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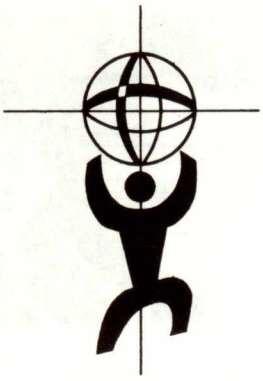
FEATURES

CANADIAN FISHERIES NEWS

FISHERIES NEWS FROM ABROAD

COVER PHOTOGRAPH: The "B.C. Clipper" brings an 85,000-pound catch of halibut into Vancouver harbour. The halibut fishery of the North Pacific is an outstanding example of the rehabilitation of a resource by international regulation. (See page 8)

A Natural Resources Conference
Montreal - October 23-28, 1961



Resources for Tomorrow

Of National Interest

THE "RESOURCES FOR TOMORROW" Conference being held in Montreal from October 23 to 28 will, with good reason, focus attention on Canada's renewable resources.

The conference, which is jointly sponsored by the federal and all 10 provincial governments, is the third national resources conference to be held in Canada. However, it is much broader in scope than its predecessors, and it is also the first federal-provincial conference especially designed to study the integrated multiple-use of renewable resources.

Although the conference is not a policy-making body, many practical solutions for improved management procedures are likely to be advanced. It can be definitely stated, however, that all those taking part, and through publicity media the public in general, will gain a greater appreciation of this nation's resources problems. Because of the magnitude of the conference, "Trade News" this month features in the following pages a summary of each of the papers on fisheries and related topics which have been especially prepared for the conference. I am confident that our readers will find these not only informative but thought-provoking as the views expressed by the various authors must surely strike a responsive chord in all those who are sincerely interested in conservation and the wise management of our natural resources. The complete texts of the fisheries papers, along with about 70 others relating to agriculture, land use, forestry, recreation, water and wildlife, will serve as background for discussion at the conference and will be distributed to those taking part before the meetings get underway.

At this time it might be appropriate to make a few brief comments about the authors of the fisheries papers. These men are highly-trained specialists well versed in the intricacies of the Canadian fishing industry and related fields. Among them are numbered economists, biologists, engineers, lawyers, and administrators. Not only are they specialists in different academic disciplines, but they also represent important sectors of the community concerned with the fisheries, including the universities and federal and provincial governments. The subjects covered by the authors touch on virtually all aspects of the fishing industry. As these papers are of such importance, and because they have been prepared by men of such broad interests, the Department, which itself is dedicated to the conservation and maintenance of the fishery resource, is pleased to present these summaries. The conference will, I am certain, give a greater impetus to public understanding of the problems inherent in resource conservation and management.

E. R. Clark

Deputy Minister of Fisheries

The Role of the Fisheries in the Canadian Economy

By J.A. Crutchfield
Professor,
Department of Economics,
University of Washington,
Seattle, Washington

IN THE FISHERIES of Canada salt cod, canned salmon, and the lobster carried much of the initial burden of regional economic development, and were literally the sole raison d'etre for entire communities. Whatever their current problems, their place in Canadian history is secure.

Even in their halcyon days, however, the fisheries were no golden road to wealth and ease. Fishing was and is a hard life, bypassed in many respects by the social and technical developments that have eased the lot of most other workers. Nevertheless, the industry did provide export staples; and with them, vitally needed foreign exchange and a stimulus to income and employment in areas where remoteness and nature's niggardliness with respect to natural resources would otherwise have precluded substantial growth, at least until much later.

The fisheries, though regionally significant on both coasts and in a few inland districts, will no longer play a leading and active role in Canadian economic development. But they are too important for us to ignore the difficult and continuous problems of adjustment which face them: problems which, in the main, are only partially self-correcting.

What unique characteristics of the fishing industry account for the chronic sickness and the constant need for government action? First, there is probably no industry in which both long- and short-run relationships between effort and output are subject to so much uncertainty. Each fishery population is part of an incredibly complex environment. Even if all else remained constant, the dynamic relationships between fishing effort, population, and sustainable catch would be difficult to quantify. But all else simply cannot remain constant, and the painfully slow (and costly) efforts to put together a scientific record of the key variables, hampered by our inability to see and count, have not progressed to the point where we can identify with precision the relationships so important to both industry and science. Moreover, the reaction time of a fishery population to, say, a change in fishing intensity may be so great that the full effects are not felt for many years.

A second aspect of the fisheries which gives them nearly a unique position in the Canadian economy is the common property status of the basic resource. Perhaps the word nearly should be emphasized, since this conference, concerned as it is with water, wildlife, and recreational use of the outdoors, will deal with most of the exceptions. However, the fishery case is certainly the most important instance of a head-on clash between the concept of a universal right of access to a resource and the requirements of sound economic utilization.

Other peculiarities of the fisheries are common to other resource-oriented industries in greater or smaller degree. One is the geographic isolation of the activity and the men who pursue it, and the consequent social and economic apartheid which, involuntarily, grows up around many of them. Fishing is, in real fact, a different way of life. If it is carried on in a physical environment ill-suited to other economic activity, the ability of its labor force to adjust to the inevitable changes in the market (or in the physical availability of fish) is seriously impaired.

A by-product of the necessity of fishing where the fish are is the distinct possibility of faulty operation of the waterfront market for fish. With vigorous competition among independent buyers and sellers we could be reasonably sure that the prices received by fishermen, while less stable than we might wish, would approximate their full economic value at the landing point. But this assumes actual or potential access by fishermen to a fairly large number of alternative buyers - at their own ports or at assembly points. Where landings are badly scattered, however, it may simply be impossible for more than one or two buyers to operate with any degree of efficiency. Fish processing and marketing are not operations normally associated with economies of large scale. The actual buying areas are often so small than even firms of modest size become effective buying monopolists. The conse-

quences of such market structures continue to be of real concern in parts of Canada.

Finally, it should be necessary only to mention the effects of the natural environment of fishing on the riskiness of business ventures. Fluctuations in the availability of fish, the vagaries of weather, and the inherent riskiness of relatively small craft in open water all combine to make control of supply and its adjustment to short-run variations in demand extremely difficult. If our view is extended to include the marketing operation, the extreme perishability of fish and the high cost of checking quality deterioration are additional impediments to orderly distribution. Again, these problems are similar to those of some agricultural industries and perhaps to forest products as well, but rarely in as extreme a degree. They are accentuated by the fact that more than 60 per cent of the Canadian catch is sold in export markets.

Productive Capacity of Canadian Fisheries

(This is a condensation of parts of a comprehensive study by Dr. Ricker which the Resources for Tomorrow Conference will issue separately. Herein are the introduction to the longer paper, and, for the fish species of principal economic importance, brief statistics on recent landings, and forecasts of landings in 1980. For much more information and a thorough understanding of the subject, the comprehensive paper should be consulted.)

By W. E. Ricker,
Fisheries Research Board of Canada,
Nanaimo, B. C.

THE FUTURE YIELD potential of a fishery is best estimated from the size of the landings and the percentage utilization of the stock, past and present, as these are related to the amount of fishing effort and to environmental conditions. Estimates of percentage utilization come from percentage recoveries of tagged fish, or from comparison of catch with escapement. Where no regular fishery exists, exploratory work can indicate the general extent of a stock, but it usually can give only a vague idea of the potential yield.

The actual size of a fish stock is a much less useful statistic than an estimate of its yield potential. Different fish stocks may be able to yield anywhere from about five per cent to possibly 200 per cent of their weight annually, depending mainly on the rate of growth and age at maturity of the fish. Yields of more than 100 per cent a year indicate that the stock is producing an annual surplus greater than its own bulk--something which is quite easy under tropical conditions, as every guppy fancier knows. In Canada's cool-temperate and subarctic climates potential yields are usually 50 per cent a year or less, sometimes much less. For example, commercial-size whitefish in cool Great Slave Lake increase in weight by 10-12 per cent a year, whereas in Lake Erie, with its warm water and much longer growing season, the weight increase is 30-40 per cent a year. The harvestable surplus produced by the two stocks is in much the same proportion. In general, the farther north you go, the smaller is the annual yield that can be expected from a fish stock of any given size.

Stock size can be a misleading guide to potential yield in another way. A stock of salmon, cod or any other fish decreases in abundance when man begins to use it, and its adult fish must remain less numerous as long as an annual crop is removed. For long-lived fish, the original period of "fishing-up the accumulated stock" may extend over quite a few years, and it is a time of better fishing and larger catches than can ever be obtained again. It is like the harvest of trees from a virgin forest--there is a big initial yield of mature timber, after which the annual sustained yield from yearly growth will be much less. For example, some of the northern redfish stocks of the west Atlantic are today in this early phase of utilization, and are yielding catches which cannot be maintained for more than a few years. For them it is necessary to predict much smaller yields 20 years from now. By contrast, stocks that have long been fished are likely to have come to equilibrium and will continue to produce at least at the present rate.

For some of our stocks the rate of capture of the fish in sight is high, 50 per cent a year or more,

because it is only the mature part of the population that is available for catching. This is true of the Pacific herring fishery and most salmon fisheries.

