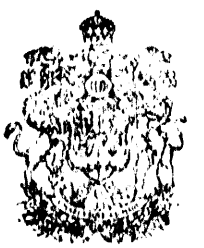
REPORT

OF THE

Royal Commission Investigating the Fisheries of the Maritime Provinces and the Magdalen Islands



OTTAWA
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1928

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OTTAWA, May 4, 1928.

The Honourable P. J. A. CARDIN,
Minister of Marine and Fisheries,
Ottawa, Ont.

SIR,—In compliance with the Commission dated 7th October, 1927, we have the honour to submit our report, wherein we deal with the matters falling under the Terms of our Reference.

We attach as Appendix I, a copy of the Commission, the instructions of which we have kept in mind as indicating the spirit in which it was desired our Terms of Reference should be interpreted.

We have the honour to be, Sir,

Your obedient servants,

A. K. MACLEAN,
CYRUS MACMILLAN,
H. R. L. BILL,
JOSEPH MOMBOURQUETTE,
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INTRODUCTION

Upon a Report of the Committee of the Privy Council, approved by the Deputy of His Excellency the Governor General, on the 7th day of October, 1927, we were appointed a Commission under Part I of the Enquiries Act, Chapter 104 of the Revised Statutes of Canada, 1906, with instructions to investigate all phases of the fishing industry of the Maritime Provinces, the Magdalen Islands and the coastal portion of the Province of Quebec, and more particularly to enquire into

1. What should be done to increase the demand for fish both in the home and foreign markets.
2. Whether the spread in the price of fish between the producer and the consumer is excessive, and, if so, what should be done to remedy the condition.
3. What should be done to develop the inshore fisheries to their capacity.
4. Whether there should be any further restriction on steam trawlers operating from Canadian Atlantic ports, and, if so, what they should be.
5. Whether keeping in view that no exceptional privileges are available to Canadian fishing vessels visiting United States ports, the so-called modus vivendi privileges, or any of them, should be renewed.
6. Whether or not the amount now annually distributed as fishing bounty should be continued on the present basis.
7. Whether there should be an inspection of fresh fish of all kinds as landed, as placed in storage, and as shipped from the coastal points.
8. Whether there should be an inspection and grading of dried fish.
9. Whether there should be any modifications in the lobster fishery laws and regulations.

We were directed to report with recommendations to the Minister of Marine and Fisheries on the above specific matters and to enquire into and report upon the general condition of the fishing industry, how existing conditions of the fisheries and fishermen might be improved and how the industry might be further developed with expedition and efficiency.

Such portions of the enquiry as related to the coastal portion of the mainland of the Province of Quebec, was the result of a request, made by the Minister of Colonization, Mines and Fisheries of that Province, that the Commission extend its investigation to the Gaspe Peninsula and the north shore of the Gulf of St. Lawrence. The Province of Quebec controls and administers its fisheries, subject to regulation by the Federal authorities. Although the Magdalen Islands are part of the Province of Quebec, their fisheries, by arrangement with the Government of that Province, are administered by the Federal Department of Marine and Fisheries, and for fishery administration purposes are included within the Maritime Provinces; in our use of the term "Maritime Provinces," it will, therefore, be understood to include the Magdalen Islands. The Minister of Marine and Fisheries advised the Minister of Fisheries of the Province of Quebec that owing to the late date at which the Commission would begin its work, it would be manifestly impracticable for the Commission to visit the north shore of the Gulf of St. Lawrence, but that a meeting would be held at a central point in the Gaspe Peninsula at which representatives of those there interested in the fisheries might appear. The Department of Fisheries of the Province of Quebec was asked to arrange to have representatives from the different sections interested attend this meeting. The first public hearing of the Commission was accordingly held at Gaspe, P.Q., on October 15th last.

Subsequent to the appointment of the Commission, and prior to its formal organization, the Department of Marine and Fisheries, hereafter referred to as the Department, issued instructions to its fishery officers in the Maritime Provinces, advising them that a Commission had been appointed to investigate the conditions and requirements of the fisheries, and directing them to co-operate with the fishermen in their several districts in order to ensure an expression of their views. To each fishery officer there was forwarded a memorandum showing the places at which the Commission would hold hearings, as well as the limits of the district or districts which each meeting was expected to serve. The fishery officers received from the Department printed posters, announcing the appointment of the Commission and its purpose, and containing information as to the date and place of meeting; these they were requested to post prominently throughout their respective districts. In general the fishery officers were instructed to encourage in their respective districts the calling of public meetings of fishermen to discuss the several matters which might or should be brought to the attention of the Commission; they were further instructed to request leading fishermen in each district to call such meetings to determine the nature of the representations to be made, and to select one and not more than two persons, to appear as representatives of all others in the particular locality.

These instructions also informed the fisheries officers that the Department was conscious of the difficulty of having representatives attend the hearing of the Commission because of the travelling and living expenses involved. In order to remove this difficulty, the officers were advised that travelling and living expenses of the properly selected and accredited representatives would be paid by the Department.

The itinerary arranged by the Department prior to the organization of the Commission, was, on the whole, adhered to. It was found necessary to cancel some meetings advertised for certain places, and it was found desirable to hold additional meetings in other places. We were unable to visit the Magdalen Islands, but the delegates there appointed by the fishermen appeared before us at Souris, P.E.I.

The procedure of calling meetings of fishermen in their several communities and having representatives appointed by such meetings to appear before the Commission, and the payment of the travelling and living expenses of such representatives, resulted in a very large number of persons appearing before us. Some such form of organization and procedure was necessary, particularly owing to the late season of the year at which the Commission commenced its work; and while it may have added substantially to the cost of the enquiry, we think it fully accomplished the purpose of affording a reasonable opportunity to all interested in the fisheries to present their views.

Altogether we held forty-nine hearings, many of which extended over several days, and at which 823 persons appeared before us. The report of the proceedings is quite voluminous, filling over 5,700 typewritten pages. In addition to the representations made verbally to us, written statements were also filed with us. A great deal of correspondence was also, from time to time, directed to the Commission upon fishery matters, and we had many informal interviews or conferences with persons directly or indirectly interested in the fisheries. We probably received evidence or statements on subjects not strictly within the terms of the reference, but we did not deem it proper to decline to receive any information, even remotely related to the fishing industry, if the person offering it considered it at all relevant. As might be expected, the many subjects brought before us varied in importance; some of them we do not discuss in this report, because they may be more properly and effectively considered by the Department.

I

FISHERY RESOURCES AND EXTENT

The fishing grounds available to Canadian fishermen on the Atlantic coast are probably the most extensive in the world, as is evident from the length of the coastline of the Maritime Provinces and Quebec, and the proximity of the North Atlantic fishing grounds to this coastline. Nova Scotia particularly, is most favourably situated as a base for fishing operations, because of its accessibility to the extensive fishing banks off the south coasts of Nova Scotia and Newfoundland, as well as to other fishing grounds nearer its shores.

It may be of interest to note the principal fishing grounds of the North Atlantic, resorted to by fishing-vessels and steam trawlers from the Atlantic ports of Canada, and by vessels and steam-trawlers from other countries. With their approximate areas, they are as follows:

	Square Miles
Grand Bank	36,000
Green Bank	1,450
St. Pierre Bank	4,800
Quereau Bank	3,000
Misaine Bank	1,820
The Gully	1,200
Western Bank	6,320
Le Have Bank	700
Le Have Ridges	1,575
Roseway Bank	175
Browns Bank	1,375
Seal Island Ground	1,250
Georges Bank	8,498
South Channel (about)	1,300
Total	69,553

A brief description of some of these fishing banks will perhaps be useful, while their exact location will be seen from the map, appendix II.

The Grand Bank, lying southeast of Newfoundland, is perhaps the most important cod fishing ground in the world, and is frequented by fishing vessels and steam-trawlers from France, Portugal, Spain, United States, Newfoundland and the Maritime Provinces of Canada. It is in the form of an irregular triangle, one side of which is 264 miles, another 225 miles and the third 264 miles long. Green Bank lies between Grand Bank and St. Pierre Bank; a portion of it is regarded as an excellent halibut ground, although cod are also taken there in considerable quantities. It is 62 miles long and 36 miles wide. The fishing season here is usually from April to October. St. Pierre Bank is only about 10 miles distant from the Islands of St. Pierre and Miquelon. Cod and halibut are found here in considerable quantities, but it is not often resorted to by Canadian vessels seeking cod. It is 125 miles long and its width varies from 35 to 65 miles. The fishing season on this bank begins about the first of April and extends into November. Quereau Bank is an important fishing area, some 120 miles by 47 miles in extent. Cod and halibut are the principal fish taken here but haddock and hake are also abundant. Sable Island Bank, or Western Bank, lies east and south of the mainland of Nova Scotia, and is a well known and important fishing ground. It is about 156 miles long and 76 miles wide, Sable Island being at its eastern end. Cod and halibut are the principal fish taken here, the former being most abundant from March to June, although taken in quantities in later months. Haddock are also found here in substantial proportions. Le Have Bank, lying off the southwest of Nova Scotia, is a relatively small fishing ground. Cod and haddock are the principal fish taken

there, and they are most abundant in the early winter months, although they are to be found in all seasons of the year. It is 52 miles long by 54 miles wide. Le Have Ridges is a continuation of the same ground, but apparently haddock are not there to be found in any great quantities. It has a length of 45 miles. Roseway Bank lies to the west of Le Have Bank, and is about 21 miles by 15 miles in area. Cod and haddock are the principal fish taken on this fishing ground. Georges Bank is the most important and largest fishing ground near the United States coast, and is about 150 miles by 98 miles in extent. Cod and haddock are particularly abundant in parts of these grounds during the months of February, March and April. Browns Bank is separated from Georges Bank by 15 miles only, and is some 63 miles by 43 miles in extent. Cod, haddock and halibut are the principal fish taken there. Seal Island Ground, about 35 miles in extent, lies between Browns Bank and Seal Island, and is much frequented by Nova Scotian vessels. Cod and haddock are the principal fish there taken. South Channel is practically an extension of Georges Bank, and is much resorted to by the Boston and Gloucester fleets; this fishing ground is particularly prolific in haddock; and, being near United States fishing ports, is therefore, of special value in the production of fresh haddock for the United States markets. (a) In addition to these fishing banks there are other well known fishing grounds near the Atlantic coast, and in the Gulf of St. Lawrence waters.

These banks, embracing an area of nearly 70,000 square miles, have yielded annually on the average for thirty years past, more than eleven hundred million pounds of cod alone, and here undoubtedly is to be found the greatest cod and haddock fishery in the world.

Vessels from Nova Scotia, Newfoundland, the United States, France, Spain and Portugal, frequent these fishing grounds. In 1927 the fishing fleet on these banks, other than Georges, numbered more than 350 vessels, including steam-trawlers, and was manned by more than 10,000 men.

Inclusive of some of the fishing banks already mentioned, where cod and haddock are the principal products, there is around and adjacent to the Maritime Provinces a total ocean fishing area of approximately two hundred thousand square miles, or over four-fifths of the entire ocean fishing area of the North Atlantic. Fifteen thousand square miles of inshore fishing waters are controlled entirely by the Government of Canada. The commercial products of these extensive areas consist for the most part of cod, haddock, hake, herring, halibut, pollock, mackerel, sardines, salmon, smelts, alewives, swordfish, tuna and shell-fish, principally lobsters, scallops, oysters and clams. The average yearly value of the catch in the Maritime Provinces from 1921 to 1926 inclusive was over $16,000,000 or over 37 per cent of the value of the total catch of all fish taken in Canada during that period. In 1926 the value of the catch was nearly $20,000,000. In that year the capital invested in equipment for fishing such as boats, nets, traps and general gear was $12,700,000, or about 45 per cent of the total capital invested in Canada for such equipment. The capital invested in canning factories and curing establishments was approximately $6,000,000. The total capital invested in the fishing industry in primary and secondary operations was nearly $19,000,000, or over 35 per cent of the total investment in the Canadian fishing industry. The total number of persons engaged in the fishing industry of the Maritime Provinces in 1927 was over 40,000, or 50 per cent of the total number employed in the industry in all Canada. The fishing industry may therefore be regarded not only as of vital importance to the Maritime Provinces but also as a most valuable asset to Canada.

(a) House of Representatives' Document No. 1519.

The following table shows the value of the fisheries in each of the Maritime Provinces and at the Magdalen Islands in certain years:—

Year	Nova Scotia	New Brunswick	Prince Edward Island	Magdalen Islands	Total
	$	$	$	$	$
1887	8,370,782	3,559,567	1,037,426	418,069	13,384,784
1897	8,090,340	3,934,135	954,940	299,510	13,278,940
1907	7,632,330	5,300,504	1,492,695	240,221	14,665,810
1926	12,505,922	5,325,424	1,358,934	633,223	19,823,553

II

CONDITIONS IN 1927

The report of the Committee of the Privy Council appointing this Commission observed that during the latter part of 1926, and the winter months of 1927, the weather conditions on the Atlantic coast were particularly favourable for fishing. The result was that the quantity of fish landed during that time was greater than the demands of the market and greater than in any corresponding period for many years previously. This was also true of the inland fisheries. The favourable weather of this period also enabled steam trawlers to land larger catches than usual. The report further observed that by reason of the low level of prices paid to fishermen in the spring and summer of 1927, particularly in eastern Nova Scotia, the fisherman was not receiving a reasonable return for his labour.

It is quite clear, we think, that in the period mentioned there was an unusual quantity of fresh fish on the market, with the result that there was an excess of supply, and keen competitive selling. This market condition was not wholly attributable to overproduction by those normally engaged in the production of fresh fish. The salt fish trade in 1926 was unusually unremunerative, and this variety of fish was being sold at the lowest price in many years. A consequence of this condition of the dried fish trade, was the encouragement of a number of shore and offshore fishermen to engage in the fresh fish trade, and to abandon the dried and pickled fish trade. In the Digby-Annapolis section of Nova Scotia, the hake, taken largely in summer and usually salted for South American markets, came into the Canadian fresh fish markets, because it was displaced in the South American markets by low priced dried cod from Norway and Scotland. It is also said that in the fall of 1926, and the following winter months, large shippers of fresh fish from Nova Scotia experienced unexpected competition in certain markets of the western United States, from United States producers. This turned into the Canadian market considerable quantities of fish that had been intended for the United States. Whatever may have been the causes contributing to this situation, and they were many, they resulted in price cutting, unprofitable alike to shippers and fishermen.

III

THE FISHING INDUSTRY

1. Lobsters

The lobster industry is one of the most important and most valuable branches of the fisheries of the Maritime Provinces and Quebec. In the past season 1927, the total production was 31,198,500 lbs. Of this catch approximately 23,000,000 lbs. were packed as canned lobsters, which at an average of 200 lbs. of live lobsters to a case, made 115,114 cases. The remainder of the

catch, approximately 8,200,000 lbs. was shipped in the shell. The total value to the fishermen was approximately $3,888,136. As the price paid for live lobsters for shipment averaged about twenty-five cents a pound and that paid for lobsters for canning about eight cents, the live lobster industry brought to the fishermen approximately $2,050,000, and the canning industry about $1,840,000, the former being much more remunerative. There were 385 canneries in operation—126 in New Brunswick, 126 in Nova Scotia, and 133 in Prince Edward Island. The number of persons engaged in fishing in 1926, that is in primary operations, was 13,768; the number employed in the canneries was 6,501. The total number of traps set was 1,613,974. The total capital invested in traps, factory buildings and equipment was $3,404,167.

Although in recent years the money value of the industry has kept to a fairly average level the actual catch has greatly declined in quantity. The table in appendix III shows the decrease. The greatest decrease has been in New Brunswick and Prince Edward Island. In Nova Scotia the catch in 1926 was 184,316 cwt., an increase of approximately 4,000 cwt. over the average yearly catch for the past seven years of 180,235 cwt. About three times the number of traps required ten years ago are needed to-day to take one hundred pounds of lobsters. The decrease in the catch and the necessary increase in the number of traps indicate a serious depletion. This depletion is undoubtedly partly due to illegal fishing, that is fishing out of the permitted season, and to the taking of small lobsters and of "berried" or spawn carrying lobsters, all of which will be referred to later.

We do not presume to present here a final solution of the very difficult and intricate problems connected with the lobster fishery, but we venture to express some suggestions and recommendations which may be of assistance to the industry.

1. *Seasons.* For purposes of administration the sea coast of the Maritime Provinces and Quebec is divided into ten districts numbered from 1 to 9, with a small district in Nova Scotia numbered 4A.* The open fishing season in these districts varies and is determined by considerations of ice conditions and by the known or surmised presence of lobsters in these particular waters at non-spawning periods. Much evidence was placed before us bearing on these various seasons, evidence which asked for slight changes and which on the whole seem to us to be reasonable. In several districts there was no expressed desire and apparently no valid cause for change.

In each of districts 1, 2, 3, 4, 4A, 6, and 9, the present season, in the consensus of opinion expressed to us, is satisfactory and no change would seem to be desirable or necessary. Changes were asked for in districts 5, 7 and 8. District No. 5 in Nova Scotia extends from Cole Harbour eastwards, covering about one-half of the southern coast of the province, thence northward to the northern entrance of the Strait of Canso and including a small part of the southwestern coast of Cape Breton Island. In this district the open season is now from April 20 to June 20. It was stated by many persons in the eastern part of this section that the date of opening is too early because of the almost invariable presence of ice along the coast at that time, particularly in the Strait of Canso and on the southern Cape Breton shore. We, therefore, recommend that the open season in this district be changed to April 30-June 30.

In district No. 7 it was apparent from the mass of evidence submitted to us that because of ice conditions in late April the opening date, April 26th, is too early. Very seldom has the fisherman been able to put out his traps before the first to the fifth of May, and when he has taken the risk, loss of gear and equipment has almost invariably resulted. We recommend that in this district the open season be advanced from April 26th-June 25th to May 1st-June 30th.

* See map, Appendix IV.

District No. 8 presents a difficult problem based on a variety of conflicting opinions expressed by fishermen, canners, and scientists. Here the open season is from August 16th to October 15th. For twenty years previous to 1919 the open season here was from May 25th to August 25th. It was recommended by the Shell Fish Commission of 1912-13 that there should be one season in the entire Northumberland Strait, from April 20th to July 1st. The Advisory Board then in existence supported this recommendation, but no action was taken because of strong representations from fishermen who alleged that in the early spring there were no lobsters in what is now district No. 8, and that fishing in such period would be a useless and profitless undertaking. In 1918 the joint conference of lobster fishermen and canners held at Halifax, N.S., recommended that the open season be changed from May 25-August 10th to August 1st-September 30th. But because of scientific advice that on August 1st the shell of the lobster might not be sufficiently hardened after spawning, the open season was subsequently changed to what it is at present, August 16-October 15. In this district there is relatively little canning other than of small lobsters. The industry is gradually becoming a live lobster industry. Lobsters of nine inches in length and over are shipped alive to the United States and Canadian markets at a time when the supply from other sources is low and at more than double or even treble the price received by fishermen from the canners. The average price last year for live lobsters shipped from this district to the United States market was 25 cents a pound; the average price paid by canners in the district was 8 cents a pound. The catch in Prince Edward Island and in Nova Scotia in this section has kept to a fairly average level in the past five years; the catch on the New Brunswick coast has seriously fallen off. The following statistics are of interest.

	1923	1924	1925	1926	1927
	cwts.	cwts.	cwts.	cwts.	cwts.
Nova Scotia Coast	1,370	1,251	671	978	734
New Brunswick Coast	27,436	24,008	20,699	17,913	13,225
Prince Edward Island Coast	7,507	7,896	5,886	5,610	6,308

The average yearly catch on the Nova Scotia coast in five years was almost 1,000 cwt. and the catch last year showed a decrease of over 25 per cent below this average. The average yearly catch in New Brunswick in the same period was 23,662 cwt. and the catch last year was over 40 per cent below the average. In Prince Edward Island, the average yearly catch was 6,653 cwt. and the catch last year was approximately up to the average.

It was stated to us by canners that the present season in this district encourages and increases illegal fishing, that during the legal season in No. 8, fishermen in No. 7 continue to ply their trade in their own district, and to dispose of their catch to dealers or packers in No. 8. It was said that fishermen in district No. 7 in New Brunswick fished in the season fixed for No. 8 and disposed of their illegal catch to dealers operating from Prince Edward Island. Other persons declared that the present season encroaches on the spawning period. On the other hand, fishery officers informed us that in Prince Edward Island the fall season in this district has resulted in a marked decrease in illegal fishing. The majority of fishermen in the district asked that the season be changed to August 1st-October 1st, alleging that stormy weather in October made fishing well nigh impossible. With regard to the first argument put forward against the present season, we believe that illegal fishing can be stopped by a rigorous and impartial enforcement of existing laws. We believe that it would be in the interests of the industry to have but one season for the districts Nos.

