sea lamprey in Lake Superior had increased in recent years but the population in 1968 was estimated to be about 20 percent of the pre-control level. In 1966 and 1967 it was less than 10 percent of the pre-control level. The recent increase was believed due to improved survival of young lamprey on reaching the lake where fish on which to feed were more abundant.

In Michigan waters of Lake Superior, the abundance of lake trout in inshore waters more than doubled in 1968. This improvement was due largely to heavier plantings. Preliminary analysis showed that total mortality of planted trout prior to 1961 was too high (presumably because of lamprey predation) to allow any significant number to reach maturity and spawn. A trend toward lower mortality in subsequent plantings was now appearing. A few native fish had been taken in Michigan waters but the recovery of natural reproduction was several years behind that of Wisconsin stocks.

The recovery of inshore lake trout populations in Canadian waters appeared to be slightly ahead of that in Michigan. Native fish began to appear in the spring of 1969 at both ends of the lake apparently as the result of meager spawning in the past few years.

Lake trout plantings proposed for Lake Superior in 1969 total 3.0 million yearlings. However, as a result of the appearance of increasing numbers of native fish, it was recommended that plantings in the United States be reduced progressively



A feeder site on the Nottawasaga River, set up last year in treating Lake Huron area with lampricide to combat the sea lamprey menace.

as native year classes displayed greater strength.

Lamprey control measures on Lake Michigan were carefully reviewed by the Commission after receiving reports of heavy lamprey scarring on lake trout in the northern sector. Lamprey activity in this area appeared to be causing high mortality of planted trout prior to the first spawning. The Commission accordingly provided in its 1971 budget for increased surveys to locate residual populations and the establishment of special crews to treat problem areas such as estuaries where regular treatment procedures were not completely effective.

COHO PLANTING

The returns from Michigan's planting of coho salmon were of particular interest since the program had caused a major expansion of the sport fishery in Lake Michigan. Although the 19.2 percent return in 1968 from the 1967 smolt planting was considerably less than the 32 percent return from the first planting, the estimated number of fish taken by anglers increased from 33,500 in 1967 to 91,200 in 1968. The average size of 29.0 inches and 9.0 pounds was only slightly less than in 1967.

In Lake Superior, the return of coho from the 1967 planting in the Huron River was estimated to be 2.2 percent. Spawning coho entered many streams in addition to the one planted and survival was probably higher than reported recoveries indicate. The Lake Superior coho were relatively small – 21.1 inches and 3.9 pounds. Approximately 7,000 were taken by anglers.

Coho smolt plantings were made for the first time in Lake Huron in 1968. Recoveries in the fall of that year and the spring of 1969 indicated that these fish were growing rapidly and surviving in good numbers despite a relatively high incidence of lamprey scarring. A substantial catch of about 70,000 pounds was made during a short period in the spring of 1969 in Canadian waters of southern Lake Huron by commercial fishermen setting for walleye and whitefish.

SPLAKE IN LAKE HURON

The Commission was advised that the first of a series of selected splake plantings in Lake Huron had been made in the spring of 1969 with the introduction of about 30,000 yearlings in Canadian waters. These fish were the result of selection from hybrid (brook trout x lake trout) stock through 5 generations. Larger plantings were proposed for 1970.

The catch of the Lake Erie fishery continued to match that for all other lakes combined, with Canadian fishermen taking most of the poundage, mainly yellow perch and smelt. The catch of walleye in the western basin was the third lowest recorded. This low catch was, to some extent, the result of a number of restrictions on commercial fishing adopted by agencies to reduce exploitation as recommended by the Commission. Additional restrictions were being imposed to further stimulate recovery of the walleye population.

The Commission took note of the increasing population of freshwater drum in Lake Erie and recommended that the potential of this species as a game and commercial fish be examined, and if these studies showed possibilities for greater use, that a promotional program be developed.

The Lake Ontario Committee, after reporting on the continuing low production, urged the Commission to intensify its efforts to extent lamprey control to Lake Ontario as soon as possible.

RECOMMENDATIONS

The Commission adopted several recommendations from its Scientific Advisory Committee which had reviewed the information required for effectively managing the Great Lakes fishery. The first recommendation called for a review of the collection of statistics from the sport and commercial fisheries, and the inclusion of information on size and age of fish in the catch in order to provide more complete descriptions of the fisheries. Encouragement was given by the Commission to the efforts of the Lake Michigan Committee to establish systematic sampling of important fish in the lake. The Commission urged that priority be given to analyzing mortality rates of lake trout in Lake Superior so that more definite conclusions could be drawn regarding the effectiveness of lamprey control.

It also recommended analysis of the now considerable accumulation of information on sea lamprey by a scientist free to devote his full attention to the study. In view of the recent increase in environmental investigations in the Great Lakes and scattered nature of studies on physiological responses of fish to various environmental factors, the Commission agreed that it should support or convene meetings in which information from these kinds of research could be brought together and interpreted.

At the conclusion of the meeting, the Commission adopted a greatly expanded program of lamprey control which it estimated would cost $2,472,400. The program provided for (1) a major increase in lamprey surveys to locate residual populations, (2) the establishment of special treatment crews for problem areas, (3) completion of stream treatments on Lake Huron, and (4) preliminary surveys on the lower lakes.

Patrol Vessel 'Goose Bay' Launched

The *Goose Bay*, a 66-foot fully-equipped vessel, is the latest addition to the fleet of patrol boats operated in Newfoundland waters by the Fisheries Service, Department of Fisheries and Forestry.

The vessel was christened and launched June 18 during special ceremonies held at Port Union, Trinity Bay. The naming ceremony was performed by Mrs. J.W. Carroll, wife of the Assistant Chief of the Department's Conservation and Protection Branch in Newfoundland. Also present were Mr. Carroll, H.V.E. Smith, Branch Chief and Mrs. Smith, and officials of Carpenter's Shipyards, Port Union, builders of the new patrol boat.

Equipped with radar and modern radio-telephone communications facilities, the *Goose Bay* will patrol the south-east coast of the province between Trepassey and Cape Bonavista. The vessel carries a four-man crew.

The "Goose Bay", newest addition to the patrol boat fleet operated in Newfoundland by the Fisheries Service, Department of Fisheries and Forestry, is christened by Mrs. J.W. Carroll, wife of the Assistant Chief of the Department's Conservation and Protection Branch, Newfoundland Region.

The patrol boat "Goose Bay" after her launching at Port Union, Trinity Bay.

New Fishing Technique for Small Boats

An entirely new fishing technique, pair seine netting, has been successfully demonstrated in a program to diversify small boat operations on the Atlantic coast. Lobstermen in particular can benefit from this method.

During a single afternoon in June, two Prince Edward Island lobster boats, the *Norma M* and *Marie Lou II*, towing a single net between them, caught 7,000 pounds of sole and cod in three hours' fishing in 20 fathoms of water off Souris, P.E.I.

The boats had been adapted for pair seine net fishing under the direction of Captain J. Thomson, a Scottish fishing skipper under contract to the Industrial Development Branch of the federal Department of Fisheries and Forestry. Captain Thomson also supervised the first fishing trial.

The machinery and gear needed to adapt the boats is relatively inexpensive and the power requirements low in comparison to regular draggers. Lobster fishermen will be enabled to utilize their boats during the many off-season months when normally they are tied up. Other types of low-powered inshore vessels can also be used.

The new technique is similar in concept to pareja (pair) trawling, which is carried out in the Atlantic by Spanish deep sea trawlers.

In the trial fishing off Souris, the *Norma M* and the *Marie Lou II* used a small Scottish seine net to make the bumper catches of sole and cod. Captain Thomson intends to replace this with a high vertical opening Vinge trawl as soon as hake start to appear on the Souris grounds, and expects equally good results.

The net used is funnel-shaped, similar to a regular otter trawl in principle. The skippers of the lobster boats haul the net by using a small winch on each boat, and co-ordinate their operations by radio-telephone. Captain Thomson estimates that the new technique will allow ten tows in a normal working day. The 7,000-pound catch was made in three short tows.

Further extensive fishing trials and demonstrations by the Industrial Development Branch will follow and their results made public.

U.S. Groundfish Catch Down

A decline in the United States' catch of groundfish and increased imports of this seafood have been reported by the U.S. Bureau of Commercial Fisheries. Species affected include cod, cusk, haddock, flounder, hake, ocean perch, and pollock.

The Bureau reported that a cost-price squeeze, attributed to low-cost imports, is hurting American groundfishermen, although the total U.S. market has been growing. The domestic catch now supplies less than one-third of the United States market. As recently as 1956, the U.S. was producing more than half the groundfish it consumed.

United States landings of groundfish totaled 427.4 million pounds in 1967. This was a decline of 25 percent from 1954. However the U.S. consumption of groundfish increased from 315.8 million pounds in 1956 to 468.8 million pounds in 1967, an increase of 48 percent. Groundfish imports were 107 percent higher in 1967 than in the 1954-56 period.

The Bureau points out that fish sticks and fish portions have become more popular than fillets and steaks. The U.S. industry, the report says, is unable to compete in producing frozen fish blocks and slabs because the cost of catching fish is lower for competing nations. Two factors contributing to this situation are lower vessel construction costs and government subsidies to fishermen in various forms in competing countries.

Canada and Nordic countries have been the principal exporters of groundfish to the United States.

"CODE OF PRACTICE" ON SHRIMP HANDLING NOT YET FINALIZED

A reference to a "Code of Practice for the Handling of Shrimps Aboard Vessels and in Plants" which appeared in an article on Maritimes shrimp fishing in the June, 1969, issue of "Fisheries of Canada" has prompted a number of requests for copies of this Code.

It should be explained that this Code has been drawn up in *draft form* only. It is likely to be several months before the Code is finalized and ready for public distribution, at which time an announcement will be made in "Fisheries of Canada".

Under-Exploited Groundfish On the Nova Scotia Banks

BY J.S. SCOTT
Fisheries Research Board of Canada
Biological Station, St. Andrews, N.B.

The population explosion is forcing man to search for new sources of food, with the sea as the main hope. However, contrary to what was believed up to the beginning of this century, the sea is not an inexhaustible source of fish and other food stuffs. If we are going to make best use of what it has to offer, we must realize that there are strict limitations on how much fish and other animals or plants we can remove for our use without destroying the stocks.

At present, our fisheries are based on the intensive fishing of comparatively few species: cod, haddock, redfish, herring, flatfish and a few others. Most of these are being very heavily exploited and some, such as the haddock, appear to be over-fished already. Since we are reaching the limits with these species, we must look elsewhere for additional supplies.

For the immediate future, we should have a look at other fish, those which are not fully exploited. They may not have great consumer appeal and many of them are unmarketable or uneconomical for the fisherman to land at present. However, with increasing demand for food they may well become important for direct consumption or for conversion to fish protein concentrate (F.P.C.) or fish meal.

DATA FROM RESEARCH CRUISES

Over the past 10 years (1958-1968) the St. Andrews Station of the Fisheries Research Board of Canada has recorded the numbers of groundfish of every species caught during its research cruises. The fishing effort on the Nova Scotia Banks, in particular, has been spread over almost the whole of that area from depths of about 30 to 250 fathoms and over all seasons. The total catch of each species of fish, therefore, reflects the relative number of that species which is available to the otter trawl used. From this we can get an indication of the species which may be worth investigating as potential candidates for commercial exploitation in the future. By applying corrections for various factors, we can convert these figures to give us the weight of each species caught over any given length of time – weights are obviously more significant than numbers as indicators of the value of the catch. Table 1 lists the main species in order of weight caught per 100 hours fishing.

As would be expected, the list is headed by those fish which form the most important part of our commercial catches, but there are several surprises. All the main commercial species of

TABLE 1

Species	wt per 100 hours (lb)
Haddock	14,397
Argentine	9,191
Cod	8,311
Pollock	5,749
Redfish	4,459
Plaice	3,650
Silver hake	2,039
Witch	1,630
Yellowtail	1,554
Angler	1,273
Halibut	1,161
Common hake	1,092
Skates	1,056
Dogfish, spiny	780
Sculpin, longhorn	601
Squid	545
Wolffish	342
Cusk	332
Sea raven	46
Sand launce	44
Eelpout	38
Grenadier	21

Catch rates of groundfish on FRB research cruises, 1958-1968.

groundfish are included in the first twelve places, but among these are two which do not appear in Canadian landing statistics: argentine, second only to haddock, and silver hake, at seventh place.

It is difficult to believe that there are more argentine that cod or redfish in the area. After all, cod is the most important constituent of commercial landings from the area and the commercial catch rates for cod are not very much lower than for haddock – cod 15.84, haddock 22.88 tons per 100 hours for large Canadian otter-trawlers in 1968.

SPECIAL STUDIES

The research cruise data appear to exaggerate the importance of haddock, argentine and silver hake. These are the three groundfish species on which special studies have been carried out in the past few years. Specific efforts to catch them may have inflated their comparative catch rates. Nevertheless, their importance is undoubted: haddock is the second most important species in the total commercial groundfish landings in the area; the USSR landed about 15,000 tons of argentine (and 11,000 tons of cod) from the banks in 1966; most spectacular of all, the USSR caught more than 123,000 tons of silver hake on the banks in 1963, although the catches have since declined to almost zero. For comparison, the Canadian cod landings in the area for 1966 and 1963 were 41,854 and 28,826 tons respectively.

The unused species in the bottom half of the list are headed by the angler (monkfish) and skates which together constitute 4% of the total catch. The remainder, all relatively minor items, nevertheless total 2,749 lb/100 hours (4.71% of total) which makes them of considerable interest as a group.

SELDOM LANDED

The skates are potentially important for direct consumption as a source of F.P.C. but are seldom landed here, although the U.S.A. landed over 2,700 tons in 1966. Similarly, few angler are landed by Canadians – 56 tons from the Nova Scotia Banks in 1966, as against 640 tons by USSR. The 56 tons represent only 0.01% of the total Canadian fish landings, although the research data indicate that angler constitute 2.18% of the total catch – for each angler landed, 200 are thrown away!

Wolffish and cusk are acceptable in the markets at present, to a limited extent. The sculpins and sea raven are unattractive fish, awkward to handle and their future would seem to lie in fish meal and F.P.C., unlike eelpout which is used for direct consumption elsewhere. The grenadiers, or ratfish, are unimportant on the banks, but evidently abundant in deep water. As an indication of their potential, the Russians caught more than 28,000 tons off the Canadian coast in 1968.

There are three species which are of special interest: sand launce, spiny dogfish and squid. It is difficult to assess their importance as the catch figures in Table 1 may not reflect their true abundance.

Sand launce are known to occur in shallow water on the Nova Scotia Banks and sometimes in great concentrations. The Nova Scotia Department of Fisheries reported catches of up to 15 tons per 1/2-hour tow during experimental fishing operations by a small trawler in 1968. The fish are plankton feeders, not strictly groundfish, and so are not always available to the bottom trawl. They constitute a very important part of the fisheries in the North Sea – more than 187,000 tons were landed for conversion to fish meal in 1967. There is sufficient evidence to justify further investigations into this resource off the Canadian coast.

Spiny dogfish have been caught in considerable quantities at times on the Nova Scotia Banks. They appear to come into shallow water in summer and retreat to deep, warmer waters in winter. They are plentiful off the New England coast and may be only summer visitors in the Nova Scotia area. As a resource they are of unknown value but merit serious investigation as a source of F.P.C. A survey of the fish stocks off the New England States places them third only to silver hake and herring.

SQUID PLENTIFUL

Finally, squid also are mainly summer visitors to the shallower waters on the banks. Evidence from echo-sounder traces and trawl-hauls suggests that the squid approach the Nova Scotia banks in immense numbers in spring and retreat in fall. They may well constitute the greatest fishery resource in the Northwest Atlantic, but it appears that special techniques may have to be developed to capture them efficiently.

On the basis of the figures in Table 1, at least one quarter of the available groundfish resources of the Nova Scotia banks are not used.

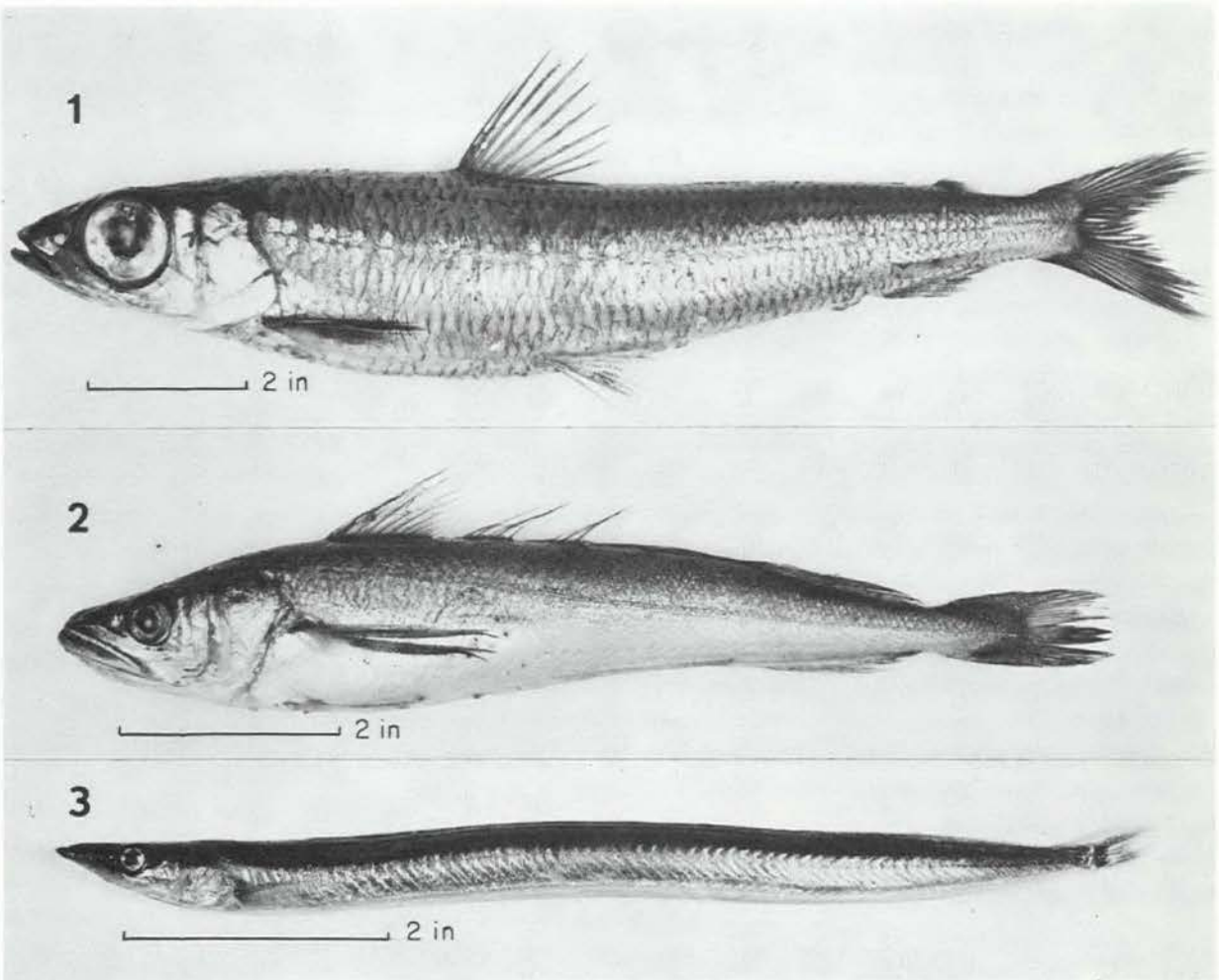
Why are so many of these species not sought by Canadians? It is not because they cannot be used. Silver hake has been important in the New England fisheries for many years, both for human consumption and industrial use. The Russians apparently regard

the argentine, a delicious smelt-like fish, as a reserve in case of decline in herring stocks. In other countries, dogfish, squid and sand launce support special fisheries, and skates and angler are very acceptable.

The Canadian fisherman obviously caters for a traditional market based on a handful of fish species. The market has changed a little in recent years with the development of new fishing and processing techniques, but it is still highly specialised. Increasing competition, especially from east European nations, is endangering the stocks on which the market relies, and this may force the Canadian industry to diversify further.

So far as exploitation of new fish resources is concerned it is already years behind USSR. With increasing pressure on food resources, it is obvious that it will become impossible to ignore present unexploited species simply because they have not been used in the past or because there is no consumer demand for them. Demand will be created by shortage of other fish.

While we recognize that a 25 per cent increase in fish landings, offered by rejected fish, will not solve the world's food problems, new, untapped resources such as squid, lantern fishes, krill and plankton might do a lot. Still, we need new techniques to replace uncontrolled, primitive hunting with planned production in order to make the most efficient use of our marine resources.



Three species of groundfish plentiful on the Nova Scotia Banks suggested as worth study for increased commercial exploitation: (1) Argentine *(Argentina silus);* **(2) Silver hake** *(Merluccius bilinearis);* **(3) Northern sand launce** *(Ammodytes dubius).*

Appoint Chief of Vessels and Engineering Division

The appointment of Commander H.A. Shenker, RCN, 49, as Chief of the Vessels and Engineering Division of the Industrial Development Branch, Fisheries Service, Department of Fisheries and Forestry, Ottawa, has been announced by federal Fisheries Minister Jack Davis. Since July, 1967, Cmdr. Shenker has been Senior Staff Officer, Ship Engineering, on the Canadian Embassy staff in Washington, D.C.

In his new position he will be responsible for programs designed to increase the efficiency of Canada's commercial fishing fleet through wide application of mechanization and automation. This will involve fisheries engineering development, including new concepts in fishing vessel design and equipment, improved methods of powering vessels, use of new construction materials and electronic fish-finding and navigation gear, all directed to achieving better working conditions for crews and increased productivity.

Born in Hamilton, Ont., Cmdr. Shenker served as a bomber pilot with the RCAF during the Second World War, receiving the Distinguished Flying Cross. Following graduation from the University of Toronto and Massachusetts Institute of Technology with bachelor of science and naval engineering degrees, he joined the Royal Canadian Navy and served in various capacities relating to the design and construction of naval vessels.

In 1957 he was appointed Deputy Manager, Constructive Department, HMC Dockyard, Halifax, moving to Ottawa the following year to become Project Leader on the design

H.A. SHENKER

of naval vessels. In 1959 he was appointed Manager Constructive Department, HMC Dockyard, Esquimalt. He returned to Ottawa in 1963 as Assistant Director, Ship Design and Construction (Contract Design). His most recent position in Washington involved technical liaison with the United States Navy and other U.S. government agencies and private industry on all facets of ship engineering.

Cmdr. Shenker is a member of the Association of Professional Engineers of Ontario, the Society of Naval Architects and Marine Engineers and the Royal Institution of Naval Architects.

NUMBER 15

The addition of the *Goose Bay* to the patrol boat fleet brings to 15 the total number of vessels operated in Newfoundland by the federal Fisheries Service.

Herring Tagging Project Starts In North Sea

The International Council for the Exploration of the Sea (ICES), of which Canada is a member-nation, has announced that a large-scale herring tagging experiment is now underway in the North Sea.

The experiment, which is being jointly conducted by several European countries, is designed to provide an estimate of the proportion of juvenile herring taken by the commercial fisheries operating in the area generally referred to as the Bloden ground and in the north-eastern North Sea and Skagerrak where in recent years an increasing proportion of the catch has been of small herring. This estimate is required in order to assess the effect of industrial fishing in these areas on recruitment to the adult herring stocks of the North Sea.

The experiment should also provide useful information on the movements of the juvenile herring within these areas and the pattern of migration away from them.

The success of such an experiment depends, among other things, on the possibility of tagging a sufficiently large number of fish and, in order to achieve a satisfactory number, tagging will be conducted over an eight-month period from mid-July 1969 till mid-March 1970. During this period it is hoped that some 50,000 to 100,000 fish will be tagged in these areas.

It is hoped that a sufficient return of tags will have occurred by the spring of 1971 to permit an analysis of the experiment. The final results will be made known.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	January–May 1968		January–May 1969	
	Landings[1]	Value[2]	Landings[1]	Value[2]
	'000 lb.	$'000	'000 lb.	$'000
CANADA – TOTAL	**737,327**	**40,523**	**748,521**	**38,147**
ATLANTIC COAST – Total	**695,234**	**34,913**	**716,759**	**32,624**
Cod	141,145	6,173	115,859	4,971
Haddock	48,209	3,616	54,059	4,276
Redfish	16,971	422	24,568	592
Catfish	2,781	99	2,812	96
Halibut	2,144	856	1,831	730
Other Flatfishes	99,183	3,294	88,859	3,467
Pollock, Hake, Cusk	16,417	599	11,966	381
Other Groundfish	1,767	23	1,651	23
Herring & Sardines	334,709	3,348	384,277	3,641
Mackerel	807	40	464	29
Swordfish	452	319	290	256
Tuna	39	11	619	22
Alewives	2,511	50	1,036	22
Salmon	234	145	175	123
Smelts	2,141	229	2,987	239
Other Fish	503	44	477	37
Lobsters	17,467	11,449	13,457	9,434
Clams & Quahaugs	1,862	133	2,111	161
Scallops	4,150	3,303	3,745	3,163
Other Shellfish	1,742	204	5,516	783
Misc. Items	–	556	–	98
PACIFIC COAST – Total	**42,093**	**5,610**	**31,762**	**5,523**
Pacific Cods	10,555	823	6,105	497
Halibut[3]	8,798	2,201	7,812	2,818
Soles & Other Flatfishes	4,246	256	4,244	257
Herring	5,810	155	2,722	110
Salmon	2,374	1,280	1,593	1,051
Other Fish	3,141	90	2,232	77
Shellfish	7,169	799	7,054	713
Misc. Items	–	6	–	–
BY PROVINCES				
British Columbia	42,093	5,610	31,762	5,523
Nova Scotia	216,032	18,686	214,765	18,364
New Brunswick	92,761	2,665	62,857	2,608
Prince Edward Island	9,518	3,104	8,119	2,022
Quebec	40,838	1,889	42,579	1,644
Newfoundland	336,085	8,569	388,439	7,986

[1] Fish and Shellfish only. [2] All Products–Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms.
[3] Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES – MAY 1969

		Montreal	Toronto
		$	$
Cod fillets, Atl. fresh, unwrapped	lb.	.423	.540
Cod fillets, Atl. frozen, cello 5's	lb.	.335	.437
Cod fillets, smoked	lb.	.415	.533
Haddock fillets, fresh, unwrapped	lb.	.563	.667
Herring, kippered, Atl.	lb.	.259	.330
Mackerel, frozen, round	lb.	.182	.293
Lobsters, canned, Fancy	Case 48-1/2s	70.087	72.600
Sardines, canned	Case 100-1/4s	10.736	10.180
Halibut, frozen, dressed	lb.	.487	.550
Silverbright, frozen, dressed	lb.	.662	.667
Coho, frozen, dressed	lb.	.912	.980
Sockeye, canned, grade A	Case 48-1/2s	28.053	28.907
Pink, canned grade A	Case 48-1/2s	18.710	19.360
Whitefish, fresh	lb.	.576[1]	.667
Lake Trout, frozen	lb.	.464	.563

[1] Dressed.

PRICES PER CWT. PAID TO FISHERMEN
(Week ending May 17th)

	1968	1969
	$	$
Halifax		
Cod Steak	5.75	5.75
Cod Market	5.5	5.5
Haddock	9	9
Plaice	4.5-5.25	4.5-5.25
St. John's, Nfld.		
Cod	–	4-5
Black's Harbour		
Sardines	2	–
Vancouver		
Ling Cod	10-13	7-16
Grey Cod	7-7.5	8
Soles	8-12	8-8.5
Salmon (Redspring)	40-80	–

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF MAY

	1968 '000 lb.	1969 '000 lb.
TOTAL – Frozen Fish, Canada	**68,721**	**57,727**
Frozen – Fresh, Sea Fish – Total	**48,714**	**37,701**
Cod, Atlantic, Fillets & Blocks	9,238	10,301
Haddock, Fillets & Blocks	5,195	4,350
Rosefish, Fillets & Blocks	2,600	963
Flatfish, (excl. halibut) Fillets & Blocks	6,619	2,960
Halibut, Pacific, dressed & steaks	7,795	4,679
Other Groundfish, dressed & steaks	2,412	1,078
Other Groundfish, fillets & blocks	4,705	1,917
Salmon, Pacific, dressed & steaks	2,275	2,939
Herring, Atlantic & Pacific	330	292
All Other Sea Fish, all forms	4,390	4,126
Shellfish	3,155	4,096
Frozen – Fresh, Inland Fish – Total	**5,543**	**5,639**
Perch, round or dressed	1,624	36
Pickerel (Yellow & Blue) fillets	315	122
Sauger, round or dressed	65	42
Tullibee, round or dressed	107	187
Whitefish, round or dressed	471	683
Whitefish, fillets	95	113
Other, all forms	2,866	4,456
Frozen – Smoked Fish – Total	**1,580**	**1,381**
Cod, Atlantic	723	593
Sea Herring, kippers	400	226
Other, all forms	457	562
Frozen For Bait and Animal Feed	**12,884**	**13,006**

SALT FISH STOCKS AS AT END OF MAY

		1968 '000 lb.	1969 '000 lb.
Salted and Pickled Fish, Atlantic Coast			
Wet-Salted – Total		**8,988**	**4,654**
Cod		6,522	3,409
Other		2,466	1,245
Dried-Salted – Total		**12,919**	**6,309**
Cod		11,897	6,100
Other		1,022	209
Boneless – Total		**1,217**	**439**
Cod		1,077	399
Other		140	40
Pickled – Total	(barrels)	**9,269**	**5,095**
Herring	"	5,174	4,577
Mackerel	"	1,875	[1]
Alewives	"	2,220	518
Turbot	"	–	–
Bloaters	(18 lb. boxes)	81,354	45,311
Boneless Herring	(10 lb. boxes)	4,698	4,304

[1] Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS
JANUARY – APRIL

	1967-68 $'000		1968-69 $'000	
TOTAL EXPORTS		**66,833**		**75,728**
By Markets:				
United States		42,237		46,742
Caribbean Area		6,126		5,674
Europe		16,477		20,118
Other Countries		1,993		3,194
By Forms:				
Fresh and Frozen		**39,650**		**47,132**
Whole or Dressed	**11,485**		**14,346**	
Cod, Haddock, Hake	317		266	
Halibut, Pacific	1,286		1,358	
Salmon, Pacific	3,605		6,706	
Swordfish	181		179	
Other Seafish	2,029		1,833	
Whitefish	1,933		1,900	
Pickerel	719		664	
Other Freshwater Fish, n.e.s.	1,415		1,440	
Fillets, Blocks and Slabs	**19,611**		**21,257**	
Cod, Atlantic	5,806		6,368	
Haddock	2,740		3,299	
Ocean Perch, Hake, Cusk, Pollock	2,559		2,713	
Flatfish	5,033		5,567	
Pickerel	819		591	
Other Fillets and Blocks	2,654		2,719	
Shellfish	**8,230**		**10,763**	
Lobsters (in shell & meat)	4,789		6,768	
Scallops	2,920		3,058	
Other	521		937	
Frozen Fish & Shellfish, pre-cooked	**324**		**766**	
Cured		**7,602**		**6,668**
Smoked	**737**		**831**	
Herring	403		418	
Other	334		413	
Salted, Wet & Dried	**5,968**		**5,020**	
Cod	5,200		4,421	
Other	768		599	
Pickled	**897**		**817**	
Herring	551		516	
Mackerel	209		108	
Other	137		193	
Canned		**15,478**		**15,978**
Salmon	12,098		12,959	
Sardines	2,311		2,037	
Lobsters	347		146	
Other	722		836	
Miscellaneous		**4,103**		**5,950**
Meal	2,038		4,175	
Oil	128		323	
Other	1,937		1,452	

Current Reading

FREEZING AND IRRADIATION OF FISH

Edited by Rudolf Kreuzer.