Without fishing, a fish stock becomes so dense that growth is slow and mortality is great, especially among eggs and young; growth and reproduction suffice only to compensate for natural losses, and there is no net surplus. This is true in cold water or in warm, regardless of how large the potential surplus production may be. A fishery, by reducing the density of the stock, creates the conditions necessary for production of a surplus that can be harvested annually. Removal of most of the large old fish may increase the net rate of reproduction, increase the rate of growth, and decrease the average rate of natural deaths in the stock--all of which increase the net surplus product. Of course, if a stock is reduced too much, eventually the annual production of a usable surplus must decline. Somewhere in between there is a level of fishing, at which the "maximum sustained yield" will be obtained.

Thus there are two fundamental rules of fishery management:

(a) If a stock is being used to less than capacity by reason of underfishing, more fishing will increase the sustained yield and at the same time decrease the size of the stock (or of the spawning stock, at least).

(b) If a stock is being used to less than capacity because of overfishing, less fishing will increase the sustained yield and at the same time increase the size of the stock.

It turns out that for many of our fisheries we must anticipate a trend which superficially seems paradoxical: in future a greater catch will be taken from a smaller stock. Consequently, in what follows usually only the estimate of future catch is given, not the stock size.

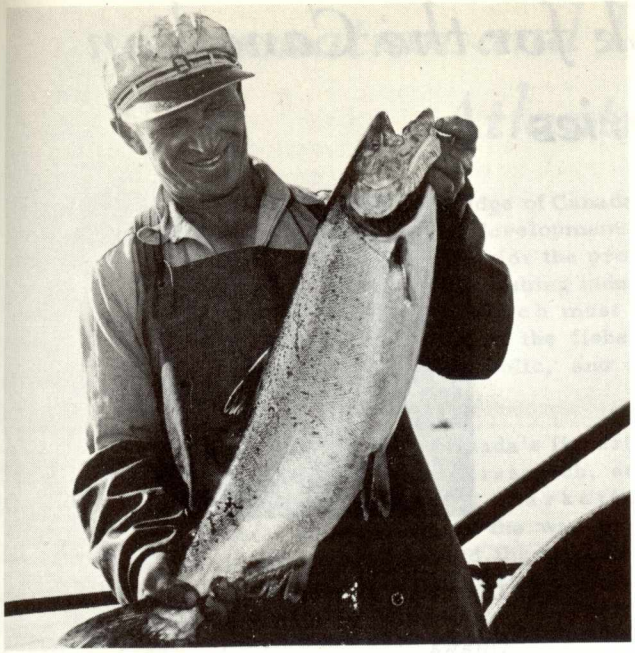
The above rules define underfishing and overfishing in biological, not economic terms. After exploitation of a fish stock passes the very early exploratory stage, increase in effort always gives a less-than-proportional increase in yield--that is, catch per unit of fishing effort falls off steadily, even while there is still no sign of biological overfishing. In some fisheries it is impossible, from an economic point of view, to increase fishing to the point of maximum sustained yield because monetary returns per unit cost would fall too low. In that event, increased catch in future might arise from use of more economical gear, improved handling, new uses for the product, greater consumer demand, etc., which would be reflected in greater landings per fisherman or an increase in landed value per pound. Equally, a less favourable economic climate can reduce a fishery: salt cod and herring meal are examples of products that have recently become more difficult to market.

On the other hand, for a preferred species, fishing can easily become intensive enough to reduce the annual yield much below the sustainable maximum, without reducing the profitability of the fishery below what is economically bearable. In that event obtaining the maximum sustained yield becomes possible only with some kind of legal restriction on the amount of fishing done: for example, by closures, size-limits, quotas, or restricted licensing. All these measures except the last are used to maintain the catch of the Pacific salmons, halibut and herring, and all are widely used in regulating freshwater fisheries. Granting of leases or property rights has been done in the case of some shellfish, where maximum yield is possible only on a "farming" basis and the individual can profit in proportion to his own efforts.

Rules of fishery management given above define the eventual, or equilibrium, effect of increasing or decreasing fishing. The immediate effect may be different. Increasing fishing always means a greater catch in the current year. Less fishing always decreases the current year's catch. These short-term effects tend to obscure the overall picture. For example, often an increase in fishing effort will give an immediate increase in catch sufficient to more than pay its cost, but after two or three years the catch--though perhaps still larger than it was originally--may fall to an equilibrium level that is uneconomic for that amount of fishing. Scarcely less painful is the situation where investigation has shown that less fishing will eventually increase the yield, yet this increase can be realized only by reducing effort and, temporarily, catch as well. For our prediction of future yields, however, we assume that such transition periods will have been passed successfully.

Variations in climate are an important cause of change in size of fish stocks, hence of catch. Warming of the water along any coast permits establishment or increase of warm-water species, and causes a decrease in abundance and retreat northward of cold-water species. Consequently the long-term prospects of some fisheries depend on the ocean temperatures which will prevail 10, 20 or 50 years from now.

No secure prediction can be made of the direction of climatic change. On the Atlantic coast there is some indication that the sea has begun to cool from the unprecedented high levels of the 1950's. This would benefit cool-water species like cod and salmon, while summer visitors like tuna and swordfish would not come north as far or in as great numbers. On the Pacific coast no basis for prediction is available, but in the past 10 years water temperatures have risen a little after having fallen sharply from 1940 to 1950.



In addition to natural changes in environment, man-made modification must be taken into account. Our anadromous fishes have been most susceptible to damage, and even where the physical cause is removed, it may be many years before stocks are restored to the size which gives maximum yield. In such instances predictions must take into account the future maximum yield and the rate at which it can be achieved. Less spectacular environmental changes due to logging, pollution, etc., have been considered as far as possible.

Not all changes are harmful. For example, domestic sewage, suitably handled, qualifies as a fertilizer and can increase fish stocks in fresh waters.

Man can also sometimes increase fish stocks by direct aids to production. For example, fishways surmounting natural obstacles, improvement of natural spawning facilities, artificial propagation, predator control, etc., will likely play increasing roles in future.

One of the greatest unknowns is the extent to which increasing demand, combined with research, enterprise and ingenuity will bring new fisheries into being. The rapid increase in population now taking place the world over cannot fail to produce a long-term increase in the demand for fish. Evidence of the effects of population on exploitation of fishery resources may be seen in the much larger landings made from European and Asiatic waters, than are made in North American waters of comparable extent. Recent decades provide several examples of previously unused fish becoming the basis of large industries--for example, the Atlantic redfish, the Pacific cod in British Columbia, and the smelt in the Great Lakes. The importance and timing of such advances are, however, impossible to predict with any confidence. They involve stocks about which little is now known, and usually also some break-through in technology, such as in the case of fish-sticks, or else some major shift in economic trends. Beyond pointing to some of the currently unused stocks, we are unable to predict what may be very important contributions to our fisheries by 1980.

Another variable is the extent to which foreign participation in fisheries that interest Canada may affect our landings. The present trend is toward rapidly increasing competition in some areas, and potential threats elsewhere.

With the preceding considerations in mind, potential landings in 1980 of the species of major importance have been forecast. They are presented below along with average annual landings for the period 1951-55 (except in the case of the Pacific salmons, for which the base period 1951-54 is used). Landings are in millions of pounds round fresh weight, except as indicated.

	Present Average 1951-55	Potential 1980
Atlantic Fisheries		
Cod	752	850
Haddock	107	120
Redfish	44	45
Atl. Halibut	7	6.5
Flounders (4 spp.)	68	100
Herring	245	350
Mackerel	29.7	40
Lobster	47.7	48
Scallop	1.5	8-million lbs. of muscle
Oysters	6.5	15)) million lbs.
Clams (3 spp.)	13.7	12) (shell incl)
Pacific Fisheries		
Sockeye Salmon	35.8	74-109
Pink "	49.6	100-130
Chum "	56	80
Coho "	22.7	27-mixed wts.
Chinook "	12.4	13.5 mixed wts.
Pac. herring	360	520
Pac. Halibut	61.4	75
Soles (5 spp.)	9.1	24
Crabs	3.3	6
Oysters	6	24)) million lbs.
Clams (3 spp.)	4.6	5) (shell incl)
Freshwater Fisheries		
Lake Whitefish	25.3	36
Lake Trout	6.1	6.4

The Demand Outlook for the Canadian Fisheries

By W.C. MacKenzie,
Director, Economics Service,
Department of Fisheries of Canada,
Ottawa.

EXCEPT for two or three products such as fish meal and cured codfish, the future of which is at present doubtful, the demand for all products of the Canadian fishing industry may be expected to increase. This means that, except for the species in relatively elastic supply, raw-fish prices will continue to rise. In addition to the more obvious cases such as lobster, salmon and pikeperch, certain of the groundfish species utilized for the fillet trade, for example haddock, are likely to be affected, as well as a number of fairly minor species such as swordfish and perch. The price of Atlantic herring, on the other hand, appears unlikely to be affected, and the effect on the price of cod depends on the outcome of the inter-form competition for this species: if the current shift from curing to filleting continues, there is unlikely to be much change in the price of cod for some time to come.

Two general inferences flow from these conclusions. The first is that, in the fisheries based on species inelastic in supply, rising prices will continue to attract excessive inputs of labor and capital, creating progressively refractory problems in the field of fishery-management or resource-conservation. The second is that industrial development based on utilization of the Atlantic demersal stocks will continue to be encouraged by an expanding demand, but that margins will be narrow and an increase in productivity will remain urgent. It is to the questions posed in these two fields, fishery-management and industrial productivity, that policy must be directed.