5, 7 and 8, and that, if considered possible and feasible after investigation, such a uniformity of season should be established. We feel, however, that we have not sufficient evidence on the migration or presence of lobsters in district No. 8 at specific periods, nor have we enough definite evidence on the spawning periods of lobsters in these parts to warrant us in making any recommendation for a sudden or drastic change. We, therefore, recommend that the season remain as it is for the present. We recommend further that, meanwhile, a size limit be fixed in this district beginning in 1929 with 8 inches, advancing in 1930 to 9 inches. The industry here, as we have said, is gradually becoming a live lobster industry, and we are convinced that the fixing of a size limit which will enable the fisherman to sell his whole catch to the live lobster market will in the end not only conserve the lobster, but will prove more remunerative to the fishermen. And we further recommend that the Biological Board be requested to carry out at once a thorough biological and statistical investigation to determine whether or not the present season is injurious to the industry, whether it encroaches on the spawning period, and whether the season could be changed to the spring without hardship or loss to the fishermen. When the investigations have been sufficiently adequate and conclusive, the Department should take such action as it considers advisable. If the result of these investigations indicates that the present season should not be changed to a spring season, we recommend that the limits of the district be extended northward to a line from Escuminac, N.B., to North Cape, P.E.I., a more natural and specific dividing line from district No. 7.

We recommend that all regulations bearing on closed seasons be fixed by statute, so that dates can no longer be changed by the Department to suit individuals or localities or in answer to petitions of either canners or fishermen. We were informed that fishermen, who in one year have already operated in one district frequently move their gear to another district in which the season is later, for the purpose of again in the same year engaging in lobster fishing. It was suggested that this practice be discontinued. We recommend that the Department consider the advisability of making this suggestion effective.

2. Conservation. The great decrease in the lobster catch has been caused by three definite factors, illegal fishing, or fishing during closed seasons, the taking of "berried" or spawn-carrying lobsters, and the catching of small lobsters.

(a) Illegal Fishing. Along some parts of the coast illegal fishing or fishing in the closed season is carried on in open and flagrant manner. Many persons informed us that violations and violators are generally well known and that the former are usually regarded lightly in the community. We were told publicly by reliable witnesses that in some districts the quantity of lobsters caught illegally in the closed season amounted to at least sixty per cent of that caught in the legal period; and we were informed privately that in at least one section the quantity taken in the closed season equalled that taken in the regular legal season. We were told, too, of surreptitious canning and packing in barns and kitchens and woods, of illegal sales of fresh lobsters in local towns, and of even the export of illegally caught lobsters. The impression left on our minds in certain districts was that there was an utter lack of observance of the existing lobster regulations and little individual or community sentiment in support of their enforcement. Nor was there any thought of the future barren period which must inevitably result from the wanton illegal taking of fish. The old fable of killing the goose that lays the golden egg is true to-day of the lobster fishery. Law observance and law enforcement have in some localities been shamefully lax; breaches of the regulations have been too frequently ignored, and violators have too often been allowed to go unpunished because of powerful influences. In one district a fishery guardian was killed in 1926, apparently because his enforcement of the law was considered too strict, and his assailants were never

brought to justice. The fishing of lobsters in the closed seasons can only be prevented by a rigorous and impartial enforcement of existing regulations,—an enforcement which may require the appointment of additional guardians and more numerous and faster patrol boats in some parts. We believe that with such persistent enforcement, after a period of a few years illegal fishing would be reduced to a minimum.

(b) *"Berried" or Spawn-carrying Lobsters.*—Evidence showed that "berried" lobsters are frequently sold. In some parts no effort whatsoever is made to protect them. The spawn or "berries" are washed off with a brush or are blown off by the exhaust pipe of the engine, over which the law-breaker holds the lobster. The lobsters thus cleaned of their spawn are sold unnoticed with the legal catch as it is extremely difficult to distinguish them. Regulations against the taking of "berried" lobsters are obviously very difficult to enforce. Protection depends perhaps more on education than on law. The individual fisherman must in some way be made to realize the inevitable disaster which will follow his failure to return to the water the spawn-carrying female. This can only be done by a campaign of education in the various fishing villages not only among the fishermen, but among the school children—a campaign to which school and press and pulpit should each contribute its share. Destruction frequently results from ignorance of the consequences, rather than from a deliberate breaking of the law. Several persons advocated a regulation similar to that in force in the State of Maine under which the fisherman who takes a "berried" lobster sells such lobster to the dealers at the current rate. The State collects these, reimburses the dealer, punches a hole in the tail or flipper, and releases the lobster. The hole serves as a mark which prevents the lobster from being brought in and sold a second time in the season. We cannot see the fairness of this regulation, which means a bonus for merely obeying the law and for protecting one's own industry. In one district the fishermen at the beginning of the season voluntarily take an oath before the Overseer that they will return "berried" lobsters to the water. In another district each member of a Fishermen's Union promises to protect the "berried" lobster, and he is fined, or after a second offence suspended, if he is caught violating his promise. We believe that the fishermen should take the matter in their own hands. The taking of such an oath or a pledge would doubtless have a restraining influence.

(c) *Size Limit.* In district 1 a size limit of 10½ inches is in force; in districts Nos. 2, 3, and 4A on the Pacific coast, it is 9 inches. As far as we were able to judge, these regulations are fairly well observed. In other districts there is no size limit and it was stated by fishermen that the only size test was "anything with eyes". We recommend that in all the above districts and in district no. 4, where there is now no size limit, a uniform limit of 9 inches be established. If after investigation by the Department it is found that in certain parts of the section included in the above districts the larger size limit would be preferable, the limit should be fixed at 10½ inches. In district 4A the limit of 9 inches applies only in the fall season of December, but as a result of evidence submitted to us and of a petition forwarded by fishermen to the Department, we recommend that the fall size limit apply also to the spring season of March 1st to May 15th, thus ensuring a greater supply of larger lobsters in the fall season when prices in the United States market are usually at the peak. The size limit in the districts where no limit now exists must naturally vary. Where lobsters are on the average smaller because of water temperature conditions the limit must be smaller. In all districts other than those where the limit already exists, and district No. 8 to which we have already referred, we recommend that the minimum size be fixed at six inches the first year, 1929, and that it be advanced one inch each year until it reaches 8 inches, excepting in such dis-

tricts where in the opinion of the Biological Board after observation and thorough investigation it is necessary because of successful breeding to fix a smaller final limit. Because of peculiar conditions, certain waters are more favourable than others for abundant breeding, but the lobster does not reach a large growth. In such places a smaller size limit may be permitted without depleting the fishery.

The Atlantic coast is the premier lobster-producing region in the world, a fact which shows that conditions generally along that coast are suitable for it. The varied conditions found from the Bay of Fundy to the Strait of Belle Isle are not, however, all equally favourable. The more northerly waters, like those along the north shore of the Gulf of St. Lawrence, are somewhat too cold, and those of the New Jersey coast, the southern limit of the lobster's presence, are somewhat too warm, and it is found in but small numbers near both of these limits of its range. Near the middle of its range there are also great differences. In the Bay of Fundy the lobster is comparatively rare and of large average size; this is because of the lack of suitable water for breeding; nearly all the lobsters are consequently immigrants and several years old. In Northumberland Strait on the other side of the neck of land which connects Nova Scotia with New Brunswick, the lobster is of small average size; the waters there, generally shallow and warm in summer, give excellent breeding conditions, and thus assure a plentiful supply of young. As would be expected from this, the Northumberland Strait has a very productive fishery, although not the best on the coast.

The whole lobster-fishing coast has a frontage on gulfs, large bays and open ocean of over two thousand miles, and furnishes an annual catch ranging up to over forty million pounds. Yet a forty-five mile frontage, from Port Maitland, near Yarmouth, to Cape Sable, yields up to five million pounds, or approximately one-sixth of the Canadian Atlantic coast production. In fact for the twenty-year period from 1897 to 1916 inclusive, its yield was almost one-fifth, notwithstanding its nearness to the important markets of the large cities of the United States, which has stimulated very intensive fishing. A combination of conditions has made this possible. The waters generally along that section of the coast are too cold for successful lobster breeding, but in the Tusket region south of Yarmouth there are extensive shallow inlets, the waters of which become quite warm in summer, and furnish ideal conditions for the growth of the fry. On the other hand, the coast generally is rocky, rich in food, and with waters providing most suitable conditions in temperature and salinity for the adults from the shore line to quite a considerable depth. The rugged, exposed nature of the coast makes fishing far from easy; and this, together with the protection furnished by the rocky bottom and the distribution over such a range in depth, serves to prevent any considerable depletion of the stock by overfishing, and assures to that district by far the best lobster fishery in the world.

Regulative measures for limiting size should, therefore, vary in districts. The comparative lack of suitable breeding conditions in the Bay of Fundy makes it advisable to have a high size limit so that the few lobsters that reach the adult stage, or that immigrate from other waters, may yield as many pounds as possible to the fishermen. In Northumberland Strait and adjacent areas very successful breeding renders it unnecessary to apply such a high size limit; but the water is comparatively so shallow and the bottom so smooth, that overfishing readily occurs, notwithstanding the large numbers, and there corrective measures are imperative. Near Yarmouth less regulation is needed because of the favourable breeding and growing conditions and because of the natural protection from overfishing. Nevertheless, here also protection is needed, and to an even greater extent along the whole outer coast of Nova Scotia.

The best of the inshore breeding areas, for example the shallow inlets, should be set aside and fishing therein should be prohibited. Where the breeding areas are very limited, as on the outer coast of Nova Scotia, an effort should be made to place the berried females in the warm shallow bays when the fry

are hatching. Where breeding areas are practically non-existent, as in the Bay of Fundy, great betterment of the fishery would result from the regular introduction of small lobsters from other waters. Whether or not such could be economically accomplished, we are not in a position to affirm, and we recommend experimental work of this nature.

A brief reference to the history of size limits may be of interest. Up to 1910 there was a size limit on all parts of the coast; in Charlotte and St. John Counties, N.B., it was 9 inches; in Albert County, N.B., Kings, Annapolis and the Bay of Fundy part of Digby County, N.S., it was 10½ inches. From, and including, St. Mary's Bay eastward to Halifax Harbour, it was 9 inches. From Halifax Harbour eastward and northward to the Labrador, including all the Gulf of St. Lawrence, it was 8 inches. In 1910 the size limit was abolished everywhere in the Maritime Provinces, except in Charlotte and St. John counties, in the Bay of Fundy. It was replaced in 1923 in the western part of Halifax County and in that part of Lunenburg County bordering on St. Margaret's Bay, but to meet special local circumstances the limit was applied to fishing in the month of December only. The Shell Fish Commission of 1912-13 recommended a progressive annual size limit of from 8, 8½, to 9 inches from Digby to Halifax, and one of from 7, 7½, to 8 inches from Halifax eastward and northward to Miscou Island in the Gulf of St. Lawrence. This recommendation was not adopted, because, it was alleged, it would result in closing the canneries; it was also said that the size limit previous to 1910 was ignored and could not be enforced by the poorly paid, part-time Fishery Overseers of that day.

It was suggested to us that as large lobsters should be conserved for spawning purposes, a maximum size limit of thirteen inches should be fixed as well as a minimum size limit. There is a conflict of opinion on this point. It was stated to us in scientific evidence that if the very large lobsters are removed the small ones have a better chance of surviving as more food will then be available for them, and that as the large lobsters to some extent eat the smaller ones the latter will have fewer enemies and will increase in number. As the smaller lobsters make better use of food for growth than the larger ones, the same district will produce a much greater weight of smaller lobsters than of larger ones. Regulations must, therefore, be designed with the purpose of getting the proper balance between large and small lobsters so that there may be a maximum production of pounds without interfering with breeding, and this will naturally vary in different districts.

In making the above recommendations with reference to conservation, we are far from saying that violations of the existing laws are universal or even widespread. It was gratifying to hear that in many quarters regulations are strictly obeyed and that the fishermen are honestly and earnestly doing all in their power for the protection of their own industry. In many places illegal fishing is unknown; "berried" lobsters are zealously returned to the water, and under-sized lobsters are not taken. These facts were made plain to us. But we cannot too strongly emphasize our conviction that great injury has been done and is being done to the industry by lawless individuals and even by whole communities of lawless fishermen. Many canners, too, and dealers must share the responsibility for the present unsatisfactory situation. The fisherman cannot do business without a buyer and we cannot absolve the canner and the dealer from blame for their indifference, or for their purchasing illegally caught fish. We were told by Overseers that in their efforts to enforce the law they received little or no support from the packers in some localities. We are of the opinion that a packer found guilty in a season of trafficking in illegally caught lobsters, berried lobsters, or under-sized lobsters, should after the first deliberate offence automatically have his license suspended for the remainder of that season. If

he is found guilty of buying or taking lobsters after the legal season has closed, he should not be given a license to operate in the next following season. The Department is in possession of the evidence bearing on the chief centres of violations, and these centres should be rigorously watched. Only one conclusion can be reached, that if earnest and immediate efforts are not taken to protect the industry in these parts it will undoubtedly in a very few years be no longer a profitable enterprise. Either adequate laws must be enacted, and obeyed by fishermen, canners and dealers, or the industry must very soon inevitably disappear. There is no other alternative. If it is to be saved for the future, the fishermen themselves must be its protectors; its life is entirely in their hands, and they must take the full responsibility for its death.

3. *Lobster Pounds.* Lobster pounds were established and permitted in order to benefit the live lobster industry and to regulate the output to suit market conditions. It happens not infrequently that lobsters spawn while still impounded, and it is alleged that such berried lobsters are sold illegally. We recommend that a stricter supervision of all pounds be exercised by the Department, especially on the liberating of berried lobsters, and that the Overseers, or preferably where possible, a member of the staff of the Atlantic Experimental Station, be requested to watch the temperature and the salinity of the water in the pound throughout the winter, and check the condition of impounded lobsters in every way possible. The existing regulations of the Department with regard to checking, etc., seem to us to be fully adequate.

4. *Canneries.* The number of canneries in the Maritime Provinces is far in excess of the requirements of the industry. Many of the establishments are well equipped and are adequately and excellently conducted, with every possible attention to cleanliness and sanitation. Indeed, evidence of expert inspectors showed that several factories reached in this respect a standard of 100 per cent. But while this fact is gratifying, it must be stated that many of the smaller packing places are very inadequate. The amalgamation of some of these smaller plants would result in great benefit to the industry. The industry's worst enemy has been within itself, in the form of poor products. We were told of complaints from foreign buyers because of discoloured meat and careless packing, which resulted in a lost market. The only remedies for these unfortunate conditions are thorough inspection and more careful manufacture based on efficient labour and adequate equipment. On the discolouration of lobster meat, the following extracts from the evidence of Dr. F. C. Harrison of McGill University, who has given much time and labour to the study of the causes, are of interest:—

"Seventy-five per cent of the discolouration is due to chemical causes and 25 per cent to bacteriological causes—that is to say, to certain organisms getting into the can either through the water or through the lobster and growing in this can and producing black discolouration—but the major part, 75 per cent is due to chemical causes. Lobster when it is packed has practically an alkaline reaction, which is different from other canned products—the only other canned product which has a definite alkaline reaction is hominy, which, however, is not canned in this country. Hominy is canned in the South and they have had a similar blackening owing to the chemical nature of the tin. You are all familiar with the blackening of the spoon put in egg. This is exactly similar to the blackening of the lobster. The lobster contains 3 per cent of sulphur and an egg more, and that alkaline reaction produces black salt—in the case of the lobster an iron sulphide and a small quantity of tin sulphide. In the case of the egg it is a silver sulphide formed from the silver and the egg in the spoon. That develops very quickly in the can and we proved it beyond doubt. We put shingle nails in the can; if it was an alkaline reaction it would act very quickly. In a week the contents blackened if shingle nails were put in a can of lobster.

The thing was what to do in order to change this alkaline reaction. Two substances suggested themselves: one vinegar and the other citric acid. Everyone uses vinegar. Citric acid is the same as you get in grape fruit and in orange, and putting a small quantity in the pickle, that is to say the brine, whether from salt water or fresh water plus salt, would

change the alkaline reaction. By adding a certain amount of vinegar or acetic acid, or spirit of vinegar, to the pickle and using more than they do—they usually show one measure, we suggested a measure and a half—and by using this there was never any blackening, provided the organisms present were destroyed. That was the remedy for the chemical causes.

The remedy for the bacteriological causes was proper processing or sterilizing. The whole method of processing, or boiling, lobsters in the Maritime Provinces is entirely wrong, and it is the only trade I know of where they attempt sterilization by boiling and not by boiling under pressure, that is having the temperature up to 245°. That is the only food I know of in which sterilization is attempted by ordinary boiling. True they boiled it for two or three hours, but you find some forms of bacteria that can stand four, five or six hours boiling at a temperature of 212°. Retorts, that is steam under pressure, should be the only method of sterilizing the cans in lobster canneries. We canned the lobsters and kept them for two years. I went down to the Maritime Provinces and took some of these cans with me and opened them and showed there were no traces of blackening. They would not believe that this was possible—to keep them for this length of time until I showed them. Of course a little red appeared but this did not amount to anything."

There seems, however, to be some difference of opinion on the necessity for retorts. We recommend that from all the scientific evidence available, the Department consider the feasibility of requiring canners to equip their factories with retorts for boiling under pressure. These are obtainable at a very small cost. We recommend, too, that the suggested regulations of Dr. A. P. Knight, known as the Knight Regulations, be applied as closely as possible. Where the full enforcement of these regulations would result in undue hardships or great loss, we recommend that the Department apply them at first in modified form to suit individual cases, and that a reasonable time be given for their full and final adoption. It must be remembered that with the intense competition of foreign products, particularly Japanese crab meat, canneries must have the efficiency and the essentials of a laboratory. The day of slovenly, poorly equipped factories has gone; the modern market will no longer tolerate products manufactured under such conditions.

5. *Markets.*—The market is gradually changing from a canned lobster market to a live lobster market, but the former is still much greater than the latter. Of the catch last year of about 31 million pounds only about 8½ million pounds were disposed of in the shell, while 23 million pounds were used for canning. As the market price for live lobsters averaged to fishermen at least three times that of lobsters for canning, the live lobster industry was nevertheless the more valuable. The canned lobster market in Europe has decreased in late years because of depleted currency, heavy customs duties, poor quality of the pack, and the competition of Japanese crab meat. But while the foreign market has declined, we were surprised to find that so little had been done by the canners to extend the home market. We believe that a greater demand for canned lobsters can be created in Canada and that the consumption can be considerably increased. To explore this market we were asked to recommend Government assistance in advertising, but we do not feel that such assistance would now be justified, particularly to an established industry of such long standing. The packers of Japanese crab meat each contribute a stated sum per case for advertising their product and for seeking new markets.

We found an unfortunate lack of co-operation among the canners and dealers, both in standardizing the quality of the product and in marketing. It is obvious that greater success could be attained if co-operative methods in selling were followed and if by co-operation the reputation of the Maritime Provinces product in quality, weight and general attractiveness to the consumer were jealously safe-guarded by the canners themselves. But up to the present there has been a somewhat surprising indifference to this necessity.

6. *Inspection.*—We found a widespread feeling in favour of inspection of canneries and of the canned product, and we recommend that a method of inspection be devised by the Department and strictly applied. Not only should can-

neries be subject to inspection by fishery officers, but the pack should be inspected at the point of export. Many representations were made to us with reference to Japanese crab meat and to the effect of its competition, and we were asked to recommend that it be subject to a high customs duty of 25 per cent. But this foreign product competes with the Maritime Provinces lobster in the European market rather than in Canada, and a duty on Japanese crab meat entering Canada would have but little effect on the lobster industry. We believe that as a delicacy in itself, the lobster has little to fear from the Japanese crab, but in the quality of the pack, in inspection and in the method of marketing, it must be improved if it is to survive the competition. If the Maritime Provinces lobsters are properly manufactured and inspected, and if only the best grades are exported, they will not be superseded by foreign crab meat. But a drastic change must be made in this phase of the industry. The methods of the Japanese packers as outlined in the following paragraphs by Mr. Langley, Canadian Trade Commissioner in Japan, may be of interest:—

Inspection and Grading. When canned crab began to be recognized as an important export product, many concerns with very little experience went into the canning business and sold crab of poor quality. As a consequence many complaints were received from foreign buyers regarding the bad quality of the canned crab exported, and after repeated requests for improvement of the canning process had been received by the authorities during 1,08 and 1909, the Ministry of Agriculture and Commerce called a meeting of the concerns interested in the putting up of canned crab, and enlisted their assistance and recommended a strict inspection of all crab intended for export, this inspection to be carried on not only by the authorities at the producing plants, but also by the organizations concerned at points of export. As a result of this co-operation, canned crab is now inspected at the packing plant and also at the port of exportation. In the Hokkaido district this inspection is carried on by the Kemuro-Chishima Marine Products Canners' Association and in Saghalien by local Government authorities. Prior to shipment, inspection is again made at Tokyo, Yokohama, Kobe, Osaka, and other export centres. In Yokohama the Association of Provision Exporters began inspection as early as 1912. In 1915 the Government again emphasized the necessity of stricter inspection and grading, and at that time allocated certain sums to ensure enforcement of the regulations. After the Federation of Crab Packers and Exporters Association of Japan (generally known as the Japanese Canned Crab Packers and Exporters Association) was formed a few years ago, authority to supervise the inspection was transferred to this federation. The inspection is in accordance with the regulations issued by the Ministry of Agriculture and Commerce.