Published by Fishing News (Books) Ltd., London, Eng. Price $30.00

The 1967 FAO Congress in Madrid on Freezing and Irradiation of Fish was held with the basic aim of providing the latest and fullest knowledge about the merits and capacities of refrigeration practices so as to contribute to the fuller utilization of the world's fishing catch for human food. This book, published by arrangement with FAO, puts that Congress on permanent record.

In six main parts and with 80 papers from probably the most experienced and authoritative scientists and technologists in the world, the 528-page volume was produced under the editorship of the Secretary of the Congress, Dr. Rudolf Kreuzer, Chief of the Fishery Products and Marketing Branch of FAO, assisted by associate editor R.S. Bolton, of the Fish Inspection Branch of the Department of Fisheries and Forestry of Canada.

The six sections cover freezing fish at sea; freezing and processing of frozen fish; economies of producing and marketing frozen fish products; the quality of frozen fish products and its assessment; storage, packing and distribution; and preservation of fishery products by irradiation. Fourteen Canadian scientists and technologists were among those who contributed papers.

Although the contents are essentially scientific, the book should prove of considerable practical value to all those engaged in the processing and distribution of fish.

LIMNOLOGICAL SURVEY OF LAKE ONTARIO, 1964.

Technical Report No. 14, published by the Great Lakes Fishery Commission,
Ann Arbor, Michigan.

The five papers in this publication document a lakewide hydrographic and fishery survey of Lake Ontario, conducted by the U.S. Bureau of Commercial Fisheries in September 1964. The 10-day survey included the measurement of several chemical constituents of the water, identification and counts of phytoplankton, and the sampling of bottom fauna and fish populations.

A previous shortage of data such as obtained in this 1964 survey has made measurement of environmental changes in the Great Lakes a difficult task and, in turn, hindered efforts to recognize, control and prevent pollution. However, as far as Lake Ontario is concerned, it is felt that a combination of isolated studies with lakewide surveys at periodic intervals should give a good base from which to measure changes that will undoubtedly continue in the lake. And when pollution abatement becomes a reality, it should be possible to measure the rate of recovery of the lake to a more desirable condition.

Authors of the five papers are Herbert F. Allen, Jerry F. Reinwand, Roann E. Ogawa, Jarl K. Hiltunen and LaRue Wells, all with the U.S. Bureau of Commercial Fisheries Biological Laboratory at Ann Arbor, Michigan.

TUNA DISTRIBUTION AND MIGRATION

By Hiroshi Nakamura

Published by Fishing News (Books) Ltd., London, Eng. Price: $5.75

The hypotheses of tuna distribution and migration based on ocean currents and temperatures were first conceived by Dr. Nakamura in 1937 and presented publicly in 1954. An appointment as visiting scientist at the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, in 1967 provided him with the opportunity to rewrite the hypotheses in the light of subsequent information and the resulting treatise is what has been produced in book form.

Dr. Nakamura states that the Japanese tuna fisher men have come to acknowledge the validity of th hypotheses and have programmed their fishing operation on the basis of them. He also suggests that the hypothese afford a point of departure not only for the study c tunas, but also possibly for other fisheries.

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Inshore cod fishing, St. John's, Newfoundland.

FISHERIES of Canada

Sept. 1969 Vol.22 No.3

In This Issue

Report of the FAO Technical Conference on Fish Inspection and Quality Control

Department of Fisheries and Forestry, Ottawa

September 1969

FISHERIES of Canada

CONTENTS

COVER PHOTO – A memorial to 35 New Brunswick fishermen who lost their lives in a storm 10 years ago was recently unveiled at Escuminac, N.B. See article on back cover.

Published by the Department of Fisheries and Forestry, Ottawa

Editor:
E.H. Hearnden

Conference Urges Promotion Of Fish Inspection Systems

Action to promote and develop fishery inspection and quality control services, both nationally and eventually world-wide, was recommended at the conclusion of the FAO Technical Conference on Fish Inspection and Quality Control held at Halifax, N.S., July 15-25. About 250 delegates, representing government, industry and private and international institutions in 45 states, took part.

The conference, the first of its kind, broadly examined the scientific, technical and legal aspects of the problem of fish inspection and quality control. It agreed on the need for efficient, scientifically-based inspection systems to assure the highest quality of fish and fish products, both in the interest of consumers and the fishing industry in general. It was emphasized that better quality control would also help to reduce wastage and facilitate exports by developing countries especially.

To this end, the conference urged that a symposium on Fish Inspection and Quality Control be held at an appropriate future time to continue the work already begun. It approved recommendations for the establishment in individual countries of suitable inspection programs, including education and training of personnel. FAO was requested to appoint a special committee to elaborate such programs, considering also the problem of education and training.

The conference discussed whether fish inspection programs should be voluntary or mandatory and decided that this depends on the circumstances in each particular country. In any case, it was emphasized that there should be "no compromise in matters affecting public health".

GLOSSARY OF TERMS

The conference also recommended that FAO undertake publication of a glossary of terms used in fish inspection and quality control which could be applied internationally. Such a glossary – to be submitted to govern-

Dr. A.W.H. Needler, Deputy Minister of Fisheries and Forestry and President of the FAO Inspection and Quality Control Conference, delivering his opening address to the 250 delegates attending from 45 countries. Officials and guests for the opening session were: (Left to right): G.G. Anderson, Acting Director, Inspection Branch, Ottawa and Conference Vice-Chairman; Deputy Mayor Reg Allen, City of Halifax; Dr. Needler; Dr. R.R. Logie, Assistant Deputy Minister (Fisheries Service), Ottawa, and Conference Chairman; Premier G.I. Smith, Province of Nova Scotia; Roy I. Jackson, Assistant Director-General (Fisheries), Food and Agriculture Organization, Rome; and Dr. Rudolph Kreuzer, Chief, Fisheries Products and Marketing Branch, FAO Fisheries Department, Rome.

In an impromptu gesture of goodwill and gratitude for Canada's aid to his country, Fred Peterkin of Guyana presents Fisheries Minister Jack Davis with a copy of an original sketch of a 150-year-old Georgetown church.

Freeze-dried shrimp displayed by Scientific Liaison Officer P.M. Jangaard in Fisheries Research Board Laboratory, Halifax, receives close attention from Moisé Kramer, Director of Fisheries, Israel; Cabrera Quiroz, Bacteriological Unit, Agriculture and Fisheries Department, Peru, and R.H. Calabrese, Marine Biology Institute, Argentina.

ments for comment – would serve to establish a common language in a very complicated field and facilitate understanding, it was noted.

Finally, the meeting noted the possibility of detecting fish spoilage through chemical means. To date, trimethylamine, which develops during spoilage of fish, is the most promising, though the method is applicable only to certain species of marine fish.

Almost 100 papers on various aspects of fish inspection and quality

Roy Jackson, Assistant Director-General (Fisheries) of FAO, addressing the conference.

determination were discussed. The general topic of Fish Inspection and Quality Control was covered under the following headings: the need for inspection and quality control; national fish inspection programs; general principles and program development; in-

Conference Pays Tribute To H.V. Dempsey

Several moving tributes to the late H.V. Dempsey, Director of the Inspection Branch of the Department of Fisheries and Forestry of Canada, who died earlier this year, were paid at the FAO Technical Conference on Fish Inspection and Quality Control, held at Halifax, N.S.

Referring to the fact that Mr. Dempsey played a leading role in the preparation of the Conference, Roy I. Jackson, Assistant Director-General (Fisheries) of FAO, said his outstanding knowledge of national and international fish inspection programs enabled him to see the need and the possibilities for a worldwide understanding of the principles of fish inspection.

"As chairman of the steering committee which assisted in the preparation of the Conference, Mr. Dempsey rendered invaluable service to the preparatory work for both the Conference and the Seminar/Study Tour, which was his idea". Mr. Jackson said. "He was the moving spirit in the development of a concept of fishery inspection, and his thinking will have left an indelible mark on this Conference and its outcome."

Dr. A.W.H. Needler, Canada's Deputy Minister of Fisheries and Forestry, said the Conference would have been the high point in Mr. Dempsey's career and his contribution to it would have been immense. "I know I am speaking for all who knew him when I express our sincere regrets for the loss of a good man and true friend" Dr. Needler added.

Conference delegates observed a minute of silence in memory of Mr. Dempsey.

Dr. Rudolph Kreuzer, (left) Secretary for the FAO Inspection and Quality Control Conference, with study tour participants from three continents: Dr. P. Karnasut, Director-General of Fisheries, Thailand; C. Dhatemwa, Regional Fisheries Officer, Uganda; and R.H. Calabrese, Marine Biology Institute, Argentina.

dustrial advantages of inspection and quality control; research reports on methods for quality assessment.

During the general debate, speakers called for greater research into fish spoilage and development of quick, efficient methods for its detection. Numerous speakers, especially from developing countries, emphasized the need for education and training in the field. The participants, on the whole, agreed that there was a trend towards more stringent standards as regards fish quality and that consumers were becoming more demanding in this respect.

One participant, C.H. Castell of the Fisheries Research Board of Canada, predicted that spoilage of fish after catching will eventually, thanks to modern scientific advances, be reduced to insignificance and that consumers will enjoy the same high standards for fish and fish products that they now expect and get from meat and poultry products.

MINISTER'S WELCOME

Welcoming the delegates on behalf of the Canadian Government, federal Fisheries and Forestry Minister Jack Davis said it was a matter of pride for Canada that a number of Canadians were among the early advisers to FAO and that many others are serving with the organization.

Referring to the trend on the North American continent for consumers to use fish as a premium quality food, rather than a commonplace staple as in the past, the Minister predicted that this change was likely to happen on a world-wide basis in the future. As a wider range of foods became available to consumers, giving them the opportunity to pick and choose, quality of food products would become more and more important. "You have a great and challenging

field ahead of you to explore" Mr. Davis told the delegates.

In an opening address, Roy I. Jackson, Assistant Director-General (Fisheries) of FAO, said that in recent years FAO had received an ever-increasing number of requests from developing countries for assistance in improving the handling and marketing of fish, in modernising processing methods and in developing products which enable a more profitable utilization of the catch.

"One of our primary concerns should be to improve the public image of fishery products by ensuring consistently high quality and thereby enhance consumer appreciation of fish as food" Mr. Jackson said.

Dr. A.W.H. Needler, Canadian Deputy Minister of Fisheries and Forestry, was president of the Conference. Chairman was Dr. R.R. Logie, Assistant Deputy Minister (Operations) in the Canadian Department of Fisheries and Forestry. Secretary was Dr. Rudolf Kreuzer of FAO, assisted by R.M. Bond, also of FAO's Department of Fisheries.

Study tour participants hear an account of Fisheries Research Board Laboratory programs from the Director, Dr. D.R. Idler, following a visit to the Inspection Branch and FRB laboratories, Halifax.

Experimental Transplant of Chinook Salmon

The fish population of the Capilano River in British Columbia increased by more than 100,000 chinook salmon fingerlings during August as the result of an experimental transplant by the Department of Fisheries and Forestry.

Object of the transplant is to determine the possibility of establishing self-sustaining chinook populations in rivers such as the Capilano which presently do not support this species. The fingerlings introduced into the Capilano River were four months old and had been reared at the Department's Big Qualicum River Salmon Development Project on Vancouver Island.

The transplanted salmon were distinctly marked prior to release so that adults returning two or three years from now can be positively identified when captured in the sport or commercial fishery.

A transplant of a similar number of fish to the Tsolum River, a tributary of the Puntledge near Courtenay, B.C., is also planned when water conditions are favourable.

CORRECTION

In the caption to a photograph showing Dr. A.W.H. Needler, Deputy Minister of Fisheries and Forestry, receiving an honorary Doctor of Science degree at the University of British Columbia ("Fisheries of Canada", July, 1969), the President of UBC (Dr. Walter Gage) was erroneously identified as Dr. F.K. Hare, who is the former President. We regret the error.

Planning and Organizing A Fish Inspection Program

BY H.V. DEMPSEY*

When compared with most foods, deteriorative changes occur rather quickly in fresh fish. From the moment the fish is taken from its natural environment until it is consumed in some form, hours, days, weeks or even months later, there is a relentless and losing struggle against physical and chemical phenomena which singly or in combination eventually make the fish unacceptable for human food.

Quality control, or the war against spoilage, can be defined as "all methods, procedures, techniques and processes employed to inhibit, delay or prevent deteriorative changes in freshly killed fish and in fish products, and to prevent contamination or adulteration." More simply quality control is the application of technology to the handling, production, manufacture, storage and distribution of fish and fish products in order to meet established or acceptable norms.

Fish inspection is the act of measuring the effectiveness of quality control. It may be the subjective sensory assessment of the odour and appearance of whole fish when landed on a dock or wharf from a fishing vessel. In another instance, fish inspection may be represented by a complex laboratory procedure to determine the presence of pathogenic micro-organisms.

Inspection is possible of all species of fish in any form.

THE PROBLEM

In the organization and planning of a fish inspection program, the nature and extent of the problems of quality control in the catching, processing, storage and distribution of fish must first be established through surveys and other forms of assessment. No systematic planning is possible without substantial knowledge of the problems to be solved. Measurement of performance must precede effective control.

Factors which contribute to the degradation of quality in fish and fish products can, for the purposes of assessment and control, be segregated into two broad areas. The first is raw material quality depending upon the handling of fish at sea and on shore. Product quality, in the second area, is affected by the environment and methods of processing, storage and distribution, including retail sale.

Survey of raw material quality

Quality which has been lost through faulty handling of fish at sea cannot be restored by any form of processing. Only low grade food can be expected from poor quality raw material even though some processes such as salting and smoking may partially mask the more obvious defects of staleness or sourness.

Good quality fish may be landed which, because of inadequate or improper shore handling facilities, can become unfit before it is processed. Of considerable concern is the practice, during unloading or subsequent boxing, of mixing fish of different levels of quality.

In assessing the problem of raw material quality, a survey should be made at each port of landing. The quality and condition of the catches of each vessel should be observed and, if possible, the study should continue over a period of several months in order to provide a record of performance for each catching unit. The level of effectiveness and efficiency of the crew of each vessel may differ considerably with regard to proper handling, chilling and stowing procedures. There is the continuing added problem of frequent changes in crew personnel. The capability of the vessel to maintain quality is related directly to its construction in respect of:

1. Insulation to inhibit heat transfer to fish holds;
2. The availability of suitable protection of the fish from sun, wind and weather;
3. The use of impervious and

***Mr. Dempsey, until his death in June, 1969, was Director of the Inspection Branch of the federal Department of Fisheries and Forestry. This paper, which he prepared for the FAO Technical Conference on Fish Inspection and Quality Control at Halifax, was presented at the conference by G.G. Anderson, Acting Director of the Inspection Branch.**

easily cleaned materials in the fabrication of holds and other storage areas.

The survey should also take into account the duration of trips from the time of first catching until the vessel returns to port. Refrigeration capacity and its effectiveness should be assessed. Finally, information is necessary about the adequacy of port facilities to handle and protect the fresh fish until it reaches the processing plant or is boxed for direct distribution to wholesale and retail outlets.

Survey of product quality

Processing. It is usual to find a grave lack of application of the fundamentals of the technology of quality control in the fishing industry from the fisherman through each link in the chain of production and distribution to the consumer. Rather a detailed survey is required to accurately define the quality control problems existing in the fish processing activity because of failure to use available technological information. The fresh, unspoiled, whole fish arriving at a processing plant contains spoilage bacteria in the skin slime, in the gut cavity and in the gills, while the uncut flesh remains virtually sterile. The reduction of bacteria through efficient washing prior to processing is a necessity. In addition to data on this factor, the survey should define, in considerable detail, the processing environment created by the construction, equipment, hygiene and operation of each factory. In particular the assessment of the quality control problems must reveal the degree to which processing is a vector of contamination and spoilage.

Various means of preservation are used to inhibit deterioration of quality in fish products including freezing, canning, drying and salting. The survey should include data on the effectiveness of these processes in order that specific problem areas can be isolated for future attention.

Storage. Whether refrigerated or not, storages can make an important positive contribution to the quality control of fish products. Refrigerated storages for chilled fresh, salted and other types of unfrozen fish, as well as low temperature storages for frozen fish, should be capable of providing and maintaining an optimum temperature environment. The survey should provide temperature data for storage rooms and for the products being held. Storages can also contribute to problems of product contamination. Assessment of construction and operational details is necessary. Knowledge of time/temperature relationships is essential.

Distribution. The movement of fish products from the ports of landing or from processing plants to the centres of wholesale or retail sale can, in many countries, represent a quality problem of some significance. In Canada, for example, most of the major cities are located inland from 1000 miles (1600 km) to 2000 miles (3200 km) from the ocean. Therefore transportation facilities by road or rail must be capable of maintaining a suitable temperature environment over several days, particularly during periods of high ambient temperatures. The survey should establish the role of distribution in quality control.

OBJECTIVES

Following completion of a comprehensive survey of problems in fish quality control, an assessment of the data collected should indicate the need for quality control and define the areas of activity where corrective measures through inspection are necessary. Objectives must now be established on which a fish inspection

A federal Fish Inspector examines fish for freshness after passing through weighing machines at an East Coast processing plant.

program can be structured and these could be stated as follows:

1. To develop and apply at all levels of production, distribution, storage and sale, a program of fish inspection which will:
   (a) Protect the health of the consumer
   (b) Ensure that fair trade practices are observed which prevent fraud and deception
   (c) Create confidence in consumers by maintaining a consistent level of good quality in fish and fish products
2. To establish such classifications and standards of quality as are necessary for the development of a viable industry in the production, processing, storage and marketing of fish products.
3. To develop an awareness and understanding on the part of fishermen, plant workers, management, wholesalers and retailers of the need for improved technology in the handling, processing and marketing of fish, primarily through education and secondarily by application of regulations.
4. To develop and enforce, primarily through registration requirements, adequate sanitation, handling facilities and methods on fishing boats and in fish processing plants.

Simply stated, the objectives of a fish quality control and inspection program are:

1. To ensure the safety and acceptability of fish and fish products.
2. To improve the quality of fish and fish products.
3. To improve the environment of handling, processing, storage and distribution.
4. To increase the consumption of fish.
5. To improve the earnings of fishermen and industry.

THE PROGRAM

Properly set objectives anticipate ways and means for their achievement. In planning and establishing a fish inspection program, seven major steps should be followed:

Inspection centres

Strategically located bases of inspection must be established which will result in the most effective use of manpower. They should be located at important fishing ports or so placed that a number of ports or processing plants could be serviced from each centre. Inspection services should also be available in each large centre of distribution and consumption.

Staff and training

Careful consideration must be given to staff selection and appointment. To reject and condemn fish and to close unhygienic processing establishments is only a small part of the total task of fish inspection and quality control. Any reasonably intelligent person can be taught in a few months to segregate fish into good and unacceptable lots. While the consumer undoubtedly is protected by such action, the basic problem is not corrected. Rarely does a fisherman or a processor deliberately produce poor quality fish products. Instead, lack of knowledge and understanding of the technology of handling, processing, preserving, storing or distributing fish and shellfish is almost always the cause. It follows therefore that inspection and quality control officers should have a high standard of education and be given special training in fisheries technology in order that they may convey to fishermen and industry the information necessary for them to solve their technological problems.

In summary, each person engaged in the inspection of fish and fishery products must have a detailed understanding and knowledge of how fish are caught and processed; spoilage patterns for each species; the methods of freezing, packing, storage and distribution; and, in general, have a good working knowledge of fish product technology from the ship to the shop if both the consumer and the industry are to benefit from his expertise. Each fish inspection officer must therefore regard himself first as a counsellor to industry in food processing technology, with reserve powers as a policeman and enforcement officer to be used as a last resort when dealing with recalcitrants and other law breakers who refuse to obey the rules.

Equipment

Each inspection centre must have ready access to a supporting laboratory where chemical and bacteriological analyses can be performed to check the safety of the food. Such analyses are necessary also to monitor the effectiveness of quality control measures and to confirm judgments reached and decisions made by quality control officers.

Standards

Standards or norms must be established both for fish and fish products and for processing establishments and other facilities. At the same time, methods and techniques for measuring compliance with the standards must be developed. These will include both objective tests and methods of sensory assessment. It is a mistake to get initial standards too low

if there is to be any incentive for improvement by industry. Similarly, standards which are unrealistically high must be avoided if a high degree of co-operation from the industry is to be expected and if the quality control officers are to achieve success.

Industrial relations

All draft standards must be discussed with industry. The most successful fish inspection program results from a co-operative effort between the inspection agency and industry, developed in an atmosphere of mutual confidence and respect. Coercion does not develop a reputable fish processing and marketing industry with a pride in its product. Fish inspection cannot be made to work simply by passing laws and enforcing them. The inspection agency and the industry share a common goal – consistently to provide the consumer with the best quality of fish and fish products.

Application of inspection

It is wise practice to apply most quality and operational requirements on a voluntary basis for at least three years before giving them the force of law as standards. This procedure serves several purposes. It enables both the inspection agency and industry to determine, through application, what is ultimately desirable in mandatory requirements so as to achieve a balance between what is ideal and what is practical, without in any way sacrificing consumer protection. It enables quality control inspectors to develop and whet their skills on the grindstone of practical experience. Voluntary application also exposes the industry to the demands and disciplines of food technology and inspection and to controls on the environment of processing and marketing so that the necessary managerial and operational adjustments may be made before the program becomes compulsory.

Preparing dilution blanks for bacteriological analysis at the Vancouver inspection laboratory of the federal Department of Fisheries and Forestry.

Regulations

The formulation and application of regulations should be the last step in the development of a fish inspection program. As previously stated, a co-operative effort by government and industry is desirable. Unfortunately, however, there exists in the fish processing and marketing industry, as in most other endeavours, a small unprincipled element able to profit financially in the short term by trafficking in the lowest quality fish products. Thus regulations are required for two main reasons:

1. To provide uniform minimum standards of quality for the protection of the consumer and the stabilization of the industry.
2. To protect the industry as a whole from an unfavourable public image by controlling the production and sale of low quality fish products.

GOALS

If a fish inspection program is to make steady and significant progress toward the achievement of stated objectives, annual goals should be set to produce results within a given period of time. Target dates should seldom exceed twelve months. In the setting of goals, the fullest account must be taken of available resources of

money manpower and materials in order that they may be utilized with maximum effect. Examples of the form in which goals may be stated are:

1. Standards of operation for frozen fish factories will be developed by February 15, referred to industry for comment by March 31 and adopted for voluntary application by August 1.
2. Three-day seminars on inplant sanitation are to be given for foremen of fish processing plants in the ports of A, B and C before November 30.

CRITERIA OF PERFORMANCE

Once a program has become operational, its performance must be measured against established criteria. Using this technique, areas of difficulty and of low output can be identified. Goals may have to be modified if found to be unrealistic and unattainable within the restraints of time and cost. Alternatively, it may be discovered that progress within the reporting period consistently exceeds the goals set, making possible a more optimistic projection of future performance. Some criteria of performance which might be used are:

1. A reduction in the quantity of raw material found unsuitable for marketing or processing.
2. Fewer consumer complaints about fish product quality.
3. An increase in national **per capita** consumption of fish and fish products.
4. Higher levels of sanitary quality of the product based on microbiological criteria
5. Compliance by the processing industry with official standards of hygiene and temperature control

Meeting the Challenge of Automation

The ultra-sophisticated fishing equipment afloat and processing equipment ashore, now becoming available to a rapidly changing fishing industry, as well as the advanced operation and maintenance skills such equipment demands, are to be studied in detail at a major fisheries conference to be held in Montreal next February 3-6.

It will be a Conference on Automation and Mechanization in the Fishing Industry (C.A.M.F.I.), sponsored by the Federal-Provincial Atlantic Fisheries Committee. Representatives of federal and provincial governments, the industry itself and the scientific, engineering and business enterprises who can contribute to the modernization of the industry will participate. More than 40 of them will present papers, mainly on the application of automation and mechanization and on related subjects such as new management techniques.

These papers will seek to provide answers to many of the questions which arise when an industry's survival depends upon obtaining maximum efficiency. To meet increasing competition from other fishing nations and to deal with problems of growing capital investment and production costs, the structure of the Canadian fishing industry is undergoing drastic change. The main objective of the conference is to show ways and means of meeting the challenge, how arduous and tedious tasks can be reduced, and pay and working conditions of the labour force improved.

Automated and mechanized equipment as well as new processes and production techniques which are now in operation or will become operational within the next five years will be discussed. The conference is planned to benefit not only the fishing industry but the builders of fishing vessels and the producers of the necessary machinery, systems and equipment on the vessels and in the land based plants.

The membership of the Federal-Provincial Atlantic Fisheries Committee is made up of the deputy ministers responsible for fisheries in the Federal Government and the governments of Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland. Previous major fisheries conferences sponsored by the Committee have dealt with Atlantic offshore fishing vessels, the Atlantic herring fishery, fish protein concentrate, and fishing vessel construction materials.

BRINE SHRIMP INDUSTRY

In connection with the article on the brine shrimp industry in Saskatchewan ("Fisheries of Canada", July, 1969), it has been pointed out that Manitou Lake is not the only lake in Saskatchewan where these shrimp are harvested.

Three companies are presently harvesting brine shrimp products from Little Manitou, Chaplin, Frederick, Ingebright, Alsask, Morse, North Verlo and Snakehole Lakes. These companies are also carrying on a limited harvest of freshwater crustaceans (i.e. daphnia and cyclops).

W.R. Parks, Deputy Minister of Natural Resources for the Province of Saskatchewan, to whom we are indebted for this information, also points out that brine shrimp is harvested in the State of California.

Close Part of Bay to Purse Seiners

A decision to close the northern part of St. Mary's Bay in Nova Scotia to herring purse seiners was announced August 1 by Fisheries and Forestry Minister Jack Davis. This ruling, he said, is coupled with a program to limit weir licences in the same area.

The part of St. Mary's Bay which will be reserved for weir fishermen includes all waters north of a line from Petit Passage on Digby Neck to Church Point on the French Shore. It will be closed to herring purse seiners from May 1 to September 30 each year, starting in 1970.

Mr. Davis, who visited St. Mary's Bay recently, said that the new licence limitation scheme was being introduced in order to make the weir fishery more economic. Installations reporting poor results will be phased out. Those producing a decent livelihood for their owners will be retained.

"Generally speaking, I am against regulations which favour one type of gear over another", Mr. Davis said. "However, because weirs in certain locations have produced top quality herring and because the shallow end of St. Mary's Bay lends itself to the weir fishery, we are making an exception in this case."

All existing owners will be able to operate their weirs in 1970. However, no additional licences will be granted and new weirs can only be built if they replace old ones.

Beginning in 1970, the annual licence fee for each weir in the restricted section of St. Mary's Bay will be $25.00.

Weirs which are not productive will tend to disappear. Those which report an average annual catch of less than 200 tons of herring will be struck off the list in 1974 in any case.

Weir operations in other parts of the Maritimes are under review. "Those which are protected from purse seiners by an arbitrary line must also show us what they can do. They have a privilege and it is up to the Department of Fisheries and Forestry to make sure that they use it to generate a decent income for our fishermen," the Minister said.

The Minister noted that the number of weirs in St. Mary's Bay had risen from 8 in 1965 and 1966 to 22 in 1969. "Of these less than half are economic. Therefore I will not be surprised if many of the poorer weirs disappear over the next decade," Mr. Davis said.

Draft New Treaty For SE Atlantic

An international treaty for safeguarding fishing grounds in the Southeast Atlantic Ocean off southern Africa will be discussed for adoption by plenipotentiaries of interested governments in Rome, October 14-23.

Invitations to attend the conference, which is being convened by the Food and Agriculture Organization, have been issued to the 18 governments most immediately concerned and to FAO member and associate member nations and interested international organizations.

After its scheduled adoption by the conference, the Convention for the Conservation of the Living Resources of the Southeast Atlantic will be open for signature by all members of the United Nations and its specialized agencies. It will enter into force after it has been formally ratified by a prescribed number of governments.

The convention provides for establishment of an international commission to undertake studies and to make recommendations to member states for the regulation of fisheries in the area, which lies off the western coast of Africa between the mouth of the Congo River and the southern tip of the continent at 50 degrees south latitude. The commission will be assisted by a special scientific advisory committee.