Survey of Legislation and Treaties Affecting Fisheries

By S.V. Ozere,
Assistant Deputy Minister of
Fisheries of Canada, Ottawa.

THE MAIN OBJECTIVE in fisheries conservation is to maintain and, if possible, increase the sustainable yield. Many types of measures are used for that purpose, based on results of scientific investigations.

From the viewpoint of national jurisdiction, fisheries in Canada are constitutionally a subject of legislation for the Parliament of Canada, although in non-tidal waters the provinces have property rights in fisheries and may therefore legislate as to their disposal, subject to federal legislation imposing any restrictions on fishing. In some respects federal and provincial legislative jurisdiction may overlap, in which case co-operative arrangements are made to bring about the necessary co-ordination. Some provinces administer their own fisheries and by arrangement with the federal Government enforce the federal fishery regulations. In the conservation of sea fisheries and anadromous fisheries, it is necessary to make treaties with other countries interested in any fisheries which are also of interest to Canada. For this purpose, a number of bilateral and multilateral conventions have been made and international commissions established to recommend to the governments of the participating countries, on the basis of scientific investigations, any necessary conservation measures. Some progress has also been made in the development of international rules of general acceptance under the sponsorship of the United Nations Organization.

Information and Extension Work in the Atlantic Fisheries

By A.F. Laidlaw, National Secretary,
Co-operative Union of Canada,
Ottawa, Ontario.

PUBLIC understanding and knowledge of Canada's fisheries are essential to the development of the resource for the benefit of all and for the prosperity of the people who depend on the fishing industry for a living. The three groups which must be informed and educated are made up of the fishermen themselves, the consuming public, and all those in the industry between the two.

At the end of World War II Canada's fisheries were 30 years behind agriculture in research, scientific and technological development, marketing methods and general outlook. Since the war there has been a change in attitude toward the fisheries. The need for a programme of technical and vocational education for fishermen is now recognized; co-operative organizations have emphasized the need for increasing fishermen's productivity; processors welcome inspection programmes which will improve the quality of their product, and administrative bodies are aware of the need to educate consumers in the value of the resource from an economic standpoint and as a source of much-needed food. Despite the improvement the fisheries are still behind, partly because of the phenomenal advances made in agriculture in the past 15 years.

Techniques and programmes for information services and extension work in fisheries have to be developed along new lines, and reluctance to accept the findings of research must be overcome. Extension and educational work must be kept separate from the policing of the fisheries; the latter might well be handled by the R.C.M.P. or a special force. The best educational approach can be made through groups, by dedicated people in the field.

Special attention must be given to the publication of material dealing with the fisheries, and the results of scientific research must be translated into a language that can be understood by the people for whom it is written. In addition to publications of many kinds, greater use of films and filmstrips, radio and television will be necessary, and technical and vocational schools are needed to train personnel for the fisheries, somewhat along the lines of agricultural colleges. An Atlantic School of Fisheries at Halifax, for instance, closely associated with various government research agencies and other services, could provide an intellectual home and help create a culture and develop an improved technology for the people identified with the fisheries resource.

The Management of Atlantic Salmon

By C.J. Kerswill,
Fisheries Research Board of Canada,
Biological Station, St. Andrews, N.B.

INVESTIGATIONS carried out since 1949 by a federal-provincial co-ordinating committee have indicated that catches of Atlantic salmon, in decline since 1930 but showing some improvement since 1955, can be restored at least to the average of the years between 1930 and 1959. Sport fishing might also be improved. This would mean an annual commercial catch of about 6.8 million pounds and an angling take of about 75 thousand fish in the Maritime Provinces, Quebec and Newfoundland.

Best use of the stocks of Atlantic salmon should be attained by effective manipulation of the resource and the enforcement of recommended regulations, drafted on a sound biological basis, by appropriate management and protection staffs. Eco-

nomic benefits of both commercial and sport fisheries must be considered as well as the conflicts between those interests. However, the human side of the economic situation generally must also be taken into account because other activities (hydro power, forest industries) which affect salmon could outweigh fisheries if the dollar value of any resource were to be its most important factor.

Commercial salmon fishing statistics go back to 1870 for the Maritime Provinces and Quebec, and to 1910 for Newfoundland. The last year of peak production was 1930, with 13 million pounds. The 1959 catch was 61 per cent of the 1910-59 average.

NEW APPROACH

The federal Government and the governments of the Atlantic provinces established the co-ordinating committee to investigate the factors limiting production and utilization of Atlantic salmon. The programme followed has called for close liaison between all participating individuals and groups and for the provision of information for the general public, as well as for extensive biological and economic research. A new approach to the topics of behavior and physiology of salmon is underway.

Progress has been made in developing practical knowledge of growth and natural mortality of young salmon up to the smolt stage, and a maximum rate of smolt production for specified areas, under controlled conditions, has been estimated. Scale readings and data on the recovery of marked or tagged fish have provided clues to the survival rate of salmon in the sea. The combined commercial and sport fisheries appear to remove, on the average, about one-quarter of the total adult salmon stock.

The improvement of natural conditions in streams, the creation of artificial spawning beds and artificial freshets, and the transportation of large fish have all proved successful. Further experimentation in habitat improvement is needed. A promising development is the rearing of hatchery stock to smolt size, a method followed in Sweden, where power development has eliminated natural rearing areas. The reduction in numbers of competitive species of fish and experimental control of predator birds, particularly American mergansers, has improved the survival rate of fry.

Much research has been carried out on pollution problems but there is need for a special staff to assess the extent of industrial and domestic pollution. Extensive aerial spraying of forests with DDT since 1942 to control an outbreak of spruce budworm has polluted rivers in New Brunswick and Quebec. The losses of fry and older young salmon through spraying have been assessed, as has the reduced abundance of aquatic insects which are the main food of young salmon. Experiments have shown that a reduced concentration of DDT has had less harmful effects, and a planned modification of the DDT formula in future spraying operations is expected to reduce further damage to stock. The effects of mine effluents and deforestation are also under study, and fish passage facilities have been built or recommended to minimize loss or damage from natural or man-made obstructions.

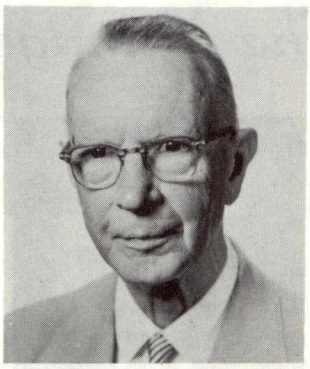
Potential handicaps to maintaining the 1910-59 average level of production are pollution and other harmful changes in the freshwater environment, which good management could keep from being too serious. Predatory bird control and the planting of hatchery-reared stock of smolt size may also bring about improvement.

Requirements in Fisheries Research

CANADA has been fortunate in having a programme of fisheries research in operation for the past 60 years. Universities had a large part in the beginning and have maintained a fairly close association with the research programme to the present day. This association should be fostered and cultivated because government agencies must look to the universities for trained young men for their staffs and for carrying out many fundamental types of research.

Detailed knowledge of the life histories of the fish and other aquatic organisms is essential in a research programme. Associated with these studies are studies of the physiology, biochemistry, ecology and behaviour of the animals.

Since a fish is subject directly and indirectly to all the physico-chemical and dynamic characteristics of its environment, it is essential to have



By W.A. Clemens,
Department of Zoology,
The University of British Columbia.

a thorough knowledge of the oceanographical and limnological features of the waters.

It is essential to integrate the biological with the oceanographical and limnological information, first by establishing correlations and then by seeking explanations of these correlations. In most cases laboratory experiments will be required to help solve the problems.

Studies of the population dynamics of fish stocks are necessary for wise decisions as to the development of regulatory measures and as to the feasibility of manipulation of the stock. In the development of mathematical models, decision needs to be made as to the data required for their construction and then definite attempts made to apply them to the stocks concerned.

With those fishes which propagate in fresh water various measures may be undertaken to maintain or increase production. Hatcheries may be used to provide stock for rehabilitation of certain streams, to circumvent the lack of adequate spawning streams or to stock barren lakes. Where hatcheries are used, all procedures should be based on the known physiology of the fish. Protection and improvement of spawning beds and the construction of new spawning beds would seem to be good procedures but scientific documentation is scanty. The fertilization of lake waters does not seem to be an established effective procedure. Removal of non-game or non-commercial fish offers possibilities in certain circumstances. Here again much additional research is required.

Hybridization of fishes does not seem to be an effective procedure because of difficulty or impossibility of isolating the stock and of continuity in selection.

More basic information on the primary factors involved in the productivity of salt and fresh water is required.

It is expected that with the increase in human population and greater demands for foodstuffs, attention will be directed more and more to the resources of the ocean. Investigations of plants and animals little or not used at the present time should be encouraged.

Parasites and disease organisms are ever present in fish populations. Research should be carried out not only on life histories and control measures but also on the factors which favor their development.

The discharges of domestic and industrial effluents are a threat to fish production and to the acceptance of a food product produced in grossly impure waters. In addition to a steady programme of investigation, an educational programme would help focus attention on the problems involved and the need for eliminating pollution.