According to the regulations: (1) 10 per cent of shipment is to be examined in reference to packing, swollen and rusted cans. (2) For quality inspection not more than five cans from one shipment; less than fifty cases of the same grade, or not more than ten cans from each shipment of fifty to one hundred cases, not more than twenty cans from each shipment of one hundred to five hundred cases. (This ratio applies to larger shipments) (3) After examination cans are to be classified in three grades "Fancy", "Choice" "Fair". (4) Crab meat classified as "Flakes", the fourth grade, will be reclassified into two classes, "A" and "B". (5) In addition to examination as to quality and condition, weight is to be inspected. (6) A stamp, denoting the grade, is placed on each case and a certificate is given for each lot of shipment.

The following figures show the results of examination at Yokohama, Osaka, Kobe, and Hakodate made during the three years ending December, 1925:—

Classification	1923	1924	1925
	Doz.	Doz.	Doz.
"Fancy"	107,466	155,210	200,908
"Choice"	18,393	26,728	57,222
"Fair"	13,810	21,361	18,230
"Flakes"—			
"A"	10,777	44,163	69,393
"B"		16,614	37,700
Under Grade	6,013	17,058	16,809
Spoilt	821	3,586	748
Total	157,291	285,620	401,100

The federation of the various crab canners and marine products associations was organized in May, 1924, affiliating, as already mentioned, for the purpose of enforcing regulations regarding inspection of canned crab, for the purpose of helping in the improvement of the canned crab; and for the development of markets by advertising, and also in order to govern the sale prices each season."

From the above paragraphs it is evident that the care in packing, the graded quality, and the rigid inspection are doubtless in large measure responsible for the popularity of this product in the markets of the world.

We recommend that a definite system of branding and labelling be established. At present large dealers frequently buy from small factories unlabelled cans, and ship them to Europe where the European dealer attaches his own label. When later the product is found to be inferior in quality there is no way of tracing the inferior pack back to its packer. We recommend that all packers be required to stamp such unlabelled cans with an identification stamp or mark and that such marks, numbers, or letters, be assigned by the District Overseers.

7. *General.* We were asked to recommend the establishment of sanctuaries for lobsters in certain waters, or in sheltered coves or bays. The feasibility of such sanctuaries should be investigated further by the Department as there seems to be a conflict of opinion on their value. It was suggested to us that the weight of meat in the cans should be reduced so as to prevent the bulging of the can ends. Such bulging, however, is apparently caused by careless packing. Several suggestions were made to us on the use of by-products. It was pointed out that thirty per cent of the lobster was unnecessarily wasted and that more attention should be given to the canning of lobster paste. On this subject, Bulletin No. X — "The Preparation of Lobster Paste" by R. F. Ross, Assistant for Technical Processes, Atlantic Experimental Station, Halifax, N.S., contains abundant information and is available to fishermen and canners.

It was suggested by the fishermen of Grand Manan that crates or boxes, in which live lobsters are held should bear the name of the owner of the lobsters so kept, and we recommend that a regulation should be enacted to meet this request. We were told in some parts that the number of traps operated by each fisherman should be limited, but we can make no recommendation on this suggestion. We recommend that a design for a standard crate for the shipping of live lobsters, and also a crate for the storing of live lobsters while awaiting shipment, be designed or obtained by the Department; that methods to ensure the reduction of mortality to a minimum during transit be studied; and that this information be made available to fishermen and shippers.

We recommend that any changes in existing regulations bearing on lobster seasons and size limits be not enforced until 1929.

Oysters

For many years the oyster fishery was one of the most valuable fishing industries in the Maritime Provinces, but its story is a distressing story of decline, and, in places, almost of extinction. The following table gives in concrete form the annual quantity taken in a period of fifty years, from 1877 to 1926.

Year	New Brunswick	Prince Edward Island	Nova Scotia	Total
	bbls.	bbls.	bbls.	bbls.
1877	7,730	20,850	980	29,568
1878	11,270	17,9[illegible]2	912	30,090
1879	9,420	18,145	1,067	28,632
1880	12,280	20,297	1,861	34,438
1881	8,413	20,815	2,270	31,498
1882	5,850	57,042	1,743	64,646
1883	10,317	38,880	1,343	50,540
1884	11,854	28,200	1,505	41,7.6
1885	27,308	28,204	1,310	56,882
1886	28,083	33,125	1,397	62,605
1887	23,106	36,448	1,746	61,300
1888	16,384	35,861	1,589	53,834
1889	17,760	41,257	2,532	61,549
1890	16,710	35,203	3,013	54,926
1891	14,934	41,050	4,318	60,282
1892	17,840	32,937	3,776	54,553
1893	16,365	29,637	3,488	49,480
1894	16,960	24,055	2,512	45,527
1895	18,070	25,467	2,540	46,073
1896	14,700	30,214	2,460	47,374
1897	19,835	20,915	3,372	43,122
1898	22,675	26,481	2,097	51,256
1899	17,250	18,236	2,[illegible]7	37,513
1900	19,240	17,[illegible]25	1,855	38,020
1901	14,460	24,972	1,690	41,122
1902	12,719	20,334	1,663	34,716
1903	12,470	18,333	1,454	32,157
1904	15,320	18,000	1,411	34,737
1905	14,303	17,030	1,466	33,422
1906	14,020	14,988	1,722	31,630
1907-08	15,435	1,072	1,537	26,444
1908-09	19,080	11,472	1,515	32,067
1909-10	19,340	13,519	1,716	34,575
1910-11	14,015	11,204	1,690	27,005
1911-12	15,430	8,835	2,090	26,361
1912-13	9,230	8,031	2,726	20,506
1913-14	10,800	12,951	3,397	27,148
1914-15	15,130	7,823	1,824	24,777
1915-16	12,408	6,306	1,502	20,206
1916-17	8,294	6,431	2,074	16,799
1917	6,926	3,038	1,879	11,843
1918	7,188	3,375	1,904	12,467
1919	7,343	3,302	1,451	12,180
1920	8,207	2,775	1,826	12,808
1921	11,094	3,702	2,356	17,242
1922	10,708	5,211	1,464	17,383
1923	14,574	4,035	2,765	21,374
1924	17,201	7,945	2,173	27,319
1925	12,038	5,278	2,644	19,960
1926	12,383	5,101	2,354	19,898

Production reached its highest point in 1882 with nearly sixty-five thousand barrels; in 1926 it was less than twenty thousand barrels.

During the first forty years of that fifty year period, the average yearly production was about forty thousand barrels. During the past ten years the average decreased to eighteen thousand barrels. The greatest decrease was in Prince Edward Island; there, the peak of production was reached in 1882 with a total quantity of fifty-seven thousand barrels; in 1926 the quantity taken amounted to slightly over five thousand barrels. The decrease in Nova Scotia and New Brunswick has not been relatively so great, but the diminution has been equally serious.

Many reasons were given to us in attempted explanation of the astonishing decline, but the evidence has not been definite and conclusive in support of any one of them to the exclusion of all others. There is a conflict of opinion on the causes for the marked diminution. Among the reasons given to us was the

method of fishing, with tongs or rakes, which bring up large quantities of sea-bottom consisting of mud and eel grass; this is dropped back into the water and, it is alleged, covers and destroys the young oysters. Other reasons advanced were the inroads of the starfish, the enemy of the oyster; the accumulation of silt; the destruction of beds by the taking of sea-bottom for farm fertilizer; the almost total lack of proper cultivation of beds; and the spreading of disease brought in by oysters from other parts for the purpose of planting or replenishing areas. In Malpeque Bay, Prince Edward Island, once the most noted oyster producing region in the Maritime Provinces, the disappearance of the oyster was coincident with the planting of some of the beds with oysters from other waters, but whether or not these imported oysters carried disease which brought about the death of the native fish has not been clearly established.

The gradual disappearance of the oyster in many parts may be due to a variety or a combination of causes. But it is plain that in the Maritime Provinces, with the exception of very few places, there has never been intelligent cultivation of oyster areas. The beds have been left almost wholly to natural courses and development, and little artificial cultivation has been attempted. Sea-bottoms where the oyster thrives, have, invariably, abundant material to which the seed can cling. On bottoms where no such materials exist in sufficient quantity but which otherwise are favourable for growth, successful producers of oysters place oyster shells, birch branches and other deposits to which the seed can attach itself. The problem is solved by thorough cultivation, which implies keeping the beds clean, placing on them the proper deposits, replenishing them with seed, and persistent care. We feel that a sufficient study has not been made of the necessary requirements for profitable production, or of the causes responsible for the present unfortunate condition of the industry. Until that is done, only general recommendations can be of value. Several years ago considerable scientific research was carried on in the Maritime Provinces in relation to the oyster. But it was apparently for purely scientific or biological purposes and had only remote bearing on the commercial aspect of the industry. At any rate, whatever knowledge it may have acquired, its results have not been evident in great practical value in the areas where it was conducted. We believe that the present is an opportune time for making new researches and experiments. We recommend, therefore, that a survey of the Maritime Provinces waters be undertaken at once to ascertain, if possible, the causes of depletion in certain areas, to devise means for re-establishing these areas and to create new areas, to determine upon the best means of cultivation and to formulate plans for the instruction of fishermen or dealers in these methods.

This work should be undertaken by the Department, through the Atlantic Experimental Station. To carry it on effectively, it will be necessary to establish experimental oyster beds or "farms" or demonstration areas. Such places would not only serve as models of care and cultivation, but they would be sources of knowledge to all interested in the industry. They would also serve as places for the production of "certified seed", which would be available to oyster farmers desiring to stock or to replenish their beds. They should be in charge of competently trained supervisors with practical skill and experience and some scientific knowledge. In the United States, for example, the Government operates what are called State beds, which are maintained for the benefit of all lease holders within reasonable radius. They afford practical demonstrations of improved methods of cultivation and they provide certified seed or spawn for those requiring it. Efforts in general should be made to determine where the oyster produces the most spat, and arrangements should be made for the transfer of young oysters to places where the best quality of oysters can be grown. For this purpose the laws governing the shipments of certified oysters from one

province to another might, under certain circumstances, be made more elastic. We recommend that special attention be given to Malpeque Bay in Prince Edward Island in order to determine whether or not the restoration of the once valuable oyster fishery there carried on is now possible and under what conditions it can be revived. And in order to assist the Atlantic Experimental Station to carry on its work with greater efficiency, convenience and despatch, we recommend that the Department provide at Malpeque Bay or Richmond Bay, or at a place to be selected by the Director of the Station, a small experimental station with the necessary equipment, for the further study of the problem by the staff of the parent Station.

Considerable difficulty has arisen because of conflict over the question of proprietorship of oyster areas by the Provincial Governments or the Dominion Government. While the Province owns the areas, the Dominion Government is considered, and held, responsible for their regulation. The result of this situation is not satisfactory, and a new relationship between the two authorities should be established. Prince Edward Island has recently relinquished its right of proprietorship and has given over its oyster areas to the full control of the Department, which will henceforth supervise and lease them. We were told on behalf of the Government of New Brunswick that if such an arrangement was considered advantageous by those interested in the industry no obstacle would be placed in the way of its fulfilment by the Provincial authorities, and that whatever action would be regarded as the better for the industry would ultimately be taken, if such private interests as now exist will be cared for. In Nova Scotia, it was stated on behalf of the Provincial Government that the areas would not be given over to the Department, but that certain places, if required, would be given to the Department for purposes of experimentation or demonstration. We feel that a uniform policy should be followed, and that the arrangement entered into between Prince Edward Island and the Department would, if adopted by all the Maritime Provinces, be in the best interests of the industry. One of the obstructions to development in the past has been the lack of definite control and responsibility.

We believe that the majority of oyster areas should be leased to private individuals or companies at a fair rental, with the understanding that a certain amount of work must be done on the beds each year under the supervision of an instructor appointed by the Department for the purpose. Provision should be made for public fishing in areas reserved for the public, under strict regulation and supervision. But the establishment of privately leased beds would solve many of the problems and would result in conserving and developing the industry to a highly remunerative level.

The areas leased and privately operated by Mr. William Mombourquette at Orangedale, N.S., and by Mr. Edward B. Barnes at Buctouche Harbour, N.B., are striking examples of the success that can be attained by the leasing of private areas, by proper cultivation, by the application of scientific methods in protecting the spawn, and by the general care of the beds. The former area consists of 102 acres practically all under cultivation but not all fished each season. Every year a certain section of the area is cleaned and carefully cultivated. Successful experiments have been made in transplanting beds with small oysters from other places. The production here was, last year, about 500 barrels, which, with further development, will greatly increase. The latter area, in Buctouche Harbour, consists of 12½ acres, all under cultivation. Here too, successful experiments have been made in transplanting beds with small oysters or spawn taken from Richibucto. The production of this area was last year 564 barrels. Both of these efficiently conducted areas produce oysters of excellent quality and of the highest reputation; they are in demand not only in the markets of Canada and the United States, but also in those of England and France.

There is no doubt of the great demand for oysters in the shell and in bulk in the Canadian and the United States markets. The demand for good oysters is in excess of the supply, and with the requisite care in production and in marketing, the industry could be made exceptionally profitable. The industry has been injured in the past, however, by the thoughtless or deliberate carelessness of shippers. The quantity of oysters forwarded in a barrel has varied, even the size of the barrel has not been uniform, and the container has been of many forms. There has been no adequate grading, and large quantities of very small oysters are taken contrary to the regulations, with disastrous results to the beds. We recommend that the size limits be strictly enforced, not only among fishermen and dealers, but in retail places where oysters are sold; it should be unlawful to sell, or to expose for sale, undersized oysters. We recommend that shippers be required to ship oysters in a standard barrel, and that the standard quantity in each barrel be fixed by regulation; the quantity suggested to us was two and a half or three bushels. We recommend too, that all barrels be branded with the name and address of the shipper, the kind or grade of oysters contained therein, and the name of the locality in which they were grown. The Malpeque oyster has temporarily disappeared and is not now a commercial product. Yet, oysters sold in the Canadian markets are still advertised as "Malpeque oysters." The use of misleading trade names should be prohibited. Oysters should be inspected at the point of shipment, and the shipment, whether of oysters in bulk or in the shell, should be accompanied by a certificate showing that they were taken from unpolluted waters. In France, for example, all shipments of oysters must have such certificates. Similar certificates are now required from oyster shipments imported into Canada, but in the interests of the industry they should also be required with shipments from the Maritime Provinces.

It was suggested to us that considerable waste arises because of the throwing away of the oyster shells. The shells, we were told, are ground elsewhere into "grit" to be mixed with poultry feed We were informed that there is a growing demand in Canada for this product, which is now imported from the United States in considerable quantities. Shells are also of value in oyster cultivation by providing places of attachment for the spawn. It was suggested that the waste of shells could be eliminated by shipping oysters in bulk rather than in the shell. But the form of shipment must conform to the requirements of the market. And in the supplying of the market, in any form, the replenished and reserved oyster areas of the Maritime Provinces, under proper cultivation and supervision, would seem to have almost unlimited capacity.

3. Scallops.

The scallop fisheries of the Atlantic Coast are already quite substantial, and are undoubtedly capable of very great development. Statistics indicate a total catch in Canada in 1926 of 23,200 barrels valued at $147,228. Of this quantity Nova Scotia produced 19,918 barrels; New Brunswick 560 barrels; Quebec, 2,722 barrels. Of the production in Nova Scotia, 5,000 barrels were taken in Lunenburg County, about 8,300 barrels in Digby County, and about 6,600 barrels in Annapolis County. These three counties, therefore, produced a large proportion of the total catch on the Atlantic coast. In New Brunswick the production in Charlotte and Restigouche Counties was, respectively, 245 and 315 barrels; while in the Province of Quebec, Bonaventure County produced 722 barrels, and Gaspe County 1,950 barrels. In 1927 the total production in Canada was 39,000 barrels, of which 37,595 barrels came from Nova Scotia. The most extensively organized scallop fishery is conducted in the Bay of Fundy, chiefly

from the port of Digby, N.S., where 35 to 40 specially equipped boats operate, each costing on the average about $2,500. This scallop fleet began operations about six years ago.

It is apparent that scallops are to be found in abundance around the coast of the Maritime Provinces, the Gaspe Peninsula, and the Magdalen Islands. In many places outside of the well known and recognized scallopbed areas, large quantities of scallops have been taken. We have been permitted to see the report of an exploratory survey of scallop beds made by the Department in 1924 along the northern shores of New Brunswick. From that report it is evident that scallops are there to be found in substantial quantities.

It was urged that the Department be requested to make exploratory surveys of scallop beds along the entire coast of the Maritime Provinces. There is strong evidence that scallops are to be found off the Prince Edward Island coast, but the extent of the beds has not yet been determined, and this is equally true of other parts of the Maritime Provinces and Quebec. We strongly recommend that these exploratory surveys be commenced as early as possible.

Scallop fishermen from the vicinity of Chester, N.S., where the scallop fisheries have been carried on for many years, requested us to recommend a closed season of three years in Lunenburg County for the purpose of conservation. Suggestions were also made to us elsewhere that the present closed scallop fishing season be changed. Because of the meagre facts submitted to us, we cannot make any recommendation. Sufficient study has not yet been made of the scallop, and we recommend that these requests be promptly taken into consideration for study and investigation by the Department through the Atlantic Experimental Station at Halifax. There are many other questions regarding the scallop fisheries which require close observation and study with a view to assisting those interested in this fishery. The possibilities of this very promising industry have not yet been sufficiently explored. The scallop population of the known fishing areas should be studied carefully and periodically, so as to discover in time when restrictive measures should be adopted for the preservation of the scallop beds. Intensive fishing of present prolific areas will undoubtedly cause a rapid decline in the catch, and therefore we think the intensity of the fishing should soon be wisely regulated. There is no limit at present in Canada to the catch of scallops per person, per day. In the United States it has been found necessary to set a definite limit; in the State of Massachusetts, the catch is limited to 10 bushels per person per day, including the shells; in Rhode Island the limit is 15 bushels per boat per day. We suggest a study of the propriety for a similar limitation of the scallop catch in the Maritime Provinces.

While we think the Canadian market for fresh scallops is capable of great expansion under proper selling organization, the canning of scallops in a form attractive to consumers would minimize the danger of over-production in the fresh form. We recommend that investigation be conducted on the most improved methods of canning scallops, on the possibility of enlarging the market, and on improved methods of marketing.

4. Salmon

In order to present in convenient form the extent and value of the salmon fishery in the Maritime Provinces and Quebec, we include as appendices V and VI statistics of the catch in quantity and value by provinces for the last ten years; the number of boats and fathoms of nets used in salmon net-drifting in the Miramichi Bay from 1907, when this method was there first used, down to the year 1927; also the yield for the years 1922 to 1927; and the number of net stands in Miramichi Bay and River, with the production for the years 1922 to 1927 inclusive.

The salmon fishery in New Brunswick presents problems which are not found elsewhere, at least not to the same extent. To make these problems intelligible it is necessary to refer briefly to the habits of the Atlantic salmon. From

the early summer months onwards the salmon ascend the rivers to spawn, the time of migration depending much on the character of the streams. The young salmon is said to remain in fresh water until it is one or two years old; in its second or third year it goes out to the sea where it reaches its growth; it then returns to its natal stream to spawn. The best authorities believe that when the salmon leaves a river it does not journey far but dwells in the sea near to its natal waters. In the small streams of New Brunswick, a large part of the salmon run is in the late summer. The Departmental view, supported by Dr. A. G. Huntsman, Director of the Atlantic Biological and Experimental Stations, is that many of the smaller streams have not now, during the early summer months, the volume of water or the low temperatures that prevailed before the clearing of the forest lands through which these streams flow, and that the fish, therefore, remain outside until the conditions for ascending the streams are more favourable.