Fishing in the area has more than doubled in the past decade, largely as a result of the entry of long-distance fleets from other parts of the world. This has caused heavy exploitation of certain stocks, particularly hake and pilchard.

'GANDER BAY' LAUNCHED

The *Gander Bay*, a new 66-foot patrol vessel to be operated in Newfoundland waters by the federal Fisheries Service, was launched from Newfoundland Shipyards, Clarenville, July 30. The naming ceremony was performed by Mrs Grace Barbour, wife of Capt. Wilf Barbour, the Department's Marine Superintendent in Newfoundland.

Manned by a crew of four, the *Gander Bay* will be placed in service on the west coast of the province.

Strange Catches

Dragger Lands a Walrus Jaw

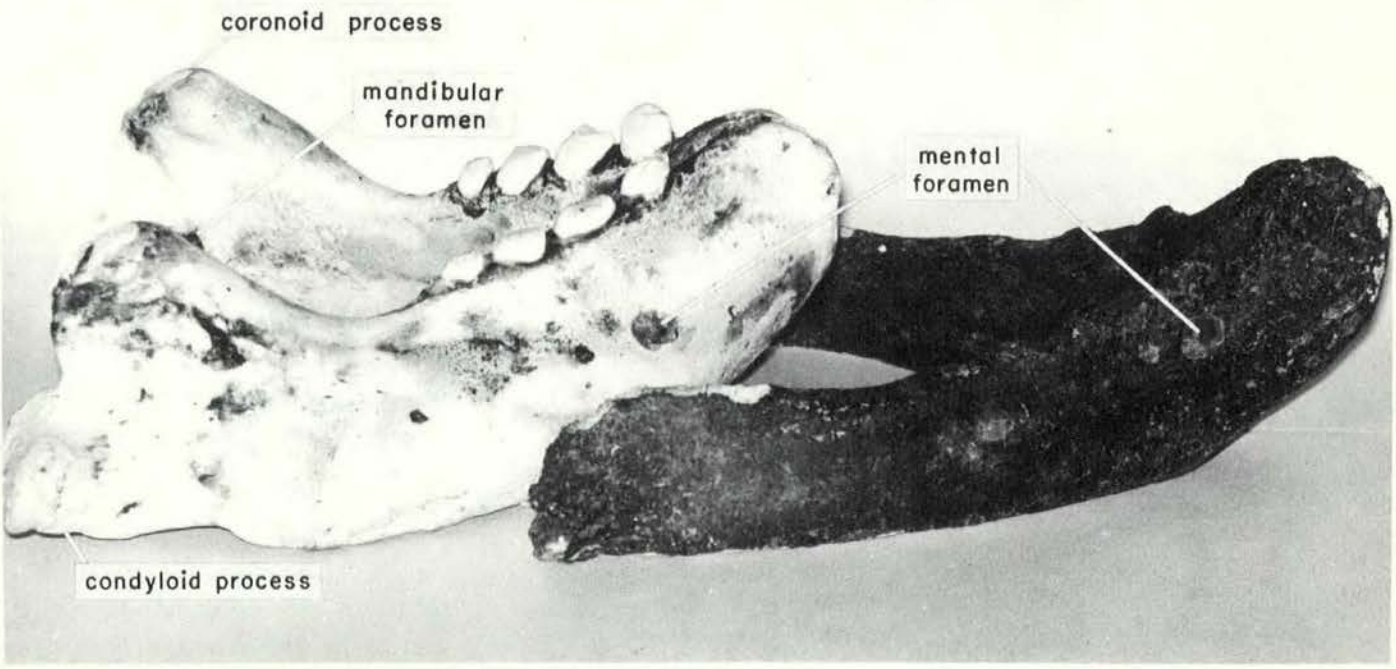
BY PROF. SHERMAN BLEAKNEY
Acadia University, Wolfville, N.S.

The bottom of the sea is one of our world's greatest museums and libraries. Recorded in its layers of sediments are the remains of many different species that lived in the sea during successive historic and prehistoric changes in sea temperatures and sea levels. On Canada's east coast these specimens range from skeletons of microscopic one-cell organisms to bones of giant elephants.

I recently examined a bone sent to Dr. J.C. Medcof of the Fisheries Research Board's Biological Station at St. Andrews, N.B. It was taken by Ira Grant of Pictou, N.S., and dates from a period when walrus were living around the Gulf of St. Lawrence. The specimen is 9 inches long and the distance between the ends of the arms is 7 inches. It was brought up from 17 fathoms by the scallop dragger *Lameque No. 1* on July 9, 1968, while fishing about 5 miles south of Sandy Hook, Magdalen Islands, at 47°10'N latitude and 61°42'W longitude. It is being presented to the National Museum of Natural Sciences, Ottawa.

At first impression this lower jaw (black in photograph) resembles that of a giant sea turtle both in size and shape. However, it is the jaw of a walrus. Comparing it with the jaw from a young female walrus (white in photograph) leaves no doubt about the identity. This white specimen, now in the Acadia University Department of Biology Museum, was taken at Cape Dorset, Baffin Island, in 1960. I wish to thank William McMullon of St. Andrews for assistance in preparing the illustration.

Some of the diagnostic features of the back end of the black jaw have been eroded away, for example, the articular knob that attaches the jaw to the skull (condyloid process) and the dorsal projection (coronoid process). But in spite of this there are other features that certainly distinguish it as the jaw of a mammal. The first is that it is a single solid bone, whereas the the jaw of a turtle is made up of five



Walrus jaws: left, from young female taken on Baffin Island, 1960; right, dredged from sea bed off Magdalen Islands, P.Q.

separate bones and these would not likely stay together after the animal died. A second mammalian feature is the row of sockets for the four pairs of missing teeth. These are simple bowl-shaped pits in which the distinct peg-like walrus teeth are anchored. A third is the nerve and blood vessel tunnel that runs through the core of each jaw. The posterior opening (mandibular foramen) to this tunnel is evident on the inside of the white jaw. The anterior opening (mental foramen) appears in the photograph of both specimens on the outside surface in the region of the chin.

The bone Mr. Grant has found is not a fossil because the lower edges of both wings of the jaw have been ground down (probably in the scallop drag) and show that the bone is still white and porous. The ground surfaces are so even and flat that the jaw rests neatly on the table. We would call the jaw "recent", meaning that it has been on the sea floor only several hundred or perhaps several thousand years – not millions. Over the years it probably became buried by soft sediments and acquired its black colour but at one period in its history it must have sat exposed upon the ocean floor. In this position it was washed by rich currents, for growing upon it are several colonies of bryozoan animals and spiral tube-worm cases. These small creatures feed on sea plankton which in turn was fertilized by a ton or so of the decomposing carcass of our walrus.

Assistance Program Draws Wide Response

The Indian Fishermen's Assistance Program, inaugurated last year to upgrade fishing vessels and shore installations owned and operated by Indian fishermen in British Columbia, has drawn a wide response from those it was designed to help.

To date, 280 applications for vessel assistance and 11 proposals for shore installations have been received by a five-man Indian Fishermen's Development Board appointed by Minister of Indian Affairs and Northern Development Jean Chretien, and Minister of Fisheries and Forestry Jack Davis.

The Board consists of two representatives of the Indian fishermen, a member appointed by the Minister of Indian Affairs, one representative of the Department of Fisheries and one member-at-large appointed by the Minister of Fisheries.

The $4,500,000, five-year program will provide loans and grants to enable Indian fishermen to buy newer, more efficient vessels and to remodel existing craft which are sound, but inadequately equipped.

Indian fishermen will also be given training in current methods of navigation, engine care, electronic equipment, fish handling and other technical subjects.

Appoint Assistant Deputy Minister

W. Evan Armstrong, 39, of Ottawa, has been appointed Assistant Deputy Minister, Planning and Administration for the Department of Fisheries and Forestry, effective September 2, 1969.

Mr. Armstrong will be responsible for the integrated development of Policy, Planning and Program Evaluation in the Department and as well will be responsible for a number of organizational components including the Biometrics and Computer Division, Public Information and Consumer Branch, Property Management, Personnel and Finance and Administration.

Born in Ottawa, Mr. Armstrong received his Bachelor of Commerce degree from Carleton University in 1952. Following graduation he worked with and held senior executive positions with Canadian General Electric. In 1960, he joined a national consulting firm as Atlantic manager and was located in Halifax, N.S.

W. Evan Armstrong

Mr. Armstrong joined the Public Service in April 1965, and at that time was appointed Departmental Financial and Management Adviser for the Department of Indian Affairs and Northern Development. In June 1968, he was appointed Director of the Northern Administration Branch of that Department and in November 1968, Director – Operations, Social Programs.

Some Fundamental Problems In Assessment Of Fish Quality

BY C.H. CASTELL
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Grading fresh fish differs considerably from grading fresh meat. Sheep, swine and cattle are usually brought live to the abbatoir where they are killed, cut and then placed immediately into cold storage. It is the characteristics of meat at the time of slaughtering that determines its grade or quality. This includes the colour and texture of the muscle and fat, as well as their proportion and distribution in the cut.

In many instances the feeding, handling, and selection of the animals before they are killed are significant factors in the production of "high quality" meat. Some have been fed special rations; deformed, diseased and unhealthy animals are eliminated; and domestic animals are rarely slaughtered for food during the later stages of gestation or immediately following parturition. Under these conditions the problem of the extent of microbial decomposition or other forms of deterioration in the tissues are rarely encountered. In grading meat, post mortem deterioration is not generally taken into consideration.

The problem of grading fish is quite different. Like the warmblooded animals, fish at the time of slaughter (catching) do have variations in the chemical composition and texture of their tissues. When looked at from a seasonal standpoint, these variations are often much more extensive than those encountered in meat. For fish in open waters there is no control over their spawning or feeding as is the case with sheep and cattle. With most species, commerical fishermen continue to catch and process the fish regardless of their physiological condition; and with some species they work on a year-round schedule.

The extent of change in the chemical composition and physiological conditions of the fish differs greatly with the species. In extreme cases, such as the Pacific salmon, once spawning has been completed, the fish have been so depleted that they roll over and die. Other species do not die but the same phenomenon of depletion occurs in varying degrees. The reduction of the fat content of herring and other fatty fish are typical examples. And the sardine canners are well aware that in addition to the change in the fat content there are equally important changes in the firmness and texture of the muscle.

However, as a result of our methods of catching, handling, storing and transporting fish we have the additional problem of changes in quality resulting from microbial and other types of enzyme deterioration. This aspect of the problem is so important with our so-called "fresh" fish that many of our present systems of grading are based almost entirely on the extent of post mortem deterioration. This is unfortunate. It tends to make us overlook some of the other important factors that should be considered when judging the quality of fish. But more important, as we gradually improve our methods for controlling bacterial activity, we will become increasingly aware of that "other" quality reflecting the physiological condition of the fish at the time of death.

EXAMPLE WITH MILK

A striking example of a somewhat similar situation occurred in the market milk industry many years ago. As long as the milk had high bacterial counts, the problems of the milk producers were confined almost entirely to taints and deterioration caused by bacteria. But once the bacterial content was substantially reduced by improved sanitation and better refrigeration, they were then faced with an entirely new set of problems. When left in the sunshine on the customer's door step the milk now developed "cardboard", "cappy" and "tallowy" off flavours. And if the milk with a very low bacterial content was held or processed in equipment that had exposed brass or copper surfaces it developed off flavours resulting from oxidation of the lecithin or the butter fat. These lipid oxidations, catalized by sunshine or metals, never occurred when milk had substantial numbers of bacteria, which act as first class anti-oxidants. The very act of eliminating the bacteria gave rise to conditions which permitted another type of spoilage to develop.

Elimination of bacterial spoilage, therefore, will do two things: It may give rise to conditions that will permit another type of deterioration; and it

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will focus our attention on differences in quality resulting from the physiological condition of the fish. In view of the technological progress that is now being made in methods for catching, handling, transporting and preserving fresh fish, it is quite probable that in the forseeable future, bacterial spoilage will become relatively unimportant – just as it has in market milk. The emphasis in grading fish will then shift away from post mortem spoilage and we will judge the quality of fish as we now judge meat from beef, sheep and swine.

There is one other point that I would like to draw to your attention. Most of our systems for grading fish have been set up for "fresh" fish – that is fish that will be consumed in the unfrozen state. We take it as axiomatic that fish that is top grade for the fresh fish trade is also top grade if it is to be frozen. In a very general way this might be so. But there are exceptions. And these exceptions, which I will later point out, have cost some of our Canadian processors many thousands of dollars.

During this Conference you will hear many papers dealing with various aspects of grading in relation to post mortem spoilage. It is very important,– the most important aspect at the present time. I have been asked to review and discuss that other aspect – the influence of physiological and environmental factors on the quality of fish. It is a subject so large that it could be dealt with at another whole conference like this one. All I can do is to give a very brief outline with some interesting examples.

There are three principal factors that determine the quality or physiological condition of the fish at the time of death; sexual maturation, the types and amounts of feed consumed, and environmental conditions – such as water temperature and the presence of organic and inorganic pollutants in the water. Quite often these factors overlap and their effects cannot be distinctly separated. And the effects of these physiological conditions must frequently be observed while bacterial decomposition is developing in the tissues. But for the purpose of discussion they are most easily treated separately.

SEXUAL MATURATION

Although some of the nutrients and energy required for the development of milt or roe come directly from the feed, this is not sufficient. The body of the fish is called upon to make up the difference. This results in a depletion in fat, protein, and other nutrients in the fish. Weightwise this loss is frequently made up by incorporating more water into the tissues, which to some extent masks the depleted condition of the fish. Following spawning most fish feed vigorously to regain their lost nutrients.

The effects of changes during sexual maturation and spawning is most striking in the case of the so-called fatty fish – which store most of their lipids in or adjacent to the muscle tissues. There is no need to point out to the herring or sardine processors that changes due to spawning and the recovery from spawning contribute immensely to the quality of their fish. But with the lean species

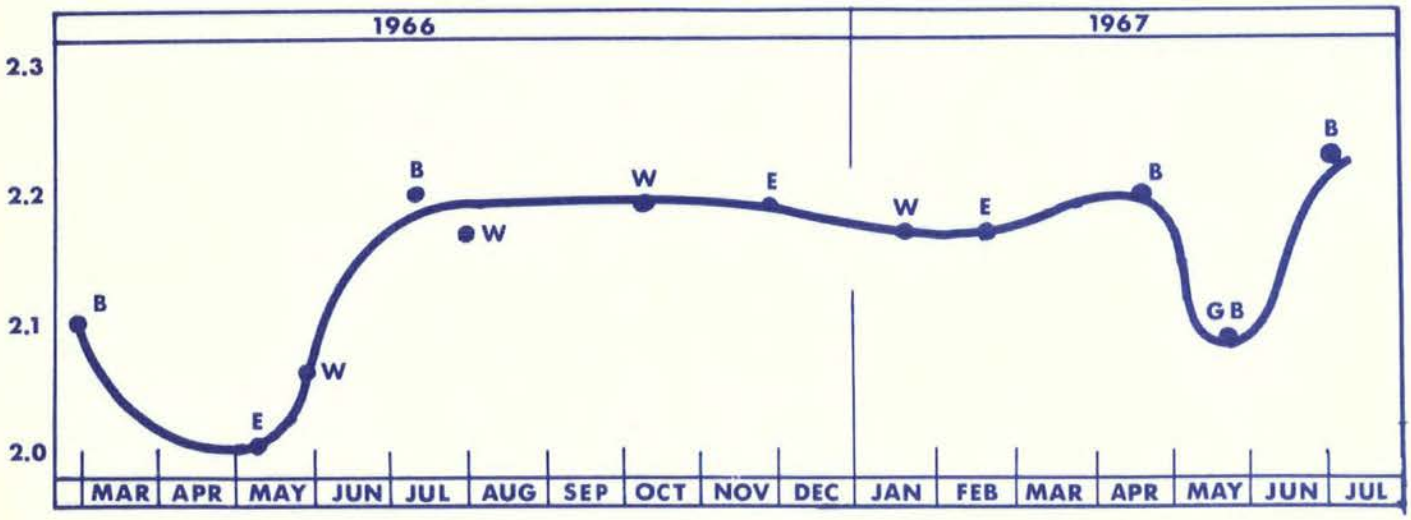

Figure 1. Mean EPN values for 12 lots of fish (each consisting of 12 to 23 fish) that were landed and tested on the dates indicated. The letters above the data refer to the Banks on which the fish were caught: B – Browns; E – Emerald; W – Western; GB – Grand Banks.

this is not so evident because the lipids are stored in the liver instead of in and around the muscle.

Most processors of cod, haddock, halibut and other lean fish recognize that during spawning the fish may be "slinky" and the fillets are often thinner and softer than when taken earlier in the year or later in the summer. But they fish right through this spawning period, and I don't think very much consideration is given to this condition when the fish are graded. They are much more concerned with the degree of post mortem deterioration that has taken place. Perhaps they are right. Our own experience has been that there is more depreciation of quality, and more difficulty in grading fish, during the summer than during the spring spawning period.

In the summer the air and water temperature rises and the fish are feeding vigorously. The derogatory effect of high temperature on the tissues is supplemented by greater fecal contamination in handling the heavily-feeding fish; and by more active enzyme systems in the digestive tract that tend to soften the adjacent tissues once the fish has been killed.

Over 10 years ago we set out to examine, grade and make chemical tests on trawler fish landed at various times throughout the year. This included a careful examination of more than 25,000 fish and was carried out almost daily throughout an 18-month period. Always it was the summer months that gave the trouble. During this time bacterial deterioration took place more quickly. Iced fish that would remain good quality for 7 or 8 days during the spawning period, would be second grade in 4 or 5 days in June or July. This was not all due to bacterial decomposition and a true picture of quality could not be obtained using volatile bases or trimethylamine as a measure of quality. Frequently where significant bacterial spoilage had not taken place the fillets were to soft to be of good quality.

SPOILAGE PROBLEMS

During June, July and early August I visited many wholesale and retail fish stores in Ontario, Quebec and in the adjacent states across the border. At each place, after examining the fish I asked the manager: "What are your principal spoilage problems? " Frequently I was met with the response: "Our present problem is not one concerned with flavours or odours, – but texture. The fillets are soft and the haddock in particular tend to flake apart. The housewife doesn't want to buy a fillet that is mushy or one that has been split into 3 or 4 pieces."

During February and again in July we carried out two not very scientific experiments that illustrated this point. At both periods we took freshly cut fillets from fish that had been held 4 or 5 days in ice on the trawler and we nailed the fillets to the wall through their tail section. In less than 20 minutes all the July fillets had split and fallen to the floor; 78% of the February fillets were still whole at the end of an hour.

In the other non-scientific test we borrowed a 10-foot ladder and set it up on a cement floor. We carried whole gutted fish to the top of the ladder and let them drop to the floor. The fish were filleted along with similar fish that had not been mistreated. We examined the fillets without knowing which fish they came from. In February, in most cases we couldn't separate the fillets from the dropped and undropped fish. In July the mistreated fish had fillets that were mainly mush and in every case could be distinguished from fillets cut from the undropped fish.

I am sure that what I am saying is familiar to most of you from your own experience. I am not so sure that those who are responsible for setting up grading systems recognize the difficulty of grading summer-caught fish where bacterial breakdown is coexistant with changes in the texture of the tissue that cannot be measured by trimethylamine or hypoxanthine; nor can it always be judged by the condition of the eyes or the gills, or from

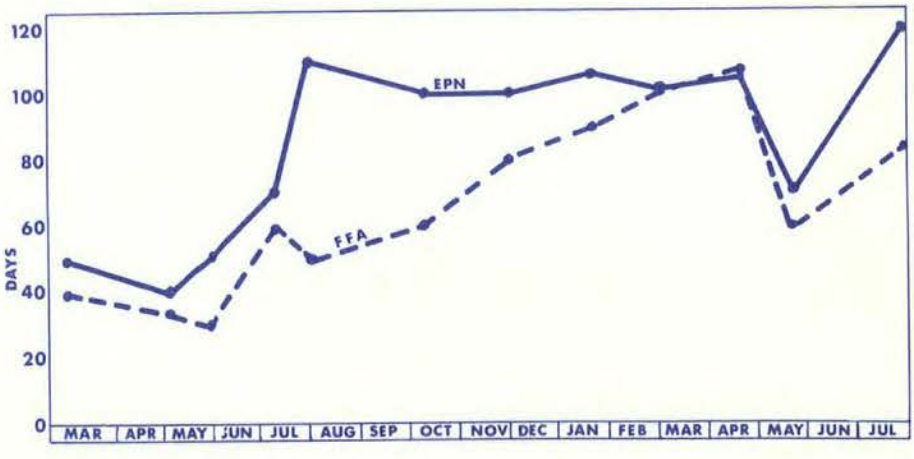

Figure 2. The number of days for fish caught at different periods of the year, frozen in a plate freezer at - 40°C and then stored at - 12°C to reach a free fatty acid value of 40 per cent of total lipids and Extractable Protein Nitrogen value of 1.50.

odours in the flesh or from the gut cavity.

STORAGE LIFE

However, I would like to go back again and discuss the relation of spawning to the quality of cod from another aspect. This has to do with its effect on the storage life of frozen fish.

Over a period of a year and a half we took good quality fish from the trawlers' last day's catch. They were filleted, packaged, frozen in a plate freezer at -40°C for an hour-and-a-half and then put into our own controlled frozen storage lockers at several different temperatures. Each lot consisted of 100 lb. of fillets and we repeated the procedure about once a month for 16 months. Periodically samples were removed from frozen storage and tested to determine the extent of some of the chemical change that had taken place. This has enabled us to get some idea whether the seasonal changes in the physiology of the fish has affected their keeping quality in frozen storage.

First we had to determine the initial characteristics of the fish before it was frozen; which we did by measuring the trimethylamine value (to insure freshness), total lipids, free fatty acids, extractable proteins, and several other things. Then we made similar measurements periodically on frozen fish.

Figure 1 shows the percentage of extractable protein-N in the fish prior to freezing at different times of the year. Each value is a mean for 12 to 22 fish of approximately the same size. There is a pronounced dip in the spring at the time of spawning. This is followed by a plateau of higher values until the spawning time of the following year.

Among the changes that take

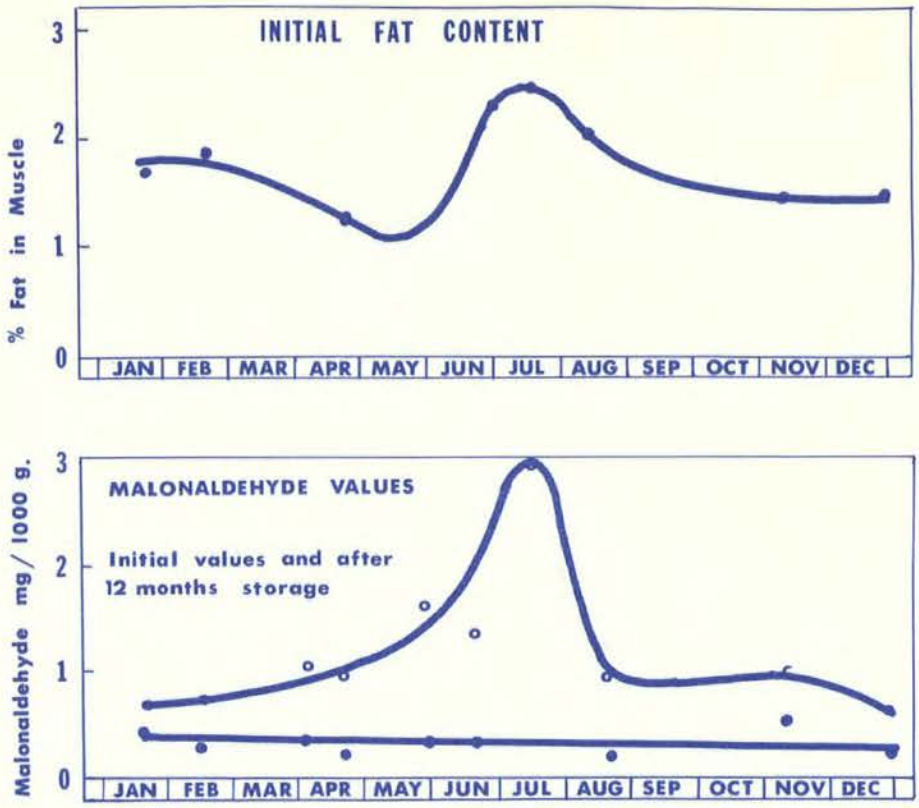

Figure 3. Result of experiments carried out with American plaice to determine effects of cold storage over a period of 12 months.

place in cod muscle during frozen storage are increased free fatty acid content and decreased extractable protein. These reactions appear to be related to, and are a reasonably good indication of the deterioration taking place in the frozen muscle. Figure 2 is data from the same lots of fish shown in Figure 1. It gives the number of days in frozen storage at -12°C before the fish reached a FFA value of 40% (of the total lipids), and for the time to reach an E.P.N. value of 1.50. The similarity in the curves shown in Figures 1 and 2 strongly suggest that cod, caught and frozen during the relatively short spawning period in the spring, have a shorter frozen storage life than at other periods of the year. It is particularly interesting to note that during the summer, when there is most trouble with the quality of fresh fish, the keeping time of the frozen fish was better. This, of course, does not imply that you can freeze poor quality summer fish and hope to obtain a good frozen product!

This may sound complicated to say that quality of the fish is to some extent determined by its physiological condition at the time of catching; and then to say further, that the significance of this quality is different for fresh and for frozen fish.

OTHER EXPERIMENTS

Now let us shift away from cod to another species. We have also carried out similar, but not quite so extensive experiments with scallops and flounders.

Flounders differ from cod in having a much greater seasonal variation in the lipid content of their

muscle. In the spring and winter the lipid content is not too far removed from that of the cod, ranging between 0.8 to 1.2%. During the heavy summer feeding, following spawning, the lipid content of the muscle goes up to values ranging between 2 and 3-1/2%, followed by a gradual decline during the fall and winter. During part of the year the flounder is a lean fish; for another part of the year – during the summer months – it is a semi-fatty fish.

This experiment was carried out with American plaice, which are sometimes called "black backs" or "winter flounder". During a period of 13 months 11 lots of fillets were frozen and placed in commercial cold storage at somewhere close to - 23°C. As with the cod, samples were removed periodically and tested for changes that had taken place. Figure 3 gives some of the results. The top curve gives the initial fat content of the fish at the time of freezing. You can see that it is highest during June and July. The second curve shows the malonaldehyde value for the initial fish and for the fish after 12 months storage. (Incidentally for the frozen cod there was no increase in malonaldehyde values – even after a much longer storage period).

Every sample of frozen stored fish at the time of thawing was examined for off odours and recorded as:

(1) good fish – free from off odours

(2) questionable quality – slight off odours

(3) poor quality – pronounced off odours.

After 4 months in frozen storage the fish caught during late May, June and July were already beginning to develop off odours, although not very objectionable. After 8 months those summer caught fish had quite strong odours and at the end of the year the fish caught in December, January and February were still free from odours but those caught in April, August and November were beginning to smell – but were still commercially acceptable.

Figure. 4 shows the general relationship between the malonaldehyde values and the odour development for 84 lots of defrosted flounders after they had been removed from frozen storage.

These results indicate that flounders that are frozen when their lipid content is high, spoiled in a manner similar to what occurs in frozen fatty fish. They develop a mild form of rancidity. At other times of the year, – that is, for flounders caught and frozen during the winter and spring, – deterioration in frozen storage is slower to develop and tends to be more like that which occurs in the lean fish.

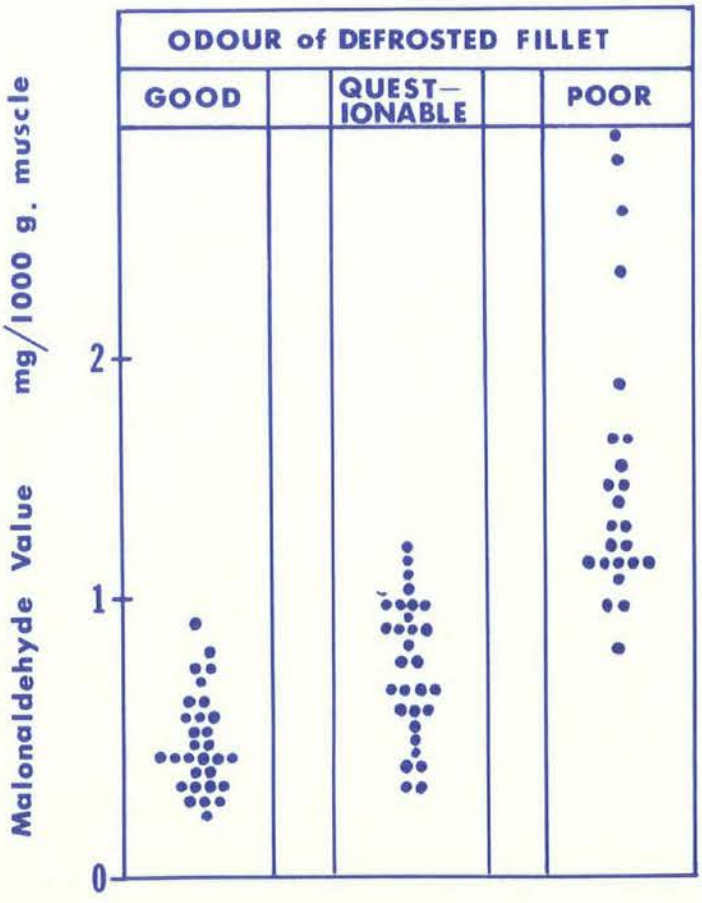

Figure 4. Relation between odour of 84 lots of defrosted fillets and their development of lipid oxidation as indicated by their malonaldehyde content.