High dams constitute a barrier to fish moving up and down stream. A solution to the problem has not yet been found and a great deal more research is required.

Research in fish technology is necessary to ensure the best and most economical product possible for the consumer. The technologist should seek to attract the consumer by improving the quality of the fish product and in this attempt he should be aware of advancements in other food industries and be ready to adapt them to fish if advisable.

The Organization of Wildlife and Fisheries Research in Canada

By J.R. Dymond,
Ontario Department of Lands,
and Forests.

THERE ARE a number of respects in which the organization of wildlife and fisheries research in Canada needs to be improved.

The extent of support received by various organizations concerned with research in Canada varies, and the total support is quite inadequate to meet the need if the management of our wildlife and fisheries resources is to be as effective as it should be.

The amount and nature of research being carried out by federal and provincial government agencies are largely determined by their administrative responsibilities and their financial resources.

Research having direct application to the management of resources should be carried out as closely as possible in relation to its point of application, but much of the necessary research cannot be undertaken by the less wealthy provinces.

To overcome difficulties inherent in this situation, close liaison should be maintained between agencies doing research having relation to the conservation of resources.

An important problem in the organization of research is in determining what categories of research are better carried out directly by administration and service departments of government or by a board, as in the case of the Fisheries Research Board. This problem should be studied by a Committee or Commission of persons having technical knowledge of and experience in actual research.

Universities are not being enabled to carry out adequately their two indispensable functions in the promotion of research, viz., basic research and the training of research personnel. Therefore the requirements of universities must receive immediate attention if the research needs of the coutry are to be adequately met.

Since the most effective management of renewable resources requires a knowledge of the interrelationships between plants and animals and between them and their non-living environment, the preservation of nature reserves where ecological studies may be carried out is a necessity. Adequate provision must be made for setting aside, preserving, and studying samples of all types of ecological communites found in Canada.

A common weakness of research is a lack of understanding between administrators and research personnel. Onus for this situation must be shared by both parties, but the situation should be rectified if the most effective results are to accrue from a research programme and the application of its results in management. An important element in bringing about understanding between administrators and research personnel is much more time spent in duscussion.

Related to the problems outlined above is that of the maintenance of high scientific morale in government research organizations.

There is urgent need for active liaison not only between federal and provincial research agencies, but between these and academic institutions.

Because of the great complexity of plant and animal relationships and the difficulty of conducting controlled experiments in the field, biological research is unusually difficult. This situation is not generally understood. As a result biological research does not receive support commensurate with the difficulty and range of problems involved in the management of living resources.

Arising from a lack of understanding of biology is its failure to attract a sufficient number of first class students prepared to undertake training as research workers. The result is that there exists an inadequate supply of highly qualified research workers. Efforts must therefore be made to bring about a better understanding of the nature and importance of biological research and of its problems.

The Effect of Man-made Changes on the Environment of Fishes

MAN'S ACTIVITIES can affect environments of fishes in many ways. It is convenient to classify these effects biologically rather than to catalogue the various kinds of human activity. In general, effects can be measured by consideration of (1) factors influencing basic aquatic productivity (2) the requirements of aquatic organisms and (3) the requirements of fish populations. Each of these considerations involves a large body of specialized research information as well as detailed investigation of highly local conditions.

Constructive improvement of the physical environment of fishes has been attempted by creation of bodies of water, regulation of stream flows, elimination of natural obstructions, and lake fertilization. Control of undesirable species has recently been emphasized with the development of ef-

By P.A. Larkin,
Director,
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University of British Columbia.

ficient chemical eradicants, supplemented by electric fishing devices. Culture of desirable species of fish for wholesale planting from hatcheries into the wild has proved unsatisfactory in many instances and has been largely replaced by hatchery devices for solving highly specific fish cultural problems for which an adequate research background has proved the need.

Development of resources other than fisheries can have profound effects on fish and their environment. Pollution of lakes and streams is a growing problem in the more urban areas of Canada and pollution control is beset with a variety of biological and administrative complexities. A national conference on pollution is recommended.

Problems posed by construction of dams on lakes and rivers have been regionally important in recent years. Except for large dams on rivers with large runs of fish, the present technological information is adequate for development of compromises which preserve a sufficient proportion of fish production without undermining the economics of the dam construction. Good land use practice is in general associated with proper protection of water resources. Soil erosion caused by agricultural abuses or excessive logging are detrimental to fish production. Improvements in land use practices have resulted in benefits to fisheries. There have been some isolated instances of marine pollution and obstruction which have underlined the need for oceanographic investigation. The satisfactory resolution of resource use conflicts involving fisheries requires both federal and provincial legislation and supervision. The federal statutes are broad and effective, but to plan resource development properly and to avoid unnecessary conflicts it is desirable that provinces have some agency which represents the fisheries resource. This is particularly important in the coastal areas. A substantial body of technical information is necessary to provide adequate protection of fisheries at the local level and staffs of technical personnel should be increased.

To date, Canada has successfully handled the problems for fisheries involved in the development of natural resources. The next few decades may be decisive in determining whether this favorable trend will be continued into the indefinite future.

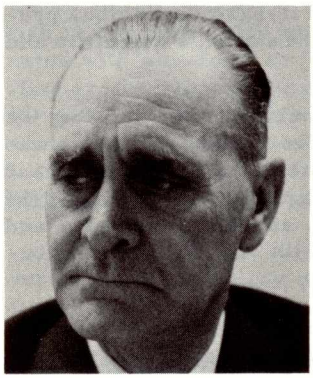
Multi-purpose Development of the Fraser River

By A.F. Paget, Department of Lands and Forests, Victoria, B.C. and
C.H. Clay, Department of Fisheries of Canada, Vancouver, B.C.

MULTI-PURPOSE development of the Fraser River involves flood control, fish, power, navigation, irrigation, recreation, domestic and industrial water supply, waste disposal and other uses. From time to time public attention is directed toward the need to develop the river for these purposes. Floods such as the one which occurred in 1948 increase the public awareness of this need. Section one of this paper reviews provincial water legislation, the history of the Fraser River Power Development, other water uses and the work of the Fraser River Board, and concludes:

"It has never been considered fair to attempt an economic comparison between present resource use of the Fraser River Basin and the value of electrical energy available because the real need for the energy has not yet been demonstrated. The time when such a comparison must be made is rapidly drawing near, however, and it is reasonable to expect that the energy resource values will far outweigh any resource losses consequent to such development." Section II reviews federal fisheries legislation, the history of the Fraser River fishery, the present status of the Fishery and River Basin Development and the future of the Fraser Rivery fishery. Conclusions are:

First, research on the fish must be pursued vigorously, and increased far beyond present levels. Such research will have value in maintaining and extending the fishery regardless of whether full scale hydroelectric development proceeds or not. Secondly, all possible alternatives should be thoroughly explored before consideration is given to full scale hydroelectric development. This includes the examination of alternative methods of power development such as production from fossil fuels and atomic energy, as well as production from hydro-electric sites in adjacent river basins. Thirdly, pending a solution to the complex problem of fish maintenance, no planning of full scale hydroelectric development should be implemented without taking into consideration the full economic and social consequences which would result from reducing this valuable fishery. ✔



Mr. A.F. Paget

Mr. C.H. Clay

Milestone in Fisheries Research At Grand Riviere

A QUARTER-CENTURY record of fruitful contribution to the Canadian fishing industry was officially marked early this summer in the picturesque Gaspe fishing village of Grande Riviere when the federal fisheries technological station there marked its silver anniversary. The Grande Riviere Station has been singularly noted for its leadership in the study of salt fish processing.

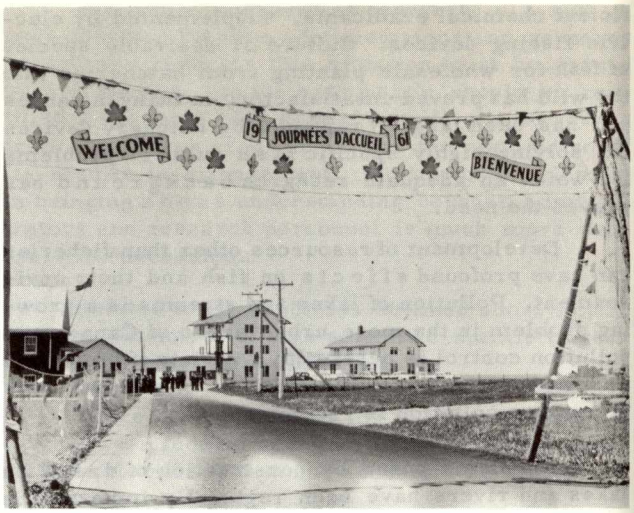
The June event attracted wide interest along the Gaspe coast and hundreds of spectators visited the establishment to see first-hand the various projects being undertaken by the station's scientific and technical staffs.

Chairman of the formal ceremony marking the anniversary was R. Legendre, station director, who welcomed guests and visitors in both the English and French languages. Dr. J. L. Kask, Chairman of the Fisheries Research Board, added his welcome and commended the station and its staff for its contribution to fisheries research.

The important role of Canadian fisheries scientists in this age of changing technology was put into focus by Dr. Lucien Piche, Fisheries Research Board Member and vice-rector of the University of Montreal, who said that Canadian science must keep pace with the changing scientific scene so that this nation could meet increasing competition from foreign fishing vessels exploiting the fishing grounds bordering Canada.