Salmon fishing in river estuaries is chiefly carried on by means of stake-nets, and in the bays and along the coast by anchored nets. In Miramichi Bay in recent years the drift-net has been extensively used. By this method, a boat having a long net, or several nets joined together, extended like a vast curtain, drifts with the tide, the length of the nets being on the average 750 fathoms. The number of boats engaged in this particular form of fishing has grown from 4 in 1907 to 61 in 1927, while for the same period the total fathoms of net used has risen from 2,400 to about 40,000. Drift-net fishing in the Miramichi Bay is prohibited within a line drawn from the light house at Escuminac Point to the eastern side of Tabusintac Gully. In the seasons of 1925 and 1926 it was found that salmon were not as plentiful as formerly in the upper waters of the Miramichi River. With the hope of promoting a more pronounced movement of salmon to the headwaters of this river, and generally for their conservation and propagation, the regulations were amended in November 1927 so as to end net fishing for salmon in the river on August 15th instead of the 31st, and drift-net fishing in the Miramichi Bay on July 31st instead of August 31st.

Apart from the net-drifters, there are three classes interested in the salmon fisheries of the Miramichi River and Bay. These are, first, the set-net fishermen who operate from the mouth of the river to the head of tidal waters; in 1927 they numbered two hundred and eighty-six; second, the set-net fishermen who operate above tidal waters; these numbered last year, twenty; and third, the anglers, who are licensed by the Government of New Brunswick, and the riparian owners with fishing rights, leased from the Provincial Government. These three classes of fishermen contend that during the past few years the spring run of salmon has become almost negligible because of the net-drifting conducted in the Miramichi Bay and in the Gulf of St. Lawrence. They declare that there is a menacing volume of drift-net fishing in the season when salmon are running in the river between the last week of May and the tenth of June, and they ask that drift-net fishing be not permitted to such an extent as to deprive the angler and the set-net fisherman of a reasonable catch. They also stated that the regulations governing the size of the mesh are not sufficiently enforced, nor are the limits prescribed for their operation strictly adhered to. It is also complained that the official statistics do not accurately disclose the actual yearly catch of the drifters. A representative of certain riparian owners and anglers stated to us, that the total catch of salmon in the Miramichi district was officially reported as 676,800 lbs. in 1926, while for the same year and district, the Canadian National Railways alone carried 1,330,554 lbs. by freight and express, and that to this should be added local and inland sales which would bring the total catch well up to 1,500,000 lbs. It was suggested that this quantity was largely taken by the drifters, and that the quantity taken by set-net fishermen, riparian owners and anglers was negligible. It is by such statistics that many salmon fishermen supported their case for the limitation

of net-drifting which they contend, if not carefully restricted, will ultimately destroy the Miramichi salmon fisheries.

Various recommendations were made to us by the protesting classes. Among these were: (*a*) the entire prohibition of the drift-net; (*b*) the reduction of set-net licenses in order to allow a fair proportion of salmon to move up the river; (*c*) the prohibition of drift-nets for one year in order to observe the results of the cessation of that form of fishing; (*d*) the prohibition of drift-nets until the first day of July, thus permitting more salmon to move up the river in the spring; (*e*) the permitting of net-drifting only in alternate weeks; and (*f*) the reduction of the number of fishing days per week.

Those engaged in the net-drifting fishery say that it is not always profitable; that they have on the average only four nights a week of fishing because of stormy weather which frequently prevents their operations; that net-drifting has not diminished the up-river catches, but that the decline in the catch in the river proper, is caused by the fact that the set-net fishermen are allowed to have too many nets and too many fishing days per week.

From evidence in our possession we do not feel that we can rely upon the official statistics of the quantity of salmon caught by the drifters and others. At least they are so doubtful that we are not warranted in reaching conclusions based upon them. The statistics given to us based upon railway shipping records may be equally unreliable, for it must be remembered that the Canadian National Railways distinguishes its freight and express shipments of fish only as fresh and frozen fish, and makes no distinction in the various kinds of fish transported.

While the statistics of the catches of salmon given in appendix V, cannot be considered as wholly correct, there is no reason for believing that the method of collecting them has altered, and the figures should therefore show with comparative accuracy the increase and decline in the fishery. From 1922 to 1926 the number of drift-nets and set-nets in the Miramichi region was practically constant. Within this period the total catch almost doubled from 1922 to 1924, but by 1926 it dropped to somewhat less than that of 1922. The rise and the fall equally affected these two classes of fishing, which practically divided the catch between them. They must, on that basis, be considered as equally responsible for taking fish that might have gone up the river to the anglers, but there is a probability that the fish caught by the set-nets and therefore already in the lower reaches of the river, were on their way up-stream and belonged to the so-called "spring-run".

The reason for the pronounced rise and equally rapid fall during the period under consideration is far from clear. It was not however confined to the Miramichi region. It did not occur in the St. John region of southern New Brunswick, but a similar variation is shown in the catches along the northern coast of the Province, in Kent, Gloucester and Restigouche counties. The latter two counties, which are north of the Miramichi, show an equal or even more rapid rise, but a much smaller decline.

The regulations now require that drift-nets must not be used from sunset on Saturday until six o'clock on Monday morning. But as drifting operations are carried on only at night, the net-drifters are thus allowed but five nights of fishing each week, and the movements of salmon are not therefore impeded by net-drifters from Saturday morning to Monday after sunset. In addition to this regulation, stormy weather prevents the net-drifter from fishing one night a week on the average, so that his actual fishing time averages four nights a week from sunset to sunrise, or approximately thirty-five to forty hours out of one hundred and sixty-eight hours a week. It would seem to us that in the total closed period the salmon has ample freedom to enter the river, for the migration cannot always coincide precisely with the periods of net-drifting. We cannot, therefore, recom-

mend any change in the time permitted for such a mode of fishing. We believe, however, that there has not yet been a sufficiently careful and proper study made of all the facts pertaining to the question in controversy, and we recommend that further investigations be made by the Department. Meanwhile, we recommend as remedial measures, that no further extension of the present total length of nets used be permitted, and if additional licenses are issued the length of nets used by each fisherman must be shortened accordingly; that the mesh of set-nets in the river be fixed at six inches for the season of 1929 and thereafter; that no further set-net licenses be granted in the Miramichi River, and if possible that they be reduced; and that there be a more vigilant and vigorous enforcement of the regulations in the tidal and non-tidal parts of the river.

The salmon fisheries of the Restigouche River and Bay de Chaleur appear to be well maintained. The headwaters of the Restigouche are held by riparian owners, and the fishing rights are leased from the Government of New Brunswick, which last year received $75,500 therefor, this sum to be paid annually for ten years. For the ten years previous to 1927, the annual amount paid was $13,000.

It is a stipulation of the leases that the lessees shall provide guardians or officers to protect the head waters from illegal fishing, and to enforce all the regulations. The Riparian Association, comprised of such lessees, spend annually for the protection of the salmon in the Restigouche and its tributaries over $30,000. Fishermen and others interested in this district testified to the beneficial results of the efforts of the Riparian Association in carrying out their agreement to protect the salmon fishery. Such testimony was of interest because it indicated that the enforcement of the regulations designed to conserve the salmon is productive of visible results, and that there is approval, rather than criticism and suspicion, of private lessees.

Numerous strong representations were made to us by residents along the Restigouche River and on the south side of the Bay de Chaleur, respecting the practical value of the fishery regulation, section 17 (8), which requires the raising or manipulation of salmon nets so as to admit of the free passage of salmon from a certain hour on Saturday to a certain hour on Monday morning. Compliance with this regulation was said to entail unnecessary hardships and difficulties, and it was stated that it was not productive of any valuable result. Below Dalhousie, where the Bay is more than twenty-five miles wide, it is clear that the regulation is not well observed, and it is doubtless true that at times it is difficult, or almost impossible, to comply with it because of stormy weather; on the north side of Bay de Chaleur the regulation seems to be fairly well observed.

We were told, on the other hand, that in making its way up to the river, the salmon follows the shore line, and it is to ensure an unimpeded approach for a limited period that nets are required to be raised weekly. The governments of the Provinces of Quebec and New Brunswick have protested against any change in this regulation. We cannot recommend its repeal so far as it relates to the district under discussion. But we suggest that fishery officers exercise a wise discretion in enforcing the regulation when its observance is rendered difficult by weather conditions. We think, however, that the question of net raising should soon be definitely settled, so that requests for the repeal of this regulation will not continue to be made year after year. We recommend that the Department call a conference of representatives of the Governments of Quebec and New Brunswick, and of the fishermen, together with its own departmental officers, for a frank and exhaustive discussion of the subject. We have dealt with this point at some length, because of the extensive coast-line to which this regulation is applicable, the number of persons affected by it, and the extent of this fishery in the Bay de Chaleur.

A similar regulation requiring the lifting of nets on Saturday evening is in force in Nova Scotia, and we were asked on behalf of the salmon net fishermen that it be repealed. We were also asked to recommend that a regulation be enacted requiring salmon nets to be set at a greater distance from the mouth of the Margaree River than at present. The evidence on each of these points is not conclusive, and we think further investigation should be made by the officers of the Department. If they find evidence that nets are set so close to the mouth of this river as to prevent a reasonable up-stream movement of salmon, new limits should be fixed. The setting of nets in the mouth of any river, should not be permitted and the Department should courageously support its officers in the enforcement of the regulations bearing on this offence.

Our attention was called to the fact that on the River Medway, N.S., thirteen salmon nets are annually licensed, although contrary to the general practice on such river. This discrimination is permitted on the theory that as this right was at one time granted to certain riparian owners, it should not in equity be taken from them in their life time. Under an old convention the privilege lapses upon the dimise of the holder of each existing license. No licenses are granted to others on this river, whether riparian owners or not, and those to whom licenses are refused are dissatisfied because the privileges denied to them are granted to a limited few. We recommend that this practice be discontinued.

Representations were made to us requesting that in places the salmon fishing season be changed; that the period of fishing be extended or shortened; that only certain kinds of nets be used; that nets be set farther apart; that certain existing regulations be relaxed, and new restrictions enacted; that the number of guardians be increased; that salmon net licenses be limited to one per person; and that the mesh of salmon nets vary in size in different localities. It is not possible for us to give decisions on all these matters. They are questions which can be more intelligently and effectively disposed of by the Department after careful and complete scientific investigation.

5. SHAD.

Shad spawn in the spring in the fresh water of streams emptying into the sea. The young stay for a brief time in fresh water and then drop down into the estuary of the river and finally reach the sea. Here they remain the greater part of their lives, as a rule not far from the mouth of their natal river. In about four years they mature, and ascend the river in the spring to spawn. It is during this spawning period that they are exposed to the greatest danger of depletion, as they congregate in definite localities where they may be very readily taken. If fished at all, they must be taken with nets, and such fishing gear makes possible the greatest abuse in catching whole schools of the fish. During the spawning period they are in the poorest condition, but yield roe for which there is considerable demand.

The growth of the fish takes place almost wholly in the sea, and during this period they are so scattered over a considerable area of open water, that fishing for them with nets may not be profitable, but even here the fishery requires regulations to ensure protection. The sea fishery is conducted during the summer and yields fish in prime condition and most desirable for food.

The shad fisheries are decreasing notwithstanding a three years closed season in 1918, 1919, and 1920. In 1861 the catch was close to three and one-half million pounds. There have been increases and decreases since, but generally the trend has been steadily downward. Since the closed season referred to, there was an increase for three years, but the catch for 1927 was 2,685 cwt. as compared with 5,152 cwt. in 1926. The shad is caught in rivers, chiefly the St. John, Petitcodiac, Shubenacadie, Annapolis, the Miramichi and the St. Lawrence. A closed season was suggested for the Shubenacadie river and other rivers in Nova Scotia for a period of five years and also in the estuaries of such rivers.

It was also suggested that fishing be limited to the open sea. The information available to the Commission is not very conclusive, and scientific investigations have not yet been sufficiently extensive to warrant us in making any important recommendations. This subject has had the attention of Dr. A. H. Leim of the Atlantic Experimental Station but his work has not yet been completed. We recommend that he be enabled to continue it as vigorously as possible. The results of his work will doubtless provide data on which regulations for the conservation of this very valuable fishery may be based. The whole subject is one which requires careful and intelligent study, largely of a scientific nature.

Meanwhile the only recommendation which we venture to make to the Department for its serious consideration, is, that certain areas in rivers peculiarly adapted for the spawning of shad, should be set aside as sanctuaries and that net fishing in such waters be at all times prohibited. Pending the completion of Dr. Leim's investigations we cannot recommend a closed season for shad fishing in any of the rivers in the Maritime Provinces, except those which may be reserved as sanctuaries. To bring the fishery back to its former level however, we emphasize the necessity for entirely preventing fishing during the spawning season. This may involve a more continuous patrol of the most important streams during such a period.

6. SMELTS.

The Maritime Provinces possess some particularly successful but very localized fisheries. These are dependent upon the existence in restricted localities of extremely favourable conditions for the fish in question. The smelt has a wide distribution on both sides of the Atlantic, and is to be found on the North American side from New Jersey to the Strait of Belle Isle. On the Canadian coast, with the exception of the north shore of the Gulf of St. Lawrence, it is fished to a greater or less extent everywhere. Northumberland County in northern New Brunswick, with a frontage on the Gulf of St. Lawrence of only about twenty-five miles, furnishes from two to three and one-half million pounds annually, which is approximately from one-quarter to over one-third of the total catch of smelts in Canada; about one-seventieth of the coast yields, therefore, about one-third of the catch.

When it is realized that Canadian waters yield about three-quarters of the world's production of smelts, it will be seen how important are the waters of Northumberland County, in providing the foremost smelt fishery of the world. The coast of this County coincides with the sea front of the Miramichi River System, which drains the central part of the province of New Brunswick. This river is tidal for a distance of over thirty miles from the sea; it is only about three fathoms deep, and the tide has a range of only three or four feet. Not only are the main river and its two principal branches broad and shallow for many miles, but near its mouth it broadens rapidly into a shallow inner bay comprising about seventy-five square miles, which is protected from the open waters by a series of sandy islands and shoals. Beyond these is the outer bay, which continues to broaden, and to deepen only very gradually towards the sea. This provides a very extensive estuary of shallow water, which becomes comparatively warm in summer and serves as the feeding ground for an immense number of smelts. The many streams emptying into the river offers ready access for the smelt to very extensive spawning grounds in fresh water, which are required in the spring by this fish. From these grounds the fry drop down into the upper parts of the estuary, where they find great quantities of small shrimp to serve as their food until they seek the shore or bottom and move seaward. This river system, with its estuary and shallow sea front, provides ideal conditions for the breeding and growth of smelts.

During the winter, smelts congregate in the protected water of the inner bay, which at this season is covered with such a thick layer of ice that the

fishermen can readily reach all parts of it. As the fish are in schools and somewhat torpid, owing to the water being below 32° F., they are easily taken in bagnets or box-nets, which the fishermen are able to anchor by long poles or stakes readily driven into the soft bottom of the shallow water through holes cut in the ice. In this way a most valuable fishery is provided at a time when other fishing is quite impossible.

In the Province of New Brunswick, smelt fishing ranks third in value in fishery production and amounts to from sixty to seventy-five per cent of the total catch of smelts in Canada. The importance of this fishery may be gathered from the following figures:—

Year	Lbs.	Value	Year	Lbs.	Value
1900	7,863,000	$ 393,152	1922	6,268,000	$ 731,151
1905	6,688,700	334,435	1923	4,321,000	582,203
1912	8,028,800	802,880	1924	6,397,500	844,730
1917	5,570,300	834,445	1925	4,609,200	718,140
1920	4,004,100	365,279	1926	5,940,000	850,913
1921	6,201,200	580,804	1927	7,019,890	—

The Miramichi district is the most important smelt-fishing centre in the world. It produces about three million pounds annually, or one-half of the total production in New Brunswick of about six million pounds. The production in Prince Edward Island in 1926 was 1,539,000 pounds valued at $98,670; while in Nova Scotia for the same year the production was 1,581,000 pounds valued at $165,630. In Quebec the production was 284,200 pounds valued at $28,000.

Smelts are caught by gill-nets, bag-nets, and more recently by what are called box-nets, to some extent by hook and line, and by spearing. Bag-nets and box-nets are generally used in the larger centres of production, and are responsible for the greater part of the catch; they are usually operated through holes cut in the ice. Gill-nets are used chiefly in open waters before the fishing areas are frozen over, and are practical as a means of production where cold-storage plants are available for freezing. The number of gill-nets is rapidly declining, and there has developed considerable opposition to their use, particularly on the north and east coasts of New Brunswick. Gill-net fishing is permissible from October 15th to February 15th; and bag-net and box-net fishing is permissible from December 1st to February 15th. Freezing temperatures usually prevail during this latter period, and smelts then caught are generally sold and shipped to market in a frozen condition.

Our attention was called to the fact that extensions of a few days have frequently been made to the smelt-fishing seasons. In the past six years the season has been extended every year, with the exception of the year 1926. In 1922, there was an extension of thirteen days; in 1923, five days; in 1924, ten days; in 1925, thirteen days; and in 1927, eleven days. In 1928 many applications were made to the Department for an extension, but no extension was granted. We were informed that the refusal to grant any extension this year resulted in the maintenance of a higher price level to the end of the fishing season. There exists a very general opposition to such extensions. We are convinced that extensions are unnecessary, unprofitable alike to fishermen and smelt dealers, and that the practice is not supported by any substantial body of opinion in the districts affected. We recommend that no extensions of the smelt-fishing season be hereafter granted, and that the season be henceforth fixed by statute.

There has definitely developed in smelt-fishing districts, particularly in New Brunswick, a strong opposition to gill-net fishing before December 1st. It

is alleged that under the pretence of gill-net fishing, bag-nets and box-nets are frequently used before that date, contrary to regulations, and that, therefore, the season for all forms of smelt net-fishing should begin not earlier than December 1st. We believe that this change should be made in New Brunswick where the gill-net is fast going out of use by fishermen. In 1926 on the north and east coasts of New Brunswick 5,303 bag-net licenses were issued, and only 128 gill-net licenses. In the same year no licenses for either bag-net or gill-nets were issued in the Bay of Fundy section, and only one license was issued on the St. John River. We recommend that in New Brunswick the opening of the season for gill-net fishing be changed to December 1st. We recommend too that the same regulation apply to Prince Edward Island. Smelts are of little market value unless they are shipped in a frozen condition, and the sooner they are frozen the better is the quality of the fish. At present, smelts caught in the early season are kept as a rule some days before going to cold storage for later shipment. The postponing of the opening date of the season to the 1st of December when low temperatures prevail will result, we believe, in a larger return for the season's product, because of the improved quality. In Nova Scotia, particularly in the western parts, the season should be made the subject of careful investigation by officers of the Department before a decision is finally reached. In that province, the facts presented to us were too meagre to justify us in making any recommendation with respect to seasons.

In New Brunswick a system of grading of smelts has been established by custom rather than by law. The grades are 1, 2 and Extras, according to size. Representations were made informally to us that a legal standard of grading should be established. We believe that a new and definite grading fixed by regulation would be in the interest of the industry and of consumers, and we recommend that a standard should be determined by the Department, after conference with the dealers interested, and after a study of the requirements of the various export markets in this respect.

Smelts are largely sold in a frozen condition to dealers in the United States, where pending demand they are held in cold storage. The prices paid for smelts on the ice on the Miramichi River vary from 6 to 14 cents per pound, and at Richibucto from 7 to 12 cents per pound; the fish are all sold on commission; the commission paid to the commission merchant in the United States is from 7 per cent to 12½ per cent. There would not appear to be a sufficient profit to producers or dealers in New Brunswick, largely because there is no control or direction over the export of smelts to the United States markets. There is therefore an unnecessary fluctuation in prices. In view of the fact that the Maritime Provinces and Quebec constitute so largely the sources of supply of smelts on this continent, it should be possible, by co-operation among producers, or among producers and dealers, to establish more orderly methods of marketing. This would eliminate unnecessary costs, particularly in the number and amount of commissions paid, and it should yield a higher and more constant level of prices to the fishermen, as well as a safer margin of profit to the dealers.

Owing to the rapid growth and generally successful spawning and breeding of smelts in the chief rivers of northern New Brunswick, intensive fishing there is not, in our opinion, likely to result in a diminishing catch, and even if there should be a temporary decline, with some restriction of the fishery there should be a rapid recovery. In other districts, particularly in Nova Scotia and southern New Brunswick, conditions are not always so favourable, as in some cases the eggs are spawned in situations that preclude successful development. Here, where practicable, corrective measures should be applied. It is possible that restriction of smelt fishing to the larger sizes, even in successful breeding regions

like the Miramichi River, would result in an annual catch of smelts greater in quantity and higher in quality.

7. Fresh Fish

Our discussion on the marketing of fresh fish will relate largely to the cities of Montreal and Toronto; as what is true of them is characteristic of other domestic fresh fish markets. While the shore fisheries and the deep sea fisheries in the North Atlantic have been carried on for more than four hundred years, it was not until about twenty-five years ago that the marketing of fish in a fresh condition became a substantial part of the industry. Prior to that time, methods of preserving fish for food were limited to smoking, drying and salting. Freezing fish in order to preserve it, while long known, was introduced commercially in the Maritime Provinces about twenty-five years ago. Provision having been made for air freezing fish, cold storage plants at the coast, refrigerated railway cars, and cold storage plants at points of consumption, it became possible to ship frozen fresh fish further inland and thus develop new and wider markets.