CAUSE OF OFF ODOURS

On several occasions we have been asked to examine some commercial, frozen flounders that had been shipped from Canada to the U.S. and after a period of storage had been turned down by the U.S. authorities as unfit for consumption because of strong off odours. There were records to show that these particular fish, before being frozen were examined by our federal fishery officers and classed as first grade. Our examination showed no indications that bacterial decomposition might have taken place immediately prior to freezing or during some temporary breakdown of refrigeration

while in storage. The odours on most of the fish were objectionable. I would not have eaten them or taken them home to my family – even as a free fish supper. The odours were quite similar to those we had encountered on our stored frozen summer-caught flounders, and our tests indicated that fat oxidation and associated changes were responsible for the off odours.

We later found out that these particular lots of fish had been caught and frozen in June and July. The question is: when is a first grade fish not a first grade fish? And the answer is: When it is a summer-caught flounder intended for frozen storage. This does not mean that all commerical flounder caught and frozen in June and July are going to spoil in frozen storage. But it does seem to indicate that flounders caught and frozen during this season, will have relatively short keeping times and that if conditions of storage are not satisfactory they will be the first to go and will be more objectionable than frozen fish of the same species caught earlier or later in the season.

If the fishery officers or the processors themselves had been acquainted with the physiological condition of the fish and its significance in terms of "quality for freezing", this whole trouble might have been avoided.

This may appear that I am confusing the issue and needlessly stirring up muddy water in suggesting the complexity involved in the simple matter of grading a fish for quality – by asking the question: quality for what? But with an ever-increasing proportion of our fish going in frozen or processed products why should we not give consideration to these problems?

OTHER FACTORS

I have spent too much time on a few of our own experiments and experiences trying to illustrate the fact that grading fish should include consideration of their physiological condition at the time of catching. But you do not need to take my word. The literature on this subject has a tremendous amount of data dealing with changes in the chemical composition of the fish and its relation to sex, season, feed, migration and various environmental factors.

Persons interested in the quality of fresh and processed fish will often be at a complete loss unless they have a good knowledge of the relationship that exists between the changes that occur during the onset and resolution of rigor mortis and the suitability of the fish for freezing or processing.

The effects of specific types of feed on the quality of fish constantly confronts us. The development of kerosene-like odours in fish eating the pteropod, *Limacina helicina* is a striking example. For a short period during the late summer and early fall this condition, known locally as "blackberry fish", almost immobilizes the cod fisheries in the Strait of Belle Isle and off the East coast of Labrador. The odiferous compound has been identified as dimethylsulfide. It is not confined to Newfoundland fish, but has been found in various fish and marine organisms in other parts of the world. Somewhat similar is the iodine-like odours that develop occasionally in otherwise good quality haddock.

The problems of water pollution are becoming increasingly important in having an effect on the quality of some fisheries. The biological accumulation of D.D.T. and other insecticides, the presence of increasingly large amounts of stable hydrocarbons from detergents, toxic industrial wastes such as occurred recently from the phosphorus plant in Newfoundland, increased heavy metal content of rivers from plants where metals are processed, and many other problems of the same nature are just now beginning to get attention.

I believe that unless the agencies that are trying to control and improve the quality of our fishery products, do not continuously take into consideration and study these factors that influence the condition of the fish at the time of catching, they will not always be performing a satisfactory job. The problems of properly grading fish are much more complicated than simply separating those that smell from those that do not, – although that in itself is a very useful thing to do and a good beginning.

Four Indians Added To Marketing Body

Four Indians have been appointed to the 12-man Advisory Committee of the Freshwater Fish Marketing Corporation established earlier this year to regulate international and interprovincial trade in freshwater fish. They are Simon Linklater, Pelican Narrows, Saskatchewan; Wilfred Crate, Fisher River Narrows, Fisher River, Manitoba; Henry Laboucan, Atikameg, Alberta, and Raymond Hardy, Rocky Bay Band, Ontario.

Operating in the Northwest Territories and the provinces of Alberta, Saskatchewan, Manitoba and northwestern Ontario, exclusive of the Great Lakes, the Corporation will be the sole buyer and seller of freshwater fish and will streamline present procedures for fish marketing.

Of the estimated 7,000 fishermen engaged in the freshwater fishing industry, 2,100 Indians are responsible for 17,500,000 pounds of the annual 54,000,000-pound catch taken in the designated area.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	January–June 1968		January–June 1969	
	Landings[1]	Value[2]	Landings[1]	Value[2]
	'000 lb.	$'000	'000 lb.	$'000
CANADA – TOTAL	**1,012,326**	**62,364**	**1,039,694**	**63,203**
ATLANTIC COAST – Total	**949,677**	**51,419**	**990,671**	**52,214**
Cod	259,986	10,722	222,710	8,935
Haddock	55,690	4,148	59,638	4,757
Redfish	42,609	1,069	42,214	1,050
Catfish	4,097	150	4,024	139
Halibut	2,504	983	2,146	857
Other Flatfishes	130,335	4,290	125,621	4,824
Pollock, Hake, Cusk	23,469	844	16,735	558
Other Groundfish	2,971	37	2,284	32
Herring & Sardines	365,497	3,724	447,458	4,387
Mackerel	7,458	335	10,310	460
Swordfish	973	673	1,017	741
Tuna	754	111	894	123
Alewives	6,446	122	3,488	82
Salmon	1,647	974	1,563	1,027
Smelts	2,165	231	3,137	245
Other Fish	5,922	97	3,791	81
Lobsters	25,834	16,646	24,000	16,585
Clams & Quahaugs	2,664	189	3,199	238
Scallops	5,792	4,598	5,541	4,310
Other Shellfish	2,864	312	10,901	1,257
Misc. Items	–	1,164	–	1,526
PACIFIC COAST – Total	**62,649**	**10,945**	**49,023**	**10,989**
Pacific Cods	12,961	1,029	7,749	672
Halibut[3]	13,913	3,480	13,593	5,192
Soles & Other Flatfishes	6,155	375	5,732	345
Herring	5,898	164	3,006	136
Salmon	11,362	4,794	6,504	3,614
Other Fish	3,978	120	3,922	141
Shellfish	8,382	977	8,517	889
Misc. Items	–	6	–	–
BY PROVINCES				
British Columbia	62,649	10,945	49,023	10,989
Nova Scotia	287,703	24,610	292,976	25,214
New Brunswick	128,225	4,565	116,979	4,963
Prince Edward Island	16,039	5,189	15,931	4,847
Quebec	61,140	3,233	65,404	3,332
Newfoundland	456,570	13,822	499,381	13,858

[1] Fish and Shellfish only. [2] All Products–Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms.
[3] Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES – JUNE 1969

		Montreal	Toronto
		$	$
Cod fillets, Atl. fresh, unwrapped	lb.	.423	.540
Cod fillets, Atl. frozen, cello 5's	lb.	.335	.437
Cod fillets, smoked	lb.	.415	.570
Haddock fillets, fresh, unwrapped	lb.	.577	.697
Herring, kippered, Atl.	lb.	.259	.330
Mackerel, frozen, round	lb.	.192	.293
Lobsters, canned, Fancy	Case 48-1/2s	70.520	77.467
Sardines, canned	Case 100-1/4s	10.786	10.480
Halibut, frozen, dressed	lb.	.527	.647
Silverbright, frozen, dressed	lb.	.662	.667
Coho, frozen, dressed	lb.	.910	.980
Sockeye, canned, grade A	Case 48-1/2s	28.053	28.907
Pink, canned grade A	Case 48-1/2s	18.710	19.360
Whitefish, fresh	lb.	.576[1]	.567
Lake Trout, frozen	lb.	.472	.563

[1] Dressed.

PRICES PER CWT. PAID TO FISHERMEN
(Week ending June 14th)

	1968	1969
	$	$
Halifax		
Cod Steak	5.75	5.75
Cod Market	5.5	5.5
Haddock	9	9
Plaice	4.5-5.25	4.5-5.25
Yarmouth		
Haddock	8	–
Shippegan		
Herring	–	1
St. John's, Newfoundland		
Cod	–	3.75
Vancouver		
Ling Cod	8-10	10-16
Grey Cod	7-7.5	7-8
Soles	6-9.5	8.5-9.5
Salmon (Redspring)	45-80	50-85

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF JUNE

	1968 '000 lb.	1969 '000 lb.
TOTAL – Frozen Fish, Canada	**85,542**	**79,437**
Frozen – Fresh, Sea Fish – Total	**65,430**	**54,481**
Cod, Atlantic, Fillets & Blocks	18,181	18,722
Haddock, Fillets & Blocks	4,641	4,390
Rosefish, Fillets & Blocks	3,865	2,096
Flatfish, (excl. halibut) Fillets & Blocks	7,153	4,019
Halibut, Pacific, dressed & steaks	9,376	7,088
Other Groundfish, dressed & steaks	2,415	1,390
Other Groundfish, fillets & blocks	6,013	2,568
Salmon, Pacific, dressed & steaks	4,716	4,506
Herring, Atlantic & Pacific	280	354
All Other Sea Fish, all forms	5,122	5,127
Shellfish	3,668	4,221
Frozen – Fresh, Inland Fish – Total	**5,906**	**6,487**
Perch, round or dressed	1,275	1,085
Pickerel (Yellow & Blue) fillets	347	215
Sauger, round or dressed	313	82
Tullibee, round or dressed	86	254
Whitefish, round or dressed	708	1,151
Whitefish, fillets	92	87
Other, all forms	3,085	3,613
Frozen – Smoked Fish – Total	**1,648**	**1,023**
Cod, Atlantic	845	474
Sea Herring, kippers	334	246
Other, all forms	469	303
Frozen For Bait and Animal Feed	**12,558**	**17,446**

SALT FISH STOCKS AS AT END OF JUNE

		1968 '000 lb.	1969 '000 lb.
Salted and Pickled Fish, Atlantic Coast			
Wet-Salted – Total		**11,517**	**10,735**
Cod		8,315	6,593
Other		3,202	4,142
Dried-Salted – Total		**12,721**	**4,931**
Cod		11,774	4,178
Other		947	753
Boneless – Total		**1,145**	**426**
Cod		955	369
Other		190	57
Pickled – Total	(barrels)	**18,936**	**5,327**
Herring	"	4,286	1,444
Mackerel	"	5,626	2,509
Alewives	"	9,024	1,374
Turbot	"	–	–
Bloaters	(18 lb. boxes)	67,000	69,412
Boneless Herring	(10 lb. boxes)	6,660	2,719

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS JANUARY – MAY

	1968 $'000		1969 $'000	
TOTAL EXPORTS		**86,305**		**94,520**
By Markets:				
United States		57,329		59,158
Caribbean Area		7,862		7,466
Europe		18,711		24,076
Other Countries		2,403		3,820
By Forms:				
Fresh and Frozen		**53,643**		**59,523**
Whole or Dressed	**14,138**		**17,109**	
Cod, Haddock, Hake	357		290	
Halibut, Pacific	1,708		1,581	
Salmon, Pacific	4,323		7,938	
Swordfish	493		360	
Other Seafish	2,483		2,146	
Whitefish	2,144		2,146	
Pickerel	870		847	
Other Freshwater Fish, n.e.s.	1,760		1,801	
Fillets, Blocks and Slabs	**25,431**		**26,092**	
Cod, Atlantic	7,669		7,532	
Haddock	3,593		4,157	
Ocean Perch, Hake, Cusk, Pollock	2,914		3,026	
Flatfish	6,827		7,095	
Pickerel	959		663	
Other Fillets and Blocks	3,469		3,619	
Shellfish	**13,697**		**15,307**	
Lobsters (in shell & meat)	8,814		9,675	
Scallops	4,139		4,281	
Other	744		1,351	
Frozen Fish & Shellfish, pre-cooked	377		1,015	
Cured		**9,853**		**8,452**
Smoked	**933**		**1,109**	
Herring	527		645	
Other	406		464	
Salted, Wet & Dried	**7,832**		**6,232**	
Cod	6,820		5,462	
Other	1,012		770	
Pickled	**1,088**		**1,111**	
Herring	676		755	
Mackerel	243		142	
Other	169		214	
Canned		**17,352**		**18,951**
Salmon	13,399		15,009	
Sardines	2,659		2,758	
Lobsters	442		190	
Other	852		994	
Miscellaneous		**5,457**		**7,594**
Meal	3,003		5,080	
Oil	145		490	
Other	2,309		2,024	

Current Reading

MAN-MADE LAKES, PLANNING AND DEVELOPMENT
Published by the Food and Agriculture Organization, Rome

The creation of man-made lakes for municipal and industrial purposes requires far-sighted planning to ensure maximum benefits and to avoid "a host of secondary problems" arising from their construction and use.

This is the substance of a new booklet, "Man-Made Lakes, Planning and Development," published by the Food and Agriculture Organization in co-operation with other international agencies as a guide to planners in developing countries especially.

The 71-page illustrated booklet notes that man-made lakes and reservoirs are generally planned to meet such primary needs as hydro-electric power, irrigation, water for human and industrial consumption, flood control or navigation. However, "their construction generates innumerable secondary problems, many of which have proved to be very serious," and most of which may not have been thoroughly evaluated in advance.

These problems, which in time acquire primary urgency, flow from the grave changes wrought on the environment and ecology of the region during and after construction of the lake. Populations must be displaced to make room for the lake, and resettled elsewhere. Farm and pasture lands and forests are "drowned" by the rising waters and subtracted from use. Fisheries may be destroyed by dams which hinder fish movements. Wildlife may be driven out. The entire economy and social organization of the region is affected and even disrupted.

Yet, proper planning would serve not only to ease or eliminate such problems. The booklet points out that it would enhance the value of the lake, opening up prospects for wider social and economic development.

The publication, which carries a foreword by C.H. Clay, FAO Coordinator of Lake Projects and formerly with the Department of Fisheries of Canada, and was prepared with the aid of K.F. Lagler of the School of Natural Resources, University of Michigan, U.S.A., describes four African lake projects – Lakes Kainji, Kariba, Nasser and Volta – in which FAO and other agencies provided assistance with planning and coordination of the type of studies described in the booklet.

THE CANADIAN FISH CULTURIST, Issue 40.
Published by the Department of Fisheries and Forestry, Ottawa.

Re-appearing after an absence of about two years, this latest issue of The Canadian Fish Culturist features contributions originating predominantly from staff of the Department's Resource Development Branch in British Columbia.

Subjects dealt with in this issue include; "A Comparison of Aquatic Communities in the Bow River Above and Below Sources of Domestic and Industrial Wastes from the City of Calgary" by R.H. Kussat; "Loss of Petersen Disk Tags from Spawning Chum Salmon" by D. Brent Lister and Richard A.L. Harvey; "The Application of an Air-Percolation System for Water Temperature Reduction in Robertson Creek" by F.J. Fraser and T.G. Halsey; "A Converging Throat Trap for Sampling Juvenile Salmonids" by C.E. Walker, J. Alex Wood and Iain A. Maclean; "A Modified Wolf Trap for Downstream Migrant Young Fish Enumeration" by D. Brent Lister, Richard A.L. Harvey and C.E. Walker; "Effects of DDT Larviciding on Aquatic Fauna of Bobby's Brook, Labrador" by C.T. Hatfield; and "An Improved Dip Net for Use in Electro-Fishing" by L.J. Andre Ducharme.

DIRECTORY OF FISH CULTURE INSTITUTIONS

FAO Fisheries Technical Paper No. 85, published by the Food and Agriculture Organization of the United Nations, Rome.

Prepared by the Fish Culture Section of FAO's Department of Fisheries, this directory lists private and governmental institutions engaged in fish culture research in 41 countries. It contains information on the location of the institutions, number of scientists employed, physical facilities, research programs, training facilities and publications.

Among the nations represented in the listings are the Republic of China, Germany (Eastern and Federal Republic), Hungary, Israel, Japan, Notherlands, Poland, the Union of Soviet Socialist Republics and the United States of America.

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Escuminac Remembers

Recently, in a small fishing village on the furthermost point of land jutting out on the east coast of New Brunswick, thousands of people paid reverence to 35 fishermen who lost their lives in a sudden storm 10 years ago.

The ceremony took place at Escuminac, at the entrance of Miramichi Bay, with the unveiling of a seven-foot high limestone statue – a memorial to the fishermen of that village.

In mid-June, 1959, Atlantic salmon were running through the Gulf of St. Lawrence, heading for such home rivers as the Miramichi and Restigouche. To the Escuminac commercial salmon fishermen it was the best salmon year in a decade, and on the morning of June 19, the Escuminac fleet put to sea. Most of the boats measured from 40 to 50 feet in length. Although that evening the sky appeared a little threatening, the salmon fishing was so good most of the fishermen decided to spend the night on the fishing grounds. But suddenly, late in the evening, after crews had set their drift nets, the wind came up in gusts and soon became a violent gale. Before morning a smashing, savage storm had torn fishing vessels from their nets, clawed off sails and rigging and crushed or capsized 22 boats in giant waves.

The next morning, June 20, the terrible toll became known – 35 fishermen lost, leaving behind them 26 widows and 83 children. It was a disaster of monumental proportions for the small community.

The fishermen's memorial at Escuminac, N.B., is unveiled by Lt. Governor Wallace S. Bird, of New Brunswick.

Families, friends and officials remembered these lost fishermen with a simple monument 10 years later.

Created by sculptor Claude Roussel, director of visual arts at the University of Moncton, the work shows the stylistic forms of three fishermen, shoulder to shoulder, wearing sou' westers, with a fishing net draped over the shoulder of one and being touched by the other two. Bronze plaques at the base bear the names of the 35 fishermen who lost their lives and 16 names of survivors singled out for acts of bravery in the disaster.

FISHERIES of Canada

Oct. 1969 Vol.22 No. 4

Department of Fisheries and Forestry, Ottawa

October 1969

FISHERIES of Canada

CONTENTS

COVER PHOTO – Grading salt cod on the dock at Carbonear, Nfld.

Published by the Department of Fisheries and Forestry, Ottawa

Editor:
E.H. Hearnden

Herring Landings and Distribution Of Catches in Newfoundland, 1967-68

BY V.M. HODDER

Fisheries Research Board of Canada Biological Station,
St. John's, Newfoundland

In the past the Newfoundland herring fishery has been associated largely with the demand for herring as bait for the cod fishery and the periodic demand for pickled herring products as food, especially during and just after World Wars I and II. In 1946 there was a peak landing of just over 80,000 tons (1 ton = 2000 lb) all of which were taken by gillnets and beach-seines. Subsequently the annual landings decreased to less than 10,000 tons in the early 1960's (Fig. 1).

In the autumn and winter of 1964-65, a purse-seiner from the Pacific coast of Canada carried out exploratory fishing along the south coast of Newfoundland to determine the feasibility of exploiting the large concentrations of herring which migrate to the area in late November and remain until March or April, when they disappear from the coastal waters.

The initial explorations were so successful that more seiners from the Pacific coast were attracted to the Atlantic coast, especially in 1967 after the failure of the British Columbia herring fishery, and the seiner fleet operating along the south coast of Newfoundland between Cape Ray and Fortune Bay increased rapidly from four seiners in the autumn of 1965 to about 55 seiners and 25 carriers by the autumn of 1968. Consequently, seiner landings in 1968 reached an all-time high of 158,000 tons, with an additional 5,000 tons taken in Newfoundland waters by other gears (gillnets and bar-seines). Included in the seiner landings for 1967 and 1968 are small quantities landed by four or five midwater trawlers.

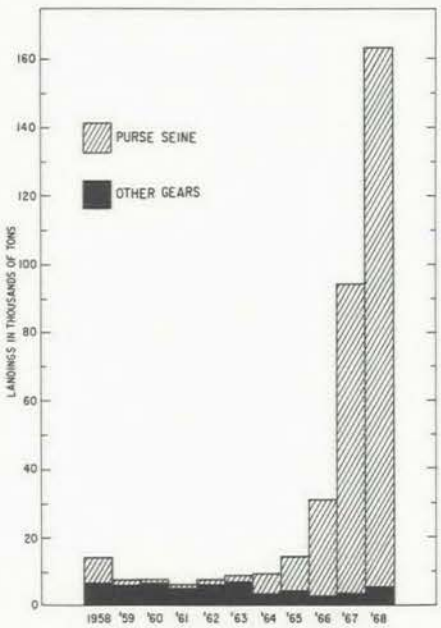


Fig. 1. Newfoundland herring landings, 1958-68. (The seiner landings for 1967 and 1968 include small quantities by midwater trawl.)

The quantities shown in Fig. 1 were landed at Newfoundland ports and includes about 3,000 tons in 1967 and 11,000 tons in 1968 caught in the vicinity of the Magdalen Islands. Not included in the totals are quantities caught in Newfoundland waters and transported by carrier directly to mainland ports in Quebec and Nova Scotia. In 1967 and 1968 these landings amounted to about 7,500 tons and 16,000 tons respectively.

Statistics for the first half of 1969 are as yet incomplete, but preliminary data available indicate that about 120,000 tons were landed by seiners at Newfoundland ports, 11,000 tons of which were caught in April and May mainly in the vicinity of the Magdalen Islands (10,000 tons) and a little from Chedabucto Bay, N.S. (1,000 tons).

To provide a basis for describing the distribution of herring in Newfoundland waters, the coastal waters are divided into fishing areas coincident with the district boundaries

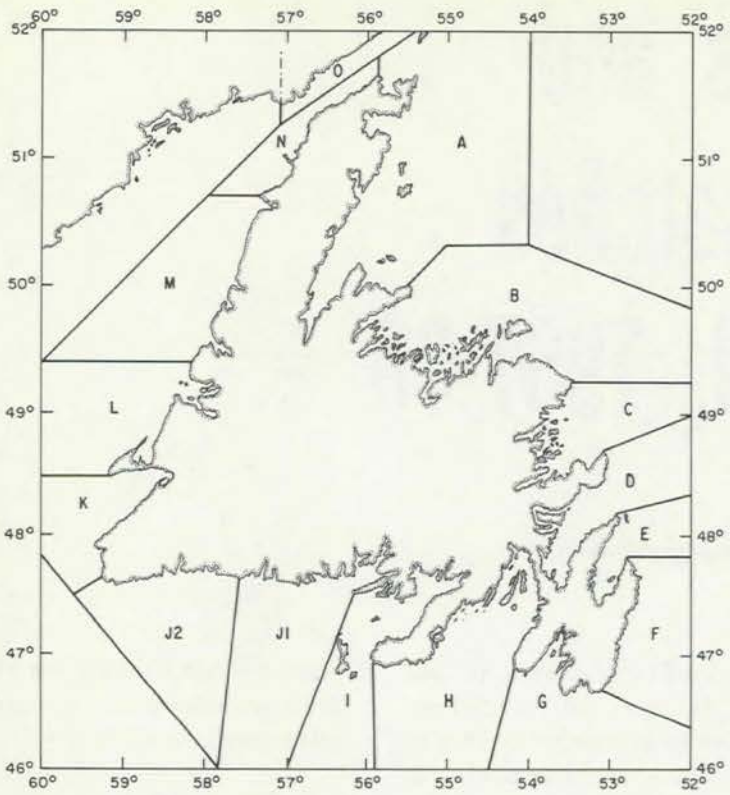


Fig. 2. Statistical areas referred to in Tables 1 and 2.

of the Department of Fisheries and Forestry (Fig. 2). Each district is further subdivided into smaller areas in order that landings may be associated with the areas of capture. Along the south coast, for example, the sub areas are associated with the major inlets, in which most of the fishing activity occurs.

Information on the dates, locations and quantities of herring caught are obtained from confidential records kept by many seiner captains in log books provided by the Fisheries Research Board. For landings not accounted for by log-book records information is obtained from port interviews with seiner personnel, by observers stationed at the major ports of landing and from purchase slip records. Consequently nearly all landings can be assigned an area and date of capture. The few landings for which no information is available are assigned on the basis of the distri

Table 1. Newfoundland herring landings (in tons) by area and month for 1967.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
A	...	...	...	...	...	1	4	2	...	...	2	...	9
B	...	8	1	...	25	86	23	6	82	64	11	42	348
C	...	...	...	...	37	7	2	4	15	9	11	...	85
D	...	...	...	...	1	21	5	4	4	...	25	...	60
E	...	...	...	...	...	...	...	...	...	...	4	...	4
F	...	...	...	...	5	6	1	...	...	...	...	...	12
G	12	12	286	1167	153	58	21	1	7	4	5	...	1726
H	249	34	49	27	202	126	6	...	8	2	...	...	703
I	...	17	...	4904	755	514	15	...	...	...	29	...	6234
J1	18757	12420	7790	189	28	4	24	...	25	...	4424	19573	63234
J2	27	332	3968	5705	338	24	2	30	28	7	1129	79	11669
K	...	...	...	741	186	27	12	...	1	9	3	...	979
L	...	...	...	...	47	13	6	2	...	2	1	...	71
M	519	...	...	...	79	...	...	...	...	1	991	4503	6093
N	...	...	...	...	10	...	...	...	...	...	4	...	14
O	...	...	...	...	...	1	...	16	13	...	...	...	30
**	...	...	...	...	456	...	...	...	...	...	2378	...	2834
Total	19564	12823	12094	12733	2322	888	121	65	183	98	9017	24197	94105

** Bird Rocks and Magdalen Islands

bution of fishing activity by other seiners. The small quantities caught by gillnets and other gears in the inshore fishery are considered as caught in the districts where landed.

The herring landings for 1967 and 1968 are given in Tables 1 and 2 by month and district where caught. The fishery in the months of January, February, March, April, November and December in both years contributed to 96% of the annual landings, and considerably more than half of the annual total was caught in the area between Burgeo and Hermitage Bay on the south coast. The area between Cape Ray and Burgeo is second in importance, followed by Fortune Bay and Bonne Bay. In 1968 there was a fourfold increase in landings from the Magdalen Islands area over those of 1967, mainly attributable to a large reduction plant having been located at Isle aux Morts in the autumn of 1968.

The seasonal distribution of seiner catches is best illustrated as in Fig. 3 for the 1967-68 autumn and winter fishery. The first catches were made in the Port aux Basques to Rose Blanche area on November 19-21, in the White Bear Bay area by November 24, and in the Rencontre Bay area by November 27. Twelve seiners were actively fishing along the south coast by the end of November and this number increased rapidly to 27 by the end of December. The peak activity occurred in late January and February when 35 seiners were involved. Subsequently the number of seiners decreased to 20 by the end of March, to 10 by the end of April and to none by the end of May.

In December and January fishing activity was concentrated in the area between Burgeo and Baie d'Espoir. With an abundance of herring in the inlets along that part of the coast, this situation is not surprising for all of the reduction plants were then located in Fortune Bay and farther eastward. However, by February the La Poile Bay area became a significant contributor to that month's catch, and during March most of the fishing activity occurred west of Burgeo. By April the herring concentrations had moved farther westward around the southwest corner of the island.

In Fortune Bay good catches were made during February and March on a population considered, on the basis of biological information obtained from the examination of numerous specimens, to be distinct from the populations which overwinter between Hermitage Bay and Port aux Basques. The Fortune Bay herring are typically spring spawners and by late April and May they have moved into shallow water around the bottom of the bay for spawning. The

Table 2. Newfoundland herring landings (in tons) by area and month for 1968.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
A	...	...	...	...	...	...	2	...	4	17	18	...	41
B	...	17	16	2	58	12	89	17	98	66	48	...	423
C	...	...	...	...	33	3	...	...	3	1	26	...	66
D	...	...	...	...	4	3	12	8	21	27	61	102	238
E	...	...	...	...	...	...	1	2	1	1	...	...	5
F	...	...	...	...	...	...	...	6	...	...	...	...	6
G	11	32	153	4431	1323	64	34	25	3	9	5	3	6093
H	181	12	64	1288	169	21	1	3	3	3	4	56	1805
I	...	5833	4856	2904	1831	190	...	3	1	7	...	207	15832
J1	25267	10902	4067	169	75	12	7	32	...	1	6289	44831	91652
J2	997	8444	15599	2123	25	12	7	34	...	23	208	2096	29568
K	...	...	432	1543	126	12	...	8	5	20	...	1	2147
L	...	...	...	...	53	6	...	2	1	3	...	...	65
M	415	...	...	...	65	1	1	1	1	4	2566	1322	4376
N	...	...	...	...	5	...	...	...	...	2	3	1	11
O	...	...	...	...	...	...	...	9	...	...	...	...	9
**	...	...	...	804	1149	...	...	...	29	1418	7072	558	11030
Total	26871	25240	25187	13264	4916	336	154	150	170	1602	16300	49177	163367

** Bird Rocks and Magdalen Islands

southwest coast populations, on the other hand, leave our coastal waters in April and presumably migrate into the Gulf of St. Lawrence.

Just prior to the appearance of large concentrations of herring along the south coast in late November, seiners operating from the Magdalen Islands and western Newfoundland fish in the vicinity of the Bird Rocks, just north of the Magdalen Islands. In the spring, following the disappearance of herring from the southwest coast, a short but intensive fishery again develops in the area between Cape Breton and the Magdalen Islands. These herring, like those caught in southwestern Newfoundland are largely summer and autumn spawners. To date there is no evidence of any significant autumn spawning of herring in Newfoundland waters; this, together with the spatial distribution of catches suggest a migratory route between the summer and autumn spawning grounds of the southern Gulf of St. Lawrence and over-wintering areas in southwestern Newfoundland.

During the early 1960's, when the annual landings were at an all-time low level, herring were utilized for food, largely pickled and vinegar-cured, and for bait. Successful exploratory fishing of the south coast autumn and winter herring stocks late in 1964 initiated a major change in the form of utilization of the herring production, a breakdown (in tons) of which is as follows for 1960 to 1968:

Year	Reduction	Bait	Food	Total
1960	–	2,945	5,034	7,529
1961	–	1,851	4,351	6,202
1962	–	2,863	4,879	7,742
1963	–	3,191	5,678	8,869
1964	464	2,708	6,120	9,292
1965	5,343	2,076	6,829	14,248
1966	21,442	1,884	7,636	30,962
1967	84,960	2,305	6,840	94,105
1968	157,072	1,978	4,317	163,367

The quantities utilized for food and bait have not changed significantly, but herring used for reduction into meal increased rapidly to 90% of the 1967 yield and to 96% of the total for 1968.