"We must understand," declared Dr. Piche, "that the scientific work of stations such as this one at Grand Riviere is necessary not only to solve immediate problems of the fisheries but also to maintain active participation in the scientific movement in order that the industry may profit from it."

The speaker noted that the establishment had been functioning for a quarter century and was now



The "Welcome" sign for the many visitors.

Audience hears 25-year history of Station.

One of the displays at the anniversary.

staffed with seven scientific workers assisted by 11 technicians. They were mainly concerned with the problems of light-salted fish. However, he continued, the objective was not concerned so much with the systemization of a century-old Gaspe industry but rather to evolve new techniques in the drying or pickling of fish in other agents than salt.

CO-ORDINATED RESEARCH

Dr. Piche noted that the work of Canadian fisheries scientists was co-ordinated with groups of researchers in universities who undertook to study problems where more theoretical and fundamental knowledge was wanted. Such work was supported by the Fisheries Research Board which has a programme of scholarships aimed at the recruitment of students into the various fields of fisheries research.

Of particular interest to the visitors attending the two-day function were colorful charts and picture displays describing the work of the station as well as giving graphic descriptions of work in various phases of the Atlantic fisheries generally. In addition there was a display of live fish of different ocean species in tanks especially constructed for the event.

Coming in from the sea to take part in the two-day celebration was the motor vessel "Harengus," a research craft of the Board's biological station at St. Andrews. A high-light of the social programme was a reception given at the School of Fisheries in Grande Riviere by the federal Minister of Fisheries.

Another attraction that drew much attention was the biologocal station of the Quebec Department of Fisheries. This establishment contains an aquarium that is the only one of its kind east of the St. Lawrence River. In addition to a wide range of fish and shellfish species, the aquarium also has an adult Atlantic seal.

The history of the federal technological station at Grande Riviere goes back to 1936, when it was decided to establish it there to serve the Gaspe Peninsula, northern New Brunswick and the Magdalen Islands.

Known originally as the Gaspe Fisheries Experimental Station, the new establishment soon made its impact felt in the Gaspe fishing industry. Its first task was an evaluation of industry along the coast and the presentation of instructions on the elementary principles of fish curing.

Not long after the establishment of the technological unit, the Quebec Department of Fisheries became interested in the operation of Laval University's biological station at Trois Pistoles and this station was transferred to its present site in Grande Riviere.

During the first year -- in 1939 to be exact -- the biological station was invited to use the facilities of the technological unit, and its new director, Dr. Jean-Louis Tremblay, oriented the research toward marine fisheries with special emphasis on cod, herring, lobster and smelt, the mainstays of the Gaspe fishery. In those days the biological station operated only six months in the year.

In 1951, Laval University transferred the administration of the biological station to the Quebec Department of Fisheries and the unit resumed its operations under new direction and with a new name: The Marine Biological Station. It now operates 12 months of the year under its present director, Dr. Alexander Marcotte.

Meanwhile, the federal technological station continued to grow in stature. Initially, its main work was devoted to preservation of fresh fish, canning of cod livers, smoking of fish, production of fish meal, extraction of cod liver oil and preparation of salted cod in boneless form. Later, the station turned its scientific resources to the preservation of fresh fillets and also gave careful study to the utilization of fisheries by-products and the artificial drying of salted cod fillets.

Currently the station has several important projects underway. Probably one of the leading studies at the moment is an examination of the characteristics of the method of processing salt fish known as the "Gaspe cure." This method of curing fish is internationally known and has not been duplicated with any degree of success. Station scientists are seeking to find all there is to know about the subject so that this method of processing can be controlled. In other words, the scientists want a formula that will guarantee the maintenance of the high quality fish that this cure produces.

As a sequence, the station is planning to investigate the possibility of using other preservatives for curing, along with, or in combination with, salt.

Because of parliamentary duties Hon. J. Angus MacLean, Minister of Fisheries for Canada, was unable to attend the Grande Riviere celebration. He was represented by Roland English, M.P., his parliamentary secretary.

Two former directors of that station were present for the ceremony. They were: Dr. Arthur Labrie, Quebec Deputy Minister of Fisheries, and Dr. A. Nadeau, Director of Technical Service, Quebec Department of Fisheries. From the federal Department of Fisheries were L. Morin, Quebec Area Director, and M.A. Foley, Ottawa, chief engineer with the Department's Industrial Development Service. Representing the Quebec Government was Claude Jourdain, M.L.A., Gaspe North, while the Bishop of Gaspe was represented by Rt. Rev. Msgr. Roland Bryere, Grande Riviere. ✔

Home Economists' Staff Conference

Home Economists of the Department of Fisheries and others who took part are shown at the sixth staff conference, held in Ottawa from July 10 to 14.

THE SIXTH staff conference of the home economists of the Department of Fisheries was held July 10-14, 1961, in the Sir Charles Tupper Building, Ottawa. The meetings were chaired by the Chief Home Economist of the Department's Information and Consumer Service, Miss Margaret Myer.

The Conference was opened by Deputy Minister of Fisheries G.R. Clark, and during the week the home economists were briefed on various aspects of the fishing industry by senior officials of the Department. Each of the area home economists reported on her work and told of problems encountered. These were given consideration and solutions were discussed.

In addition to speakers from the headquarters staff of the Department of Fisheries, the home economists were addressed by a number of prominent workers in the field of home economics. These included: a talk on teaching methods in Home Economics by Miss Mary Clark, Supervisor of Home Economics, Ontario Department of Education; a description of television techniques by Miss Claire Donovan of Station CJOH, Ottawa; a report on a special study of farm homes and homemakers by Mrs. D.P. Ferris, economist, the federal Department of Agriculture; demonstration techniques by Mrs. Dorothy MacKinnon, Home Economics Director, Poultry Products Institute of Canada; a talk on education in the far north by Miss Frances McKay, Chief, Adult Education Division, Department of Northern Affairs and National Resources; a talk on The Philosophy of Adult Education by Miss Helen McKercher, Director, Home Economics Service, Ontario Department of Agriculture; a paper on Teaching Nutrition to the Public by Miss Corinne Trerice, Director of Nutrition, Bakery Foods Foundation; news from the Nutrition Division of the Department of National Health and Welfare by Misses Dorothy Sinclair, Suzanne St. Hilaire, and Margaret Lock; and news from the Consumer Section of the Canada

Department of Agriculture by Misses Lenore Newman, Gertrude Gerlach, and Henriette Rouleau.

HOUSEWIVES PRESENT A PROBLEM

One of the more interesting papers presented at the conference showed that home economists have an up-hill struggle on their hands to convince the Canadian housewife that she should serve fish more often. And one of the chief reasons for reluctance to use fish as a major item in the Canadian diet, despite its nutritious content, is psychological.

Mrs. P.D. Ferris, an economist with the federal Department of Agriculture, described a recent socio-economic study undertaken jointly by the Rural Sociology Unit, Economics Division, Department of Agriculture and the Home Economics Service of the Ontario Department of Agriculture. The survey showed clearly that the Ontario farmwide does not serve fish very often.

Information released by the Dominion Bureau of Statistics shows that Canadians, as a group, are not fish eaters, Mrs. Ferris stated. The annual consumption of fish in this country is far below that of fruit, potatoes, meat, cereals, and vegetables. In supporting her contention that psychological blocs have a great deal to do with low consumer preference for fish products, Mrs. Ferris said that the vast majority of housewives who stated that they served fish infrequently could give no specific reason for so doing. Their answers tended to be vague, and when pressed for more definite reasons they claimed that fish was not readily available.

Mrs. Ferris said that this is simply not the case in this era of supermarket shopping, as even the most remote country store has an ample supply of canned fish stacked on its shelves.

"Food patterns, both preferences and prejudices are a fascinating area of human behaviour," Mrs. Ferris stated. "Logical factors such as availability of high nutrient value may be overridden by a host of other factors--including religious sanctions and tabus, class distinctions, educational levels, psychological blocs, personal preference (which is often no more than a family way of doing things passed on subtly from one generation to another).

"Just the other day, the following food prejudice came to my attention. Two young Burmese community development officers were in the office discussing Canadian rural development schemes. One of their major problems was how to feed an increasing population. 'But as a rice substitute' I suggested, 'would manioc not be a possibility?' Evasive answers were forthcoming, the whole idea of tapioca was skirted by the Burmese. Finally we routed out the fact that during the occupation, the Japanese confiscated Burmese rice supplies and gave them instead skimpy manioc supplies. The people hated manioc not because it wasn't edible but because it was forced on them by conquerors--and so now if the Burmese government tried to push tapioca as a food staple, a psychological bloc would tend to defeat the measure."

Another example of availability being superseded by other factors is provided by the typical Maritime fishing village, Mrs. Ferris continued. In a delightful setting such as this surrounded by fresh fish and wild blueberries, the tourist is likely to find, more often than not, that the town's restaurant ignores fish completely and offers in its place spaghetti or baked beans and tinned peaches.