Prior to 1908, the markets of Quebec and Ontario for fresh fish were almost entirely supplied by the New England States. Haddock from Portland was a staple in the fresh fish trade in Montreal, and fresh and frozen fish from Boston was also marketed there in quite substantial quantities. These points of shipment were less than half the distance from Montreal, compared with the Atlantic ports of Canada; the freight and express rates were much less; and even with a duty of one cent a pound in their favour, the shippers of the Maritime Provinces were unable to market any substantial quantity of fresh or frozen fish in Montreal, and still less in Toronto. In 1908, the Department concluded to encourage the sale of fresh fish from the Maritime Provinces in the central Canadian markets, and undertook to pay one third of the express charges on less than carload lots from Atlantic ports, to points west of the Maritime Provinces. From that time, Maritime Provinces fish obtained entry into these markets. While figures are not available to indicate the exact quantities annually shipped from the Maritime Provinces, the increase in volume may be seen in the progressive payments made by the Department as its proportion of the express rates. In 1909-10 the amount paid by the Department was $15,-102.20, while in 1917-18 it was $40,550.89. These figures indicate that shipments of fish by express increased three hundred per cent in eight years. As shipments increased in quantity, improved freight facilities were provided by the Intercolonial Railway, and refrigerated cars were gradually put into service. As a consequence of all this, by 1915 the markets of Quebec and Ontario were firmly secured for Maritime Provinces fish, and today they afford the best home market. By this time, too, shippers and distributors had already made successful advances into markets farther west, especially for finnan haddies, and smoked fillets. Retailers and wholesalers in the Montreal and Toronto Markets state that the quality of fresh fish from the Maritime Provinces has continued to improve until it is now superior to any other available sea-caught fish. If this condition continues these markets can doubtless be retained for Maritime Provinces fish.

For the purposes of this report, the term fresh fish, is to be interpreted as including not only unfrozen but also frozen fish, and fish that have been lightly smoked, such as smoked fillets, finnan haddies, and kippered herring. Cod, haddock, and flounder or sole, which frequent the sea bottom and are generally known to the trade as ground fish, form the staple varieties. For this there are several reasons; they are obtainable in quantities, the limits of which have not yet been reached; they are available at all seasons of the year; and the prices are reasonable.

As the demand for fresh fish in the markets of Quebec and Ontario is greatest on Wednesday, Thursday and Friday of each week, it is the usual practice of shippers to forward their largest shipments by freight or express so as to arrive on Tuesday, Wednesday and Thursday. In practice, therefore, fresh fish as a rule reaches Montreal or Toronto on specific days each week.

Ground fish are taken by steam trawlers, schooners of various sizes, and shore boats. On the steam trawlers they are cleaned, dressed and packed in crushed ice in "pens" or boxes. The steam trawler endeavours to make short and frequent trips, with the view of landing fish as soon as possible after they have been caught. Fish taken by boats and vessels are not usually iced on board, but as a rule are landed the day they are caught. After landing, fish intended to be marketed fresh is packed in crushed ice in boxes, each containing from one hundred and fifty to two hundred pounds of one variety only, the weight depending upon the season of the year. Because of its perishable nature, and distances from market, ground fish is not sold on view as is done in many places and the purchaser must therefore rely wholly on the shipper for the quality of the fish. Because of the limited consuming population adjacent to the points of production in the Maritime Provinces, it has not yet been found necessary to establish fish markets or exchanges at the landing ports, as is the practice in Great Britain and the United States.

Ground fish are shipped fresh in one of the following forms:—(1) in the round, that is merely cleaned and dressed, but with the head on; (2) headless, that is, not only cleaned and dressed, but with the head removed; (3) filleted, that is, the clear flesh of each side without skin, bones and fins. The cleaning and dressing of the fish involves a loss in weight of from 5 to 7 per cent, the removal of the head 25 per cent additional, and filleting a loss of from 55 to 67 per cent of the weight of the fish in the round. Smoked haddock, in the form of finnan haddie, represents a loss in weight of about 40 per cent; and cod in the form of smoked fillets a loss of 67 to 70 per cent.

Ground fish marketed in Montreal and Toronto is usually handled by a wholesaler or jobber before it reaches the retailer. In practice the shippers at the coast, every Thursday, either direct or through their agents in Montreal and Toronto, quote prices at which they will deliver ground fish the following week, either f.o.b. at the coast, or at these markets. Almost without exception the wholesalers in the markets of Quebec and Ontario expressed to us their preference for a stabilized price at the coast of from 5 to 7 cents per pound, instead of the lower and widely fluctuating price prevalent at times during the past few years. A fall in the wholesale price is not apparently shared in by the consumer, and the tendency is for the retailer to maintain the higher level of prices to provide for possible losses. It is also said that fluctuating retail prices are regarded with some suspicion by consumers. There is therefore, the anomalous situation of the retailer and wholesaler both preferring a steady and higher level of prices, yielding a greater return to both fishermen and shippers, while the shippers frequently lower the price in unprofitable competition with each other without any advantage to the consumer.

Not only are the Provinces of Quebec and Ontario the largest markets for fresh fish, but they also consume a considerable portion of the smoked fish produced in the Maritime Provinces. Complete statistics are not available to indicate the exact quantity of fish sold in these markets. We have, however, made a somewhat careful study of railway shipments both by express and by freight, for the year 1926, and we have also had estimates from the larger producers and shippers, and from the principal distributors in these Provinces. Upon this information we estimate that the markets of Quebec and Ontario at present purchase annually from the Atlantic coast the product of approximately 31,500,000 pounds

of ground fish in the round, and herring, mackerel, salmon and smelts; the Maritime Provinces themselves consume approximately 13,500,000 pounds annually; and the markets of Western Canada, the United States and elsewhere 45,000,000 pounds annually. In tabular form this estimate is as follows:—

Markets	Approximate consumption	Per cent of total
	Pounds	
Maritime Provinces	13,500 000	15
Quebec and Ontario	31,500,000	35
Western Canada United States and Elsewhere	45,000,000	50
Total	90,000,000	100

We have also made an estimate, based on information obtained from the larger shippers at the coast, and distributors in Montreal and Toronto, of the quantity of ground fish sold and the form in which it is sold, in the markets of Quebec and Ontario, for the year 1926. In the following table, the weight of the fish, whether as fresh fillets, smoked fillets, finnan haddie or headless, is given in pounds of fish in the round and also in pounds as marketed:—

TABLE I

Form in which Marketed	Quebec		Ontario	
	Weight in pounds		Weight in pounds	
	Round	Marketed	Round	Marketed
Round and headless	8,500,000	8,200,000	1,800,000	1,460,000
Fresh Fillets	3,750,000	1,300,000	3,500,000	1,200,000
Smoked Fillets	2,850,000	875,000	4,700,000	1,500,000
Finnan Haddie	550,000	325,000	1,500,000	900,000
Total	15,650,000	10,700,000	11,500,000	5,000,000

There is much discussion of the price spread between the fishermen and the consumer in Quebec and Ontario. A fact too frequently lost sight of, when comparing retail prices in these markets with the prices paid to the fisherman, is that there is a loss in weight when the heads are removed, or when the fish is filleted. As already pointed out, when the head of a cod is removed 27 per cent of the weight of the fish in the round is lost; and in haddock the loss is 25 per cent. When a fish is filleted, from 55 to 67 per cent in weight is lost, depending on how closely it is cut, and when fillets are smoked 3 to 5 per cent additional weight is lost. It is evident therefore that the prices of headless or filleted fish must reflect these losses. For example, a shipper who purchases 100 pounds of haddock in the round, at say 2½ cents per pound, pays $2.50. We will assume that the customer requires headless haddock, and thus a loss of 25 pounds in weight is at once incurred. The shipper therefore must receive $2.50 for the remaining 75 pounds, or three and one-third cents per pound. It is estimated that when fish is filleted, three pounds of round fish are required to make one pound of fillets. Therefore when a shipper buys one hundred pounds of fish for filleting, he must receive $2.50 for the resultant 33⅓ pounds of fillets or 17½ cents per pound to realize what he paid for the fish without any allowance for the labour of filleting or handling the fish.

The consumer in Toronto or Montreal pays, let us say, 22 cents per pound for filleted fish ready for cooking. The fishermen could of course convert the fish into this form, but as he usually finds this impractical he confines his work to catching, cleaning and dressing the fish. Further preparation of the fish, its handling and transportation until delivered to the consumer is left to others. Thus, between the producer and the consumer a number of middlemen intervene, such as fish buyers or shippers, railway companies or carriers, wholesalers, jobbers and retailers all of whom must be paid for their services.

It may be of interest to follow a transaction in fish purchased on the coast and sold to a consumer in Montreal. After the shipper receives the fish in the round at the landing stage, he must wash and pack them in ice in boxes, each box containing from 150 to 200 pounds of fish according to the season. If the weather is warm, more ice is required, and consequently less fish is put in the box. The shipper must maintain his plant; he must provide for the labour required in handling, washing and packing; he must purchase boxes and ice; he must transport the packed fish to the refrigerated car and there load it, and he must bear the expenses of management and marketing. For these services it is estimated that $1.70 per hundred pounds of fish as landed is not excessive. This amount includes an allowance for shrinkage in weight from the time the fish is bought by the shipper, until it reaches the refrigerated car. Freight charges must be paid, and also charges for icing the car, while en route. The car icing charges vary with the season of the year. To this must be added the unloading charges at the point of distination. The average freight rate paid from the principal shipping points in Nova Scotia to Montreal including icing charges, is $1.00 per hundred pounds. The following table gives the details of the transaction:—

TABLE II—ESTIMATE OF THE COST OF FRESH FISH, SHIPPED IN THE ROUND, AND LANDED IN MONTREAL

100 lbs. fish at 2½ cents	$2 50
Handling, boxing, icing, loading and overhead expenses	1 70
Freight to Montreal including charge for icing cars	1 00
Shipper's profit, say ½ cent per pound	50
Delivery charges at Montreal and distributor's profit	1 00
Cost of 100 pounds of fish delivered to retailer	$6 70

This fish landed in Montreal and delivered to the retailer has thus cost him $6.70 for 100 pounds of fish purchased at the coast, or nearly six and three quarter cents per pound. It is usually sold at 10 cents per pound at "cash and carry" stores, or 12½ cents per pound, if delivered.

Headless fish is also shipped to the Montreal market. As pointed out, about 25 per cent of the weight of the fish is lost when the head is removed. When, therefore, the shipper at the coast purchases 100 pounds of fish, only 75 pounds remain to sell after the head is removed. The following table illustrates a transaction in headless fish sold in the Montreal market:—

TABLE III—ESTIMATE OF THE COST OF FRESH FISH SHIPPED HEADLESS TO MONTREAL

100 lbs. fish at 2½ cents (yielding 75 lbs.)	$2 50
Handling, boxing, icing, loading and overhead expenses	1 70
Shipper's profit, say ½ cent per pound (100 lbs.)	50
Freight to Montreal including charge for icing cars (75 lbs. at 1 cent per lb.)	75
Delivery charges to retailer at Montreal and wholesaler's profit, 1 cent per lb. (75 lbs.)	75
Cost of 75 lbs. of fish delivered to retailer	$6 20

This fish delivered to the retailer in Montreal costs him $6.20 for 75 pounds, or about 8¼ cents per pound. For the purpose of these estimates we have assumed the shipper's profit to be one half a cent per pound on the fish in the round,

which is probably less than the amount to which he is reasonably entitled. Headless fish is usually sold to the consumer in Montreal at 12½ cents per pound at "cash and carry" stores and 15 cents per pound if delivered.

Different shippers gave us different estimates of costs for particular services. Apparently there is no uniformity in the cost accounting methods used by shippers, and indeed we doubt if some of them keep books of accounts in sufficient detail to enable them to determine their costs accurately. In attempting to estimate such costs we are therefore obliged to present two tables based upon information available to us from sources which differed somewhat widely in their estimates. These tables show the approximate cost of producing and delivering fresh fillets in Montreal. Table IV (A) is based on 33⅓ lbs. of fillets manufactured from 100 lbs. of fresh fish, while Table IV (B) is based on 40 lbs. The tables differ slightly on the cost of various services between the producer and the consumer. An estimate of the cost of producing and delivering fresh fillets of fish in Montreal follows:—

TABLE IV (A) ESTIMATE OF COST OF PRODUCING FRESH FILLETS AND DELIVERY IN MONTREAL

100 lbs. of fresh fish at 2½ cents (33⅓ lbs. of fillets)	$2 50
Cost of handling, filleting, boxing, icing, loading, and overhead expenses	2 00
Shipper's profit	50
Freight charges and cost of icing cars (33⅓ lbs.)	34
Montreal wholesaler's profit and delivery charges	50
Cost of 33⅓ lbs. of fillets delivered to retailer	5 84

Thirty-three and one third pounds of fillets have, on this basis, cost the retailer in Montreal approximately 17½ cents per pound, and he usually retails them at 22 to 25 cents per pound, or from $7.33 to $8.33 for this total quantity of 33⅓ pounds.

TABLE IV (B)

100 lbs. of fresh fish at 2½ cents (40 pounds of fillets)	$2 50
Cost of handling, filleting, boxing, icing, loading, and overhead expenses	2 00
Shipper's profit	50
Freight charges and cost of icing cars (40 pounds)	40
Montreal wholesaler's profit and delivery charges	50
Cost of 40 lbs. of fillets delivered to retailer	5 00

On the above basis forty pounds of fillets have cost the retailer in Montreal, approximately 14¼ cents per pound and he usually retails them at 22 to 25 cents per pound, or from $8.80 to $10 for this total quantity of 40 pounds.

The cost of services rendered in delivering the fish from the shipper at the coast to the wholesaler in Montreal or Toronto, is not excessive. The largest part of the price-spread apparently occurs between the retailer and the consumer. It is said that a charge of 3½ cents per pound represents the average cost to the retailer for delivery to a household and that his general overhead expenses average 25 per cent to 35 per cent on his annual turnover. It would be desirable, if at all possible that the contact between the shipper and the consumer should be more direct. Retail prices vary considerably according to the class of shop vending fish. High class shops demand a greater price because of more efficient service and more costly equipment for storing and handling, and consequently a more reliable product, for all of which consumers must pay.

We are of the opinion that the central Canadian markets are capable of absorbing a much larger quantity of ground fish than they take at present. With the introduction of rapid freezing, to which process we refer at length in another paragraph, we feel that consumption will be increased; many stores which cannot now market fish will be able to handle rapidly frozen fish because of the convenience of the package, and the absence of many of the disagreeable

factors which are inseparable from the retailing of fresh unfrozen fish. We also believe that with a minimum of care this form of fish will reach the table of the consumer in a condition approximating perfectly fresh fish.

From the standpoint of the shipper there is much advantage to him in shipping fish in the form of fillets. As already observed, when fish are shipped in this form the waste resulting therefrom, if in sufficient quantities, may be converted into fish meal. In filleting 100 pounds of fish there is a waste of about 67 pounds. This waste may be converted into about 12 pounds of fish meal which sells for about 4 cents a pound f.o.b. Halifax. Assuming the cost of conversion to be 1½ cents a pound there remains 2½ cents a pound of fish meal, or a total of 30 cents for the 67 pounds of fish waste which otherwise would be thrown away. In addition, a saving of 67 cents is made in railway charges when 33 pounds of fillets instead of 100 pounds of round fish are shipped to the Montreal market. From the information available, we believe that by converting fish in the round into fillets and making use of the waste for fish meal, the shipper could increase his revenue at least one cent per pound of fish landed. We realize, however, that the demands of the consumer must continue to dictate the form in which fish are marketed. Consumption always regulates sales, and sales regulate not only production but the particular form of the product.

We were urged to recommend that the Department financially assist the carrying on of an extensive and systematic campaign of advertising fish. It was stated that a similar campaign some years ago, to which the Dominion Government had made a substantial contribution, had resulted in largely increased sales. We are informed that an extensive shipper of fish in the Maritime Provinces, who engaged the services of a competent woman to give demonstrations in the proper methods of preparing and cooking fish, experienced considerable success in subsequently increasing sales generally. The broadcasting of instruction in such improved methods would have beneficial results. There is no doubt, but that judicious advertising promotes an increased demand for the product advertised. But those who profit by such increased demand should therefore reasonably be expected to pay for the advertising. In the circumstances we are unable to recommend that the Department should at present grant a sum of money for this purpose. It is not improbable that a notable change may soon be made in methods of marketing fish, because of the probable success of rapid freezing processes. In the United States this method has been adopted and has already made substantial progress. The experiments carried on at the Atlantic Experimental Station have demonstrated that rapid freezing is commercially feasible, and that the particular process there devised is more economical than those used elsewhere. At present there is a prejudice against frozen fish in the markets of Quebec and Ontario. Consumers do not yet distinguish between air frozen fish and rapidly frozen fish. To overcome this prejudice it will be necessary to convince the public of the improved quality of rapidly frozen fish. This may be done by judicious advertising, and in this the Department might properly assist. Special attention should be paid to the advertising of the food value of fish products.

Complaints were frequently made to us of the practice of handling fish from boats and on landing stages with pitch forks. This practice is harmful to the quality of the fish, and should be discontinued. Any regulations which may be later enacted for the inspection of fresh fish should prohibit the use of the fork. The designing of a substitute for the fork might well be the subject of consideration by the Department. Our attention was directed to the practice of the fishermen on the Great Lakes, who carry in their boats ice on which their fish are immediately placed. Deterioration is thereby prevented and the fish reach the market in the best possible condition. This practice

should be emulated by fishermen in the Maritime Provinces. Greater care in the handling of fresh fish will result in an improved quality and ultimately a better price.

8. Dried Fish

The dried salt fish industry has been conducted for so many years on the Atlantic coast of Canada that any general review of it is unnecessary. While this fishery usually has reference to codfish, it also embraces haddock, hake, pollock and cusk. Hereafter we shall refer to the product of this fishery as dried fish. The total production of dried fish in the Maritime Provinces and Quebec in the year 1926 was 683,000 cwt. of which 449,512 cwt. was produced in Nova Scotia; 173,259 cwt. in Quebec; 59,061 cwt. in New Brunswick; and 1,385 cwt. in Prince Edward Island.

This branch of the fishery industry may be conveniently discussed by reference to the industry as carried on in the Gaspe Peninsula in the Province of Quebec, and in the Caraquet-Shippegan district in the Province of New Brunswick, where it is chiefly carried on by boats and small vessels of various sizes, both inshore and offshore; and by reference to the deep-sea fisheries of Lunenburg County, Nova Scotia, where a bank fishing fleet of large vessels operates. We shall refer to certain characteristics and conditions of the trade as found in each of these two sections of the country, and this will be sufficiently descriptive of the whole of the dried fish industry on the Atlantic Coast.

The shore and offshore fisheries of this class have declined in recent years, but in the Gaspe Peninsula, and the Caraquet-Shippegan district, the decline is less marked. The general decline is due to various causes. Many shore fishermen have transferred their activities to the fresh fish business. Where fish may be conveniently marketed fresh, the fishermen usually receive a much better return than when it is marketed as dried fish. Fresh fish, selling at one and a half cents per pound, is the equivalent of about $5.90 per quintal of dried fish; this does not include the cost of labour involved in curing, but it includes the cost of salt, estimated at fifty cents per quintal. In 1927 the average price paid for dried cod was $5.50 per quintal. Fishermen producing pickled cured fish for the boneless fish trade, also usually receive a greater return than if their product were sold as dried fish. Again, while dried haddock brings a lower price than dried cod, in the fresh form it brings a higher price than cod, and is in more demand in the fresh fish markets. The decline is also attributable to various other causes, such as the abandonment of locations which have become unsuitable for prosecuting the industry, the adoption of more productive occupations by fishermen, the drift of young men to larger centres, which is characteristic of other occupations, and the periodic absence of fish on some shores. In certain sections of Quebec we were informed that highway construction and the production of pulpwood had withdrawn many young men from the shore fisheries, but we were also informed that during the present year it was expected there would be an increase in the number of shore fishermen.