In compiling the annual statistics of the herring fishery, the assistance of seiner and midwater trawler captains, plant officials, staff of the Economics Branch and field officers of the Department of Fisheries and Forestry, and Fisheries Research Board technicians is gratefully acknowledged.

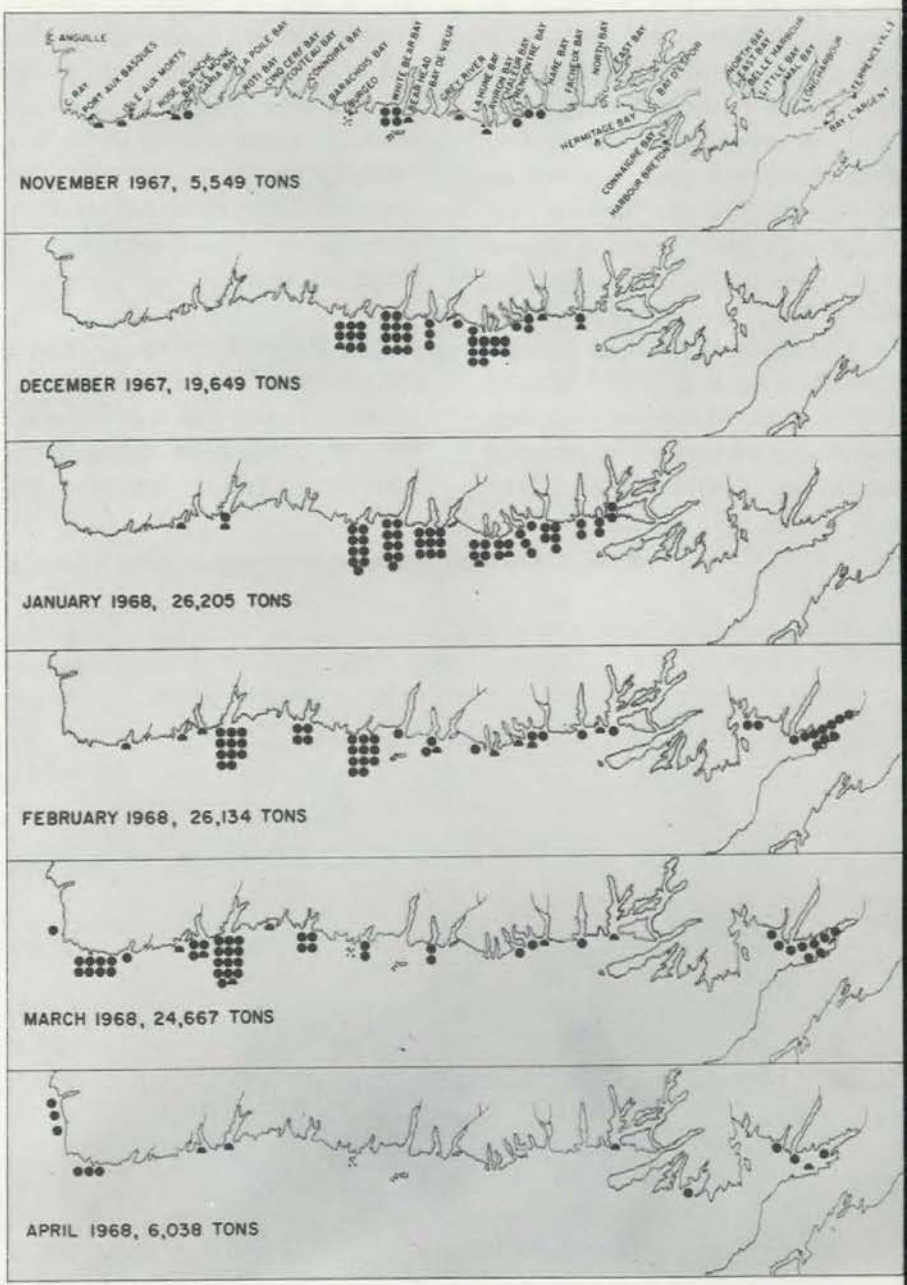


Fig. 3. Monthly distribution of seiner catches along the southwest coast of Newfoundland during the 1967-68 season. (Each dot represents a catch of 500 tons.)

Announce New Regulations For B.C. Salmon Fishery

Commercial salmon fishermen in British Columbia will have to meet a high performance target in the future to maintain their category "A" salmon fishing licence. They will also have to contribute a percentage of the landed value of their catch to finance a dogfish control project.

These are the highlights of proposals for phase two of the salmon licence control program announced by Jack Davis, federal Minister of Fisheries and Forestry. The Minister introduced phase one last September in the first move to reduce the size of the salmon fleet. At that time any vessel with an annual landed catch of fish valued at approximately $1,250 or over, qualified for an "A" category licence and could be replaced. Those under $1,250 were "B" category and could not be replaced. Here are the details of the phase two proposals:

1. To remain a category "A" vessel there must be a production equivalent to $20,000 for a consecutive four-year period, or an average of $5,000 a year.
2. After 1971, if the average annual production record for a consecutive four-year period falls below $5,000, the vessel will drop into the "B" category. It will be frozen in this category and cannot return to "A" category even if production improves.
3. In order to build a new salmon fishing vessel, a category "A" vessel will have to be retired.
4. Any new vessel introduced into the salmon fishery from now on will assume the production of the "A" vessel or "A" vessels.
5. A vessel that does not report landings of any fish in two consecutive years will not be entitled to any type of salmon licence. First year of record for this purpose is 1969.

Mr. Davis stated that when phase one of the program was announced in 1968, the initial cut-off was based on production achieved prior to that date. The phase two plan informs fishermen *in advance* what production must be achieved during a running four-year period in order to maintain an "A" licence.

The Minister said he will revamp the constitution of the Appeal Committee for salmon licences to include a majority of members who are actually fishermen.

LICENCE FEES

1. The minimum licence fee for a vessel will be $25 ($10 for vessel registration and $15 for salmon).
2. There will be two parts to the fee:

B.C. Salmon Fleet Cut By 571

British Columbia's commercial salmon fishing fleet has been reduced by 571 vessels as a result of the initial phase of the new licence limitation scheme.

Since the new scheme was announced in September, 1968, by Fisheries and Forestry Minister Jack Davis, the total has dropped from 7,548 to 6,977.

Of the current total, 5,844 are in the "A" category; 1,003 in the "B" category and 100 in the "C" category. The latter are mostly trawlers and crab boats not normally geared for salmon fishing.

Over the past year, 255 newly built boats were added to the fleet. These were vessels under construction as of September 6, 1968, when the Minister made his statement outlining the details of the new licence limitation scheme.

There were 160 vessels which would otherwise have been in the "A" category for which licences were not renewed. Another 70 "A" category vessels were retired and new ones approved to take their place.

Forty-five fish boats were lost at sea and replacements approved by the special Appeal Board set up for this purpose.

While the number of fishing vessels in the fleet decreased, its net worth has risen by $8 million. As of June 15, 1969, 6,977 vessels are valued at $95,558,000, compared with 7,548 vessels licenced in 1968, valued at $87,195,000.

(a) A minimum fee of $25.
(b) A percentage based on landed value of catch.

3. Licence fees will be subject to annual review. Total fee for 1970 will be $25 plus one percent of the landed value of the catch. This fee will be collected by the buyer.
4. Fees collected in this way will be used in initial years to control predators, i.e., dogfish.
5. There will be a further increase of one percent of the landed value in each of the following four years to a maximum of five percent.

MINISTER'S COMMENTS

"Last year's plan merely created the framework for reduction of the fleet," Mr. Davis said. "It did not penalize the fishermen. Anyone who caught a single fish in the previous year qualified for a "B" salmon licence for his boat and could fish it as long as it held together.

"Now to meet the objective of reducing the size of the salmon fleet we must move on to phase two. This means putting the fishermen on performance," the Minister added.

Mr. Davis said he expects the new regulations to relegate 50% of the present 5,800 category "A" salmon vessels to the "B" category.

This would leave between 2,000 and 2,500 vessels which would qualify for an "A" licence on the basis of the new production criteria.

"It is interesting to note that these vessels produce well over 80% of total landings", Mr. Davis said. "In other words, we are moving towards a commercial salmon fleet manned by professional fishermen."

On dogfish control, Mr. Davis said there would be *no* subsidy to eradicate dogfish.

"With this plan, those who will profit by the control of predators, the fishermen themselves, will pay to combat this pest," he said. "We have not ironed out all the details, but it is expected, on present calculations, that the increased licence fee will bring in close to $400,000 in 1970, the first year of application. By 1975 it could be up to $2 million.

"In the early years this will be all earmarked for dogfish control," the Minister said.

R.N. Gordon Appointed To Maritimes Post

Robert N. Gordon, 43, of Winnipeg, has been appointed Director of the Fisheries Service, Maritimes Region. With headquarters in Halifax, N.S., Mr. Gordon will be responsible for all operations of the federal Fisheries Service in Nova Scotia, New Brunswick and Prince Edward Island.

Born in Los Angeles, California, Mr. Gordon moved with his family at an early age to Vancouver where he obtained his formal education. He graduated from the University of British Columbia in 1948 with the degree of Bachelor of Applied Science in Civil Engineering and the following year joined the Department's Fish Culture Development Branch (now the Resource Development Branch) in Vancouver. Subsequently he played a major role in the design and construction of several of the Branch's major projects, such as the Sproat and Stamp Falls fishways on Vancouver Island and the Babine River Slide.

In May, 1954, he moved to Ottawa to serve as headquarters' engineering adviser and to assume responsibility for engineering programs in the Maritime provinces and Newfoundland. He returned to Vancouver in December, 1955, where he was concerned mainly with resolving fisheries problems stemming from industrial developments, pollution, water diversions and hydro-electric projects throughout British Columbia and the Yukon Territory.

R.N. GORDON

He was appointed Director of the Department's Central Region, with headquarters in Winnipeg, in June 1967, assuming responsibility for the Department's operations in Ontario, the Prairie Provinces and the Northwest Territories. In this capacity, he also served as Chairman of the Northwest Territories Fisheries Advisory Committee and as a director of the recently-formed federal-provincial Freshwater Fish Marketing Corporation.

New Fishing Method Attracts Wide Interest

Catches of hake and sole ranging from five to ten thousand pounds in the space of one hour by two small fishing boats working together have become commonplace in an experimental project off Prince Edward Island. These remarkable results are being achieved by an entirely new fishing technique, now known as Canadian pair seine netting, first announced by Fisheries and Forestry Minister Jack Davis on June 23, when preliminary trials had shown promise of success.

Two 40-foot Prince Edward Island lobster boats, the *Norma M* and the *Marie Lou II,* each powered with a 110 horsepower diesel engine, were converted for the new method to allow them to tow a single seine net between them. The conversion and trials were carried out under the supervision of Captain James Thomson, an experienced Scottish fishing skipper under contract to the Industrial Development Branch, Fisheries Service, Department of Fisheries and Forestry.

In a further announcement in mid-September, Mr. Davis said that following the initial successful trials, the capacity of the winches on the boats had been increased and further refinements to the fishing gear carried out. The two boats, now operating in about 20 fathoms of water off Souris, P.E.I., have had individual one-hour tows which have resulted in hauls of more than 10,000 pounds of hake and sole, while tows of more than 5,000 pounds are considered routine.

One big advantage for small boat fishermen in the new technique is that the machinery and gear needed to adapt their vessels are relatively inexpensive, and power requirements low, in comparison to those of regular draggers. Lobster fishermen will be able to utilize their boats during the many off-season months when normally they are tied up, and other types of low-powered inshore vessels can also be used.

This newly developed Canadian pair seine netting technique is similar in concept to pareja (pair) trawling, which is carried out on the Atlantic by large Spanish deep sea trawlers. The net used is funnel-shaped, somewhat like a regular otter trawl but with a higher vertical opening. The skippers of the small boats haul their net by two winches, one on each vessel, coordinating their operations by radiotelephone. Captain Thomson estimates that as many as eight tows can be made in a normal working day unless, of course, extremely heavy catches necessitate trips back to port to unload.

A number of interested fishermen from Prince Edward Island and other Atlantic provinces have visited Souris to observe the fishing operation, and numerous enquiries have already been made about the possibility of introducing this very productive fishing method to other parts of Canada. Mr. Davis points out that this is one of the objectives of the project, and that a full report, including specifications of machinery and gear, and a description of the fishing method, including diagrams, photographs and recent catch records, will be available shortly from his Department's Industrial Development Branch, Ottawa.

Fish 'n' Seafood Month Promoted

National Fish 'n' Seafood Month is being promoted throughout Canada during October.

Canada has a strong interest in advancing the development of its sea and inland fisheries. Fishing is important both in terms of providing Canadians with a varied, healthful diet and in providing the basis for profitable industrial activity.

As its contribution to the Fish 'n' Seafood Month campaign, the Department of Fisheries and Forestry made a national distribution of special photo-recipe releases to newspaper editors and other food publicists. A four-minute, color film entitled "Take a Pack of Frozen Fillets" was also distributed to television stations, and a new recipe booklet with the same title has been released nationally to supplement it.

The home economists of the Department, who constantly test and develop fish recipes, are supplying restaurants and institutions with a number of newly-tested, quantity recipes. They will make personal appearances on radio and TV shows throughout the country to tell and show consumers how to prepare fish. In addition, they will be available to assist in local activities sponsored by the fishing industry.

Love That Greenland Turbot!

Last year almost 20 million pounds of Greenland halibut caught by Newfoundland fishermen were sold in California. The fish was a popular buy with the American consumers and a lucrative market seemed assured.

Then came a problem. A ruling under the Fish Inspection Regulations earlier this year stipulated that the species *Reinhardtius hippoglossoides* could no longer be marketed in Canada or the United States as "halibut". A new trade name – Greenland turbot – was substituted. The question then arose: would the new name create sales resistance in the American market?

Judging from the response of visitors to the Pacific Fine Food and Beverage Fair held in Los Angeles this summer, where a representative from the federal Department of Fisheries and Forestry handed out samples of broiled Greenland turbot fillets, the answer is: "Name it halibut or turbot – they still love it."

"The way the fish was received by buyers was just fantastic" reports Catherine O'Brien, the Department's consumer consultant in St. John's, Newfoundland. "They loved the mild, delicate flavor of the fish and certainly considered it a gourmet item".

Miss O'Brien took about 65 pounds of top quality frozen Greenland turbot, packed in a specially insulated container, to the food fair in Los Angeles. With the ready assistance of the chef at the Biltmore Hotel, where the fair was staged, she prepared the turbot fillets by marinating them in a mixture of pineapple juice and steak sauce and broiling them in the hotel kitchen. So great was the demand for samples from fair visitors that 20 pounds of fish disappeared in the first three hours.

Catherine O'Brien, Consumer Consultant with the federal Department of Fisheries and Forestry at St. John's, Nfld., poses with a chef at the Biltmore Hotel, Los Angeles, and a dish of broiled Greenland turbot fillets, featured in a promotion at the Pacific Fine Food and Beverage Fair.

"I cooked all 65 pounds of fish which sold itself because of its top quality – beautiful, large thick white fillets" Miss O'Brien said.

The Los Angeles promotion stemmed from a request by the Newfoundland Fish Trades Association to the Canadian Department of Industry, Trade and Commerce for assistance in promoting the sale of the re-named Greenland turbot.

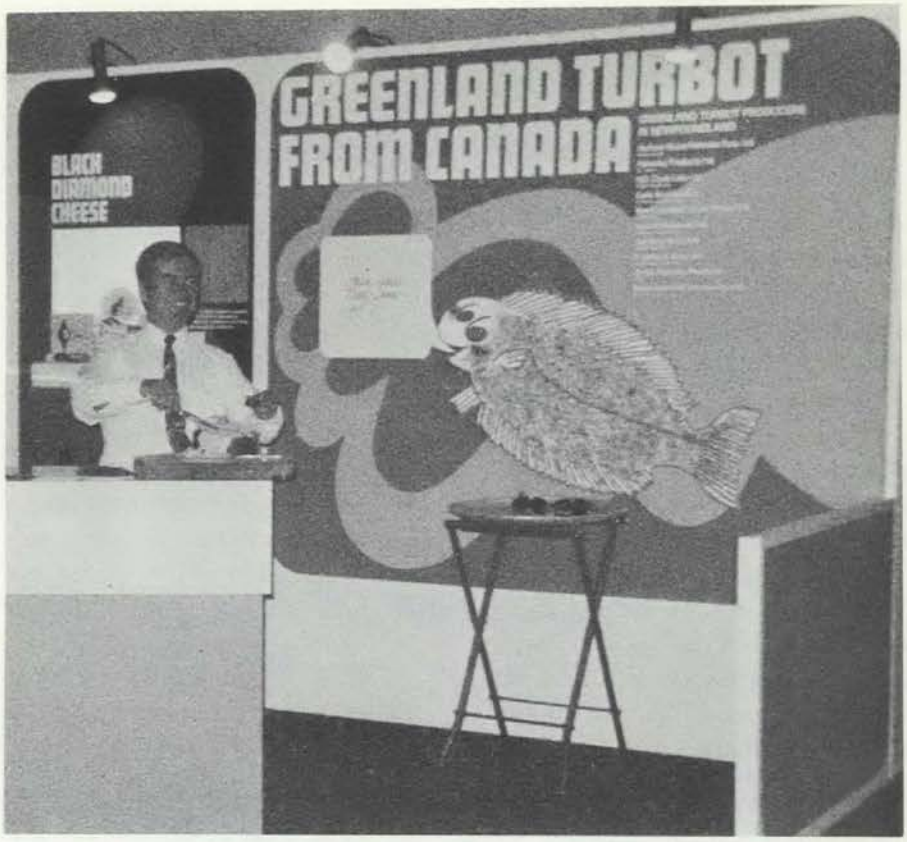
It was decided to feature the fish, along with other Canadian gourmet food items such as cheese, jams, ham and maple products, at the Pacific Fine Food and Beverage Fair. This is an annual event and attracts buyers from some 20 States and several foreign countries.

After the fair, V.B. Chew,

Canadian consul and trade commissioner in Los Angeles, commented: "We could sell the whole of the Newfoundland catch of Greenland turbot in Southern California. The demand is greater than the supply". Mr. Chew added that there is also a growing market for fish and chips, with dealers lining up for cod.

This was the second promotion to publicize the name change for turbot. In May, the Canadian consul hosted the press and members of the industry at turbot lunches in Los Angeles and San Francisco which resulted in good coverage in the newspapers and on television.

The Canadian team responsible for staging the exhibit at the Los Angeles fair included Mr. Chew, Frank J. Matthews, of the Canadian Exhibition Commission, and Roger Bedard, of the Agriculture, Fisheries and Food Products Branch of the Department of Industry, Trade and Commerce.



Part of the Canadian Government display featuring Greenland turbot at the Pacific Fine Food and Beverage Fair in Los Angeles, California. Visitors lined up to taste samples of the fish.

Issue Warning Over Damage to Gillnets

Fisheries and Forestry Minister Jack Davis announced August 30 that he will use his full powers to revoke the licences of fishing draggers and trawlers that wilfully or through carelessness damage properly marked gillnets. He said he was convinced that cod gillnets set more than three miles from shore in the Port aux Choix-Port Saunders area of northwestern Newfoundland were being destroyed by draggers and trawlers fishing in the same area.

The gillnets are not at present properly marked, having radar reflectors set only two feet above water. Proper marking calls for flags, radar reflectors and lights set sufficiently high above water to be effective. Mr. Davis said that for the present a flag and radar reflector set six feet above the water on gillnets would be considered adequate, and that it is internationally recognized that the onus is on the dragger or trawler to avoid gear so marked.

Mr. Davis said he will contact Canadian vessel owners and point out that wilful or careless violation of the rights of the owners of properly marked gillnets will result in the cancellation of fishing licences. He also intends to contact the embassies of foreign nations who fish in the area and appeal to them to honor their internationally stated position that it is incumbent also on their vessels to avoid properly marked gear.

The Port aux Choix-Port Saunders area will continue to be patrolled by Canadian fisheries protection vessels until the situation has improved.

Frozen Groundfish Market Improving

Improving conditions in the market for frozen groundfish have been reported at a meeting of major exporting countries, Fisheries and Forestry Minister Jack Davis announced in September.

Mr. Davis said he was pleased with the results reported at the Oslo meeting and with the decision to maintain close liaison among the participating countries.

Government officials of Canada, Denmark, Iceland and Norway, meeting in Oslo, expressed satisfaction in the strengthening of the market in the last six months. They met to continue the series of consultations on the international market situation for frozen groundfish begun at Copenhagen in March.

Examining the world market situation as it developed since the last meeting, representatives of the supplying countries reasserted their confidence in the basic elements of strength in the market. They expressed determination to maintain a strong and stable world market for frozen groundfish.

In the course of the meeting, the officials reviewed the world demand and supply situation for frozen groundfish. They concluded that world stocks, with the peak of production passed in the major producing countries, were at normal levels. It was also noted that total consumption is growing faster than production.

The four major suppliers agreed to keep world market trends under review and to continue periodic consultations.

Mr. Davis announced last February a Canadian government program to stabilize lagging groundfish prices by buying and holding stocks until marketing conditions improved.

Regional Operations Director Appointed

Clifford R. Levelton, 46, of Ottawa, has been appointed to the newly-created position of Director of the Regional Operations Branch, Canadian Fisheries Service, Department of Fisheries and Forestry. Mr. Levelton has been Director of the Conservation and Protection Branch of the Fisheries Service since 1965, a position that will now be filled in an acting capacity by J.G. Hutchison, who has been Assistant Director.

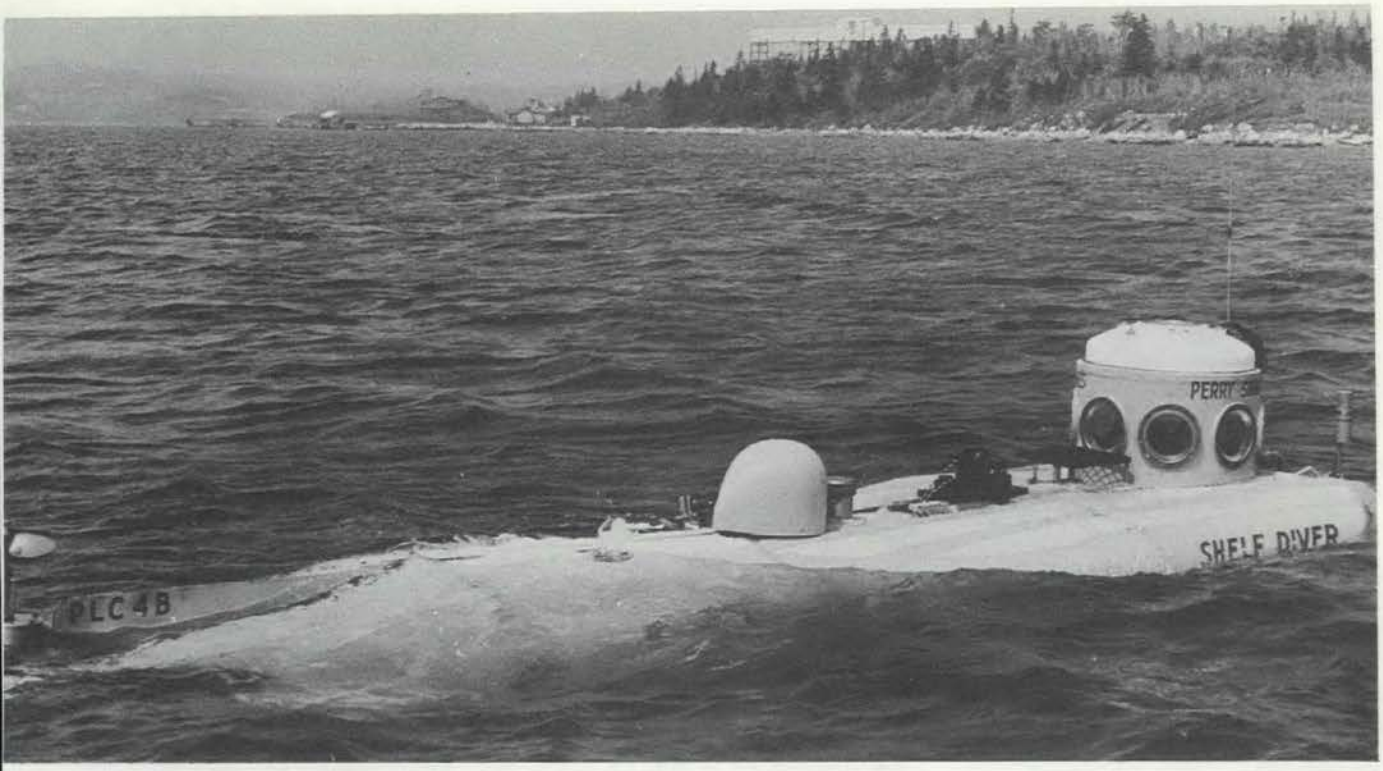
A native of Bella Coola, B.C., Mr. Levelton joined the Department of Fisheries on the West Coast in 1942. He spent four years with the Royal Canadian Air Force during the war, returning to the Department in 1946. In 1958 he was appointed Chief of the Protection Branch in the Pacific Region, with headquarters in Vancouver, and in December 1965 he moved to Ottawa as Director of the newly established Conservation and Protection Branch.

In his new position Mr. Levelton will be responsible for the co-ordination and presentation of regional contributions in the formulation of departmental policy and for the co-ordination and implementation of programs in the Pacific, Central, Quebec, Maritimes and Newfoundland regions.

C.R. LEVELTON

Mr. Hutchison joined the Department in 1946 as master of a fisheries patrol vessel in the West Coast service, and later served as Fishery Inspector in northern British Columbia coastal areas. In 1948 he was appointed Marine Officer at the Department's Vancouver office, and in 1955 became Chief Protection Officer for the Pacific Region. He was transferred to Ottawa in 1957 as Chief of the Purchasing Branch of the Department, and rejoined the Conservation and Protection Service in 1960 as Chief of the Protection Branch.

Mr. Hutchison's office is responsible for the conservation of Canadian stocks of fish, shellfish and marine mammals through the establishment and enforcement of regulations.



The three-man chartered submarine which has been used by Fisheries Research Board of Canada scientists this summer for investigations in the Bay of Fundy and the Gulf of St. Lawrence.

Sub Becomes Lab for FRB Scientists

BY RON GADSBY
Fisheries Research Board of Canada

For the second year in succession, the Fisheries Research Board of Canada in conjunction with the Department of Energy, Mines and Resources, is utilizing a submarine in its research program.

In 1968 the feasibility of a submersible for underwater research by F.R.B. scientists was established and although its field of operation was limited, its potential was recognized. This year, with a more sophisticated vessel, it is expected that puzzling questions involving herring, scallops, and queen crabs will be answered.

The Shelf Diver, a 23-foot submarine with accommodation for three observers or one observer and two divers, was chartered from the Perry Submarine Builders of Florida. It operates to a depth of 800 feet and incorporates a built-in decompression chamber that will allow divers to emerge to depths of 800 feet. It is this feature, plus better visibility from inside the craft, that makes it superior to the Cubmarine used last year.

Fisheries Research Board scientists will use it in the Bay of Fundy and the Gulf of St. Lawrence. Their efforts in the Bay of Fundy will be directed toward more intense studies of the scallop stocks and their placement on the ocean floor. How scallops are spread has long been uncertain. Do they congregate in a cluster or do they stretch out in long lines? With the help of the Shelf Diver, Dr. John Caddy and his staff will be able to observe the scallop community at close quarters.

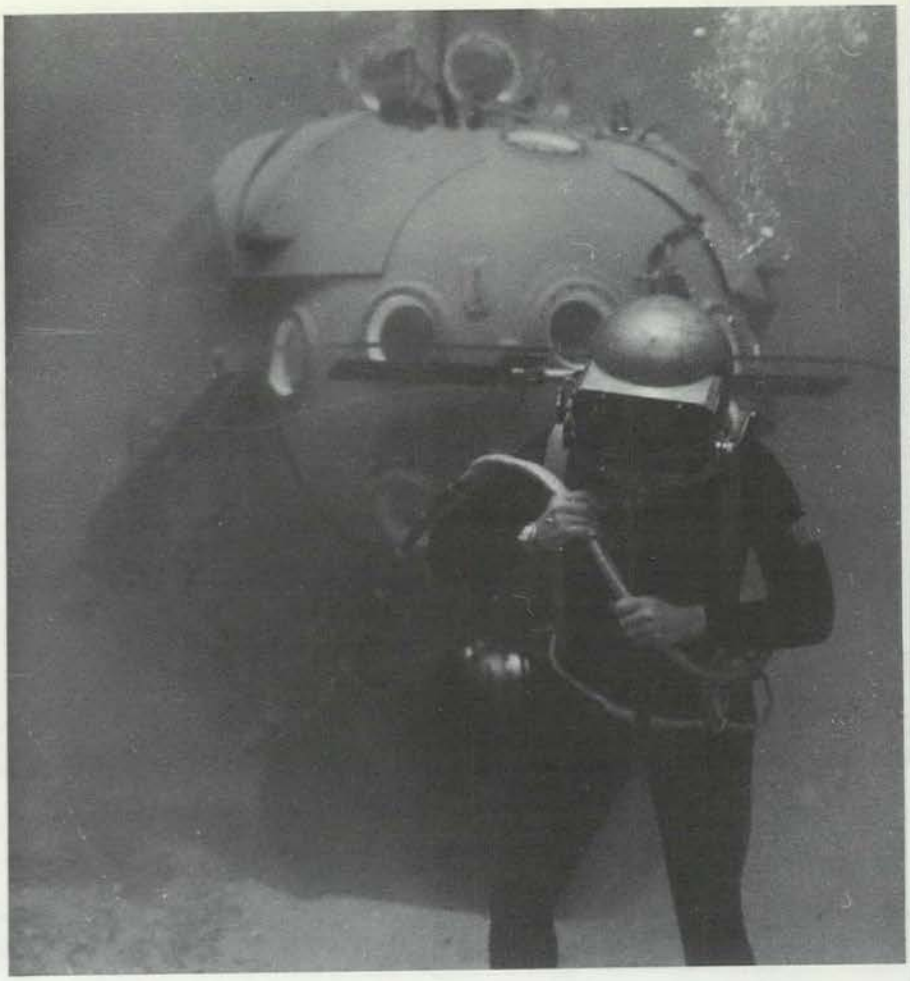
A decline in herring stocks in the Maritimes has been a cause of considerable concern recently and it is hoped the submarine will provide at least some of the answers to this problem. Unlike West Coast herring stocks, the eastern counterparts spawn at depths of from 40 to 60 feet. Shore spawning is the rule on the Pacific coast, and it is relatively easy to check the spawn and make reasonably accurate predictions on future harvests. However, in the Bay of Fundy, scientists must get beneath the surface to do accurate surveys.