Praising the fisheries home economists for their efforts to create a greater use of fish products, Mrs. Ferris said that, "in this age of conformity, it's a pleasure to be among nonconforming crusaders like yourselves who are merrily swimming upstream against the current of an anti-fish prejudice." ✔

Storing Fish at Sea

Refrigerated sea water equipment for preservation and storage of fish at sea is proving more and more useful, particularly in vessels which range far from their home ports, such as those which go to the Bering Sea for halibut. British Columbia skippers have for some time benefited from the continuing experiments and improvements in this fish-holding technique carried out at the Vancouver Technological Station of the Fisheries Research Board of Canada.

Two large British Columbia long-line vessels landed over 400,000 pounds of halibut from their refrigerated sea-water installations during 1960. During the year, also, the Board's technicians provided advice on installations in a large new salmon troller, which utilizes hydraulic drive for refrigerated sea-water equipment, and a very large salmon packer, which can carry approximately 600,000 pounds of fish in six tanks.

Recently members of the staff of the Vancouver station have been holding discussions with fishermen on the brine freezing of fish on larger halibut vessels, an idea which has received favourable reaction from vessel operators. A pilot model brine freezer has now been set up and is in operation at the station.

Vacuum packed fish are earning consumer acceptance in Britain. The fish are packed in plastic bags from which, by a method originated in Holland, all air is extracted, after which the bag is sealed. The pack has no smell and can be carried in a shopping bag.

Fish Nutrition Conference

Twenty-five major articles summarizing the world's knowledge of nutrition and public health attainments in five major divisions of fishery technology will be presented at the International Conference on Fish in Nutrition which will be held in Washington, D.C., September 19th to 27th. In addition there will be 44 short manuscripts, each presenting the results of research into the many nutritional aspects of fishery products.

The meeting is sponsored by the Food and Agriculture Organization of the United Nations. The U.S. Department of State is the official host and the Bureau of Commercial Fisheries, Fish and Wildlife Service, is in charge of arrangements.

All papers have been completed and submitted to FAO in draft form. Six outstanding nutrition and public health authorities from the United States, Europe, and the Far East have been called to FAO headquarters in Rome, Italy, to thoroughly review and edit the papers.

The conference on Fish in Nutrition is the first of its kind ever held. Fifty nations will be represented by approximately 400 delegates.

Among those planning to attend from the Department of Fisheries of Canada and the Fisheries Research Board of Canada will be W.C. MacKenzie, Director of the Department's Economics Service, Miss Margaret Myer, Chief Home Economist, and Miss Ruth MacIntosh, Assistant Chief Home Economist of the Department's Information and Consumer Service, and Dr. J.L. Kask, Board Chairman; Dr. H.L.A. Tarr, Director of the Board's Vancouver Technological Station, and Dr. Henri Fougere, Coordinator of the Board's Special Cod Project.

The agenda now being considered includes as main topics the role of fish in world nutrition, the chemical composition of fish and fishery products, the contribution of fish and fishery products to the diets of various nations; fishery products in animal nutrition and possibilities for increasing fish consumption.

Under the main titles would be reports on the amino acid composition of the protein in fishery products; fish oils and their role in nutrition; food values of fresh fish compared with processed fishery products; minerals and vitamins in fish; fish in dietetics, including geriatric diets; incidence of world malnutrition by regions; fish flour and its importance in preventing malnutrition; fish derivatives in feed for swine, calves, poultry, and fur-bearing animals; economic and social incentives for increasing production; and methods of consumer education.

Monofilament Ban

The use of monofilament synthetic material in gill-nets used in the British Columbia salmon fishery has been subjected to a one-year ban by the federal Department of Fisheries in the Pacific Area.

All sections of the British Columbia industry and fishing gear suppliers have been notified that the Department of Fisheries will prohibit use of the monofilament salmon gill-nets in 1962. The action will give the Department time to make a thorough appraisal of the administrative problems associated with this type of gear.

The decision to ban the gear was taken on the basis of evidence secured mainly during the current season's operation. It has been established that monofilament nets will, under certain conditions, outfish nylon and other gill-nets to a degree where serious management problems would follow widespread adoption of the gear. Significant numbers of fishermen planned to convert to monifilament nets next year, and any advantages to the fishermen resulting from increasing efficiency would have had to be met with further restrictions on fishing time.

Some idea of the efficiency of the monifilament nets may be gained from this single report on the use of this gear in the Rivers Inlet sockeye fishery this season. In one week, when the average catch of all gill-net boats was 410 sockeye, two fishermen using complete monofilament nets took 1100 and 1546 sockeye.

In another case, a fisherman who used a 50-fathom panel in his regular nylon net found it fished two or three times better than the remainder of the net.

The monofilament gill-net first appeared in the British Columbia fisheries in 1959, when a few fishermen used sections of monofilament webbing in their nylon or linen nets. The new gear had been introduced in the Washington fishery the previous year and, in 1960, the state brought down legislation prohibiting its use in the salmon fisheries.

The Department of Fisheries of Canada kept a close watch on the monofilament gill-nets last year, but the generally low catches did not produce conclusive evidence that the gear posed a threat to salmon stocks greater than that of other gear. The

decision to ban the monofilament gill-net was a most difficult one for the Department. In view of the problems widespread use of the gear would create in management of the salmon resource, however, there was no immediate alternative. For the time being, the ban on the use of the monofilament gill-net applies to the calendar year 1962 only.

Gigantic Mapping Operation

This spring 82 field parties comprising some 1,500 surveyors, hydrographers and supporting personnel from the Surveys and Mapping Branch of the Department of Mines and Technical Surveys fanned out across Canada and far into the Arctic to continue the tremendous task of surveying and mapping Canada's land areas and the charting of its inland and coastal waters.

The programme is designed to assist in the exploration for, and the development and utilization features of Canada's wealth of natural resources. Projects range from such features of mapping as the determining of latitude, longitude and height above sea level readings to the search for and charting of safe sea-routes through the islands of the potentially oil-rich archipelago. The programme also includes such work as the detailed topographical mapping of areas along the shores of the St. Lawtence River to aid in the study of navigation problems on the river.

Some of the highlights of the 1961 programme are: the continued topographical mapping of the archipelago, initiated in 1960, by a large, helicopter-supported party working on northern Baffin Island, Devon Island and southern Ellesmere Island; the topographical mapping by another helicopter-supported party of the region around Hudson and James bays in western Quebec and northern Ontario; the 'shake-down' cruise of the new vessel, the C.H.S. MAXWELL of the Canadian Hydrographic Service along the east coast of Nova Scotia; the establishment of first-order control, by theodolite and tellurometer, over metropolitan Toronto, and the surveying of sites for airports, schools, radio stations, residential and other developments at various localities in the Northwest Territories and Yukon.

The topographical party working in the region about Hudson and James bays is using, for the first time, an airborne tellurometer measuring technique developed by field engineers of the Topographical Survey. The C.H.L. ANDERSON of the Canadian Hydrographic Service is trying out a new electronic position-fixing device called radan, in its survey of the shoal-infested waters between Cape Sable and Yarmouth off the south coast of Nova Scotia.

The Canadian Hydrographic Service vessel, The C.H.S. BAFFIN, proceeded north to Barrow Strait, the 'crossroads of the Arctic', early in July to begin a two-range Decca survey for the charting of safe sea-routes among the arctic islands. Interest in the oil potential of the Archipelago is increasing and a knowledge of its waters is necessary to ensure safe navigation in them. Toward the end of the season, the BAFFIN will commence the survey of the approaches to Frobisher Bay.

Another C.H.S. vessel, WM. J. STEWART, using positioning by two-range Decca is surveying Hecate Strait, one of the most prolific fishing grounds of the British Columbia coast. The ship will also chart the unknown waters around Kunghit Island and Stephans Island, and toward the end of the season, will work in the more protected waters of Active Pass.

Offshore sounding operations from Sable Island toward Cape Sable is being extended by the C.H.S. KAPUSKASING. The ship will also conduct an offshore survey along the coast between Berry Head and Liscomb. Late in the season, its hydrographers will carry out surveys to determine the positions for the relocated stations of the west Newfoundland Decca chain, which is scheduled to go into operation in 1962 to assist shipping through Cabot Strait.

Two launch parties are continuing work on the long-range programme of providing modern charts for the coast of Nova Scotia: S.S. Dunbrack on the C.H.L. EIDER, is charting between Sheet Harbour and Ship Harbour along the eastern shore, and F.L. DeGrasse, aboard the C.H.L. ANDERSON, is using radan to survey the area between Cape Sable and Yarmouth on the south shore, one of the foggiest parts of the coast. At the end of the season, the party will continue the survey of the more sheltered waters of Lunenburg Harbour.

The C.H.S. MAXWELL, the newest addition to the hydrographic fleet, will be commissioned late in the season and will commence its hydrographic work by carrying out surveys along the eastern shore of Nova Scotia.

The C.H.S. ACADIA is continuing the survey of the shoal-infested waters around Cape Freels, Nfld. The ship will also resurvey Catalina Harbour on the east coast of the island about 70 miles from St. John's, where a large, fish-processing plant was constructed recently and where the entrance to the harbour has been dredged to permit deeper draft ships to enter.

The efficient container now in use for transporting live lobsters by air was evolved by a Canadian company. It is a double-walled corrugated-cardboard box with aluminum foil covering for insulation and a tape-sealed closing. It has air holes and contains ice sealed in a plastic bag to keep the lobsters cool. It holds fifty pounds of lobsters and ten pounds of ice.