In the Gaspe Peninsula and on the north shore of the River and Gulf of St. Lawrence, and part of the Labrador coast, cod is the principal fish taken, haddock and pollock being relatively scarce; it is almost wholly marketed as dried fish. In 1927 the total production of this fish was about 95,000 quintals. Light salted fish, produced chiefly on the south shore of the Gaspe Peninsula, is of the highest quality and usually commands a higher price than any other dried fish in the markets of the world. On the south side of Bay de Chaleur, in New Brunswick, where the quality of the fish is usually high, the quantity produced in 1927 was about 30,000 quintals. In 1927 on the Gaspe Coast the price paid to fishermen averaged about $6.50 per quintal, while on the New Brunswick side of the Bay de Chaleur the average price was $6.00 per cental (100 lbs.), with a reduction of 50 cents per quintal or cental during the summer season

when the proportion of the highest export grade was small. On the north shore of the River and Gulf of St. Lawrence the price paid to fishermen in 1927 was about $5.50 per quintal. The catch here consisted largely of but one grade, only the poorest being culled for certain export markets; in former years it was the practice there to make three grades. The lower price paid for this fish was said to be due to their inferior quality, lack of grading, and the cost of collecting and delivering them to the point of export, which in some instances involved considerable distance and time.

A custom of the trade in connection with the dried fish business peculiar to a section of the Gaspe Peninsula, north of Shiphead, may be mentioned, because it is a practice not generally prevalent on the Atlantic coast. Here the fish, which are of a superior quality, are packed by the fishermen themselves for export to Italy. They are packed in casks of four quintals each, the prices last year varying from $32.00 to $36.00 per cask f.o.b. coastal steamers for No. 1 export grade, and $2.00 to $3.00 less for No. 2 grade. It is also a practice here for the fishermen to consign their fish to the Italian market through the principal local exporting houses; an advance of $4.00 per cask less than the prevailing market price is made by the exporter; when an account of sales is finally rendered, a charge of 2 per cent as a selling commission is made, and also a charge of twenty-five cents per quintal for supervision and other items of expense incurred in handling the fish. On this section of the Gaspe coast a system of inspection of dried fish, established and administered by the Government of Quebec, is in force and has met with general approval. Another practice of the trade on the Gaspe coast between Newport and Perce, is what is known as the "draft" system,—that is, selling fish in a green state exactly as taken from the water, or, cleaned, with the heads off. It requires on the average one and one-half drafts of green fish as weighed before splitting to make one quintal of dried fish of the average dryness, a "draft" being 224 lbs.

The dried fish industry of Lunenburg County, principally cod, has been long carried on, chiefly from the port of Lunenburg, and usually in a very substantial and successful way. The average annual catch for the last thirty years was about 225,000 quintals. Appendices 7 and 8 furnished us by the Collector of Customs at Lunenburg, show the number of vessels engaged in the bank fisheries from Lunenburg County from 1896 to 1927 inclusive, together with the total annual catch for such years as reported to the Customs by the fishing vessels; and while the figures are only approximate they are no doubt fairly accurate. Appendix IX is a statement prepared for us by Robin, Jones & Whitman, Ltd. of Halifax, N.S., compiled from their own and other records, giving an estimate of the landings of each trip of the Lunenburg fishing fleet, the average price at which the fish of each trip was sold, and the total catch and average price for the combined fishing trips, for the years 1911 to 1927 inclusive. Appendix X is a statement prepared for us by Zwicker & Co. Ltd. of Lunenburg, N.S., giving an estimate of the average prices paid for dried fish in Lunenburg, N.S., from 1896 to 1927 inclusive. Appendix XI, prepared by the same company, gives an estimate of the average amount received by sharesmen fishing in Lunenburg vessels each year for the same period. It must be realized, however, that the average earnings of the sharesmen in the whole fleet of vessels does not give an accurate indication of the amount received by individual sharesmen. Appendix XII, also furnished by Zwicker & Co. Ltd. gives an estimate of the cost of outfitting Lunenburg vessels for the same period; this includes the cost of salt, provisions, lines and ship chandlery, but does not include anchors, dories or bait. A study of these appendices will yield a great deal of information regarding the Lunenburg dried fish industry.

The Lunenburg bank fisheries, conducted as a joint enterprise between the vessel owner and the crew of fishermen upon a sharing basis, have been so successfully carried on over such a long period of time, and under such experienced

direction, that the Commission feels there is little to suggest for their further welfare and development. Probably over 50 per cent of the dried fish produced in Nova Scotia is attributed to the Lunenburg bank fishing fleet. When we visited Lunenburg, a great portion of the catch for 1927 had not yet been sold; fear was expressed to us by many vessel owners, masters and fishermen, that the catch might have to be sold at unremunerative prices and that the outlook for the future of the industry was extremely unfavourable. We were told that the catch of 1926 was marketed below the cost of production. Shortly after our hearings there, however, the unsold catch was disposed of at an average price of $6.50 per quintal, with the effect, we understand, of restoring faith in the continued success of the industry. During the past few years the market prices for dried fish have been low, largely because of an increased European production. The production of dried fish in Iceland, for example, has grown from about 250,000 quintals ten years ago, to 1,000,000 quintals in 1927. The dried fish trade of the United Kingdom has also increased; here the production consists largely of fish caught by steam trawlers, portions of which, unsuitable for the fresh fish markets, are salted and dried. Large shipments of this fish are forwarded on consignment to the Brazilian markets, where they sell at low prices, displacing certain Canadian fish.

The cost of production of dried fish has been influenced by the increase in the cost of construction of fishing vessels, in some cases nearly 100 per cent higher than in 1914. The cost of outfitting the Lunenburg fishing vessels has also risen very considerably in the last fifteen years, as is evident from the appendix already mentioned. The capital investment in the average fishing vessel equipped for operations is substantially large; this investment is burdened by the fact that many of the vessels are non-productive during several months each year. We infer that the tendency will be towards longer employment of the vessel in the fisheries each year. The more general adoption of motor power will give in practice a longer fishing season, and thus greater earnings, and will make possible more frequent returns to port, with the more frequent landing of fish.

Several suggestions were made to us at Lunenburg by members of a committee representative of vessel owners, masters and fishermen. One was that the Government should assist by way of a loan in the erection there of a central drying plant; this we understood to mean buildings with extensive grounds, equipment adequate for washing, moving, drying and storing fish in order to encourage the buying and selling of fish in a green salted state, and curing them to meet the requirements of different markets. Under the present practice, fish as taken from the vessels are widely distributed to persons known as "fish driers" to be dried; they are then sold to the trade. No definite plan for the erection and operation of such a plant was placed before us. We believe, however, that with such centralization at Lunenburg of the curing of the largest percentage of the total catch, there would seem to be an excellent opportunity for obtaining a uniformly high-grade fish, and for reducing the labour and expense involved, thus giving an increased return to all concerned. If the present practice continues, of drying fish for the producer, and not directly by or for the exporter, we are convinced from the representations made to us at Lunenburg, it should be concentrated at a few locations where there is an abundance of ground, water, buildings and general facilities for drying and storing large quantities of fish. At present the drying is carried on in widely separated and ill-suited places. Drying should not be done in places by the side of motor-travelled roads—a practice which we heard much criticized at Lunenburg, and one which had to be abandoned in the Caraquet-Shippegan district in New Brunswick. We are unable to recommend financial assistance to the proposed central fish drying plant; the project is not sufficiently developed or matured; but if it later assumes definite and practical form, and assistance is found to be

necessary to its realization and success, we commend it to the favourable consideration of the Department.

While the quality of Lunenburg dried fish meets the requirements of certain markets, yet a higher standard of quality generally would make export possible to a greater number of markets and thus avoid at times excess exports to the customary markets. There seemed to be a very definite opinion among many of the masters of vessels and among fishermen, who appeared before us at Lunenburg, that the practice of selling the catch, or a portion of it, in a green state to exporters should be adopted, with the view that such a method would assist in the production of a higher grade of dried fish, and make possible a greater diversity of markets. It would also permit prompt settlement with fishing sharesmen, whose returns are sometimes long delayed because of postponed sales; and it would encourage fishermen in their calling. Such a departure from the present method has great merits. However, this lies wholly in the hands of those engaged in the industry, and it cannot be hastened or retarded by any suggestions from others.

A bounty on the production of dried fish was suggested to us at Lunenburg as a means of assisting the industry. This was supported by the contention that France was thus assisting its dried fish trade. We are informed that the bounty formerly granted by France to this class of fish terminated in 1926. Upon the facts put before us, we do not see any sound grounds for recommending the adoption of this suggestion.

In view of the present keen competition in the world's markets, among producers of dried cod, and the strong position occupied by exporting countries like Norway and Iceland, largely because of the quality of their products, it was very generally stated to us at Lunenburg that some system of grading and inspection was necessary. On December 17th, 1927, there was gazetted a copy of an Order of the Governor General in Council establishing standards of size and quality of dry and green salted fish; this was done after consultation between those engaged in the trade and officials of the Department. Any buyer or seller of fish bought or sold upon the basis of these grades or standards may request the services of an Inspector to determine whether or not the fish are in accordance with the standards; and on completion of the inspection, the inspecting officer shall give both the seller and the buyer a written report of the result of his inspection. The standards established may not be acceptable in detail to everybody, but experience will soon demonstrate whether or not amendments are necessary. Meanwhile, the adoption of standards is in accord with the representations made to us at Lunenburg and elsewhere, and will doubtless prove a great factor in improving the condition of the industry. This should meet the complaint of the fish buyer that he is compelled to pay the same price for all grades of fish, and also the complaint of the fish producer, that he must accept the same price for a superior grade of fish as that paid to others for an inferior quality. The standards established now apply only when fish are sold and bought on the basis of such standards. We recommend that the grading and inspection of dried fish for export be made obligatory for the year 1929. A buyer wishing to purchase fish on the basis of these standards will be at a disadvantage, if others are willing to buy ungraded fish. It is, however, within the power of fish buyers to make the standards fully effective at once by applying them to all purchases. Inspectors are, in our opinion, only necessary at the large producing and distributing centres.

Much better feeling we think would prevail between producers and exporters in this class of fish trade, if its economic position were thoroughly understood. The creation of an intelligence branch such as we recommend in another paragraph would perform a valuable service. The regular publication and circulation by it of information respecting the volume of production and stocks on hand in all competitive producing countries, the market conditions as to supply and prices in consuming countries, and any other data would be invalu-

able. If information of this character were known to all sections of the industry, it would do much to allay suspicion and mistrust between fish exporters and the owners, masters and sharesmen of fishing vessels, and would probably aid in a more orderly marketing of the annual production.

We also recommend that to the principal producing and consuming countries of dried fish, there occasionally be sent groups of men, representatives of all classes engaged in the industry, to study and observe the customs, conditions and requirements of the trade in such countries. If such were encouraged and assisted by the Department, we think good results of a general and particular character would follow. Those selected should be required upon their return home to devote some time to reporting and discussing, with the classes whom they represented, the results of their observations and experience. We further recommend that investigations be carried on with a view of ascertaining if further markets for dried fish are available, and, acting upon a suggestion made to us, we would specifically advise the immediate appointment of a special investigator to explore the possibilities of a market in Africa for this product.

We give below some statistical information regarding the principal export markets of Quebec and the Maritime Provinces for dried fish, and the export markets of a few other countries producing the same kind of fish, which may be of some interest. Canadian exports of this fish are practically all produced on the Atlantic coast of Canada. We regret that portions of these statistics are not of recent years, and in the case of Iceland we have not been able to obtain recent statistical information which would be of value.

The principal export markets for Atlantic coast dried fish are the British West India Islands, United States, Cuba, Porto Rico, Brazil, Italy and Portugal. To these markets from Canada alone there was exported during the fiscal year ending March 31st, 1927, dried fish of the following quantities and values:—

	Weight in cwts.	Value
Bermuda	3,055	$ 21,083
British Guiana	4,757	33,279
British Honduras	350	2,514
Barbadoes	5,060	38,043
Trinidad	34,606	229,618
Jamaica	52,156	354,937
Brazil	27,436	344,651
Cuba	106,791	785,667
Haiti	3,419	24,141
Italy	95,937	835,038
Portugal	13,140	90,702
United States	140,706	1,043,147
Porto Rico	116,092	784,904

Dried codfish is exported from Canada to many other countries besides those mentioned; it is also marketed abroad, green salted, or pickled. These figures, it should be understood, do not include fish such as haddock, pollock, hake or cusk.

In 1925 Norway exported to the countries below mentioned dried cod of the following quantities and values:

	Quantity	Value
	lbs.	$
Portugal	30,013,479	4,184,200
Spain	21,004,445	2,949,725
Cuba	8,753,681	1,377,000
Brazil	7,067,333	1,201,350
Argentine	7,544,763	1,203,825

In addition, Norway exported to the same countries salt haddock, and many other varieties of salted fish in very substantial quantities.

The chief imports of codfish into Cuba for 1924 were—from Canada, 11,099,328 lbs. valued at $955,108; from Norway 10,230,993 lbs. valued at $927,525; from the United Kingdom, 1,044,876 lbs. valued at $114,602 and from the United States, 3,685,937 lbs. valued at $358,786. We were unable to obtain recent statistics showing the exports of dried codfish to Porto Rico by countries. The trade figures of that island are included in the general trade statistics of the United States. A report of the Governor of Porto Rico for the year ending June 30th, 1926, states that the total imports of dried codfish amounted to 17,826,016 pounds valued at $1,455,676. The quantities and values of imports of dried codfish into Brazil in 1925, were chiefly as follows: from the United States 654,319 lbs. valued at $89,802; from Great Britain 18,398,813 lbs. valued at $2,356,858; from Norway 8,219,325 lbs. valued at $1,111,985; from Canada 5,067,561 lbs. valued at $609,821; and from Newfoundland 17,322,639 lbs. valued at $2,163,727.

The importations of dried cod by the United States for the calendar year 1926 amounted to 36,808,428 lbs. of the value of $2,793,629. The principal countries from which these importations came were: Norway, 1,687,296 lbs.; United Kingdom, 776,907 lbs.; Canada, 24,880,106 lbs.; and Newfoundland, 8,504,970 lbs. The exports of the same class of fish from the United States were to very many countries, the total amount exported being 3,954,342 lbs. valued at $423,937. Some of the principal countries to which this fish was exported are Costa Rica, 142,474 lbs.; Panama, 710,474 lbs.; Mexico, 758,360 lbs.; Cuba, 1,119,482 lbs.; Haiti, 173,859 lbs.; Venezuela, 143,875 lbs. We have mentioned only the countries to which the exports were in quantities of one hundred thousand pounds and over.

The exports of dried cod from Newfoundland and the principal countries to which it was exported may be of interest. For the year ending June 30th, 1926, they are as follows:

	Quintals	Value
United Kingdom	27,380	$ 212,790
Canada	20,471	136,549
British West Indies	107,052	991,230
Malta	2,195	23,598
Brazil	242,596	2,309,537
Foreign West Indies	82,279	801,070
Greece	56,545	350,435
Italy	134,425	1,220,991
Madeira	10,855	113,333
Portugal	295,711	2,482,060
Spain	414,046	3,394,207
United States	2,276	23,276

9. HERRING.

The herring is traditionally regarded as the example of the exhaustless resources of the sea as fishing by man makes so little impression on its abundance. It is found along the entire Atlantic coast of Canada and is taken in quantities of from one hundred million to over two hundred million pounds annually. It tends to be a seasonal fish in northern waters, where it is found near the coast only during the summer, while in more southerly waters, particularly at the mouth of the Bay of Fundy, it may be taken during a much longer season and even throughout the entire year.

It is remarkable that in the waters of Charlotte County, New Brunswick, at the mouth of the Bay of Fundy, there is taken annually from thirty to over forty per cent of the total catch on the coast. The quantity for this county is from fifty to eighty million pounds, and yet the frontage of this county on the bay is only thirty-five miles, compared with over two thousand miles of the entire coast line. The reason for the extraordinary abundance of herring within such narrow limits are several. There is an exceptional spawning ground at the southern end of Grand Manan Island where in August, over an extensive area of shoals and ledges, the water is of suitable temperature from the surface to a depth of thirty fathoms. The narrow entrances to Passamaquoddy Bay surge with strong tidal currents which bring up deep water to refertilize the surface layers and to furnish a steady supply of food for the herring at all stages. This mixing process has another effect. It equalizes the temperature from top to bottom, throughout the year, so that the herring can readily be taken in weirs close to the land during a very long season, and in the outer waters even throughout the year.

While the adult herrings are taken to some extent in the spawning condition in these waters, the fishery is almost wholly for the small immature fish, the majority of which are canned as sardines. This taking of enormous quantities of young fish, from one to two years old, has continued uninterruptedly for decades without diminishing the supply. It is safe to state that nowhere in the world is there a comparable herring fishery. The fish of medium size are very fat, and many are lightly smoked as kippers, or, in very large quantities, hard smoked and boxed as boneless herring.

Elsewhere on the coast the immature herring are not very often to be taken close to the shore, so that the fishery is largely for mature spawning herring, which are of an inferior quality but which may readily be taken when they congregate near the shore in certain localities for the purpose of depositing their eggs. If the fishery were prosecuted in deep water with proper appliances to locate the schools of fat herring, a higher grade would be taken and the fishing season could be very considerably extended. This would involve considerable expenditure in equipment, and would take time to develop. It should be considered as the logical direction for expansion, as soon as a rise in prices results from broader markets and a better quality of product.

The exports of pickled herring have been declining for some years and exporters are now heavily over-stocked owing to a lack of market demand. This has affected the condition of fishermen in certain sections of the Atlantic coast. The consumption of pickled herring in the usual markets appears to be gradually diminishing, notwithstanding the abnormally low market prices prevailing in recent years. The lack of markets is reflected in Canadian exports of pickled herring, which for the fiscal year 1927 were 52,265 cwts valued at $182,963 as compared with 88,234 cwt. exported in 1923 valued at $257,551. For the five-year period 1910 to 1914 the average annual Canadian export of pickled herring was 89,000 barrels; for the five-year period 1919 to 1923 it was 60,000 barrels; while for the three-year period 1924 to 1926 it was 30,000 barrels. The decline in the pickled herring trade may also be seen from the imports of that fish by Canada from Newfoundland, most of which, we assume, was for re-export. For the eight months ending November 30, 1927, these imports were nearly 3,000,000 pounds valued at $50,277, whereas for the fiscal year ending March 31, 1923, they were almost 8,000,000 pounds valued at $153,228. Canadian exports of pickled herring to the British West Indies and the United States show a steady decline.

It is generally conceded that the quality of herring pickled in the Maritime Provinces is not of a high standard. Any pronounced improvement in

this respect would doubtless mean an increase in sales. While the quality has somewhat improved since the Fish Inspection Act of 1914 came into force, the improvement is visible only in certain localities, and everywhere there is much room for progress. We were told that retailers find it difficult, and in many places impossible, to obtain sufficient pickled herring of a suitable quality for local markets. More rigid inspection of herring at the principal points of production or export, together with aggressive instructional methods, would do much to remedy the condition. Large quantities of smoked herring are annually exported from the Maritime Provinces, and by the production of a higher quality of this article, and a strict observance of the regulations regarding the quantity in the packages, the volume could be greatly increased. Ten thousand cases of canned herring were exported to a foreign market by Connors Brothers Limited of Black's Harbour, N.B., in 1926, but owing to adverse economic conditions prevailing in the importing country there were practically no sales there last year. Boneless canned herring is also produced in the Maritime Provinces, and the quantity is possible of increase. It would seem therefore that there is an opportunity for exporting canned herring in substantial quantities to markets that have not, as yet, been sufficiently explored. Brine frozen fresh herring will possibly find further domestic and foreign markets.

We recommend that provision be made for instruction in the curing of herring. Greater efforts should be made to enforce the regulations governing grading, packaging and inspection. Special study should be made with a view to ascertaining the requirements of various markets for herring in forms other than pickled.

10. *Mackerel.*—The mackerel is essentially a summer fish; only occasionally is it taken during the cold season of the year, and then only in outer waters. This fish is not so generally distributed as the herring, but is largely restricted to the warmer waters, such as the southern part of the Gulf of St. Lawrence, and the outer coast of Nova Scotia. During the month of May it makes its appearance in the latter waters and later in the Gulf of St. Lawrence.

Although the abundance of mackerel has varied greatly in the past, there is no definite indication of a decrease in the stock. The catch in any locality is subject to wide variations, so that fishermen are not infrequently quite unprepared to care for large numbers suddenly available. Gill-nets, either drifting or anchored, and trap-nets are generally used. It was urged at several places that the use of the purse-seine within territorial waters should be permitted. We see no objection to this, and we recommend that the regulation prohibiting its use within territorial waters be repealed, and that it be hereafter permitted subject to whatever regulations may appear necessary.

In the spring, when the mackerel are spawning they are of poor quality; nevertheless, while the catch has declined during the last thirty years, there is still a considerable quantity of pickled spring mackerel marketed at prices which frequently yield satisfactory returns to the fishermen. They are sold also in a fresh and frozen condition. The demand for the spring catch of mackerel in the British West Indies seriously declined last year as compared with former years, leaving exporters with heavy stocks on hand. The decline of exports to Jamaica was particularly noticeable. The catch of fat mackerel has also diminished in the past few years. The United States markets ordinarily take the available supplies, both fresh and pickled, at remunerative prices, but the unusual increase in the catch of mackerel in that country in the last two years has resulted in a decreased importation of fresh mackerel from the Maritime Provinces, and low prices have consequently prevailed. The decline in the value of mackerel exported is indicated by the statistics of exports for the fiscal years 1923 and 1927. In the former year the value was $529,819, while in the latter it was $367,246.