Ironically, in the world of sophisticated underwater hardware, sonic devices and computerization, one

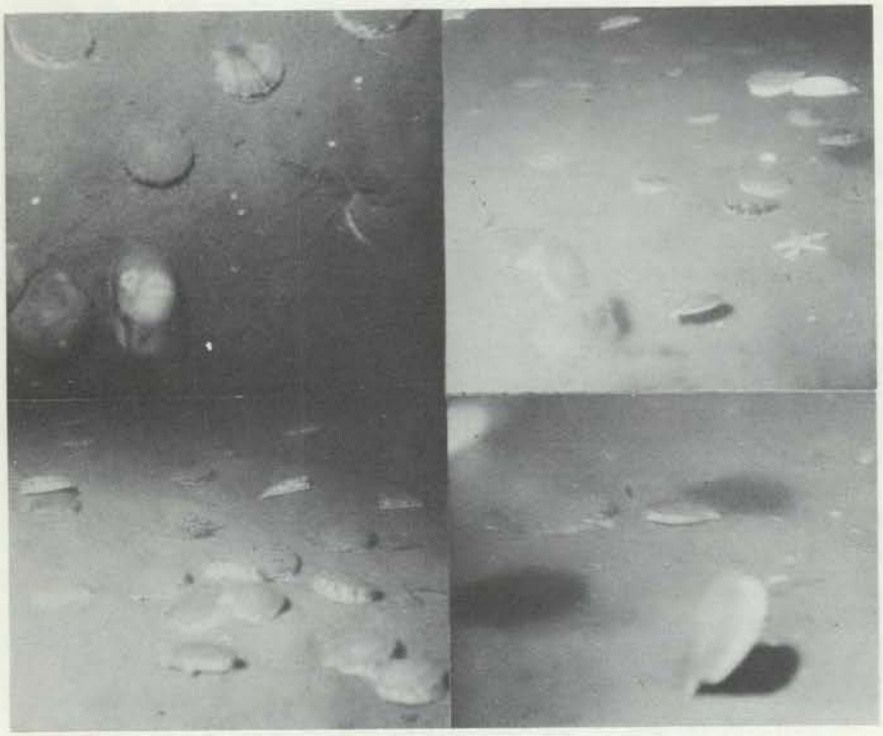
of the most effective research implements to be used by Dr. Neil Tibbo, FRB's herring expert, is a 49-cent cookie cutter. Herring spawn is a gelatinous substance up to three inches thick and the cookie cutter has proven ideal in taking samples.

In the Gulf of St. Lawrence, studies on the queen crab populations begun last year will be continued with special emphasis on the trapping gear. The effectiveness of various baits will be watched by divers 600 feet below the surface. Dr. Jeffery Watson, of the Board's St. Andrews station, is in charge of the crab operations.

In overall charge of the operation is Dr. John Anderson, Director of the St. Andrews station. In a recent interview, Dr. Anderson paid tribute to the Department of Energy, Mines and Resources for their co-operation in making FRB participation possible. Almost one third of the charter time will be used by FRB scientists, while the remaining two-thirds of available time will be spent in intensive surveys of the continental shelf off the coast of Nova Scotia.



An underwater view of the Shelf Diver with a diver operating outside the submersible.



Various shots of the scallop beds off Digby, N.S., photographed from the Shelf Diver.

Visitors Study Freshwater Fishing

Following the FAO Technical Conference on Fish Inspection and Quality Control, held in Halifax, Nova Scotia, a group of 24 visitors to the conference toured the freshwater fishing industry of the Central Region. Among the guests, representing 22 countries, were Dr. R. Kreuzer of the FAO staff in Rome, and Dr. J.M. Shewan of the Torry Research Station, Aberdeen, Scotland.

Accompanied by liaison officer O.M. Linton, of the Inspection Branch, Department of Fisheries and Forestry, Ottawa, the visitors arrived in Toronto from Halifax on August 1. A trip to Niagara Falls was organized during a weekend of sight-seeing.

The official tour started with a visit to Omstead Fisheries Ltd. in Wheatley, Ontario, during which time the group was very interested in the techniques and mechanical operation of the world's largest freshwater fish plant. As guests of the Omstead management, a fishing boat and operation crew was put at their disposal for an actual demonstration of modern fishing methods.

After arrival at the Department's, Central Region headquarters at Winnipeg, the visitors embarked on an itinerary that included visits to the local fishing industry, Central Region Fish Inspection laboratory, a tour of the Freshwater Fisherman's School at Hnausa, Manitoba; and the Fisheries Research Board of Canada's Freshwater Institute at Winnipeg. The delegates attended a series of lectures followed by questions and answer periods. Guest speakers were M.A. Foley, Inspection Branch, Ottawa; G.R. Douglas, Chief, Inspection Branch, Central Region; D.F. Corney, President and General Manager, Freshwater Fish Marketing Corporation.

The tour ended on Friday, August 8, and the delegates departed for their home countries the following day.

Dr. L.A. Britto de Castro, Dr. C.A.M. Lima dos Santos, of Brazil, S. Darmoredjo, of Indonesia, and M. Alvarez Blanco, of Cuba, study a sanitation poster for fish plants during a visit to the Hnausa Fisherman's School, Manitoba.

C. Dhatemwa, of Uganda (left) and W.K. Low of Malaysia, discuss processing methods with Leonard Omstead Jr. during the FAO seminar-study tour of Omstead Packers at Wheatley, Ont.

FRB Scientist Honored in the U.S.

The first Award of Excellence of the American Fisheries Society has been presented to Dr. W.E. Ricker, Chief Scientist of the Fisheries Research Board of Canada. Dr. Ricker is a resident of Nanaimo and stationed at the Board's Nanaimo Biological Station. He is currently engaged in teaching and research in Moscow for a six-month period.

American Fisheries Society President, Elwood A. Seaman of Virginia, presented the medal and $1,000 prize at the Society's 99th annual meeting in New Orleans.

Outlining some of Dr. Ricker's scientific achievements, Dr. Seaman referred to his outstanding work in connection with the theory of lake circulation; the methodology of statistically sound sampling in fishing waters; measuring and interpreting the vital statistics of fish population; for new concepts about growth and mortality and about predator influences on salmon survival and relations between parent fish stocks and numbers of surviving progeny.

DR. W.E. RICKER

Dr. Ricker was also cited for his scientific and technical versatility. He was a professor at the University of Indiana for 11 years and editor of the Journal of the Fisheries Research Board of Canada for 12 years. He has had published almost 150 scientific papers.

The Award of Excellence of the American Fisheries Society

The new Award of Excellence is not just for recent scientific accomplishments but is for recognition of excellence of lasting contributions to fisheries and aquatic science.

Dr. Ricker, 61 was born in Waterdown, Ontario, and attended elementary and secondary schools in North Bay. He studied at the University of Toronto where he received his B.A. degree in 1930, M.A. in 1931 and Ph.D. in 1936. He is married and has four sons.

Dr. D.R. Idler Appointed To New Position

Dr. David R. Idler, 46, of Halifax, has been appointed Atlantic Regional Director (Research) of the Fisheries Research Board of Canada. The appointment, announced by Fisheries and Forestry Minister Jack Davis, was recommended at a recent meeting of the Executive Committee of the Board, of which Dr. J.R. Weir is Chairman.

Dr. Idler has been Director of the Board's Halifax Laboratory since 1961, and will remain in Halifax. In his new position he will integrate the activities of all the Board's Atlantic establishments, which include the research laboratory at Halifax, biological stations at St. Andrews, N.B., and St. John's, Nfld., and the Marine Ecology Laboratory at Dartmouth, N.S.

He will be responsible for the planning and integration of programs and will maintain liaison and collaboration with industry, universities and governmental departments and agencies with common interests. He will also be responsible for the operations of the Board's Atlantic fleet, which consists of five major research vessels and a number of smaller craft. In addition, he will continue a personal research program at the Halifax laboratory on various aspects of the endocrinology of marine species.

A native of Winnipeg, Dr. Idler received his B.A. and M.A. degrees at the University of British Columbia in 1949 and 1950. He was awarded a Babcock Fellowship and continued his studies at the University of Wisconsin, where he received his Ph.D. degree in 1953. He joined the staff of the Board's Vancouver Laboratory the same year, and was Assistant Director before being moved to Halifax in 1961.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	Jan.–July 1968		Jan.–July 1969	
	Landings[1]	Value[2]	Landings[1]	Value[2]
	'000 lb.	$'000	'000 lb.	$'000
CANADA – TOTAL	1,435,231	101,925	1,418,551	92,135
ATLANTIC COAST – Total	1,279,638	65,640	1,328,065	67,255
Cod	397,530	16,012	351,953	13,698
Haddock	63,054	4,665	64,179	5,150
Redfish	76,218	1,932	69,800	1,779
Catfish	5,103	181	4,903	169
Halibut	2,786	1,091	2,488	986
Other Flatfishes	158,135	5,209	162,530	6,236
Pollock, Hake, Cusk	30,079	1,070	23,543	809
Other Groundfish	3,905	47	3,103	46
Herring & Sardines	462,949	4,750	558,413	5,603
Mackerel	11,379	468	14,532	596
Swordfish	2,043	1,249	2,378	1,514
Tuna	864	120	1,040	131
Alewives	6,877	127	3,645	85
Salmon	3,861	1,918	2,945	1,738
Smelts	2,199	234	3,077	247
Other Fish	8,105	132	7,550	124
Lobsters	27,300	17,582	25,942	18,015
Clams & Quahaugs	3,503	247	4,266	316
Scallops	9,071	6,495	7,484	6,186
Other Shellfish	4,677	474	14,294	1,545
Misc. Items	–	1,637	–	2,282
PACIFIC COAST – Total	155,593	36,285	90,486	24,880
Pacific Cods	15,304	1,233	9,583	839
Halibut[3]	19,566	4,893	20,433	7,992
Soles & Other Flatfishes	7,351	449	7,696	458
Herring	5,902	165	3,056	140
Salmon	93,355	28,248	34,772	14,218
Other Fish	4,739	164	5,630	200
Shellfish	9,376	1,127	9,316	1,033
Misc. Items	–	6	–	–
BY PROVINCES				
British Columbia	155,593	36,285	90,486	24,880
Nova Scotia	374,765	29,957	373,497	30,969
New Brunswick	193,947	6,198	199,114	6,727
Prince Edward Island	19,394	5,583	17,578	5,207
Quebec	89,020	4,488	105,433	4,947
Newfoundland	602,512	19,414	632,443	19,405

[1] Fish and Shellfish only. [2] All Products–Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms.
[3] Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES – JULY 1969

		Montreal	Toronto
		$	$
Cod fillets, Atl. fresh, unwrapped	lb.	.427	.540
Cod fillets, Atl. frozen, cello 5's	lb.	.338	.437
Cod fillets, smoked	lb.	.418	.570
Haddock fillets, fresh, unwrapped	lb.	.621	.713
Herring, kippered, Atl.	lb.	.259	.330
Mackerel, frozen, round	lb.	.192	.293
Lobsters, canned, Fancy	Case 48-1/2s	74.133	78.400
Sardines, canned	Case 100-1/4s	10.786	10.700
Halibut, frozen, dressed	lb.	.568	.647
Silverbright, frozen, dressed	lb.	.662	.667
Coho, frozen, dressed	lb.	.910	.980
Sockeye, canned, grade A	Case 48-1/2s	20.053	29.000
Pink, canned grade A	Case 48-1/2s	18.710	19.360
Whitefish, fresh	lb.	.539[1]	.567
Lake Trout, frozen	lb.	.472	.563

[1] Dressed.

PRICES PER CWT. PAID TO FISHERMEN

(Week ending July 12th)

	1968	1969
	$	$
Halifax		
Cod Steak	5.75	5.75
Cod Market	5.5	5.5
Haddock	9	9
Plaice	4.5-5.25	4.5-5.25
Shippegan		
Herring	–	1
St. John's, Nfld.		
Cod	–	2.5-3.75
Vancouver		
Ling Cod	8-13	10-16
Grey Cod	7-7.5	7-8.5
Soles	8-9.5	8.5-9.5
Salmon (Redspring)	45-85	50-85

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF JULY, 1969

	1968 '000 lb.	1969 '000 lb.
TOTAL – Frozen Fish, Canada	101,985	95,361
Frozen – Fresh, Sea Fish – Total	79,308	70,615
Cod, Atlantic, Fillets & Blocks	21,491	26,406
Haddock, Fillets & Blocks	4,370	3,328
Rosefish, Fillets & Blocks	7,224	4,488
Flatfish, (excl. halibut) Fillets & Blocks	6,643	4,585
Halibut, Pacific, dressed & steaks	9,631	9,211
Other Groundfish, dressed & steaks	2,726	1,542
Other Groundfish, fillets & blocks	7,077	4,559
Salmon, Pacific, dressed & steaks	10,295	7,724
Herring, Atlantic & Pacific	538	358
All Other Sea Fish, all forms	5,703	4,531
Shellfish	3,610	3,883
Frozen – Fresh, Inland Fish – Total	7,085	7,451
Perch, round or dressed	1,023	710
Pickerel (Yellow & Blue) fillets	403	261
Sauger, round or dressed	343	62
Tullibee, round or dressed	98	335
Whitefish, round or dressed	1,460	1,993
Whitefish, fillets	137	169
Other, all forms	3,621	3,921
Frozen – Smoked Fish – Total	1,759	1,489
Cod, Atlantic	905	709
Sea Herring, kippers	465	272
Other, all forms	389	508
Frozen For Bait and Animal Feed	13,833	15,806

SALT FISH STOCKS AS AT END OF JULY, 1969

		1968 '000 lb.	1969 '000 lb.
Salted and Pickled Fish, Atlantic Coast			
Wet-Salted – Total		18,842	19,811
Cod		14,530	16,173
Other		4,312	3,638
Dried-Salted – Total		11,799	5,305
Cod		10,820	5,061
Other		979	244
Boneless – Total		1,177	538
Cod		972	490
Other		205	48
Pickled – Total	(barrels)	23,309	10,067
Herring	"	8,598	3,641
Mackerel	"	6,319	2,929
Alewives	"	8,392	3,497
Turbot	"	–	–
Bloaters	(18 lb. boxes)	253,446	119,198
Boneless Herring	(10 lb. boxes)	5,618	4,029

[1] Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS
JANUARY JUNE

		1967-68 $'000		1968-69 $'000	
TOTAL EXPORTS		106,548			121,088
By Markets:					
United States		73,409			80,961
Caribbean Area		9,490			9,025
Europe		20,931			26,907
Other Countries		2,718			4,195
By Forms:					
Fresh and Frozen		69,164			80,974
Whole or Dressed	16,772		20,877		
Cod, Haddock, Hake	414		328		
Halibut, Pacific	2,126		2,581		
Salmon, Pacific	4,901		8,789		
Swordfish	802		927		
Other Seafish	2,865		2,646		
Whitefish	2,489		2,435		
Pickerel	1,102		1,067		
Other Freshwater Fish, n.e.s.	2,073		2,104		
Fillets, Blocks and Slabs	31,274		33,733		
Cod, Atlantic	9,419		9,799		
Haddock	4,324		4,986		
Ocean Perch, Hake, Cusk, Pollock	3,542		3,957		
Flatfish	8,699		9,579		
Pickerel	1,147		826		
Other Fillets and Blocks	4,143		4,586		
Shellfish	20,697		25,055		
Lobsters (in shell & meat)	14,062		16,751		
Scallops	5,668		6,228		
Other	967		2,076		
Frozen Fish & Shellfish, pre-cooked	421		1,309		
Cured		11,393			9,997
Smoked	1,089		1,244		
Herring	597		685		
Other	492		559		
Salted, Wet & Dried	9,102		7,528		
Cod	7,838		6,654		
Other	1,264		874		
Pickled	1,202		1,225		
Herring	736		858		
Mackerel	288		152		
Other	178		215		
Canned		19,107			21,062
Salmon	14,408		16,256		
Sardines	3,130		3,070		
Lobsters	574		558		
Other	995		1,178		
Miscellaneous		6,884			9,055
Meal	3,774		5,701		
Oil	193		640		
Other	2,917		2,714		

What's in there?

Dr. Karl Schiller, Minister of Economics, Federal Republic of Germany, appears fascinated by fish swimming inside a respirometer, a piece of scientific equipment developed by the Fisheries Research Board of Canada, on display in the Canadian Pavilion at German Industries Fair, W. Berlin. Explaining the operation of the respirometer to Dr. Schiller is David Denbigh, of the Information Branch, Department of Fisheries and Forestry, Ottawa. Picture at top shows a general view of the Canadian Pavilion.

If undelivered return to:
DEPARTMENT OF FISHERIES & FORESTRY
OTTAWA

CANADA
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Loans for Fishermen

CANADIANS who make their living by fishing may now borrow up to $25,000 as a result of recent amendments to the Fisheries Improvement Loans Act. Loans, which may be obtained to cover the cost of boats, gear or other fishing equipment, are guaranteed by the federal Government. Here are the details:

Who May Borrow

Only a fisherman may borrow. A fisherman is defined as a person who owns or plans to obtain a fishing vessel, or fish catching and related equipment, and who makes his living by fishing.

Where Loans Can Be Obtained

All chartered banks are authorized to make Fisheries Improvement Loans under provisions of the Fisheries Improvement Loans Act. In addition, loans may be made by Credit Unions, Caisses Populaires or other Co-operative Societies, trust companies, loan companies and insurance companies which have applied and have been designated as lenders under the Act by the Minister of Finance. Banks and other lenders can advise applicants whether they would qualify for a loan under this legislation and how their particular credit needs can be arranged.

Loan Purposes

Loans may be made for any of the following purposes:

- Purchase or construction of a fishing vessel.
- Purchase or construction of fishing equipment such as auxiliary boats, engines, winches, electronic equipment, weirs, nets, traps, and vehicles used in the fishing enterprise.
- Major repair or overhaul of a fishing vessel.
- Purchase or construction of a shore installation such as piers, wharves, boathouses and equipment used with them.
- Development or improvement of a primary fishing enterprise such as the installation of a water system or the removal of a shore installation from one site to another.

Terms and Conditions

The detailed terms and conditions of loans are arranged between the applicant and the lender. In all cases, however, the following basic conditions must be met:

- The maximum amount which a fisherman may have outstanding at one time is limited to $25,000.
- The applicant must provide a reasonable portion of the cost of the purchase or project from his own resources.
- Maximum period over which a fisherman may repay his loan depends on the purpose for which the loan is made —

  3 years for vehicles; 5 years for the purchase of fishing equipment or the major repair of vessels; 10 years for all other purposes.

- The interest rate on Fisheries Improvement Loans is geared to the rate paid by the Government of Canada on its long-term loans, and is established twice a year, on April 1 and October 1. The present rate of interest is 8-1/2%.

Security for Loan

Loans must be secured. Security is usually taken in the form of a chattel mortgage on the item purchased or a mortgage on other assets of the fishing enterprise. The applicant must also sign a promissory note.

Certain Restrictions

The purpose of the legislation is to facilitate and encourage the direct financing by private lending institutions of term loans for fisheries improvements. Refinancing of existing debts or of working capital requirements are not eligible purposes.

Application for a Loan

A fisherman who is seeking assistance should discuss his financial requirements with the manager of the lending agency of his choice. Application forms are obtainable from lending agencies. General information on the program is available from:

The Chief,
Guaranteed Loans Administration,
Department of Finance,
Ottawa 4, Ontario.

FISHERIES of Canada

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NOVEMBER, 1969

FISHERIES of Canada

The Hon. Jack Davis, Minister

Dr. A.W.H. Needler, Deputy Minister

CONTENTS

COVER PHOTO – Northumberland Strait scallop boats tied up at Caribou, Nova Scotia (See article page 17).

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Editor:
E.H. Hearnden

Threat of Industrialization To Canada's Atlantic Salmon

BY P.F. ELSON
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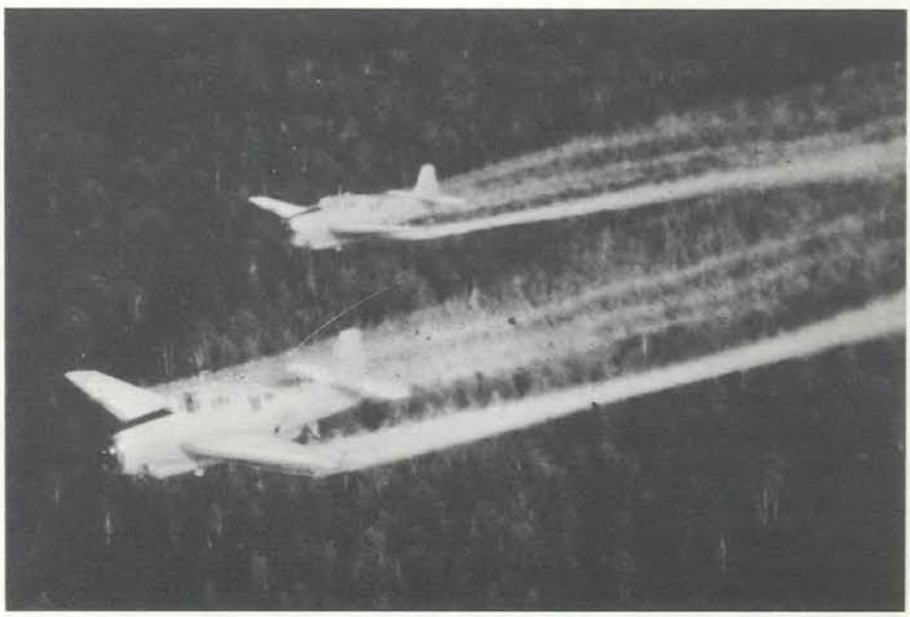
To most Maritimers mention of Atlantic salmon conjures up nostalgic memories, gustatory anticipation or daydreams about silver lightning bolts springing from deep pools of pristine rivers. Canadian commercial fishermen garnered 2.3 million dollars from Atlantic salmon catches in 1968. Tourist dollars attracted by salmon are substantial. New Brunswick sport fisheries, to which salmon contribute by far the greatest amount, have been estimated to have a gross annual value of about 10 million dollars. I suppose this value could be doubled if we include all five Atlantic Provinces.

Another, and perhaps even greater value might be attached to our salmon. Each and every one of the mature salmon we harvest, whether by nets at sea or by fly and singing reel in some forest-hidden pool, has lived for 2 or 3 years in the clean, cool waters of its nursery stream, passed down one of our rivers and through an estuary into the sea. It has lived at least a year or two somewhere at sea and then found conditions suitable to return to our shores and even, for many, to swim up a river to start a new generation of salmon.

Salmon thrive best in clean, well-oxygenated water. But they will tolerate limited oxygen deficiency, water a bit too warm, and a considerable amount of foreign material, even a limited amount of the myriad poisons man uses and discards in his industrial and domestic activities, to complete their travels. But the salmon's tolerance of many of these deleterious materials is less than man's. Hence these fish constitute an efficient force of detectives, chemically very sensitive and alert against harmful pollution of our water. Even man needs good water to live well.

Canadians are particularly blessed with abundant supplies of water, both fresh and salt. But the supplies are not boundless. Many Maritimers have been tempted to take their resources of clean water for granted. But now we know that even such vast reservoirs as the Great Lakes can become seriously polluted. It behooves us to look sharply at our own use of the Saint John, the Miramichi and all our rivers. Even the ocean **can** be polluted, as witness the much-publicized oil-drilling accidents on the Pacific coast or, closer to home, a dangerous industrial pollution of a Newfoundland bay in 1969.

There are still salmon in some old-country rivers which have been subjected to the deteriorating pressures of civilization far longer than our



A side effect of aerial spraying of forests against insect pests has been the killing of a high proportion of young salmon in streams flowing through sprayed forests. Recent substitution of less persistent poisons for DDT has removed much of the ill effect, but has not eliminated it entirely.

(Editor's note: This article is based on talk given by Dr. Elson to the Kiwanis Club of Lancaster, N.B., on August 18, 1969).

streams. But this condition has not been maintained without effort and cost. Only this spring I was told by visiting salmon biologists that some of the pollution situations they saw here in the Maritimes would not be tolerated for a moment across the ocean!

If our freshwater supplies are not boundless, our Atlantic salmon resources are even less so. To keep them we must maintain suitable environments and we must not overfish them.

HOME FISHERIES

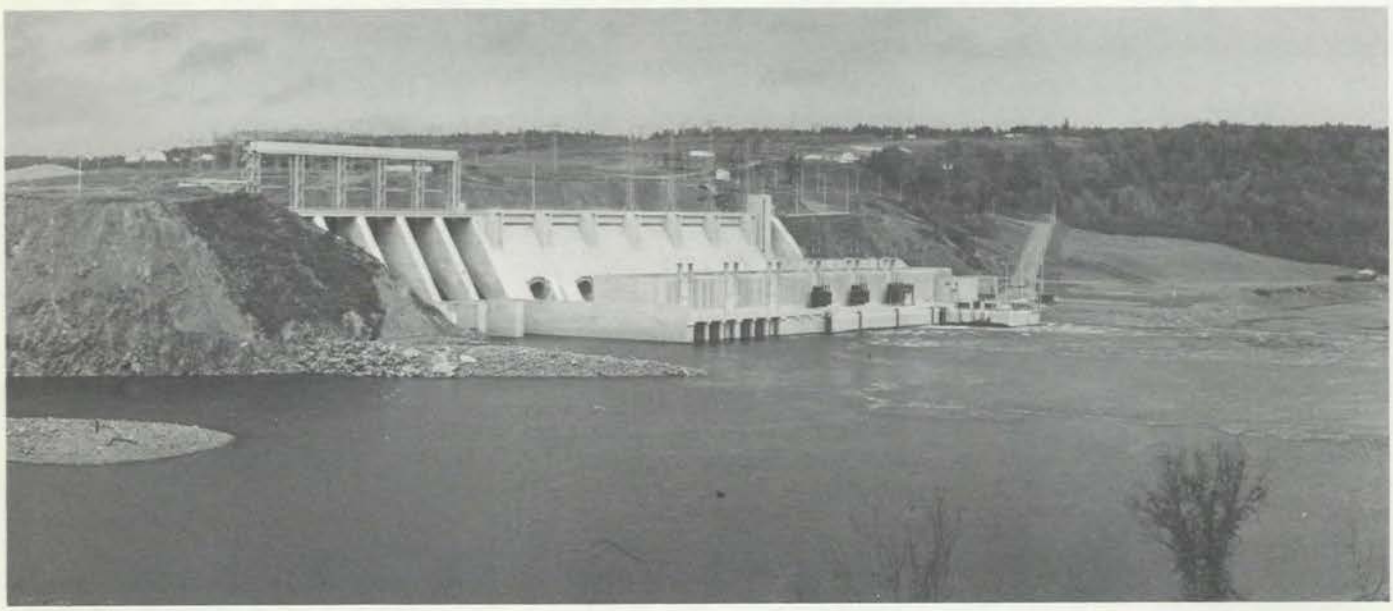
Mention of overfishing brings up pictures of nets attached to small boats drifting in the sea off our coasts, of others thrusting out into the water along our shoreline and in our estuaries, and of anglers whipping the river pools as the survivors work their way toward spawning grounds. In 1967 we harvested almost 750,000 fish before they reached fresh water, taking all Atlantic Provinces together. Roughly another 100,000 were taken by anglers. This was one of the highest recent catches, but still amounted to less than one million fish. It's doubtful that we ever harvested much more than two million. In some years the harvest was around half a million.

I once attempted to estimate the quantity of salmon available to the Maritimes. The answer came out to between 1/2 and 1-1/2 million fish, based on an assumption of a 10-lb. average weight; the estimate did not include grilse. If we extend this to all Atlantic Canada I suppose the figure might be doubled – i.e., 1 to 3 million salmon. If we want to include grilse too, the figure might be doubled again, say 2 to 6 million grilse and salmon. I will not attempt to defend these figures against all comers. Salmon numbers vary greatly from year to year. The important point is that our resource in Atlantic salmon is very finite – perhaps about one for every 5 to 10 persons in Canada if we caught every one!

Judging by the number of licences issued and the gear permitted, we seem not to be fishing our salmon much, if any, harder than 30 or 40 years ago. At that time studies involving tagging and liberating salmon caught early in the season indicated that we were taking, on the average, about 30% of the salmon on our shores. But in some places, for example the Saint John area, 70% were caught again. But nets formerly made of cotton or linen are now made of nylon. Nylon nets do catch more fish than linen nets.

In 1937 when salmon were tagged and liberated from the Port-aux-Basques fishery off southwestern Newfoundland, about 13% were later recaught in fisheries, mostly within the first 3 months. This year, in a similar study, over 30% were recaught within about 3 months, nearly half of these in the Miramichi area. So either our exploitation rate is higher or else our research techniques have greatly improved – perhaps both.

The Miramichi system is the greatest producer of Atlantic salmon in the world. As in the Saint John, the stocks are heavily exploited. The Fisheries Research Board of Canada has been studying Miramichi salmon, and especially those of the Northwest Miramichi, for the last 20 years. Since



Hydroelectric dams, such as the Mactaquac in New Brunswick (above), interfere with free passage of young and adult salmon, but fishways and hatcheries provide effective remedies. The long deep lakes behind such dams may, by slowing the downstream passage of organic wastes, contribute to serious oxygen depletion, both in the lake and river below.