Fishery Figures For June

SEAFISH: LANDED WEIGHT AND LANDED VALUE

	May-June 1960		May-June 1961	
	'000 lbs	$'000	'000 lbs	$'000
CANADA - TOTAL	335,265	22,375	386,797	24,464
ATLANTIC COAST - Total	303,855	17,683	327,554	17,848
Cod	116,604	3,157	147,736	4,016
Haddock	15,129	565	15,205	535
Pollock, Hake & Cusk	17,279	396	13,601	290
Rosefish	5,160	136	4,839	120
Halibut	1,820	365	1,451	333
Plaice & Other Flatfish	37,860	1,213	32,282	1,048
Herring & Sardines	58,429	793	57,759	794
Mackerel	3,368	220	1,448	107
Swordfish	140	55	47	25
Salmon	1,325	603	1,354	632
Smelts	32	3	5	1
Alewives	5,692	105	7,195	140
Other Fish	10,496	179	14,825	176
Lobsters	27,580	9,331	25,758	8,828
Clams & Quahaugs	772	39	1,065	44
Scallops	2,134	522	2,782	751
Other Shellfish	35	1	202	8
PACIFIC COAST - Total	31,410	4,692	59,243	6,616
Pacific Cods	1,909	130	2,075	161
Halibut (1)	18,392	2,843	16,157	3,251
Salmon & Other Flatfish	2,258	121	2,200	126
Herring	888	38	27,438	302
Salmon	3,790	1,268	7,435	2,500
Other Fish	1,349	37	945	32
Shellfish	2,824	255	2,993	244
BY PROVINCES				
British Columbia	31,410	4,692	59,243	6,616
Nova Scotia	104,182	7,462	96,304	7,329
New Brunswick	42,772	2,131	32,553	1,936
Prince Edward Island	14,036	2,404	10,739	2,066
Quebec	38,689	2,017	42,304	1,783
Newfoundland	104,176	3,669	145,654	4,734

(1) Includes halibut landed in U.S. ports by Canadian fishermen

MID-MONTH WHOLESALE PRICES, June, 1961

	Montreal	Toronto
	$	$
Cod fillets, Atl. fresh, unwrapped lb	.306	.363
Cod fillets, Atl. frozen, cello 5's lb	.258	.290
Cod fillets, smoked lb	.357	.398
Haddock fillets, fresh, unwrapped lb	.399	.462
Herring kippered, Atl. lb	.247	.290
Mackerel, frozen, round lb	.207	.247
Lobsters, canned, Fancy case 48-½s	42.113	42.710
Sardines, canned case 100-¼s	9.010	8.875
Halibut, frozen, dressed lb	.363	.360
Silverbright, frozen, dressed lb	.553	.552
Coho, frozen, dressed lb	.735	.742
Sockeye, canned, Gr. A case 48-½s	26.550	26.678
Pink, canned, Gr. A case 48-½s	14.895	15.090
Whitefish, fresh lb	.362	.315
Lake Trout, frozen lb	.459	.432

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

	1960	1961
	$	$
Halifax		
Cod Steak	4.25	4.50
Market Cod	3.25	4.00
Haddock	5.00	5.00
Plaice	3.75	3.75
Yarmouth		
Haddock	6.00	5.00
Black's Harbour		
Sardines	2.00	2.00
St. John's, Nfld.		
Cod	2.25	2.50
Haddock	2.25	2.25
Rosefish	-	2.00
Vancouver		
Ling Cod	10.00-11.00	10.00-12.00
Grey Cod	5.00- 6.00	5.00- 6.00
Soles	5.00- 9.00	5.00- 9.00
Salmon (Rdsg)	36.00-62.00	40.00-65.00

Fishery Figures For June

STOCKS AS AT END OF JUNE

		1960	1961
		'000 lbs	'000 lbs
TOTAL - Frozen Fish, Canada		68,053	63,116
Frozen-Fresh, Sea Fish - Total		48,926	41,466
Cod Atlantic, fillets & blocks		13,299	9,561
Haddock, fillets & blocks		6,832	6,332
Rosefish, fillets & blocks		950	498
Flatfish (excl. Halibut), fillets & blocks		3,936	4,746
Halibut Pacific, dressed & steaks		9,945	9,960
Other Groundfish, dressed & steaks		1,429	833
Other Groundfish, fillets & blocks		4,867	3,013
Salmon Pacific, dressed & steaks		1,626	2,500
Herring Atlantic & Pacific		492	138
All Other Sea Fish, all forms		3,635	1,980
Shellfish		1,915	1,905
Frozen-Fresh, Inland Fish - Total		3,254	4,426
Perch, round or dressed		57	33
Pickerel (Yellow & Blue) fillets		267	729
Sauger, round or dressed		14	425
Tullibee, round or dressed		198	105
Whitefish, round or dressed		749	695
Whitefish, fillets		151	168
Other, all forms		1,818	2,271
Frozen-Smoked Fish - Total		1,854	1,841
Cod Atlantic		964	924
Sea Herring, kippers		439	290
Other, all forms		451	627
Frozen for Bait and Animal Feed		14,019	15,383
Salted and Pickled Fish, Atl. Coast			
Wet-salted - Total		17,315	9,325
Cod		9,353	5,884
Other		7,962	3,441
Dried-Total		3,539	8,240
Cod		2,759	6,998
Other		780	1,242
Boneless - Total		278	217
Cod		240	182
Other		38	35
Pickled - Total	(barrels)	29,230	19,263
Herring	"	6,646	7,269
Mackerel	"	7,713	399
Alewives	"	14,531	11,595
Turbot	"	340	-
Bloaters	(18 lb. boxes)	235,414	168,572
Boneless Herring	(10 lb. boxes)	10,084	7,417

CANADIAN EXPORT VALUE OF FISHERY PRODUCTS MAY-MARCH

(Value in Thousands of Dollars)

	1960	1961
Total Exports	134,806	131,071
By Markets:		
United States	91,970	95,500
Caribbean Area	14,977	15,519
Europe	24,767	15,475
Other Countries	3,092	4,577
By Forms:		
Fresh and Frozen	81,216	88,048
Whole or Dressed	31,268	34,570
Salmon, Pacific	6,801	8,036
Halibut, Pacific	4,169	5,180
Cod, Haddock, Pollock, etc.	546	455
Swordfish	2,284	1,848
Other Seafish	4,325	4,879
Whitefish	5,675	5,929
Pickerel	2,751	2,917
Other Freshwater fish n.o.p.	4,717	5,326
Fillets	32,078	33,255
Cod, Atlantic	12,531	13,148
Haddock	4,211	4,492
Rosefish, Hake, Pollock, etc.	2,409	2,343
Flatfish	5,299	5,803
Pickerel	1,814	1,546
Other	5,814	5,923
Shellfish	17,870	20,223
Lobster (Alive & Meat)	16,024	17,262
Other	1,846	2,961
Cured	20,368	20,225
Smoked	1,246	1,241
Herring	794	828
Other	452	413
Salted, Wet & Dried	16,832	16,647
Cod	13,966	13,299
Other	2,866	3,348
Pickled	2,290	2,337
Herring	1,371	1,400
Mackerel	247	294
Other	672	643
Canned	22,271	16,792
Salmon, Pacific	16,993	9,681
Sardines	2,732	3,671
Lobster	1,973	2,530
Other	573	910
Miscellaneous	10,951	6,006
Meal	5,243	2,985
Oil	5,738	462
Other	2,970	2,559