There is great need for improvement in the quality of pickled mackerel. In several places this was openly acknowledged, and practical instruction by competent persons was requested. In the Caraquet-Shippegan, N.B., district, we were told that the art of pickling or salting mackerel had been practically lost in recent years. Instruction is needed in that section, and in fact was urgently requested. At the chief points of production, or export, the inspection of salt mackerel should be more regularly and rigorously carried out.

For both pickled mackerel and herring, we recommend that the Atlantic Experimental Station at Halifax not only continue but expand the policy of sending competent instructors to inform fishermen in the leading fishing districts as to the best methods of curing, packing and packaging these varieties of fish. For a short time, at least, more instructors will be necessary in this connection. The market for fresh mackerel could probably be greatly extended by the use of rapid freezing. The canning of mackerel has been attempted, but not on any considerable scale, nor has it been accompanied by sufficient advertising to ensure success. We believe that there are possibilities in this direction, and that the rapid freezing of fresh mackerel may provide suitable stock for canning, the uncertainty of the catch otherwise tending to make operation of canning factories at present unprofitable; investigations and experiments should have the immediate attention of those best qualified in the service of the Department. There is probably an inevitable decline in the consumption of pickled mackerel; the maintenance of the present market demand, and any hope of increase in it, will probably depend on a change in packaging, so that the fish may be sold in small units by retail shops. We are told that even the large increase of small apartment houses has caused a noticeable decline in demand for fish of this kind because of the lack of storage for the usual large packages. The exporter himself must introduce new methods of packaging. In this, however, he requires the assistance of competent investigators.

11. The Canning Industry.—In making brief reference to the canning of fish, we do not include the canning of lobsters. The canning of fish, other than lobsters, has not yet been extensively engaged in throughout the Maritime Provinces generally. The greatest output is that of sardines, in which the largest industry is carried on by Connors Brothers, Limited, at Black's Harbour, Charlotte County, New Brunswick. In 1926 the catch bought by this company was 171,637 barrels, valued at $256,728 to the fishermen; the number of cases of sardines canned was 217,592, valued at $980,472; and 122,670 barrels valued at $192,016 were sold in fresh and smoked state. In 1927 this company packed 280,000 cases of sardines, and this year they expect to can 350,000 cases. The canned product is shipped to over seventy different countries. The success of this industry has been rapid and has resulted largely from the wealth of the natural breeding grounds to which the cannery is adjacent, to initiative and care in management, to the quality of the product, and to aggressive sales organization. The greatest competitor of this Canadian sardine is the Norwegian product.

Last year licenses were issued to 48 canning establishments in the Maritime Provinces, exclusive of lobster canneries, 9 in Prince Edward Island, 14 in New Brunswick and 25 in Nova Scotia. One license was issued in the Magdalen Islands for canning codfish. Of this number, 28 licenses were issued to canners of clams. In New Brunswick the total production of clams in 1926 amounted to 27,278 barrels, valued at $111,362, and in Prince Edward Island, 5,161 barrels valued at $61,898. No statistics for Nova Scotia were available. Notwithstanding this large production, we believe that this industry has not been developed to its full capacity. The demand for clams of good quality in the Canadian and United States markets is said to exceed the supply. There is little doubt but that the demand could be increased, and there would seem to

be a good opportunity now for extending this industry, particularly in Prince Edward Island and parts of Nova Scotia, where the clam areas are prolific and where production has not hitherto been excessive.

Scallops and oysters are canned in small quantities, but as production increases the canning of these fish will doubtless increase. In Prince Edward Island a factory is operated by Mr. C. F. Miller at Victoria for the canning of crab meat. This is a pioneer industry, but with adequate attention to quality it gives promise of success. Experiments in this industry might well be made in other parts of the Maritime Provinces.

Other fish canned in the Maritime Provinces, in varied quantities, are salmon, herring, mackerel, haddock, cod, finnan haddies, halibut and tuna. The canning of tuna has only recently been attempted, but it is said that the future of this infant industry has considerable promise of success, as the canned product is of a superior quality. The commercial possibilities of canned fish, of all varieties, other than shellfish and sardines, have not yet been sufficiently explored, nor have the markets been sufficiently investigated or tested. There would seem to be a promising field for expansion in the canning of fish of all kinds. We recommend that the Department through the Atlantic Experimental Station, carry on extensive investigations on the most improved methods of canning the various fish products included in this young and growing industry, and that every possible assistance in the way of instruction and advice be given to those engaged in its development. Such assistance is not, we believe, beyond the scope of the National Research Council, and should be amply and generously provided. The Department of Trade and Commerce should continue to give assistance through its Trade Commissioners, or otherwise, in exploring more fully the possibilities of foreign markets for canned fish products, and in making the information gathered available to packers. Mr. B. M. Hill of the Connors Brothers Ltd., publicly expressed to us his appreciation of the aid rendered to that company by Canadian Trade Commissioners in various parts of the world. We recommend that inspection of all canned fish products should be required, to ensure a standard quality.

12. Salt

Many complaints were made to us, particularly in Gloucester County, New Brunswick, and in Cape Breton Island, that some of the fisheries salt in the market in 1927, was unsuitable and that its use resulted in considerable damage. Many who used the same salt, however, did not have the same unfortunate experience. As the various grades of salt in some instances differ rather markedly,—with individual advantages for certain types of cure,—and therefore require somewhat different handling, we suggest to the Department the importance and advisability of affording to users of salt full information on the characteristics of the various commercial salts, and their relation to the curing of different kinds of fish. This would require periodical testing, as the characteristics of salt vary from year to year. It is not desirable in our opinion that a definite specification should now be set for fisheries salt, for the requirements frequently differ. If, however, complaints continue to arise regarding the quality of fisheries salt on the market, the Atlantic Experimental Station should be asked to establish standards or grades, after consultation with those engaged in the trade.

Salt is imported in bulk, but frequently the trade distributes it to their customers in bags with nothing usually thereon, to indicate the name of the particular salt. We recommend that dealers be required to stencil on bags the name of the salt contained therein, or to write the same on a tag attached to the bag, and also to specify, where possible, the special grade of the salt.

IV

AIDS TO FISHERMEN

1. Navigation

(a) *Harbours, Lights, Buoys, etc.*—Numerous representations were made to the Commission respecting the construction or reconstruction of breakwaters and wharves; the dredging and improvement of harbours; and the need of aids to navigation, such as lights and buoys. Requests for such public works were based usually upon the argument that they were important and necessary in the development and maintenance of the local fishing industry, but in some instances they were supported upon the broader grounds of navigation and commerce generally. The representations made to us were very general in character, and seldom contained precise information as to cost, utility or practicability. In some cases where surveys had already been made the reports of engineers of the Department of Public Works were available.

It was not possible for us to conduct any enquiry as to the necessity, cost or utility of such suggested public undertakings, and we can only transmit with this report a list of the improvements so requested. We recommend that as soon as possible a complete and adequate survey, respecting each of them, be made by the proper Department of Government and that the requisite action be then taken. In several places where no harbours or adequate shelters exist and where boats must be hauled far up on the beach for safety, the need for capstans or hauling winches was emphasized. We submit herewith a list of such places, and we recommend that careful investigation of the difficulties and requirements be made by the Department.

(b) *Meteorological Service.*—There seems to be a general desire on the part of fishermen for the regular and widest possible distribution of weather reports and storm warnings in fishing communities and on the fishing grounds. We shall transmit to the Department a list of the places where the installation of storm signals and the furnishing of weather reports were requested. The Department at the present time seems to be making every reasonable effort to meet the demand for these services, and it may be of interest to state just what is now being done, and what is in contemplation.

Meteorological observations for the purpose of making weather forecasts are taken at Vancouver, Prince Rupert, Dawson, the mouth of the Mackenzie River, Newfoundland, Hudson Straits, and Belle Isle, every day, at 8 a.m. and 8 p.m. Eastern Standard Time. The results of these observations give barometer and thermometer readings, the direction and force of the wind, local conditions, etc., and this information is all telegraphed to the Central Meteorological office at Toronto. This, together with reports from Europe and the United States, are plotted on a Weather Map from which the Weather Forecaster makes his predictions of what the weather will be in designated areas, with considerable certainty for the next twenty-four hours, and with somewhat less certainty for the next following twenty-four hours. We are informed that of the daily weather forecasts made during the year 1926-27, 87.7 per cent were verified, and of storm warnings 93 per cent.

The bi-daily forecasts are issued at 10 a.m. and 10 p.m. each day and are telegraphed to all parts of Canada and Newfoundland. They are published in the daily newspapers, displayed in railway and shipping offices, telephone offices, municipal buildings, hotels, etc., and they are forwarded to Coastal Radio Stations for the information of ships in Canadian waters, or ships bound to Canadian ports. In addition, the 10 p.m. forecast is given to Radio Broadcasting Stations, which put it on the air.

Evidence of an approaching storm is indicated to the Forecaster in his study of the weather map; and, if, in his judgment, a storm is imminent over land or sea, he watches the progress of the disturbance with particular care, and, as far in advance as possible, he sends out storm warnings to the areas that are likely to be affected. These storm warnings are sent by telegraph to the storm signal display stations, and to coastal radio stations. At the former a visual signal is displayed, and at the latter, the warning is broadcast in code to ships at sea. There are about 110 storm signal display stations in Quebec and the Maritime Provinces.

The value of the weather forecast depends almost entirely upon the rapidity with which it reaches the person who requires the information, and in the case of storm warnings speed is of great importance. In the cities and larger towns, the telegraph and telephone companies give a twenty-four hour service every day of the week. This unfortunately is not the case in many of the localities at which there are storm signal display stations. In many localities there is only a part time telegraph service; in many places the operator goes off duty usually at 6 p.m. and does not resume again until 8 a.m. the following day. There is no service on Sundays, except where the Department, as it does in a large number of cases, pays a telegraph operator to come on duty to ascertain if any storm warning message is awaiting. We suggest that the making of similar arrangements with telephone offices be considered by the Department.

Radio broadcasting appears to offer the largest measure of relief from the disabilities of the present system of communication by land lines, both telegraph and telephone, and the Department is at present using broadcasting stations for the dissemination of the weather forecasts and storm warnings. In the Maritime Provinces weather forecasts are put on the air by some of the following stations:—CNRA Moncton; CHNS Halifax, CFBO St. John. The Department recently made extensive experiments throughout the Maritime Provinces with a view to ascertaining exactly over what areas forecasts can be received from these stations. These experiments were successfully carried on from broadcasting stations at St. John, N.B., and Halifax, N.S., and proved of great value to radio equipped fishing vessels on the fishing banks.

In addition to these stations the Department has inaugurated a new radio broadcasting service from Louisburg, N.S. This station has power of the order of 4,000 watts. It is designed to give, twice daily, to fishing vessels on the fishing grounds information regarding weather forecasts, storm warnings, time signals, bait movements, and general news of the fisheries, and it is expected that this information will be picked up all over the Maritime Provinces, and by fishing vessels at sea furnished with radio receiving sets. If this service will not satisfactorily cover the Maritime Provinces, the radio broadcasting service on the Halifax and Lurcher Lightships will be utilized.

2. Fishing Operations

(1) *Bait Freezers.*—We were informed in many places that fishing operations were frequently interrupted by the lack of bait, and many requests were made for assistance in establishing bait freezers. From 1900 onwards, for several years, the Federal Government assisted fishermen's bait associations, of not less than twenty members, to establish small bait freezers by paying half the cost, not exceeding $2,000, and a bonus on bait frozen of $5 per ton, up to twenty tons, during the first five years. The story of these bait freezers is a story of failure. Unfortunately when the bonus period ended, the majority of these freezers were no longer operated by the fishermen's bait association; indeed in some cases they were closed even before the termination of the bonus

period. In some instances, however, they were operated successfully for a brief time because of the initiative and the interest of a single member of the fishermen's bait association, rather than by the association itself. It is possible that when this policy of assistance was in force, frozen bait was not so highly regarded as it is now; that co-operative efforts by fishermen were not so hopeful of success as they are at the present time; and that, therefore, the failure of the policy may be attributed to the early time of the experiment rather than to its lack of merit or feasibility.

Later, under a modification of the above policy, the Department granted financial assistance in the establishment and maintenance of small freezers to those who were prepared to go into the fresh fish business, and who would undertake to keep in stock a supply of bait available to fishermen in the desired quantities and at current market prices. Under this policy, freezers were established at Port Hood, Hillsboro, Whitehaven, Grand Etang and Goldboro in Nova Scotia, and at St. Andrew's, New Brunswick. But only one of the freezers thus assisted was successful, and even it did not always carry a stock of bait available to fishermen.

In many seasons bait is readily and cheaply available to fishermen, and in such years freezers are of no great use. The demand for frozen bait is, as a rule, inconstant. Largely for these reasons the financially assisted bait freezers were, in the past, unsuccessful. Even if some form of assistance for the construction of bait freezers is justifiable, there are inherent difficulties in ensuring their continued maintenance. Several private cold storage plants now carry bait available for purchase by fishermen, and these, in a large measure, meet the requirements in certain localities. In recent years, too, fresh fish buyers and distributors conducting business on a substantial scale, have carried stocks of bait available to fishermen from whom they buy fish, and also to others. It is extremely difficult to state with confidence where assisted bait freezers should be established, even if such a policy were adopted. Small bait freezers can be easily designed and cheaply constructed, to make bait readily available to associations or groups of fishermen, or even to individual fishermen. Further, brine freezing or rapid freezing of bait may soon change the entire situation in such a way as to make it imprudent to inaugurate any policy designed merely to meet the actual conditions of today. In some places in the Maritime Provinces, bait freezers have been privately constructed at a very moderate cost. The subject deserves careful consideration by the Department and a thorough survey of the requirements of fishing localities, before any definite policy is formulated.

There are doubtless many sections of the Atlantic Coast where assistance in the establishment of bait freezers would be of great value, or where it may be necessary in the successful prosecution of the fisheries. Where such necessity exists to the satisfaction of the Department, we recommend that assistance in some form be given to the extent required; but assistance in the establishment of bait freezers to individual fishermen cannot be recommended. If assistance is given, it should be where and when fishermen have been organized for co-operative effort, and where they have, in some way, established evidence of the necessity for a bait freezer and of its continued operation. Meanwhile, we recommend that a simple and inexpensive bait freezer be designed by the Department, with simple specifications for construction, and details of necessary material and probable cost, and that the instructions and information so provided be made available for individual fishermen, or groups of fishermen, who may, at a minimum outlay, desire to build and operate a small freezer.

It is not improbable that rapidly frozen bait may be found preferable to fresh bait, as the former will keep fresh longer under the same conditions. As the Atlantic Experimental Station has already developed a rapid-freezing apparatus operated with ice and salt, we recommend that the Station be asked

to design a suitable brine freezer for bait, and that any fisherman, group of fishermen, or dealer, who may desire to make use of such a freezer be given the requisite advice and instruction to insure its successful construction and operation.

(2) *Cold Storage Plants.*—Many representations were made to us at many places as to the desirability and utility of cold storage plants and bait freezers. In respect of cold storage plants as a factor in the marketing of fresh fish, especially cod and haddock, it is evident that much misapprehension exists. The misapprehension is in the belief that fresh fish are marketed in a frozen condition; this is only partly correct; it is usually true of some fish such as herring, halibut and salmon. Cod and haddock in the round, or filleted, are sold fresh and not frozen, in the markets of Quebec and Ontario. There may be exceptions to this, but we are stating the general practice which to-day is different from that of former years. Fresh fish in the form, say, of fillets, including smoked fillets, are only frozen when about ten days are required for transportation. The freezing is done by the dealer or distributor. Unless the producer is a distributor, engaged in the marketing of his fish, he has no need for a cold storage plant. Therefore, in our opinion, for the marketing of fresh cod and haddock under present circumstances, cold storage plants are necessary chiefly for the fish dealer or distributor alone. As a matter of general policy the construction of cold storage plants for fish alone, other than for probable co-operative organizations, should not be lightly entered upon or encouraged.

There seems to be a sufficient number of cold storage plants in the areas where fresh fish is produced in large quantities for markets outside of the Maritime Provinces, and even these are not usually prosperous. Experience would indicate that cold storage plants should be controlled or directed by persons or corporations engaged in some commercial activity, which would provide patronage for the plant. Cold storage plants erected merely for the purpose of warehousing the products of voluntary patrons, unassociated with any commercial or trading business, and without sufficient capital for properly conducting them, meet in most cases with failure, unless they are located in large centres where the warehousing patronage is substantial and regular in volume. However, we do not mean to discourage the payment of subsidies, under the Cold Storage Act, where it may be shown that co-operative marketing by fishermen is possible or practical and likely to be successful, but before granting any such application we think it desirable that full investigation should precede action.

In another paragraph we discuss the matter of brine freezing of fresh fish. There is no doubt, we think, but that the general adoption of this process may substantially change the fresh fish industry, particularly the form of marketing. It is difficult to foresee the exact consequences. To change from the marketing of fresh fish to brine frozen fish presents difficulties, as it will require considerable expenditure of time and money to induce consumers to adopt the latter. It will, therefore, in our opinion, come into use gradually.

For the present, it would seem that the Cold Storage Act fairly well meets public requirements; at least its limitations or deficiencies have not been pointed out. Should the brine freezing process later come into substantial use, cold storage plants at certain centres as a marketing adjunct may become a necessity, for the reason that fish subjected to this process must be kept in a temperature below the freezing point. It would be unwise and futile for us to anticipate the incidents of this changed situation, and we can only recommend a thorough study by the Department.

At North Sydney, it was urged upon us by the Directors of the Cape Breton Cold Storage Company that this company be granted a yearly subsidy for a period of five years, pending a development of its business. This Company owns

a large and excellent plant which received the usual subvention under the Cold Storage Act. A very considerable amount of local capital was also invested. The plant is used only for storage for customers, and the company itself is not engaged in any commercial business which contributes patronage. Its operation has not been so far successful financially, and upon its present capital structure it is not likely to be successful. We do not see that any practical purpose would be served by recommending an additional subsidy for a period of years to meet operating deficits. At the end of a period of five years the position of the Company, in the absence of further capital, would probably not be improved. Reorganization of the Company is necessary. But during the period of reorganization there is the possible danger of the plant closing, with resultant embarrassment to those there engaged in the fishing business. In that contingency we recommend financial assistance by the Department, for the meeting of any operating deficit, but upon the condition that reorganization be promptly proceeded with.

(3) *By-Products.*

(a) *Fish Meal.*- A recent development of great value to the fishing industry is the expanding market for fish meal produced from fish waste. The value of white fish meal made from cod, haddock and other ground fish, as a food for cattle, poultry, etc., is now conclusively established and for meal of this grade there is a strong market demand. It is not necessary to discuss here in detail the chemical composition of different fish meals other than to say that white fish meal is rich in protein, and commands the highest market price. While herring meal brings a lower price as a food material, it is also in demand as a fertilizer. At present a fish meal plant is operated at Halifax, N.S. by the National Fish Company; its raw material is the waste of manufactured ground fish and inedible fish taken by steam trawlers. Dogfish are also used to a limited extent. This plant produces at the rate of 2,800 tons annually. Fish meal is also manufactured at Black's Harbour, N.B., by the Connors Brothers Company, Limited; the raw material here is the herring waste incident to the extensive sardine canning business carried on by this company. The operation of this plant is seasonal, but last year it produced about 700 tons of herring fish meal. We were informed that both of these meal plants are profitably operated.

It is, of course, a condition necessary to the successful operation of a fish meal plant, that it be located at a point where there is a plentiful supply of waste fish material, or where the waste may, at a reasonable cost, be assembled in required quantities. We found much interest manifested by many fishermen in the utilization of fish waste for commercial purposes, such as fish meal. There are localities in the Maritime Provinces and Quebec where the manufacture of fish meal might, we think, be carried on with a reasonable hope of financial success; but many places urging the establishment of fish meal plants have not sufficient raw material to warrant the necessary expenditure. Accordingly, careful investigation should precede any final decision to engage in the manufacture of fish meal. The whole subject requires special study by the Department, so that the fullest information on the minimum supply of raw material required to warrant the installation of a plant, the cost of plant and operation, the markets and other requirements, may be available to those who desire it.

A license to construct and operate a herring fish meal plant was granted in 1927 to J. W. Wentworth of Fairhaven, N.B. The issue of the license was opposed on the ground that it might deplete the herring resources of that district. It was proposed to use small herring directly as a raw material in this plant, whereas in the case of the established herring fish meal plant at Black's Harbour, N.B., the meal is made from herring waste incident to the canning of small herring or sardines. We see no objection to the granting of licenses to additional

herring fish meal plants at this place. There seem to be no grounds whatsoever for fearing that the use of herring for the manufacture of fish meal would deplete the herring resources of these waters.