Faeroese and Norwegian (right) salmon drift-netting vessels in West Greenland ports. Three to eight miles of drifting net are set at night from each vessel from August through November, fishing the waters of the West Greenland – Davis Strait area. On such vessels the fish are cleaned and quick-frozen as soon as they are taken from the net. The high-quality product brings as much as $2.50 a pound in European markets.

1960 we have been tagging young smolts as they left the river for their sojourn at sea. Earlier we tried to follow them by judiciously clipping off one or two of the less important fins and got much information. But tags seem to be spotted by both netsmen and anglers much more readily than missing fins. Now, even if the fish are caught a year or more later and a long distance away we have a good chance of learning their fate.

Besides being caught close to home Miramichi salmon are netted as far away as in the Bay of Fundy, including in the Saint John area. Other Miramichi salmon, including quite a few grilse, are netted on the south and east coasts of Newfoundland. But we have very, very few records of a salmon originating in one river being caught in the fresh waters of a different stream.

GREENLAND FISHERIES

Within the last 6 or 7 years increasing numbers of our tagged Miramichi smolts have been caught in a new fishery developing in the West Greenland area.

The new Greenland fisheries have two components. The shore fishery uses short gill-nets attached to rocks along the rugged coast line and in the deep fjords. The nets are set and tended by native Greenlanders from skiffs and small motor boats. Until 1968 this fishery took most of the catch in the region. The oceanic fishery uses larger sea-going vessels which set 3 to 8 miles of drift-net outside Greenland territorial waters. The largest vessels process and quick-freeze their catch as soon as it comes aboard and the quality of the product is high indeed. The enterprising Viking skipper of one vessel told me he got 2 to 2-1/2 dollars per lb. for top quality salmon landed in Denmark – three to four times what our Canadian fishermen get.

The shore fishery is somewhat limited by the sparse population and the long, rugged coastline. The developing high-seas fishery, with modern fish-finding and processing aids, seems unlikely to be restricted by anything short of international agreements, other than availability of sufficient high-priced salmon.

Canada has had a scientist in the Greenland area each year since 1965. Up to the present more tagged salmon of Canadian than of any other origin have been taken in Greenland. True, Canada has tagged more young salmon than any other country. The life history, shown by scales, of most of the salmon caught there does not fit with the life history of the few native Greenland salmon. Salmon from England, Ireland, Scotland, Sweden and Iceland congregate there with salmon from Canada and the State of Maine. Scientists from all the countries involved have coordinated their efforts to learn more about the marine life of salmon.

Important questions have to be answered. Would the salmon return home if they weren't caught in Greenland? How many would be eaten by sharks and other oceanic predators, if they did try the long swim home? We know that at least a few would return for in each of the last four years we've had one salmon caught in Canada that had been tagged by a British-Danish tagging team in Green-

land the autumn before. These fish were taken in Labrador, southern Newfoundland and in the Miramichi area. Only a few more than this have been taken in European waters. Some 1,500 salmon have been tagged in Greenland, but the total recovery, including in Greenland, has amounted to only about 50 fish. In their tender marine phase the fish are very difficult to tag successfully.

On the average the Greenland catch seems to run around a third of a million salmon. Perhaps about half of these are of Canadian origin. They are all potential 10-lb. or larger fish. Earlier I said that our annual home harvest was a bit under one million fish, including both grilse and salmon. If half of the salmon caught in Greenland are of Canadian origin and would return home, that fishery places a substantial drain on Canadian fishermen. But the present state of our knowledge scarcely seems to warrant fears that the Greenland fishery, at present levels, spells extinction for Canadian stocks.

Fortunately the International Commission for the Northwest Atlantic Fisheries recommended at its 1969 meeting that member nations refrain from fishing Atlantic salmon on the high seas. Canada played a large part in getting this resolution passed. We hope it will save our salmon from uncontrolled fishing.

EXPLOITATION RATES

A set of data chosen to show average use of Miramichi salmon reduces to the following figures: for salmon larger than grilse –

20% were caught in Greenland

77% were caught in Canada

3% escaped to perpetuate their race in the home river;

for large salmon recorded in Canadian waters –

The blackened foreground on this marsh is caused by creosote waste from a plant which treats hydro poles, bridge timbers etc. against rot. The marsh is flooded at high tide and drains into the estuary at low tide. Besides killing fish, poisons from the marsh can, in very weak dilution, cause salmon to turn away.

76% went to commercial fisheries

20% went to anglers

4% escaped to spawn;

for those which returned as grilse (a little over one year at sea) –

75% went to fishermen, mostly to anglers

25% escaped to spawn.

This is surely very high utilization – one suspects heavier than 30 years ago. But our salmon resources seem able to support such exploitation if we can only assure them of suitable environmental conditions.

The figures do bring to mind some tantalizing questions on which we are now working. Do grilse beget grilse? Must we protect a greater stock of large salmon for spawning if we are to continue to have 2-sea-year salmon? These two questions immediately lead

Mines, even when some distance removed from a stream, can contribute fish-killing poisons. Rain run-off from the scarified land and the roadbeds made of low grade ore waste from this copper-zinc mine can cause death of young salmon and turn back migrating adults in the main river more than 20 miles away.

to others concerning the possible importance of genetic strains.

PRODUCTION LIMITS

There are limits to the production of salmon in our rivers. Here are a few figures from FRB researches:

We should not expect to get an average of more than about five seaward migrating smolts from 100 square yards of reasonably good, well-managed salmon nursery stream. This is the same sort of limit that a farmer recognizes when he puts only so many head of sheep or cattle on his pasture. To assure the five smolts we need 200-300 eggs, more would be a waste. Female salmon which spawn deposit 600-800 eggs per lb. body weight. For every 100 smolts going to sea we can hope for about 2 to 10 salmon and grilse back.

Even through the salmon doldrums of the mid-fifties many of our streams were getting sufficient spawners to keep stocks in healthy enough shape that they could respond to apparently better conditions for survival in the early sixties. We still know very little about what makes for good and poor conditions, especially at sea. But certain it is that if we don't keep our waters in good condition salmon will not be able to respond to any favourable factors with their natural resilience.

THREAT OF POLLUTION

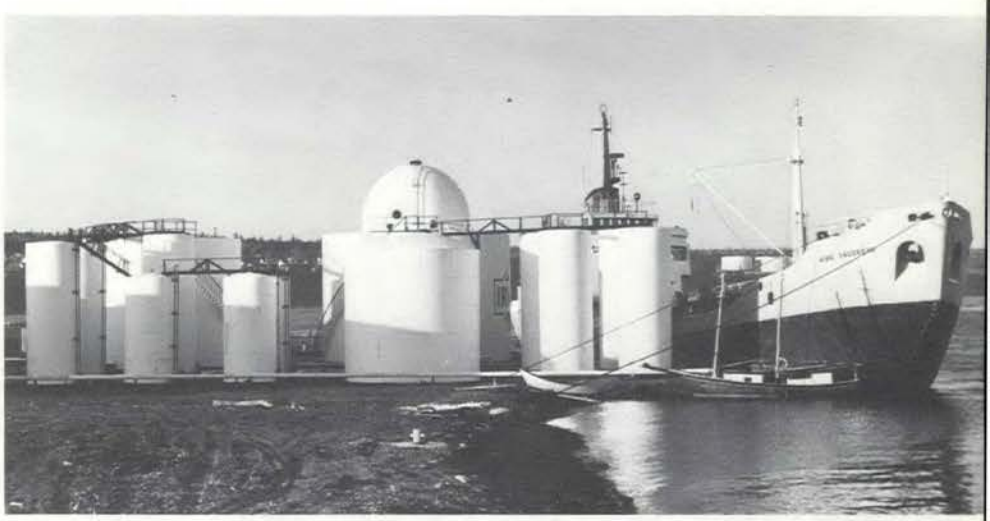
In New Brunswick we've had some sharp lessons in what pollution can do to our salmon.

In the 1950's we inadvertently killed over 90% of the baby salmon in much of the salmon nursery area of the Saint John and Miramichi systems. We did this several times, even several years in a row. It was a side effect of our effort to protect our valuable forests from the ravages of spruce budworm. While many young salmon were killed outright, others escaped with a sublethal dose which killed them when they met the added stress of winter cold. Still others escaped entirely. DDT stays around in the stream environment for a long time after actual application. We have identified some of its breakdown products in young salmon spawned in a sprayed stream more than 10 years after the last spraying. We have not identified mortalities from the small amounts accumulated after such a long time. Nor are we certain that there are **not** undesirable sublethal effects from such dosage.

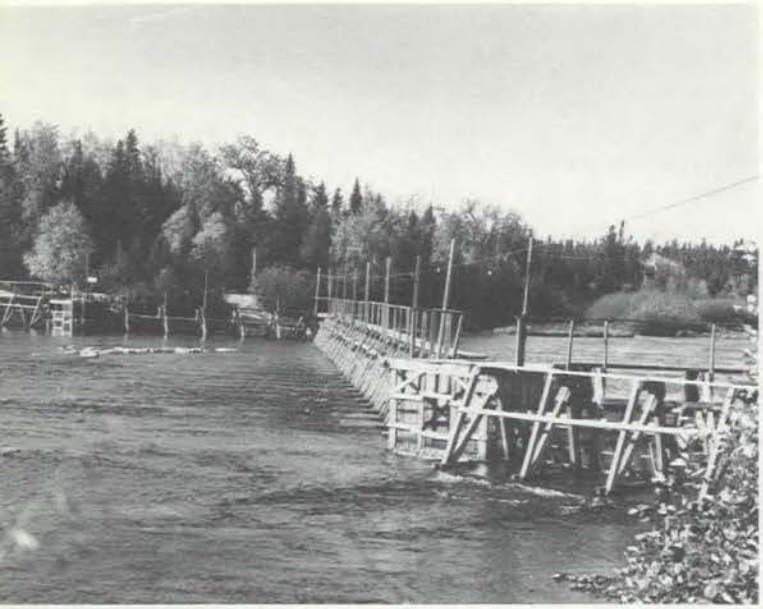
It has recently been found that trout exposed to as little as 2 parts per 100 million of DDT for 24 hours could not learn a simple response that their untreated brothers learned in about 30 trials. Whether or not such mild dosage will affect the ability of salmon smolts to recognize their home stream when they return from the sea is the subject of an experiment now under way in the Miramichi. We hope we are over most of the bad effects of DDT spraying and a different, less damaging, but not completely harmless insecticide was used on 2-1/2 million acres of New Brunswick forest in 1969.

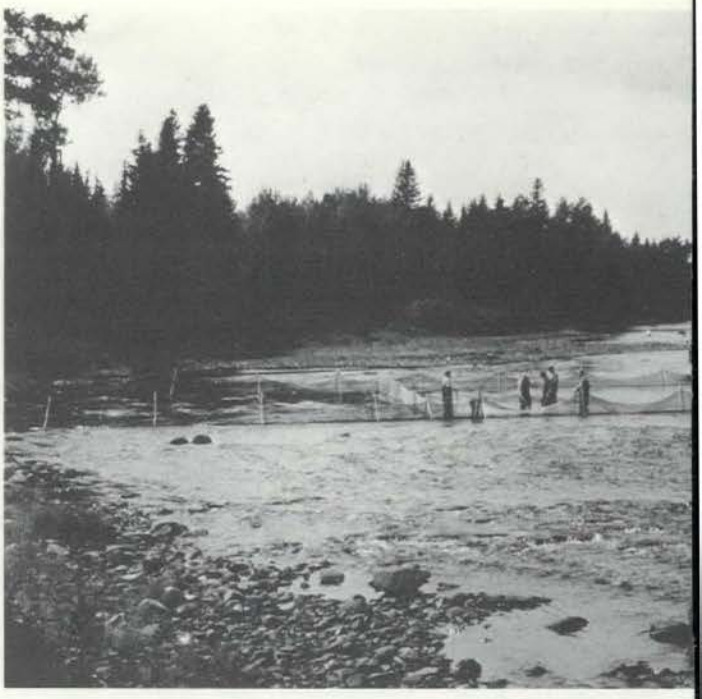
Forest spraying with DDT was largely responsible for a bad slump in numbers of Tobique and Miramichi salmon in the late '50s and early '60s Commercial fisheries suffered less because they usually draw on stocks from several rivers; but angling in the sprayed rivers suffered badly the appropriate number of years after nearly every spraying. As the spray effects wore off the rivers recovered.

Unfortunately, in the case of the Tobique and Saint John recovery had barely set in when the Saint John was given a greatly increased burden of pollution. Oxygen was burned up by excessive loads of organic waste. New hydroelectric construction had some temporary deleterious effect, but modern devices to circumvent the physical barriers to movement were being installed. The new fish facilities at Mactaquac are an outstanding achievement. But we cannot have salmon if we offer them very distasteful and even lethal water. In a dry year



In some areas, oil storage depots such as this are placed on concrete sumps which prevent oil spillage from soaking into the ground and thence the water. The Miramichi estuary has several depots unprotected by oil-proof sumps and at least two large oil slicks occurred on the estuary this past summer when oil was being transferred from tankers.





Some of the methods used in studying problems related to Atlantic salmon fisheries. Top left – A counting fence set across the Northwest Miramichi provides information on the numbers of young salmon going to sea and of adults returning. Systematic records of water conditions at the fence show under what conditions adult salmon run upriver or are delayed in their ascent. Top right – Electrofishing for young salmon spending their early years in the river shows whether they are plentiful or scarce. Here a cross-section of the river is being examined in two parts: that on the left of the barrier-net midstream is normal, clean water but that on the right is affected by copper-zinc pollution brought down by a nearby tributary. Bottom left – A supersonic transmitter being injected into the stomach of a salmon. He will then be liberated in the estuary where his track can be followed from a boat. Bottom right – A directional hydrophone attached to the gunwale of this tracking boat picks up sound from the transmitter in the salmon which is then magnified by the large horn so that the crew can follow the fish.

like 1968 the situation becomes even more critical.

On the mountains where a smallish tributary of the Northwest Miramichi arises there is a copper-zinc mine. These metals, when in solution, are poisonous to fish and to their insect food. Some metal in dissolved form escapes the mill concentration process; some is washed down by the rain from the scarified prospecting sites and from the piles of waste rock brought out of the tunnels driven into the mountain. After a few years required to identify the trouble and to install control facilities, a pretty good job of housekeeping the ordinary effluent was accomplished. But despite every effort made, enough copper and zinc ions come down the stream with every heavy rainfall to cause trouble.

Several times a year the concentration is heavy enough to kill young salmon and their food organisms in the Northwest Miramichi River 20 miles or more below the mine. In early August of this year, when mine operations were actually shut down for a time, a torrential downpour on the mountain brought down enough poison to kill even adult grilse and salmon. Of course the young fish growing in the affected part of the river needed only to be killed once a year to be permanently dead!

In the laboratory copper-zinc solution kills young salmon at a concentration of about one part in ten million, by weight. If we were talking about a very dry martini this would be one drop of vermouth in ten tank cars full of gin! The same level of concentration kills young fish in the river and a somewhat lesser dose will turn larger salmon back downstream.

There are similar mines on other New Brunswick streams and we must use our minerals, too. But the only way to surely have both mines and salmon is to be certain that plans for good water-housekeeping go hand-in-hand with those for mine development.

OTHER POISONS

Last year on the Miramichi as on many other rivers exceptionally low summer flows, caused by drought, were accompanied by poor summer runs of salmon. While we have learned to expect this sort of thing, the situation last year seemed worse than usual considering the flows and a search was made for other contributing factors. It seemed possible that harmful materials which would normally be carried out by the river flow might have more chance to concentrate with little river water to carry them along, particularly in the estuary. Here, too, fish had failed to be caught in expected numbers for the river discharge. There was also indication that more fish than usual were leaving the estuary after they had already entered it.

Among the various effluents tested was that of a plant which treats hydro poles, bridge timbers and such things against rot. Creosote was conspicuous in this effluent. It has components which kill fish in very dilute solution. More startling was the presence of pentachlorophenol in substantial amounts. This biocide kills fish in concentrations of about one part in five million. In the laboratory young trout will avoid something less than a tenth this concentration. During seven days of heaviest effluent discharge this spring it was estimated that over half a ton of pentachlorophenol was poured into the estuary. Fortunately the plant completed a clean-up operation before the salmon run started this year. But pentachlorophenol is very stable; it could be around in the mud for some time. If fish don't get killed it can give them an unpalatable "oily" taste.

Pulp mill wastes, if not properly treated, add lethal poisons as well as a burden of de-oxgenating organic material to the water.

Quite a number of fish kills attributable to agricultural insecticides and herbicides getting into streams have been reported from Maritime streams in recent years.

Another all-too-common form of pollution in our tidal waters is oil spills from shore-based plants and from shipping. Bunkers may be thoughtlessly pumped out; there may be accidental discharge into the water or undetected leakage in pipe lines. Gasolines and diesel oils can kill rainbow trout (about the closest relative of our salmon) in dilutions well under 50 parts per million, if they contain certain fairly common additives and are well mixed in the water. Mixing occurs readily in running water, while tides and waves provide ready mixing in estuaries and sea. The oil slick that dispersed in a wind may be just starting its damage.

Here's an interesting question to ponder. What kinds and amounts of pollution come to our Maritime shores in the water from the Great Lakes and the St. Lawrence River?

LOOKING AHEAD

These are but a few easily recognized examples of how we unwittingly or recklessly neglect our valuable water resources. Our Atlantic salmon are worth saving, for food, for sport, for the dollars they can bring in, but most of all as one of the best indicators that we are doing good housekeeping in our waters. With reasonable care we can have our salmon for years to come. But we will not achieve this target without foresight, hard work and some sacrifice here and there.

Norway Urged to Join Canada In Ban on Hunting 'Whitecoats'

Canada will ban the hunting of "whitecoats" or baby seals in the Gulf of St. Lawrence in 1970.

Fisheries and Forestry Minister Jack Davis announced the new government policy in Ottawa October 15 as it affects harp seals on Canada's East Coast.

Mr. Davis said: "Negotiations, meanwhile, are continuing with the Norwegians with a view to having them adopt a similar ruling which would be effective not only in the Gulf of St. Lawrence but also on the Labrador Front".

Norway is the only other country which has been active in the harp seal fishery in the Northwest Atlantic in recent years.

The new policy means that only "beaters" will be taken. "Beaters" are animals up to 80 pounds which have advanced well beyond the "whitecoat" stage. Their mothers have left them and, being able to swim, they are about to "beat" their way north to the Arctic waters.

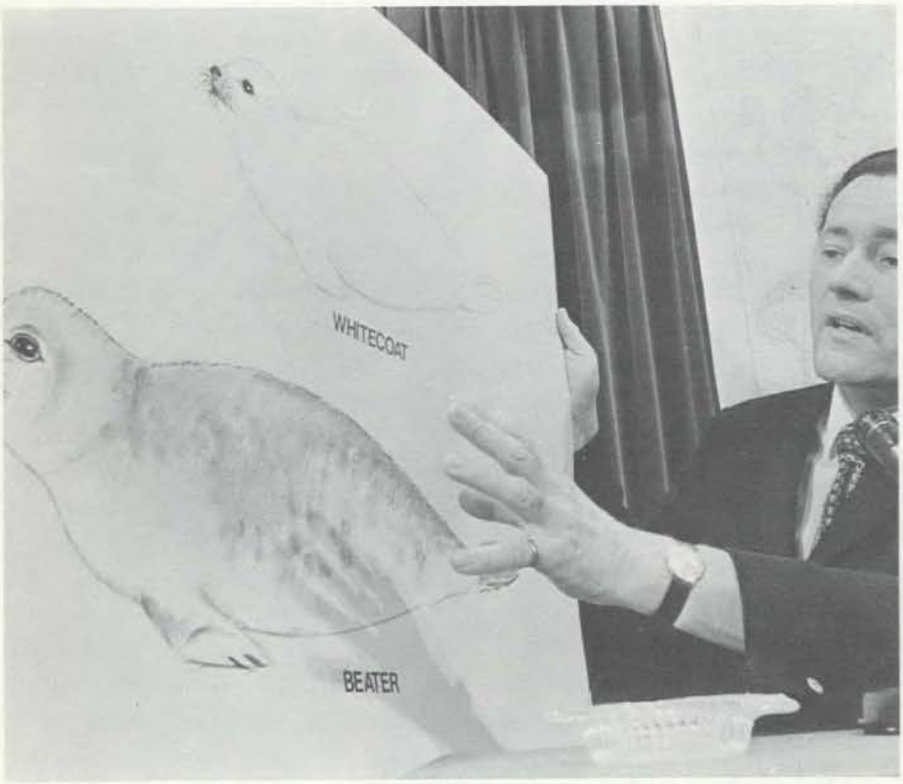
Because harp seals at the "beater" stage are far more mobile than baby seals, clubs will no longer be used for hunting. Rifles will have to be used instead.

The Minister said: "In addition to a later opening date for the hunt, the use of all types of aircraft, including helicopters, will be prohibited. This will make the hunt much more manageable from the point of view of supervision by our departmental officials. The quality of our protective service will, of course, be maintained."

Under these circumstances the commercial operations will be confined almost entirely to ships. However landsmen, walking out individually from shore, will also have an opportunity to take "beaters" during the open hunting season.

Canadians whose livelihood has been largely dependent on the seal fishery will still be protected. Newfoundland fishermen are mainly employed on the sealing vessels. But landsmen from Quebec and the Maritime Provinces should also gain financially as the value of the skins of "beaters", under current market conditions, is greater than those of the smaller "whitecoats".

Mr. Davis concluded by saying; "The new regulations not only do away with those characteristics of the seal hunt which have been most offensive to people in many parts of the world but also ensure that those who have been dependent on this fishery can still earn a livelihood by exploiting this unique resource. It is my hope, of course, that the Norwegians will cooperate with us in enforcing these new rules. Once they are applied in international waters off the Labrador Coast the killing of baby "whitecoats" will have been eliminated entirely."



Federal Fisheries and Forestry Minister Jack Davis indicates differences between a 'whitecoat' and a 'beater' during his press conference announcing changes in seal hunting regulations next year.

Background to Atlantic Coast Sealing

The following background paper on Atlantic coast sealing was issued by federal Fisheries Minister Jack Davis to accompany his announcement on changes in seal hunting regulations for 1970:

The sealing operations on the east coast of Canada depend almost solely on the harp seal populations. They constitute about 95% of the annual take in numbers, the remainder consisting of a species known as the hooded seal.

Life Cycle of Young Harp Seal

The pupping season lasts from late February to mid-March but ends earlier in the Gulf of St. Lawrence than off Labrador and northeastern Newfoundland. Each sexually mature female bears one pup annually; multiple births are rare. Contrary to popular belief, mothers seldom make any concerted effort to defend their young. Newborn pups called "whitecoats" are about 36 inches long and 15 pounds in weight, increasing to 45 inches and 80 pounds at weaning three to four weeks later. The whitecoats begin to shed fur about a week after birth, entering what is known as the "ragged jacket" stage when darker, shorter and more coarse hair appears. In three to four weeks the moult is complete and the animal is known as a "beater". By this time the young seal is completely on its own and enters the water freely.

Participation and Hunting Areas

Canadian sealing vessels from the Maritime Provinces and Newfoundland have engaged in hunting harp seals since late in the nineteenth century. Norway entered the picture in 1938.

The hunt is conducted in two areas, namely, the Gulf of St. Lawrence and the so-called "Front" off Labrador and northeastern Newfoundland. In the Gulf, the operation has been solely a Canadian one since 1965. On the Front, both Canadians and Norwegians participate.

Canadian Participation and Earnings

Somewhat more than 6,000 individuals are licensed for sealing annually. The great majority of these are "landsmen" from Quebec (including the Magdalen Islands), the northwestern and northeastern shores of Newfoundland and, to a limited degree, from the Maritime Provinces. These people walk out on the ice to take their seals or use small boats in some cases. With the development of aircraft operations, commencing in 1964, the Magdalen Islanders especially made arrangements with the aircraft owners. Seven to ten large Canadian vessels are used in sealing, employing between 300 and 400 men. These vessels take the greater proportion of the seal catch.

The landed value of the seal pelts to fishermen in recent years has been as high as $1.9 million and as low as $650,000. Average annual returns to landsmen have been as low as $39 and as high as $102 in the past few years. The validity of these figures is open to question as the great majority of the landsmen take only three or four seals, in many cases for food. The hunters from the large vessels, however, do much better. Their average earnings, for example, were $750 in 1966, and $1,200 in 1967 for four to six weeks of work.

Regulation of the Seal Fishery

There was little in the form of regulation prior to 1965 except seasons for the hunt. Seasons apply on the Front and in the Gulf of St. Lawrence. There is also a quota of 50,000 young harp seals in the southern half of the Gulf. Since 1965 stringent regulations have been developed with respect to licensing and methods of killing the seals and there is even a regulation which restricts sealing to the daylight hours.

The Conservation Problem

In 1951 the harp seal herds were estimated at around 3 million animals. By 1969 the numbers had declined to an estimated 2 million. In a normal year these are about equally divided between the Gulf and the "Front". There are indications of mixing between the two herds but scientists have not yet been able to determine the degree to which this occurs.

Scientific research indicates that the maximum sustainable yield for both the Gulf and the "Front" is around 90,000 young harp seals of the year in each area. In the Gulf, the combined take under quota and by the landsmen has generally been kept below this figure in recent years so the Gulf herd should maintain itself or even expand. On the Front, the situation is unsatisfactory in that the combined Canadian and Norwegian take sometimes reaches as much as three times the number at which the herd will maintain its present level or grow.

Under existing international law the Norwegians could still fish in the

Gulf of St. Lawrence if they wished to do so but they have voluntarily abstained since 1965. A Norwegian seal fishery in the Gulf on top of that currently conducted by Canada could only pose a serious threat to conservation of the herds and this is another reason why early establishment of fishery lines closing the Gulf of St. Lawrence is desirable.

A misleading film on sealing in the Gulf of St. Lawrence produced by Artek Films of Montreal in 1964 received considerable publicity abroad. This sparked a great amount of protest from individuals and groups in Europe; notably Great Britain, West Germany, France, Belgium, Switzerland, and latterly, in the United States and Canada. The efforts of a large number of well meaning people through advertising in the press and otherwise have also contributed greatly to the controversy.

In an effort to overcome the protest, the Department of Fisheries and Forestry has annually since 1966 taken representatives of humane societies and conservation groups to the hunt. Their reports have generally been favourable. Strict regulations concerning the use of humane killing methods have been developed in close consultation with representatives of the humane societies and are rigidly enforced.

Market Conditions

There is little doubt that the international outcry had the effect of contributing to a decline in the sealskin market, particularly for whitecoats. Regulations proposed for the Gulf of St. Lawrence this year involve a delay in opening of the season and abolishing the use of aircraft except for spotting the herds. The delayed opening will eliminate the taking of whitecoats so the hunt will centre on "beaters". This will not have an adverse effect on earnings as the price on the world market for "beaters" will probably be in the $15–$20 range. The price for whitecoats this year was around $10 per pelt.

In negotiations, Norway has only agreed to a delay of four days in opening of the season on the Front. Whitecoats will therefore be taken in some numbers in the North Atlantic off Labrador in 1970.

Hold-the-Line Fisheries Budget

Announcing a number of Departmental cuts for the next fiscal year 1970-71, federal Fisheries and Forestry Minister Jack Davis said reductions in staff and in spending on new facilities are being made in order to ensure that the overall budget for Fisheries and Forestry will not exceed $75 million. The Department's budget, in other words, will be held at the same level as that reached in 1968-69 and currently being observed for 1969-70.

Beginning at once, Fisheries and Forestry staff will be cut back. In order to offset authorized wage rate increases more than 200 full-time employees will have to go, Mr. Davis said. Another 350 seasonal jobs will be discontinued next year. (The Department's staff presently comprises 4,300 full-time employees and 2,100 seasonal employees). Every effort will be made to find other jobs for those who are laid off.

Construction starts in 1970-71 will be kept to a minimum. Mr. Davis referred specifically to:

(1) postponement of all Departmental vessel replacements;
(2) a 50% cutback in the Babine Lake salmon spawning project in B.C.;
(3) construction of the Freshwater Institute in Winnipeg. This project will go ahead. However, no other new laboratory space will be added next year.
(4) direct grants for new fishing vessel construction. They will remain at this year's reduced level of $565,000.

Mr. Davis said that the Fisheries Research Board's small technological station at Grande-Rivière, Quebec, will be closed; also that the Department's forestry operations in the Prairie Region will be curtailed.

The Government's long standing financial assistance to certain universities for the promotion of co-operative producing and selling techniques among fishermen is to be terminated. Its place will be taken by courses at existing fisheries schools and vocational institutes.

The Fishing Bounty paid to some 11,000 East Coast fishermen in amounts averaging around $12 a year will be discontinued. These payments which resulted from a Treaty settlement between Canada and the United States in 1871 have recently involved an annual expenditure of $160,000.

These cutbacks, in total, are expected to save $12 million in 1970-71.

"This is an important economy," Mr. Davis said. "It will help us to streamline our operations for the longer term future."

Buy More Salt Cod for Relief Program

Salted codfish from Canada's east coast is to be purchased for distribution under Canada's food relief program for developing countries, Fisheries and Forestry Minister Jack Davis announced October 8. Slightly over 1,000,000 pounds will be purchased from suppliers by the Fisheries Prices Support Board, acting as agent for the Canadian International Development Agency.

Mr. Davis said this order, valued at approximately $365,000, will clear up remaining stocks of salted codfish carried over from 1968, and will include part of the current season's production. Suppliers will be required to deliver their fish between October 8 and 14 at Montreal.

Substantial quantities of dried salted fish have been provided by Canada within the past two years for food relief in several developing countries to help meet urgent requirements.

It is expected that, under Canada's food relief program, the federal Government may have further requirements for salted fish later this year, Mr. Davis said.

Dried salted fish is a prime food requirement of relief organizations because of its high protein value.

Relief supplies of Canadian salted codfish and potatoes being distributed in Nigeria. This picture was taken at Ibusa in May, 1969.