Iceland

EXPORTS OF PRINCIPAL FISHERY PRODUCTS

January - March 1961

Quantities in Thousands of Pounds — Value in Thousands of Kroner

DESTINATION	TOTAL EXPORTS		MAINLY COD						HERRING		FISH MEAL	OILS		OTHER PROD.
	Quan.	Value	Fresh	Frozen	Dry Salted	Wet Salted	Stock fish	Other Types	Frozen	Salted		Cod	Other	(1)
	th.lb.	th.kr.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.	th.lb.
CANADA	24	96	-	-	-	-	-	-	-	24	-	-	-	-
U.S.A.	16,995	117,454	-	14,645	-	55	-	51	-	1,378	77	637	-	152
Other Western Hemisphere														
Argentina	4	16	-	-	-	-	-	-	-	-	-	4	-	-
Brazil	2,057	19,232	-	-	2,057	-	-	-	-	-	-	-	-	-
Cuba	1,256	10,028	-	-	1,190	-	-	-	-	-	-	66	-	-
Panama	168	1,377	-	-	168	-	-	-	-	-	-	-	-	-
Venezuela	148	1,275	-	-	148	-	-	-	-	-	-	-	-	-
Europe														
Belgium	2	77	-	-	-	-	-	-	-	-	-	-	-	2
Czechoslovakia	7,336	27,620	-	1,530	-	-	-	-	4,475	-	661	560	-	110
Denmark	9,898	20,761	-	-	33	247	-	ø	-	503	8,924	130	-	61
Finland	3,108	10,303	-	-	-	-	-	-	-	1,166	908	333	-	701
France	1,241	8,146	-	1,204	-	-	-	-	-	-	-	-	-	37
Germany East	6,695	22,897	-	-	-	-	-	-	833	5,862	-	-	-	-
Germany West	37,757	65,458	17,844	2	-	95	29	498	7,976	611	9,233	662	331	476
Greece	1,248	5,131	-	-	99		1,149	-	-	-	-	-	-	-
Hungary	57	241	-	-	-	-	-	-	-	-	-	57	-	-
Ireland	1,614	2,528	-	-	-	-	-	-	-	-	1,614	-	-	-
Italy	3,148	15,246	-	-	-	2,828	29	291	-	-	-	-	-	-
Netherlands	6,723	6,594	-	6,548	-	-	11	-	-	-	118	-	33	13
Norway	714	1,035	-	-	-	-	-	-	-	-	-	-	335	359
Poland	10,198	28,089	-	-	-	-	-	-	4,125	4,409	1,554	110	-	-
Roumania	66	151	-	-	-	-	-	-	66	-	-	-	-	-
Sweden	10,031	18,873	-	9	-	88	-	40	-	395	4,575	-	-	4,924
Switzerland	11	473	-	-	-	-	-	-	-	-	-	-	-	11
United Kingdom	32,924	117,411	-	3,860	168	505	3,693	-	4	22	15,823	-	8,107	742
U.S.S.R.	774	2,583	-	-	-	-	-	-	-	774	-	-	-	-
Yugoslavia	7	29	-	-	-	-	-	-	-	-	-	7	-	-
Other Countries														
Australia	13	91	-	13	-	-	-	-	-	-	-	-	-	-
Cameroun	53	568	-	-	-	-	53	-	-	-	-	-	-	-
Congo	35	346	-	-	-	-	35	-	-	-	-	-	-	-
Israel	944	5,580	-	944	-	-	-	-	-	-	-	-	-	-
Kenya	110	472	-	-	-	-	-	-	-	-	-	110	-	-
Nigeria	3,274	34,315	-	-	-	-	3,274	-	-	-	-	-	-	-
Total - Jan.-Mar. 1961	158,633	544,496	17,844	28,755	3,863	4,967	7,124	880	17,479	15,144	43,487	2,676	8,826	7,588
Total - Jan.-Mar. 1960	150,688	346,393	18,294	37,521	2,554	3,645	3,474	227	8,163	14,526	12,717	1,611	42,738	5,218

(ø). Represents quantities less than 500 lb.

(1) Includes all whole products which totalled in Jan.-Mar. 1961, 1303 thousand pounds, and in the first three months of 1960, 95 thousand pounds.

Current Reading

"Catalogue of Fisheries Publications and Documents," (compiled by Patricia M. Andrews, Food and Agriculture Organization of the United Nations, Rome, Italy).

In this issue, the Catalogue has been rearranged into three sections. The first, priced publications of FAO, lists periodicals and series, reprints and miscellaneous publications. The second lists FAO meeting reports and other issuances, published by other bodies by arrangement with or permission of FAO, with addresses to which requests may be sent. The third section contains titles of unpriced issuances such as mimeographed series, technical assistance reports and miscellaneous documents.

"The Murres," by Leslie M. Tuck (Canadian Wildlife Service, Department of Northern Affairs and National Resources. Available from the Queen's Printer, Ottawa. $3.00).

This handsomely produced book, lavishly illustrated with photographs, some in colour, is the first of a series of monographs published by the Canadian Wildlife Service, with which the author, a Newfoundlander, is employed as a biologist. The main library researches for "The Murres" were carried out in Europe, and the author visited every known colony of murres in Newfoundland and along the Labrador coast, as well as on Akpatock Island, Ungava Bay, Digges Island, Hudson Bay, and Cape Hay, Lancaster Sound.

Murres are relatively large sea birds, weighing on the average two pounds, with sharply defined black and white plumage. They are highly specialized for catching small fish under water. A marine species, they approach land only during the breeding season, and obtain most of their food by flying under water. They are the only sea birds in the northern hemisphere which habitually lay their eggs in exposed situations on bare ledges and rocks. They brood but a single egg and yet are probably the most abundant sea birds in the northern hemisphere. They nest on cliffs in large colonies, some of which contain several million individuals, and in the fall and winter congregate in vast flocks around the coasts of the northern continents. A common vernacular name for the murre in Newfoundland is "turr", and in England it is known as the "guillemot."

There are five sections in the book, dealing with evolution and adaptation, distribution and populations, breeding biology, factors affecting populations, and economic importance.

In the opening section the author discusses the evolution of the murres, their adaptation, variation and vernacular names, as well as the environment to which they are tied. The following chapters deal with the distribution of the species around the world, migrations, life histories and feeding habits. Weather, man, predation, diseases and environmental changes all affect the numbers of the birds and these also are discussed. In the section on the economic importance of the murres, the author suggests methods for their best management.

There are two species, the common murre and the thick-billed murre, and they occupy in the northern hemisphere an ecological niche similar to that occupied in the southern hemisphere by penguins. Their eggs, and to a lesser extent the birds themselves, have been traditionally used in the Old World for food, and were so used on the American continent, overenthusiastically, says the author, for a short time. However, the utilization of murres, with some minor exceptions, has been outlawed in the New World for more than half a century.

In the introduction, the author says: "Nesting murres require scarcely one square foot of territory per individual. Such compact colonies are possible because the food of murres is almost unlimited in summer. Murres provide a vital link in the ecology of the species which are their food. Their excrement, rich in potash, is important to the growth, and so to the abundance, of small marine organisms. Their colonies are in many respects the fertilizing factories of the northern seas." "The Murres", as well as being an indispensable reference for anyone interested in biology, provides equally fascinating reading for the non-naturalist, and there are many interesting sidelights on history, as in the chapter on "Murres and Men." A complete index provides an invaluable quick reference to the details of the book.

The murre was once very important to the economy of Newfoundland, and there are now special allowances in the migratory bird regulations to allow residents of the outports to utilize the bird; however, not nearly as many are killed now as in former years. More are killed by oil than by man. One of the greatest threats to the species is oil pollution along the shipping lanes of the North Atlantic. The oil fouls the birds' wings and is the cause of heavy mortality. Mr. Tuck's estimate of the world population of murres is 50 million.

Many Europeans consider murre eggs a delicacy, and the author states that there is more nourishment to a murre's egg than to that of a chicken.

Civil Service Commission of Canada

INFORMATION CIRCULAR Nº 61-388

HOME ECONOMISTS

$4,200 - $4,920
(Home Economist 1)

$5,700 - $6,420
(Home Economist 3)

DEPARTMENT OF FISHERIES OF CANADA
OTTAWA

The Civil Service Commission invites applications from professionally qualified Home Economists for positions in the Consumer Branch of the Department of Fisheries at Ottawa. This Branch conducts a national program of consumer education to promote domestic consumption of sea food. Home Economists participate in recipe development and testing at the large experimental kitchen in Ottawa, write material for consumer releases and carry out demonstrations and lectures with schools, women's organizations and institutional groups in person and occasionally on radio and television.

DUTIES AND RESPONSIBILITIES

POSITION A - Home Economist 3

Under general direction, to be responsible for the Consumer Branch programme in the Eastern Ontario Region; to arrange and carry out demonstrations and lectures on buying, handling and serving fish and fish products to housewives, students, women's organizations and individuals or associations concerned with institutional feeding; to test new fish cookery methods; to develop, test and adapt new recipes, to prepare written material for consumer education and perform other related duties as required.

POSITION B - Home Economist 1

Under supervision, to arrange and carry out demonstrations and lectures on buying, handling and serving fish and fish products to housewives, students, women's organizations and individuals or associations, concerned with institutional feeding; to test new fish cookery methods; to develop, test and adapt new recipes; to prepare written material for consumer education and perform other related duties as required.

QUALIFICATIONS

Graduation from a university of recognized standing with a degree in Home Economics, Household Economics or Household Science, preferably with specialization in foods and nutrition.

For Home Economist 3 - subsequent to graduation, approximately five years of experience related to the duties OR a Master's degree or equivalent and approximately three years of experience related to the duties; evidence of ability to plan, carry out and evaluate projects in food promotion and preparation, and to prepare reports and articles thereon; and supervisory ability, is also required.

Note: For both positions, candidates are required to have a knowledge of the practices and procedures required to carry out the duties, ability to meet and address the public, personal suitability and satisfactory physical condition. Additional credits may be given for a knowledge, pertinent to the duties, of Canada's fisheries resources and products.

BENEFITS

- Three weeks' annual holidays with pay
- An excellent superannuation plan
- Sick leave which accumulates at the rate of three weeks each year
- Low cost term insurance
- Optional group surgical-medical insurance plan
- Promotion by merit

HOW AND WHEN TO APPLY

Complete fully the application form CSC 36 (English) or CSC 36F (French) obtainable at the nearest Civil Service Commission Office, Main Post Office, or National Employment Service Office and forward it to the CIVIL SERVICE COMMISSION, OTTAWA.

Appointments will be made as soon as qualified candidates are available. Applications should, therefore, be filed as soon as possible. The competition will remain open until the positions are filled or until NOVEMBER 30, 1961, whichever is earlier.

PLEASE QUOTE COMPETITION NUMBER 61-338 ON APPLICATIONS AND INDICATE THE POSITION FOR WHICH YOU WISH TO BE CONSIDERED.

ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1961