The value of the manufacture of fish waste in other places is indicated by the following statement prepared at our request by Mr. L. D. Wilgress, Canadian Trade Commissioner at Hamburg, Germany.

It is principally in the by-products of the fishing industry that Germany offers the best openings for the disposal of surplus supplies available for export from Canada. This is particularly the case with fish meal, of which large quantities are imported into Germany for the purposes of pig-feeding.

Last year the total imports into Germany of fish meal for fodder and fertilizer purposes amounted to 113,502 metric tons (1 metric ton=2,204 lbs.) of a total value of $8,921,483. This compares with an import of 81,963 metric tons in 1926. These totals would include whale and other fish meal imported for fertilizer purposes, but the great bulk would be comprised of fish meal for animal feeding.

Norway and Great Britain are the principal sources of supply for the fish meal imported into Germany. Last year the former country supplied 54,776 metric tons and the latter country 30,540 metric tons, while 8,790 metric tons are shown as having come from the United States and 4,260 metric tons from Canada.

An excellent beginning has been made in the introduction of Canadian fish meal to the German market. One company in Nova Scotia is regularly shipping whitefish meal to Hamburg and the quality of their product has produced a favourable impression among the trade. During the past season around 9,000 short tons of pilchard meal were shipped to Germany from British Columbia, this quantity being considerably more than half of the total output of fish meal in that province last year. Full particulars regarding the German market for Canadian fish meal were given in a report published in the *Commercial Intelligence Journal* (Canada) of December 4, 1926.

(*b*) *Oil.*—The matter of the production and marketing of cod-liver oil appears to be under reasonably proper direction. In 1926 there were 180 places in the Maritime Provinces and Quebec producing cod-liver oil, with a production for that year of 296,182 gallons. In 1925, 26,836 gallons of medicinal cod-liver oil were produced, and in 1926, 94,383 gallons, ninety per cent of which was produced in Nova Scotia. The greater part of the medicinal oil finds a market in the United States where it is further refined. We recommend that the Department place itself in a position to afford the fullest information regarding the most advanced and scientific practices in connection with the production, refining and marketing of cod-liver oils, medicinal oils and other fish oils. There are many places on the Atlantic coast where this by-product might be saved in greater quantities if fishermen were better instructed as to the proper methods for so doing. There is room for further research work in connection with the manufacture of higher grades of medicinal oil, and the uses of cod-liver oil for other than medicinal purposes. There is much interesting information on this subject which is not readily accessible to fishermen, and printed bulletins containing this information should be published and circulated.

The chief countries manufacturing cod-liver oil are Great Britain, Newfoundland and Norway. It is claimed in respect of Newfoundland cod-liver oil, that as cod is there caught largely inshore, not when spawning but when in pursuit of food, the vitamin content of the oil is greater than in the oil of cod caught off-shore. In 1926 Newfoundland produced 5,145 tuns of cod-liver oil, the tun measuring 252 wine gallons, and 169,645 gallons of refined cod-liver oil. An interesting statement on fish oils and cod-liver oils is to be found in the Report of the Imperial Economic Committee.

(*c*) *Pearl Essence.*—A somewhat valuable by-product of the herring fishery in Grand Manan, N.B., is Pearl Essence, manufactured from crystals of guanin found on the scales of the herring. This is the only place in Canada where this product is manufactured. The herring are scaled as they are being placed in the tanks; the scales, separated from the water, are worth from four to ten cents per pound. The scales pass through a more or less secret process

which separates the crystals from them, and these, held in suspension in ammonia, are later converted into pearl essence from which imitation pearls are manufactured. At the present time several United States firms purchase the scales fresh and send them to Eastport, Maine, for manufacture. From this source the fishermen have a revenue, described to the Commission as "several times five thousand dollars."

The history of the use of this by-product is of interest. Up to about five years ago herring were packed without any thought of their scales; at least there was no thought of removing them in bulk. A method was then devised at Eastport, Maine, for taking the scales from the fish and collecting them, and a plant was established for extracting the pearl essence from them. Since then, this industry has grown steadily. The first year, the plant is said to have used 200,000 pounds of scales; this quantity soon increased to 800,000 pounds. In 1926 it dropped back to 500,000 because of a smaller run of sardines. The company has also maintained two fishing boats which visit the principal weirs along the coast, collecting scales in an attempt to secure sufficient to supply the demand. A considerable quantity of scales are secured even from the boats that handle the fish, for in turning over the catches a certain proportion of the scales fall off.

We recommend that the Department investigate the possibilities of the use of this by-product of a by-product. After investigation, if deemed advisable and profitable, information should be made available to fishermen on methods of gathering and disposing of the scales.

(*d*) *Dogfish.* We had many representations made to us respecting the damage caused by dogfish which frequent the fishing grounds of the Maritime Provinces during all the summer and early fall months. Quite frequently, they are present in such numbers as to make it impossible to fish cod and haddock with success or profit. Some attempts have been made to use them in fish meal plants, but the oil must be removed before satisfactory fish meal can be produced; this is an expensive process and the supply of dogfish does not continue long enough to make any such enterprise profitable from this source alone. Many fishermen suggested that a bounty should be paid on dogfish, but the expenditure necessary for such a policy can hardly be estimated, and the results would be doubtful. We cannot therefore recommend this. Scientists have already given some study to the utilization of dogfish for food. Canning has been tried but with little success. Investigation on how best to utilize this fish should be continued by some scientific body.

(3) GENERAL.

(*a*) *Bounties.*—Many recommendations were made to us by boat fishermen that the bounty paid to them should be on a parity with that paid to vessel fishermen. The payment of the fishing bounty began in 1882, its object being as stated in the Act of Parliament which authorized it: "To aid the development of the Sea Fisheries of Canada and the Encouragement of the Building and Fitting out of Improved Fishing Vessels and the improvement of the condition of the Fishermen." Under that statute, bounties amounting to about $160,000 are annually paid to vessels of ten tons and up to eighty tons at the rate of one dollar per ton; to boats under ten tons, one dollar; while the amount paid to fishermen on vessels and boats, fishing at least three months each year and taking at least 2,500 pounds of fish, is determined annually, the amount each fisherman receives depending upon the number of claimants who are vessel fishermen, or boat fishermen, respectively. In 1926-27 the total bounties paid to vessel and boat owners and fishermen was $159,768.10, of which $83,006.90 was paid to Nova Scotia fishermen, $16,721 to those of New Brunswick, $13,221.55

to those of Prince Edward Island and $46,818.65 to those of Quebec. The Annual Report of the Fisheries Branch of the Department gives by Provinces, the number of vessels, boats and men receiving bounty each year. The amount payable for the year 1927-28 was $6.60 to each boat fisherman, and $8 to each vessel fisherman. The total amount paid in 1927-28 was $99,330, distributed to 15,050 boat fishermen, and 3,702 vessel fishermen.

The suggestion was frequently made to us that the bounty should be paid only to residents of Canada, and not to non-residents who fish in Canadian fishing vessels during the fishing season and then return to their homes. This suggestion does not appear to us to be sound. Last year about five hundred fishermen from Newfoundland fished in Lunenburg fishing vessels, and to pay them the bounty seems quite within the spirit and purpose of the Act. They were necessary to the successful operation of the fishing fleet and to "aid the development of the Sea Fisheries of Canada." We are of the opinion, however, that the objection to the payment of bounty to fishermen engaged in the shore fisheries, but who are not citizens of Canada, is valid, and we recommend that the bounty to boat fishermen be henceforth paid only to fishermen who are citizens of Canada.

The amount of bounty paid annually to boat fishermen and to vessel fishermen is determined each year by the Governor in Council. The present basis and the method of distribution are on the whole satisfactory; the flexibility of the powers of the Governor in Council has distinct advantages and we are unable to recommend any change in the present system.

(*b*) *Sick and Distressed Mariners' Fund.*—It was pointed out to us that benefit would accrue to fishermen who fish in boats of less than ten tons, if they were permitted to avail themselves of the provisions of the "Sick and Distressed Mariners' Fund." The Canada Shipping Act makes compulsory the registration of all vessels exceeding ten tons, but the Act does not prevent the registration of a boat or vessel of less than 1 tons. The Sick and Distressed Mariners' Act, section 384, provides that the person in command of any registered fishing vessel may pay a duty of two cents for each registered ton of such fishing vessel, on its first voyage in any year, and thereafter before each subsequent voyage; but such payments are not to exceed three in any one year, and in no case shall the payments be less than $2 in any year. If these payments are made, the crew of the registered vessel or boat automatically come under the provisions of the Act and are entitled to the medical attention therein provided for. It is apparent that these facts are not generally known.

(*c*) *Workmen's Compensation Act.*—Representations were made to us in respect of a situation which had arisen concerning the bank fishing vessels of Nova Scotia, and the matter of compensation to the fishermen of these vessels for injuries suffered in the course of their employment. The Lunenburg bank fishing vessels are principally concerned in this question.

In 1915 the Legislature of the Province of Nova Scotia enacted a Workmen's Compensation Act, the important features of which are similar to all legislation of this kind. In 1919 the provisions of the Act were extended to include deep sea fishermen, and after January 1st, 1920, the owners of fishing vessels became liable to pay compensation for injuries received by fishermen in the course of their employment. The owners of vessels insured against this liability by paying to the Workmen's Compensation Board of Nova Scotia, an amount made up by an assessment upon the total wage roll of a vessel, at first fixed at the rate of three per cent. As the fishermen of the Lunenburg fishing vessels are sharesmen in the catch, the Act arbitrarily declared that a fisherman

should be deemed to earn $65 per month. The rate of three per cent was found to be too low, and it was subsequently raised to five per cent for the summer season, and ten per cent for the winter months. Owing to the loss in 1926 of two vessels with their crews numbering fifty men, the Board, at the beginning of 1927, gave notice that the rate for that year would be raised to ten per cent for the summer months, and to a still higher rate for the winter months; but the Legislature of Nova Scotia by statute fixed the rate for 1927 at five per cent, and appointed a Commissioner to determine whether or not the Board would be justified in increasing that rate in subsequent years. Under the five per cent rate, 87 vessels of the Lunenburg fleet, in 1926, paid $33,787.75 to the Board, or an average assessment of $388.36 on each vessel. The proposal to double the rate would mean, in the average assessment on each vessel, a corresponding increase which was considered to be beyond the capacity of the industry to bear. In 1927 the situation was further aggravated by the unfortunate loss of four vessels with their entire crews. In 1928 the Board notified the owners of Lunenburg vessels that the rate for that year would be approximately twenty per cent.

That was the situation when the Commission met at Lunenburg. Subsequently, arrangements were made with Lloyds to carry the risk at a premium of 7.15 per cent of the payroll, which, we are advised, would amount on the average to about $550 per vessel. We are told that the limitation of liability in the loss of any one vessel and crew is $50,000. The Legislature of Nova Scotia has, we are informed, enacted legislation fixing the rate to be paid by the vessel owner at five per cent of the pay roll, and authorizing the payment from the Provincial Treasury of the difference between the amount of this assessment and the premium charged by Lloyds. This difference, it is estimated, will this year be about $12,000.

We were asked, on behalf of the Government of Nova Scotia, to recommend that after this year the Federal Government pay annually the difference between the five per cent assessment and the premium charged from time to time for carrying the risk. An important principle is involved in the suggestion that the Federal Government assume a liability imposed by a provincial Workmen's Compensation Act for the protection of the workmen in one particular branch of an industry, and in one Province. Workmen's Compensation Acts are wholly of provincial concern, and we know of no instance where the Federal Government has submitted to assessments under such Acts, unless it was for the protection of its own employees resident in any Province. The granting by the Federal Government of the request made here for the benefit of one section of an industry, and in one Province only, would inevitably lead to similar requests from similar or other industries in other Provinces.

The record of loss in 1926 and 1927 was not typical of the long history of the Lunenburg bank fishing fleet. The liability assumed by the Government of Nova Scotia for the present year cannot be said to be burdensome, particularly as it relates to an industry so important to the Province, and as it meets in part obligations imposed upon employers by provincial legislation. In the circumstances we cannot therefore recommend that the Federal Government should assume the suggested liability. If future events should justify the presentation of a similar request because of unusual circumstances, the matter may be considered in the light of the particular circumstances, and in consultation with other Provinces.

V

TRANSPORTATION

1. Subsidized Steamship Service

The necessity for new or improved subsidized steamship services was placed before us in many localities, particularly in eastern Nova Scotia. Certain sections of the eastern coast of Cape Breton Island, where the fisheries constitute the principal occupation of the residents, have no railway communication; they are completely isolated in the winter season, and even in summer the steamship service is far from adequate. Such sections should be provided with satisfactory transportation facilities during the season of open navigation. The residents of the northern part of Victoria County, N.S., asked that a steamship service be established between there and Halifax, where their fish products are chiefly marketed and where their supplies for fishing are largely purchased. We recommend that such service be assisted by subsidy to such an extent as will ensure its operation at regular periods during the season of open navigation. A like service was once carried on, but in recent years it has been limited to certain spring and fall trips. Sections of the coast of Richmond and Cape Breton Counties, between Louisburg and St. Peter's, where fishing is extensively carried on, are without railway facilities. There, the sailings of the present subsidized steamship services are said to be insufficient to meet the reasonable demands of these communities. Any improvement in the present service might require changes in other connecting services and if the residents of this section can reasonably show that the present steamship service should be extended, and such extension requires additional subsidy, we recommend that assistance be granted.

The important fishing village of L'Ardoise in Richmond County is without direct rail connection nearer than St. Peter's and also without steamship connection with either St. Peter's or Halifax. Fish products destined to Halifax, and supplies coming from Halifax, are transported overland to and from St. Peter's at an additional charge of from fifteen to twenty cents per cwt., a serious handicap to the fishermen of that place. It was suggested to us that this difficulty might be overcome by making a motor transport service between St. Peter's and L'Ardoise an inclusive part of the present subsidized steamship service between St. Peter's and Halifax. Another suggestion was the subsidizing of a direct auxiliary schooner service to and from Halifax during the navigation season. We recommend that assistance be given to whichever form of these suggested services may be found after consideration to suit the needs of this community.

We were told that a steamship service along the coast of Guysboro County, N.S., to Boston or Portland, U.S.A., should be established and assisted. We were not, however, given sufficient facts to justify the forming of any definite conclusion on the soundness of such a project. If application is made for assistance for such a service, and if it is shown that there is sufficient traffic to warrant its establishment, the requisite support should be given.

It was recommended to us that the steamship service, between Mulgrave and Chéticamp, N.S., now subsidized by the Federal Government, should be kept in operation until the end of the navigation season, and not merely for a stated number of trips during the season as provided by the existing contract. We were told that upon the ending of this service last year there was an immediate decline in the prices paid to fishermen for their products. We think that this request is fair and reasonable and that it should be acceded to. It should at least be thoroughly investigated.

The Grand Manan steamship service was brought to our attention at the hearing held at St. Stephen, N.B. The need for an adequate steamship service from this island to the mainland is of course obvious. There is a population of

3,000 people on Grand Manan, Campobello, and Deer Islands. The fishery here carried on is extensive and is practically the sole industry. Various suggestions were made to us as to how the service might or should be improved. We recommend that an enquiry into this matter be directed by the Department of Trade and Commerce and that a revised and improved service be established to meet adequately the reasonable demands of the residents of these Islands.

2. Railways

In several places our attention was called to the alleged need of railway extension to serve certain fishing communities situated far from convenient lines of communication. Many of these localities are served by steamship connection during the season of open navigation but during the winter months some of them are almost completely isolated. Railway service in such places would aid greatly in the development of the fishing industry, by providing facilities for marketing and for the more rapid obtaining of supplies. It would also be of general advantage to the communities interested.

We were unable to make any investigation into the feasibility of the proposals made to us, and we can only here bring them to the notice of the proper Department of Government. Among the projects suggested to us were the extension of the Inverness Railway to Cheticamp; the continuation of the railway line from St. Peter's to Louisbourg; the continuation of a branch line from Lunenburg to Riverport on the LaHave River; the construction of the Guysborough railway from Sunnybrae, Pictou County, to Guysborough or Canso; and the extension of the railway line from Tracadie to Newcastle.

3. Freight and Express Rates

We were informed by many shippers who appeared before us that the railway freight and express rates on fish are considered, on the whole, fair and reasonable, and that the railway facilities for handling the product are in general satisfactory. In some places it was stated that the rate on live lobsters is considered too high. But this complaint fails to take into consideration the fact that live lobsters are very difficult to transport and must be handled with greater care and attention than that required by ordinary fish. The mortality in transit, even with the most careful handling, amounts to as as high as 15 per cent, hence the actual costs of transportation are greater. Questions of freight and express rates may always be brought to the attention of the railway authorities for consideration and adjustment.

VI

TARIFF

1. Newfoundland Duties

Section 8 of the Canadian Customs Tariff, 1907 provides, that fish and other products of the fisheries of Newfoundland may be imported into Canada free of customs duty until otherwise determined by the Governor in Council. In several places, more especially in Nova Scotia, we were asked to recommend that this provision of the Canadian Customs Tariff be amended, so as to make subject to customs duties, Newfoundland fish entering Canada. This request had reference particularly to the importation of dried fish and fresh fish.

For the eight months ending November 30, 1927, 5,692,699 pounds of dried cod, haddock, etc. were imported into Canada from Newfoundland, valued at $273,440; 2,582,848 pounds of cod, haddock and pollock, wet, salted or pickled, valued at $85,722; 2,981,550 pounds of pickled herring valued at $50,277. Of all fish, salted, dried or smoked, a total of 12,444,634 pounds was imported during

this period from Newfoundland, valued at $476,118. For the same period there was imported of preserved or canned fish, 13,922,380 pounds valued at $627,207, and of fish, fresh and frozen, 1,449,571 pounds valued at $145,460. Fresh herring and fresh salmon constituted about seventy-five per cent of the total importation of fish, fresh and frozen.

At Halifax and Lunenburg, N.S., in 1927, a considerable quantity of dried codfish was imported from Newfoundland by fish merchants who graded, dried and packed it for export. At the time of our hearing at Lunenburg a large proportion of the fish landed by the Lunenburg fishing fleet had not been marketed; consequently the importation of Newfoundland fish was the cause of much adverse comment, and was largely the reason for the demand for a duty upon such fish. The merchant importer contended that as Newfoundland fish entering Canada was not for consumption in Canadian markets, but was exported to foreign markets which are common to Nova Scotia and Newfoundland, little if any benefit would be gained by preventing such importations. It was pointed out in addition that in such prevention there would be a pecuniary loss to those engaged in the export trade. It was also contended by the Nova Scotia exporters of dried fish that they could have purchased the same fish in Newfoundland, and prepared them there for the same market to which they were exported from Lunenburg; and that even if a duty were now imposed it would not necessarily prevent importation for re-export, because the general provisions of the tariff entitle an importer to a drawback equal to 99 per cent of the duty paid, when the article is exported.

The Customs Tariff of Newfoundland provides that in addition to the normal Customs duties on certain goods, such as flour, hay, vegetables, etc. there may be levied additional tariff duties when such goods are imported from countries in which duties are levied upon fish or fish products from Newfoundland. It is therefore evident that the imposition of customs duties on Newfoundland fish, might increase the Newfoundland tariff upon certain Canadian products, which now enter Newfoundland in substantial quantities. It would doubtless raise important questions affecting many interests, and before departing from a tariff policy of long standing, careful consideration and enquiry would be necessary.

2. General

Representations were made to us on the necessity for certain tariff readjustments to suit more fairly the needs of the fishing industry. The tariff on implements of production was alleged to be too high,—particularly on implements not manufactured in Canada. The tariff on sardines is specific determined many years ago, when the price of sardines was very low compared with present prices. It was suggested that it should be changed to an ad valorem duty. In sealing sardine tins, it is necessary to use a rubber gasket which is not manufactured in Canada, and which, because of patent rights, cannot be manufactured by the packer who manufactures cans. We were asked to recommend that the tariff on these gaskets be removed. The price of gasoline, used by fishermen is excessively high in certain parts. It is alleged that if the duty and the sales tax were taken off, lower prices would result. The duty and the tax fall very heavily on the fishing population.

We do not feel ourselves competent to enter into a discussion of these questions. We recommend that all these requests, affecting the welfare of the fishermen or dealers engaged in developing the fisheries, be referred to the Tariff Board for enquiry. Repeated suggestions were made to us with reference to the desirability of continuing efforts to secure free entry for Maritime Provinces fish into United States markets. This question is, however, beyond the terms of our reference. It is a matter of long standing negotiations which, we are informed, have not been abandoned.