Ontario Joins Marketing Plan

Following proclamation on August 1 of the Freshwater Fish Marketing Act (Ontario), an agreement has been signed by the Hon. Rene Brunelle, Minister of Lands and Forests for Ontario and the Hon. Jack Davis, Minister of Fisheries and Forestry for Canada, completing arrangements for Ontario's participation in the activities of the Freshwater Fish Marketing Corporation.

The Corporation will be the sole buyer and seller of commercially-caught freshwater fish in central Canada. In Ontario, its operation will be limited to that part of the Province lying west of longitude 86°, except Lake Superior and the Territorial District of Rainy River.

Through better organization of producing, buying, transporting, processing and marketing in the widely scattered inland lake fisheries it has been estimated that primary producers – Indian, Metis, and other northern fishermen – may eventually receive as much as one third more for their fish. Markets will also be serviced more efficiently. Already there are indications that consumers want to buy more gourmet-quality inland lake products– pickerel fillets, whitefish, lake trout, sturgeon, goldeye and others – than present supply can provide. Western European consumers as well as consumers in the United States and Canada are beginning to demand more of the products from inland lakes.

There is hope that fishermen of remote northern areas in Ontario will begin to realize a much better share of the retail value of their products.

Deny 'Unsafe' Fish Put on Market

The suggestion that fish affected by phosphorus contamination in Placentia Bay has been processed and placed on either local or foreign markets has been categorically refuted by Dr. A.W.H. Needler, Deputy Minister of Fisheries and Forestry of Canada.

"This is an irresponsible thing to say about good, saleable Newfoundland fish which has been tested and found completely safe by our Department in co-operation with the Food and Drug Division of the Department of National Health and Welfare," he said.

As regards the fish which the Department bought earlier this year and later dumped, Dr. Needler said it was absolutely untrue to suggest that this fish was poisonous or dangerous to humans.

"At the time, tests proved beyond doubt that the fish was safe from a health point of view. However, we did not want anything that even looked different going into the market where it might cause unwarranted fears. To ensure this, our inspectors also kept off the market fish which had been processed before the phosphorus plant closed".

The decision to close a large part of Placentia Bay was made at a time when there was some uncertainty as to conditions there, the Deputy Minister added. The area was kept closed until the Department was absolutely certain that the waters and fish were normal.

Since the reopening of the phosphorus plant at Long Harbour competent federal fisheries scientists have been continually monitoring the waters in the Bay and testing the fish. Additionally, the scientists have investigated reports of red fish being caught in Placentia Bay. As a result of these tests and investigations no evidence has been found to support the claims that fish are now being affected by the effluent from the plant.

FACILITIES ADDED

Dr. Needler pointed out that prior to its reopening the phosphorus plant installed facilities to handle its effluent at the instigation of the federal Department of Fisheries and Forestry. These facilities, he added, have been effective in containing all harmful effluent from the plant since it reopened. The Department is continuing to monitor the effectiveness of the dredging of the sludge from Long Harbour.

The Deputy Minister emphasized that since the incidence of red fish first occurred it has been a matter of deep concern to the Department.

"Not only have we carried out extensive investigations during the past several months but we are continuing intensive monitoring and testing programs with regard to the water and fish as well as investigating reports that we receive of so-called red fish. Out of all this investigation there is no concrete evidence that fish have recently been affected."

The suggestion in a published report that the federal Department of Fisheries was involved in a conspiracy of silence about the pollution of Placentia Bay was completely unfounded, Dr. Needler said.

The nature and results of scientific investigations have been made fully available to the public through statements, press conferences and interviews with press and other media representatives.

Use Submarine To Study Trawls

Complete trawl hauls to depths of 300 ft. have been observed in a Scottish loch by British scientists using a recently built two-man submarine.

Observations are being carried out by the scientists of the behaviour of fish near fishing gear, particularly in the mouth of trawls and seine nets. It is difficult for divers to carry out this work because of the depths involved. The craft used, the Vickers-Pisces, is powered by two electric motors and is able to go to depths of 3,500 ft.

Britain's Marine Biological Laboratory – responsible for this research – also propose to have a towed underwater vehicle constructed, consisting of a pair of interconnected steel tubes with fins at the rear and windows at the front. There will be two occupants – one acting as pilot and the other as observer – although controls will be accessible to both.

This underwater vehicle will be designed to operate in depths to 50 fathoms and at speeds up to 6 knots. It will be manoeuvrable to at least 15 degrees on either side of the towing axis, and to depression angles of 30 degrees.

"Chebucto" Guarded Fisheries More Than 150 Years Ago

BY E.H. HEARNDEN

Mention the name *Chebucto* in the company of East Coast fishermen and likely as not they'll think of the modern multi-purpose protection vessel that went into service with the federal Department of Fisheries and Forestry in the Maritimes Region in 1967. They'd probably be surprised to learn that a ship of the same name was protecting Canada's fishing interests off the Atlantic coast more than 150 years ago!

The *Chebucto* of Canada's pioneer era was a six-gun brig with a crew of 15, chartered in 1818 for the protection of trade and fisheries in the province of Nova Scotia. At the time, the vessel was described by Lord Dalhousie, Lieutenant-Governor of Nova Scotia, as "in all respects calculated to be an efficient Cruizer against Smugglers, by whom the Revenue of the Province suffers severely".

Shipping contractor Samuel Cunard, of Halifax, is on record as having purchased the *Chebucto* in England for £2,960 to replace the 105-ton sloop *Earl Bathurst,* which was chartered by the province for similar duties in 1815.

These interesting facts are revealed in an article entitled "Samuel Cunard and the Nova Scotia Government Vessels" by Dr. J.C. Arnell, Assistant Deputy Minister (Finance), Department of National Defence, Ottawa, published in a recent issue of "The Mariner's Mirror".

Quoting from Public Archives and other sources, Dr. Arnell states that *Chebucto* was kept busy on a multitude of tasks, including mail trips between Halifax and New York, patrols in the Bay of Fundy and off the coast of Quebec, and short trips to the various ports around the coast of Nova Scotia presumably moving men and supplies to military or other official outposts.

UNDER ATTACK

However, all was not smooth sailing for the *Chebucto* during her period of charter with the Nova Scotia government. In 1822, for reasons which are not obvious from the records, a verbal attack was launched against the hiring of the vessel for government service. Several letters to Lord Bathurst, the Colonial Secretary, complained of the great expense of the contract (£2,400 per year) measured against the service rendered in return. One writer pointed out that if this money were placed in the hands of "our good and Excellent Governor Sir James Kempt to encourage the Emigrants in cultivating the Soil", the result would be productive of "much greater advantage to the Colony and strength of the Mother Country".

Despite the claim by contractor Samuel Cunard that the actual expense of operating the *Chebucto* amounted to approximately £2,325 annually (which included, among other items, £150 for the captain's wages, £312 for provisions for the crew and £160 for "cabin table crockery"), the Colonial Office apparently thought the amount excessive. The contract

The present-day fisheries protection vessel "Chebucto", based at Halifax.

was cancelled and the following advertisement was carried in the Halifax newspapers during the months of August and September, 1822:

"Wanted for the service of Government a fast sailing COPPERED SCHOONER from 70 to 100 tons burthen, manned with the following complement, viz: Commander, mate, carpenter, and 12 able seamen. . ."

Seven tenders were received in response to the ad, the lowest being for £1,500 per year from none other than Samuel Cunard! Reporting this to Lord Bathurst in October, 1822, Sir James Kempt wrote: "This surprised me a good deal for the statements which they (Samuel Cunard's firm) some time ago gave to me of the expense of sailing the vessel. . . . led me to suppose that they could not possibly afford to do so at that rate– upon sending for them to express my surprise at the lowness of their present offer 'They assured me that they would not gain one shilling by a contract on the terms offered, but as the vessel was completely fitted for the service and they had not at present the least employment for her they were exceedingly reluctant to dismantle her."

Dr. Arnell relates that before approving a new contract with Mr. Cunard, the Colonial Office asked the Admiralty whether a naval vessel could be employed in the service of the Superintendent of Fisheries as a matter of economy. The Admiralty replied that the North American Squadron was fully occupied on other duties and that commissioning an extra vessel-of-war would be a more expensive procedure than chartering a ship for the job.

The upshot was that Samuel Cunard's proposal was accepted and the *Chebucto* went back into service, six months after the cancellation of the previous contract, with an annual saving to the Government of nearly £1,000.

Justification for continuing the contract of the *Chebucto* was again questioned in 1831 when the British government was seeking ways of cutting expenditures in Nova Scotia. However, Sir Peregrine Maitland, then the lieutenant-governor of the province, rallied to the defence of the vessel, pointing out that "it may be worthy of consideration that she has been very servicable in the protection she has afforded to our Fisheries and has doubtless, in executing that Service on more occasions than one prevented the effusion of blood, and put a stop to altercations which might have had the effect of embroiling us in quarrels with the United States."

The Treasury decided to permit the continued use of the *Chebucto* under a new method of financing, but in March, 1832, Lord Goderich, of the Colonial Office, directed that the contract be cancelled. The *Chebucto* was finally paid off on June 30, 1833.

The present-day *Chebucto*, a multi-purpose vessel of 188 tons, went into service in March, 1967, based at Halifax. The name "Chebucto" or "Shubukto" is a Micmac Indian word meaning "the place of the big water" and referred to the area that is now Halifax.

Frozen Groundfish Marketing Outlook

Government officials of Canada, Denmark, Iceland and Norway met in Ottawa on October 15 to review the international marketing situation and. outlook for frozen groundfish. The meeting was the third in a series of consultations among the major world suppliers of frozen groundfish begun in Copenhagen in March 1969.

In a joint statement Fisheries and Forestry Minister Jack Davis and Industry, Trade and Commerce Ministere Jean Luc Pepin said that in their review of the current world situation the officials noted with satisfaction that the market has retained the basic elements of strength and stability which have been evident through most of 1969. Officials also noted in their review that production and trade in general have improved, while the consumption of the major end products has increased at a very rapid pace in the principal markets of the world.

Officials also examined the medium term outlook. They concluded that current stock levels are normal, but with the peak production period past, and in view of rapidly increasing consumption in the major importing markets, world stocks of groundfish may be expected to be drawn down to very low levels by the first quarter of 1970 with consequent further strengthening of the market.

The ministers said it was agreed that the participating nations would continue to hold periodic consultations.

Inshore Scallop Fishery Of Northumberland Strait

BY W.J. LEVER

There are two important scallop fisheries in the Maritime provinces – inshore and offshore. As an inshore fishery, the sea scallop *(Placopecten magellanicus)* is the second most valuable shellfish to the area. Only the lobster is more important.

Sea scallops are fished inshore in many areas of the Maritimes – Bay of Fundy, small areas along Nova Scotia's southshore and the Northumberland Strait waters of the Gulf of St. Lawrence. This article will deal only with the inshore scallop fishery in the Northumberland Strait; in an area from Richibucto, New Brunswick, to Pictou, Nova Scotia and the entire south-western coast of Prince Edward Island.

At various times, from May until November, up to 200 boats drag for scallops in these waters. Most of the Cape Island-type vessels engaged in this fishery are registered in ports in the Northumberland Strait area of the three provinces, but some come from ports as far away as the north shore of New Brunswick, Cape Breton Island and Guysborough County, Nova Scotia.

Since the first settlers came to the area almost 300 years ago, inshore scallop fishing has been carried out in varying degrees. The Micmac Indians also apparently appreciated this delect-

Part of the Northumberland Strait scallop fleet tied up at Caribou, Nova Scotia, the main landing port for Northumberland scallops.

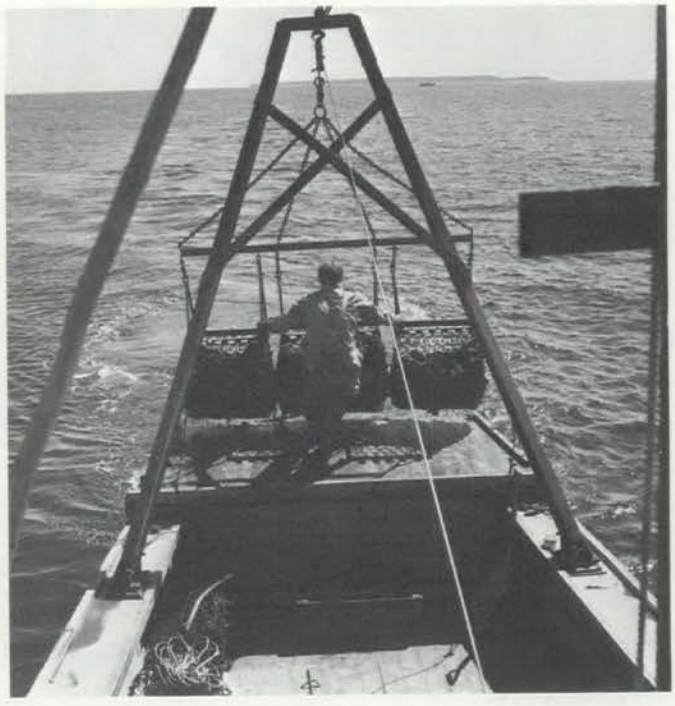
able mollusc and made constant use of scallop shells. Amateur archaeologists probing the sandy knolls along the Northumberland shore of Nova Scotia and New Brunswick have unearthed scallop shells used by the Micmacs as dishes, scrappers, decorations, jewellery and wampum.

In July and August, 1961, the Fisheries Research Board of Canada, in co-operation with the Industrial Development Branch of the federal Department of Fisheries, conducted a survey for commercial stocks of sea scallops in the southern Gulf of St. Lawrence. From the results of former surveys and information collected from fishermen and fishery officers, the 1961 operation selected 40 areas for survey.

The results indicated that five beds in the southern part of the Gulf, particularly two beds at either end of the Northumberland Strait (Richibucto bed and the Pictou Island West and Toney River bed) were sufficiently

The "Stacy Ann", skippered by Robert Hughton, of Pictou, N.S., is typical of the scallop boats operating in the Northumberland Strait. This vessel is equipped with an "A" frame-type drag.

The scallop drag being lowered over the stern at the start of a tow.



The drag comes aboard after a successful tow. An average daily catch varies from 100 to 200 pounds of scallops.

well stocked with commercial-size scallops to make small-boat scallop fishing worthwhile. The report recommended that inshore vessels, such as the Wood Islands and Cape Island types, be rigged for this fishery, adding that "none of the beds explored were large enough or well-stocked enough to interest the larger offshore scallop draggers."

TWO TYPES OF GEAR

In the years that followed many inshore boats rigged to take advantage of this new fishery. Two types of scallop gear are used by these small boats–the Digby-type drag or "boom" method and the Wood Islands-type or "A" frame drag. The Digby-type drag originated in the Bay of Fundy where the bottom is fairly rough and employs two tow lines on either side of the boat to haul the drag, while the Wood Islands-type utilizes a steel frame at the stern through which one warp is used in the haul. In 1964 some 30 boats engaged in this fishery. They landed scallops unshucked at three cents per pound. In 1965 more vessels took up scallop dragging in this area and the price rose to six cents a pound, unshucked.

Time brought improvements – improvements in dragging operations, shucking techniques and preservative methods and, as a result, in 1968 Northumberland Strait scallopers brought in 1,969,000 pounds of scallops for a landed value of $1,296,492 with a market value of almost $2,400,000. Sixty-five cents a pound for ocean-fresh shucked scallops is a far cry from three cents for unshucked five years before! This year the price rose to 85 cents at the wharf.

Northumberland Strait scallop fishermen land their catches daily. The normal crew per boat is three. They go out early in the morning and return late in the afternoon or early evening. In a day's operation up to eight one-hour tows are made in 10 to 15 fathoms of water over sand-mud bottom, resulting in an average daily catch of from 100 to 200 pounds. The scallops are immediately shucked, washed, bagged and chilled.

This fleet is a changing one since many who engage in this fishery leave when the lobster season opens in their various districts, while others remain at it from ice break-up in the spring until the winter freeze over.

The Northumberland Strait scallop is smaller than the offshore variety and smaller than the Digby type. Consequently, fishermen in the area say it is tastier, giving more to the pound thus making it a better value for the shopping dollar.

Immediately they are caught, scallops are shucked, washed, bagged and chilled aboard the vessels.

Recommend Great Lakes Clean-up

The need for a phosphorous control program to reduce the adverse effect on water quality and water use resulting from excessive growths of algae, weeds and slimes was stressed in a report on pollution recently submitted to the International Joint Commission.

The report dealt with the pollution problem in Lake Erie, Lake Ontario and the international section of the St. Lawrence River, and was prepared after intensive investigations over the past few years by two international technical advisory boards set up by the Commission for that purpose.

Under the phosphorous control program, the researchers recommended an immediate reduction in the phosphorous content of detergents to minimum practical levels and, by 1972, complete replacement of the phosphorous compounds by substitutes less harmful to the environment. An 80 per cent reduction of phosphorous complexes in municipal and industrial waste effluents discharged to Lake Erie and the Detroit River would be required by 1972, and a similar reduction in discharges to Lake Ontario by 1975.

Included in the recommended remedial measures for the areas under study were:

1) Adoption for these waters of water quality objectives appropriate to the area;

2) Acceleration as necessary of the pollution control program of the several state and provincial agencies concerned, in order to meet the recommended water quality objectives at the earliest possible dates; and

3) Maintenance of adequate water quality surveillance and monitoring activities to allow for assessment of and adjustments to water pollution programs of enforcement, management, planning and research; and a continuing board to co-ordinate on an international basis, programs for water pollution control of the Great Lakes.

The Canadian and United States Governments requested the International Joint Commission in 1964 to investigate pollution in Lakes Erie and Ontario and the St. Lawrence and report to them with recommendations for corrective action. The Commission established two boards, composed of federal, state and provincial governmental officials from both countries, to co-ordinate the necessary technical and scientific investigations by the agencies in both countries having responsibility in the pollution field.

Copies of the report are now being sent to all interested parties so that the Commission may conduct public hearings in both countries early in 1970. Thereafter, on the basis of the Board's report and evidence adduced at these hearings, the Commission will determine what report and recommendations it will then make to the Governments of Canada and the United States.

FAO Plans Pollution Conference

Plans for an international conference on marine pollution as it affects oceanic life and fishing are being circulated by the Food and Agriculture Organization of the United Nations.

In an 11-page prospectus, FAO warns that marine pollution continues to spread. It is aggravated by atmospheric fall-out and by the dumping of noxious substances by ships which "becomes more acute every day." The problem is so serious that FAO has decided to summon a Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing in Rome, from December 9 to 18, 1970.

Pollution also continues to spread in hidden forms, says the document, and "we should be preparing ourselves for events to come." Basic information must be collected on the yet unpolluted parts of the marine environment such as the tropical seas where exploitation is expanding.

Fisheries suffer through contamination of valuable commercial species, the organisms upon which they feed and through damage to nets which catch on discarded automobile bodies and abandoned gear on the bottom. Explosives and "buried" containers of dangerous chemicals and wastes present other hazards.

The prospectus, available in English, French and Spanish, is being distributed to fishery and marine sciences institutions, governments and other interested bodies.

Fishery Statistics

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	January–August 1968		January–August 1969	
	Landings[1]	Value[2]	Landings[1]	Value[2]
	'000 lb.	$'000	'000 lb.	$'000
CANADA – TOTAL	**1,818,089**	**126,151**	**1,829,770**	**115,111**
ATLANTIC COAST – Total	**1,603,264**	**78,012**	**1,713,360**	**82,426**
Cod	468,791	18,937	431,155	166,847
Haddock	69,187	5,118	68,829	5,573
Redfish	112,542	2,897	107,453	2,771
Catfish	5,665	200	5,998	207
Halibut	3,082	1,214	2,863	1,156
Other Flatfishes	183,696	6,049	198,648	7,574
Pollock, Hake, Cusk	36,570	1,288	32,055	1,123
Other Groundfish	5,229	53	4,443	61
Herring & Sardines	627,573	6,563	757,165	7,742
Mackerel	14,190	552	20,397	739
Swordfish	3,439	1,913	3,521	2,319
Tuna	908	123	1,152	141
Alewives	7,069	130	3,645	85
Salmon	4,545	2,285	4,130	2,208
Smelts	2,222	237	3,135	253
Other Fish	8,749	158	8,746	158
Lobsters	28,563	18,418	28,464	19,912
Clams & Quahaugs	4,459	315	5,318	392
Scallops	10,712	8,553	9,428	7,881
Other Shellfish	6,073	599	16,815	1,767
Misc. Items	–	2,410	–	3,517
PACIFIC COAST – Total	**214,825**	**48,139**	**116,410**	**32,685**
Pacific Cods	16,580	1,347	10,795	966
Halibut[3]	23,015	5,755	23,642	9,248
Soles & Other Flatfishes	8,081	495	8,446	504
Herring	5,904	165	3,058	141
Salmon	144,402	38,716	53,154	20,354
Other Fish	6,911	458	7,323	327
Shellfish	9,932	1,197	9,992	1,145
Misc. Items	–	6	–	–
BY PROVINCES				
British Columbia	214,825	48,139	116,410	32,685
Nova Scotia	511,157	35,680	471,817	36,287
New Brunswick	266,432	8,162	346,225	10,096
Prince Edward Island	29,119	6,489	27,175	6,546
Quebec	122,545	5,620	135,029	6,163
Newfoundland	674,011	22,061	733,114	23,334

[1] Fish and Shellfish only. [2] All Products–Includes livers, seaweeds, tongues, scales, roes, skins, oil, seals, whales and bait worms.
[3] Includes halibut landed in U.S. ports by Canadian Fishermen.

MID-MONTH WHOLESALE PRICES–AUGUST 1969

		Montreal	Toronto
		$	$
Cod fillets, Atl. fresh, unwrapped	lb.	.427	.540
Cod fillets, Atl. frozen, cello 5's	lb.	.339	.443
Cod fillets, smoked	lb.	.418	.577
Haddock fillets, fresh, unwrapped	lb.	.628	.733
Herring, kippered, Atl.	lb.	.259	.330
Mackerel, frozen, round	lb.	.195	.293
Lobsters, canned, Fancy	Case 48-1/2s	76.200	80.533
Sardines, canned	Case 100-1/4s	10.786	10.700
Halibut, frozen, dressed	lb.	.574	.720
Silverbright, frozen, dressed	lb.	.675	.707
Coho, frozen, dressed	lb.	.910	1.050
Sockeye, canned, grade A	Case 48-1/2s	28.810	29.000
Pink, canned grade A	Case 48-1/2s	19.467	19.360
Whitefish, fresh	lb.	.539[1]	.567
Lake Trout, frozen	lb.	.500	.637

[1] Dressed.

PRICES PER CWT. PAID TO FISHERMEN

(Week ending August 16th)

	1968	1969
	$	$
Halifax		
Cod Steak	5.75	5.75
Cod Market	5.5	5
Haddock	9	9
Plaice	4.5-5.25	4.5-5.25
St. John's, Nfld.		
Cod	2.25-3.25[1]	3-3.75
Vancouver		
Ling Cod	8-10	10-14
Gray Cod	7.5	8
Soles	8.5-9.5	7.5-8.5
Salmon (Redspring)	50-88	40-90

[1] Round.

Fishery Statistics

FROZEN FISH STOCKS AS AT END OF AUGUST

	1968 '000 lb.	1969 '000 lb.
TOTAL – Frozen Fish, Canada	113,336	99,843
Frozen – Fresh, Sea Fish – Total	88,760	74,015
Cod, Atlantic, Fillets & Blocks	21,239	20,907
Haddock, Fillets & Blocks	3,802	2,968
Rosefish, Fillets & Blocks	8,690	6,924
Flatfish, (excl. halibut) Fillets & Blocks	7,706	5,154
Halibut, Pacific, dressed & steaks	9,696	9,836
Other Groundfish, dressed & steaks	2,529	2,064
Other Groundfish, fillets & blocks	6,765	4,342
Salmon, Pacific, dressed & steaks	16,486	11,382
Herring, Atlantic & Pacific	1,086	418
All Other Sea Fish, all forms	6,680	6,239
Shellfish	4,081	3,781
Frozen – Fresh, Inland Fish – Total	7,040	7,141
Perch, round or dressed	766	138
Pickerel (Yellow & Blue) fillets	480	139
Sauger, round or dressed	148	31
Tullibee, round or dressed	141	288
Whitefish, round or dressed	1,667	2,621
Whitefish, fillets	210	340
Other, all forms	3,628	3,584
Frozen – Smoked Fish – Total	2,408	1,769
Cod, Atlantic	930	777
Sea Herring, kippers	754	452
Other, all forms	724	540
Frozen For Bait and Animal Feed	15,128	16,918

SALT FISH STOCKS AS AT END OF AUGUST

		1968 '000 lb.	1969 '000 lb.
Salted and Pickled Fish, Atlantic Coast			
Wet-Salted – Total		28,363	32,184
Cod		22,961	26,992
Other		5,402	5,192
Dried-Salted – Total		9,010	7,235
Cod		7,822	6,916
Other		1,188	319
Boneless – Total		1,344	660
Cod		1,102	585
Other		242	75
Pickled – Total	(barrels)	20,278	13,004
Herring	"	8,877	4,616
Mackerel	"	7,627	3,865
Alewives	"	3,774	4,523
Turbot	"	–	–
Bloaters	(18 lb. boxes)	335,561	133,852
Boneless Herring	(10 lb. boxes)	9,804	(1)

[1] Confidential.

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS JANUARY – JULY

	1968 $'000		1969 $'000	
TOTAL EXPORTS		129,889		149,086
By Markets:				
United States		92,973		102,686
Caribbean Area		10,243		9,844
Europe		23,597		31,562
Other Countries		3,076		4,994
By Forms:				
Fresh and Frozen		88,094		102,469
Whole or Dressed	21,777		26,613	
Cod, Haddock, Hake	461		374	
Halibut, Pacific	2,457		3,743	
Salmon, Pacific	6,618		10,431	
Swordfish	1,646		1,905	
Other Seafish	3,805		3,553	
Whitefish	2,977		2,863	
Pickerel	1,257		1,256	
Other Freshwater Fish, n.e.s.	2,556		2,488	
Fillets, Blocks and Slabs	39,015		42,867	
Cod, Atlantic	11,956		12,271	
Haddock	5,152		5,578	
Ocean Perch, Hake, Cusk, Pollock	5,125		5,777	
Flatfish	10,070		12,315	
Pickerel	1,427		1,140	
Other Fillets and Blocks	5,285		5,786	
Shellfish	26,760		31,401	
Lobsters (in shell & meat)	17,275		20,703	
Scallops	8,329		8,062	
Other	1,156		2,636	
Frozen Fish & Shellfish, pre-cooked	542		1,588	
Cured		12,541		11,249
Smoked	1,233		1,430	
Herring	652		754	
Other	581		676	
Salted, Wet & Dried	9,964		8,444	
Cod	8,640		7,483	
Other	1,324		961	
Pickled	1,344		1,375	
Herring	810		983	
Mackerel	297		158	
Other	237		234	
Canned		20,909		23,390
Salmon	15,410		17,702	
Sardines	3,477		3,488	
Lobsters	913		910	
Other	1,109		1,290	
Miscellaneous		8,345		11,978
Meal	4,479		6,506	
Oil	239		880	
Other	3,627		4,592	

Loans for Fishermen

CANADIANS who make their living by fishing may now borrow up to $25,000 as a result of recent amendments to the Fisheries Improvement Loans Act. Loans, which may be obtained to cover the cost of boats, gear or other fishing equipment, are guaranteed by the federal Government. Here are the details:

Who May Borrow

Only a fisherman may borrow. A fisherman is defined as a person who owns or plans to obtain a fishing vessel, or fish catching and related equipment, and who makes his living by fishing.

Where Loans Can Be Obtained

All chartered banks are authorized to make Fisheries Improvement Loans under provisions of the Fisheries Improvement Loans Act. In addition, loans may be made by Credit Unions, Caisses Populaires or other Co-operative Societies, trust companies, loan companies and insurance companies which have applied and have been designated as lenders under the Act by the Minister of Finance. Banks and other lenders can advise applicants whether they would qualify for a loan under this legislation and how their particular credit needs can be arranged.

Loan Purposes

Loans may be made for any of the following purposes:

- Purchase or construction of a fishing vessel.
- Purchase or construction of fishing equipment such as auxiliary boats, engines, winches, electronic equipment, weirs, nets, traps, and vehicles used in the fishing enterprise.
- Major repair or overhaul of a fishing vessel.
- Purchase or construction of a shore installation such as piers, wharves, boathouses and equipment used with them.
- Development or improvement of a primary fishing enterprise such as the installation of a water system or the removal of a shore installation from one site to another.

Terms and Conditions

The detailed terms and conditions of loans are arranged between the applicant and the lender. In all cases, however, the following basic conditions must be met:

- The maximum amount which a fisherman may have outstanding at one time is limited to $25,000.
- The applicant must provide a reasonable portion of the cost of the purchase or project from his own resources.
- Maximum period over which a fisherman may repay his loan depends on the purpose for which the loan is made –

  3 years for vehicles; 5 years for the purchase of fishing equipment or the major repair of vessels; 10 years for all other purposes.

- The interest rate on Fisheries Improvement Loans is geared to the rate paid by the Government of Canada on its long-term loans, and is established twice a year, on April 1 and October 1. The present rate of interest is 8-1/2%.

Security for Loan

Loans must be secured. Security is usually taken in the form of a chattel mortgage on the item purchased or a mortgage on other assets of the fishing enterprise. The applicant must also sign a promissory note.

Certain Restrictions

The purpose of the legislation is to facilitate and encourage the direct financing by private lending institutions of term loans for fisheries improvements. Refinancing of existing debts or of working capital requirements are not eligible purposes.

Application for a Loan

A fisherman who is seeking assistance should discuss his financial requirements with the manager of the lending agency of his choice. Application forms are obtainable from lending agencies. General information on the program is available from:

The Chief,
Guaranteed Loans Administration,
Department of Finance,
Ottawa 4, Ontario.

If undelivered return to:
DEPARTMENT OF FISHERIES & FORESTRY
OTTAWA

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As daylight fades, a lone Northumberland Strait scallop dragger returns to port at Caribou, Nova Scotia.